THESES

Architecture

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The Right to Ecological Space in the City

TUM.University Press

Lehrstuhl für Landschaftsarchitektur und industrielle Landschaft
Fakultät für Architektur
Technische Universität München

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Operationalising Green Infrastructure as Strategic Urban Planning Concept for a Just Access

With Lessons Learnt from Vienna and Munich

Vollständiger Abdruck der von der Fakultät für Architektur der Technischen Universität München zur Erlangung des akademischen Grades eines Doktor-Ingenieurs (Dr.-Ing.) genehmigten Dissertation.

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Prüfer der Dissertation:

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2. Prof. Dr. Andreas Voigt
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Die Dissertation wurde am 27.02.2018 bei der Technischen Universität München eingereicht und durch die Fakultät für Architektur am 20.06.2018 angenommen.

The German National Library has registered this publication in the
German National Bibliography. Detailed bibliographic data are available
on the Internet at https://portal.dnb.de.

Imprint

Layout design and typesetting: Sonia Gantioler
Layout guidelines for cover design: Designbuero Josef Grillmeier, Munich
Cover design: Caroline Ennemoser
Cover illustration: Caroline Ennemoser

TUM.University Press
Technical University of Munich
Arcisstrasse 21
80333 Munich

ISBN printed edition: 978-3-95884-025-6
DOI: 10.14459/2018md1428708

www.tum.de

EN_SUMMARY

In the last decade the quality of life of the European population has been increasingly influenced by a series of economic and financial crises. These crises have put into focus potential inequalities in the distribution of income and wealth, and their impact on the economy and society at large. This also includes potential spatial disparities they might cause, for example with regard to urban housing and the distribution and access to high-quality green areas and nature. Ongoing urban transformation processes, from the development of new residential areas to increased densities of city structures, have the potential to increase inequalities regarding the access to multiple functionings of ecological space.

In order to address biodiversity conservation beyond a network of areas of high value, the enhancement of Green Infrastructure (GI) has been introduced as an objective in various EU policies. The term refers to the conservation and restoration of a network of natural and semi-natural areas, environmental features and open spaces responsible for providing a range of benefits for human well-being. More importantly, GI has been brought forward as a concept that can ensure a wider availability and access to green spaces and their benefits especially at urban level, via the connectivity of its elements both public and private, the multitude of functions it provides and its ecosystem approach involving a range of stakeholders. However, what the concept actually means in practice and whether it delivers what it promises is the subject of ongoing discussions and negotiations between researchers and practitioners.

The thesis argues that the operationalisation of GI as a strategic planning concept can be crucial for a just access. The accordingly developed model first of all links its implementation to the dedicated principle of the right to ecological space. It not only guides GI's functional and physical shaping but also frames choices on governance entitlements. It also employs a wider understanding of spatial planning, which shifts from a technical to a policy rendering and is based on an extended value basis. It is assumed that this shall allow the identification of rationales and areas of intervention regarding a just access to ecological space and should lead to the application of an adequate mix of policy interventions addressing the justice of both processes and outcomes.

To begin with the development of the conceptual and action model is informed by a comprehensive literature analysis of the extent to which the GI concept offers new principles and characteristics in light of assumed urban disparities. What follows is a study of normative notions such as inequality or justice to define clear concepts that can be linked to GI and ensure coherence of action. This particularly refers to governance capabilities linked to property rights and the balance of political, economic and articulation powers. The development of the model is also sustained by research on what strategic spatial planning encompasses and which spatial concepts, possible instruments and methods can come into play in operationalising GI within and beyond spatial planning. In the empirical part of the research the appraisal of the gap between existing approaches in urban green space planning of defined case studies and the underlying theories and assumptions of the model is carried out. Key focus is the city of Vienna, which has introduced the declared aim of 'green area justice'. It includes a cross-check with the city of Munich, linked to its early application of urban contractual agreements. Lessons learnt on rationales and areas of interventions are drawn using a mix of methods such as document analysis, online survey, study area visits and semi-narrative interviews.

In synthesis, the appraisal indicates the still existing gap in taking into due consideration the key principle of GI integration before development takes place and in pursuing GI as an active development category, in particular in relation to biodiversity objectives. It also highlights the importance of focusing on basic needs and a renewed discussion on envisaged urban green area qualities, in relation to existing disparities and transformations. It reveals how the adequacy of policy interventions depends on their influence on governance capabilities and also shows that their support is determined by perceived disparities and inequalities. In particular the latter represents an interesting area of future, transdisciplinary research across different disciplines potentially involved in GI implementation at urban level, including planners, landscape architects, biologists, political scientists and economists.

DE_ZUSAMMENFASSUNG

Eine Reihe von Finanz- und Wirtschaftskrisen haben in den letzten Jahren die zunehmend ungleiche Verteilung von Einkommen, Kapital und Vermögen sowie deren mögliche gesamtgesellschaftliche Auswirkungen in den Mittelpunkt gerückt. Dies umfasst in steigendem Maße auch die Entstehung räumlicher Disparitäten, sowohl in Bezug auf Wohnraum als auch den Zugang zu Grünraum und Natur in der Stadt. Aktuelle urbane Transformationsprozesse wie die Entwicklung neuer Wohngebiete oder eine erhöhte Innenverdichtung bergen dabei das Potenzial, Ungleichheiten in Bezug auf den Zugang zu ökologischem Raum und dessen vielfältigen Funktionalitäten zu verstärken.

Um der möglichen Isolierung von Gebieten mit hoher biologischer Vielfalt auch im Rahmen von Biotopverbünden entgegenzutreten, wurde ‚Grüne Infrastruktur' (GI) als Zielsetzung in verschiedene Politikbereiche der EU integriert. Der Begriff umfasst den Schutz und die Renaturierung eines Netzes von natürlichen und naturnahen Flächen, anderen Freiflächen und Umwelteigenschaften, die zum Erhalt der biologischen Vielfalt beitragen und für die Bereitstellung einer Reihe von Funktionen für das Wohl des Menschen verantwortlich sind. Betont wird vor allem die Wichtigkeit des GI Konzeptes für die Gewährleistung einer ausgeglichenen Verfügbarkeit und eines verbesserten Zugangs zu urbanen Grünräumen und deren allgemeinen Nutzen. Dies soll durch die Erhaltung, Wiederherstellung und Verbindung verbleibender Flächen und der Vielfältigkeit ihrer Funktionen auf verschiedenen Ebenen erreicht werden. Zudem gilt es die verschiedenen Anspruchsgruppen in den entsprechenden Prozessen zu involvieren. Doch was das Konzept in der Praxis konkret bedeutet und ob es hält, was es verspricht, wird nach wie vor ausgiebig unter Forschern und Praktikern diskutiert und verhandelt.

Die vorliegende Arbeit geht dabei davon aus, dass die Operationalisierung von GI als strategisches Planungskonzept entscheidend für einen gerechten Zugang sein kann. Das in dieser Arbeit als Hypothese entwickelte konzeptionelle und handlungsorientierte Rahmenmodell verbindet zunächst die Umsetzung von GI mit dem Prinzip des Rechts auf ökologischen Raum. Es beinhaltet zudem nicht nur Richtlinien für die funktionale und physische Gestaltung von GI, sondern setzt auch einen Handlungsrahmen zur Gewährleistung von Governance-Ansprüchen. Dabei kommt ein breiteres Verständnis von Raumplanung zur Anwendung, welches nicht von einer rein technischen sondern von einer politischen Ausgestaltung ausgeht und eine erweiterte Wertebasis einfordert. Es wird angenommen, dass dies die Identifizierung wichtiger Handlungsprinzipien und Eingriffsbereiche hinsichtlich eines gerechten Zugangs ermöglicht. Darüber hinaus soll es zur Anwendung eines geeigneten Mix von Interventionen in verschiedenen Politikbereichen führen, welche auf Gerechtigkeit sowohl bezüglich der Prozesse als auch der Ergebnisse setzen.

Die Entwicklung des Konzept- und Handlungsmodells beruht zunächst auf einer umfassenden Analyse der Prinzipien und Eigenschaften des GI Konzepts, um mögliche neue Ansätze im Hinblick auf angenommene, räumliche Disparitäten zu identifizieren. Im Anschluss erfolgt die intensive Aufarbeitung normativer Begriffe wie Ungleichheit und Gerechtigkeit. Dies dient zur Bestimmung der ethischen Grundlagen der Dissertation und schlussendlich zur Benennung relevanter Grundsteine, welche zu einer kohärenten Umsetzung von GI beitragen können. Dies bezieht sich insbesondere auf Governance-Fähigkeiten, in Verbindung mit Verfügungsrechten und dem Zugang zu politischen, ökonomischen und sich zu artikulierenden Möglichkeitsräumen. Das Modell baut zudem auf eine vertiefte Auseinandersetzung mit der Bedeutung strategischer Raumplanung, verschiedener Raumkonzepte und Planungsansätze sowie anderer politischer Instrumente und Methoden, die für die Operationalisierung von GI von Relevanz sein können. Im empirischen Teil der Arbeit wird im Rahmen verschiedener Fallstudien bewertet, wie weit die Theorien und Annahmen,

die dem Modell zugrunde liegen, und bestehende Ansätze der städtischen Grünraumplanung auseinanderliegen. Schwerpunkt ist die Stadt Wien, aufgrund ihres erklärten Ziels der ‚Grünraumgerechtigkeit'. Es erfolgt ein Abgleich mit der Stadt München, unter anderem aufgrund ihrer Erfahrung in der Anwendung des Instruments städtebaulicher Verträge. Erste Erfahrungswerte werden durch die Anwendung verschiedener Methoden gewonnen, darunter eine Dokumentenanalyse, semi-strukturierte Interviews, Begehungen vor Ort sowie eine Online-Befragung.

Die Ergebnisse der Bewertung verweisen auf bestehende Lücken in der Umsetzung des GI Konzeptes. Dies betrifft das Schlüsselprinzip ‚Integration', welches die Berücksichtigung von GI vor dem Beginn von Bauvorhaben vorsieht, sowie die Umsetzung des Konzeptes als aktive Entwicklungskategorie, vor allem in Bezug auf Ziele des Biodiversitätsschutzes. Sie verdeutlichen die Wichtigkeit, sich bei der Bereitstellung von ökologischem Raum auf Grundbedürftigkeiten anstatt auf Präferenzen und Zielgruppen zu konzentrieren, sowie den Bedarf einer vertieften Diskussion über die notwendigen Qualitäten von Grünraum, vor allem mit Blick auf aktuelle Transformationen. Sie zeigen auch, dass die geeignete Zusammenstellung von Interventionen für einen gerechten Zugang stark bestimmt wird von deren Einfluss auf Governance-Fähigkeiten und dass der Grad der Unterstützung abhängig ist von der Wahrnehmung räumlicher Disparitäten und Ungleichheiten. Letzteres stellt einen interessanten Bereich für künftige, transdisziplinäre Forschung dar, welche all jene Disziplinen umfasst, die an der Operationalisierung von GI für einen gerechten Zugang beteiligt sind, darunter Raumplaner, Landschaftsarchitekten, Biologen, Politikwissenschaftler und Ökonomen.

ACKNOWLEDGMENTS

The endeavour of writing this dissertation started in 2013, when my acute interest in urban spatial transformations and how those imprint and are imprinted by social, economic and environmental developments led me to apply for the International Doctoral College 'Spatial Research Lab', and to Prof. Dr. Udo Weilacher at the Technical University Munich (TUM) in particular. He courageously agreed to support the venture, although aware of the different disciplines with which we were approaching the subject. This work much benefited from the resulting, challenging and straightforward discussions, which opened whole new perspectives and contributed to a deeper understanding of key concepts. I am also thankful to Prof. Dr. Andreas Voigt of the Technical University of Vienna, the second reviewer of this work, who offered important guidance on the subject of planning and justice and majorly contributed to an increased appreciation of the different ways in gaining in-depth knowledge of a place and its people. Many thanks also to Prof. Dr. Walther Schönwandt of the University of Stuttgart, who introduced me to key philosophical work that laid out the basis of some important discussions, and to all the other professors and lecturers who contributed to the development of the unique space for debate and on-the-field insights, which the Doctoral College presented. This includes Prof. Dr. Bernd Scholl and Dr. Rolf Signer of the ETH Zürich, Prof. Dr. Michael Koch of the Hafen City University Hamburg, Prof. Dr. Markus Neppl of the Karlsruhe Institute of Technology, Dr. Nicole Uhrig and Dr. Eva Ritter. The College was an exceptional experience, also due to the many fellows who were part of the voyage and shared the quite challenging experience of writing a doctoral thesis. Special thanks to Franziska Drasdo, who reviewed important parts, and to Dr. Anita Grams, who took on the role as mentor. I would also like to acknowledge the important contribution of the TUM Graduate School by offering a range of opportunities in expanding one's skill set.

My sincerest thanks go to all those who contributed to this work in the framework of interviews and surveys, to all the experts, practitioners, representatives of civil society organisations and of the public administrations of the cities of Vienna and Munich as well as individual citizens who dedicated time to contribute to this research. Your interest, dedication and perceptions were decisive in securing that I continued with this work, also during times of great doubt. In addition, it would have been difficult to conclude this dissertation without the easy access to the wealth of literature, which the Library of the Free University of Bozen-Bolzano also offers to external users, and the subject librarians accepting my long list of acquisition suggestions.

On more personal notes, Sirini, thank you so much for your language corrections even across the Atlantic Ocean, and for your continuous encouragement. And many thanks also to Marianne for your boosting words at the right moment. This research also much benefited from my previous experience at the Institute of Europan Environmental Policy, and in particular work with Patrick and Marc. I am also grateful to my former colleagues at the Terra Institute, especially Katharina, Emanuela and Claudia who wonderfully ignored my frequent leaves. Thanks to all friends and family, who often endured my absence or dragged me out from behind my desk.

Christoph, there are no words that match your unwavering support.

Bozen and Munich, February 2018
Sonia Gantioler

PREFACE

'Die Strategie der Genesis, so behaupte ich, kennt Ursachen-Verknüpfungen in Form von Ketten nur im kleineren und nur Netze von Ursachen im Ganzen. Und kein Ding in der realen Welt erklärt sich allein aus einer Richtung, jedes aus einem System von Wirkungen, deren selber es eine ist'.

Rupert Riedl,

Zoologe und Entwickler der evolutionären Erkenntnistheorie, in ‚Die Strategie der Genesis. Naturgeschichte der realen Welt'. 1976. München: Piper.

'I argue that the strategy of genesis knows cause-relationship chains only for the small, and webs of causes in its entirety. And not one thing in the real world can be explained only from one direction, everything from a system of effects, of which it also forms inherently part'.

Rupert Riedl, own translation

Zoologist and developer of the evolutionary theory of epistemology in ‚Die Strategie der Genesis. Naturgeschichte der realen Welt'. 1976. München: Piper.

Many years ago, during my studies of biology and ecology at the University of Vienna, I had the opportunity of participating in a philosophical seminar on 'everything and anything', organised by zoologist Rupert Riedl. The seminar initiated an important learning process about systemic thinking, dealing with complexity and uncertainty, facing key ethical questions and resulting ways forward in research. It increased my awareness of being conscious of how intricately also findings in natural sciences and human perceptions are interwoven and rarely value-free, for example linked to institutional impacts. Rupert Riedl also made apparent how, with rising complexity, statistically relevant results of high probability increasingly fall short, given their focus on reduced cause-relationships and the inability of capturing the webs of causes of which we also form part, as highlighted in his quote above.

One way to deal with complexity, vague information, lack of data and uncertainty in research is to take into due consideration the way scientific discovery or the research design is approached. This refers to the way deductive, inductive and, increasingly recognised, abductive elements are applied and combined to allow a creative reflection process, which promotes continuous questioning, critical thinking and hence fosters in-depth judgment. As the thesis starts with trying to solve a puzzle or a complex problem and often navigates at a systemic and also strategic level where the application of theories is difficult, abductive thinking has strongly come into play. Whereas deductive processes pursue the justification of a theory and resulting hypotheses and inductive processes aim at generating theories or general rules from observations, abductive inquiry '*seeks to explicate what would make a puzzle less perplexing*', following not necessarily a linear but '*circular-spiral pattern*' (Schwartz-Shea and Yanow 2012:27-28). In the context of this work, such a pattern particularly resulted due to the inevitability of going back and forth between the complex and systemic research question and seeking more explicit, precise explanations and also solutions in situations on the field. The normative and value laden character of some of the researched concepts also compells making the process of abductive reasoning highly visible, especially in relation to its conceptual work, which as such occupies a prominent part of the thesis. The strong focus on abductive inquiry also implies that the work will not provide overall, definite conclusions. It presents intermediary results, in a spiral of ongoing, '*sense-making research*' (Schwartz-Shea and Yanow 2012:30), which dives increasingly deeper into webs of interactions.

Bozen and Munich, February 2018
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CONTENT

A INTRODUCTION

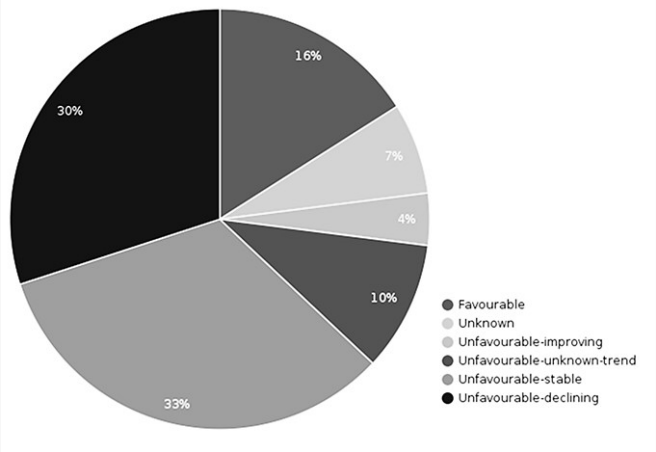
Urban transformation – environmental consequences, social challenges and Green Infrastructure

Urbanisation can be considered as one of the most dramatic forms of land transformation, on the one hand imprinted by social, economic and environmental developments and on the other hand contributing to their shaping. In this regard a city's urban green areas have historically played an important part regarding considerations on how transformation processes and environmental developments affect the quality of life of the urban population. Already at the end of the 19th century, the American landscape architect Frederic Law Olmsted argued that parks should be of sufficient size for air purification and sunlight provision as well as for guaranteeing access from different quarters of a city, especially for the poorer population in densely populated areas (Hauck and Czechowski 2015:6-7). In order to improve accessibility, he planned attached parkways as landscape roads that link different areas to the park. At the same time, he also considered how the creation of his parks could positively affect property values. From 1856 to 1873 he meticulously studied site values close to the Central Park in New York. He concluded that the park's development had led to an increased valuation of USD 209 million over a 17-year-period, resulting in an increase of tax revenues of USD 4 million (Crompton 2001:8, Fox 1990:12). The aim of the exercise was likely to use the information to justify the USD 13 million spent on the park's creation. However, he gave limited considerations on how these increases would affect overall access to the park. On the other hand, already in 1933 as part of the Athens Charter, the Swiss-French architect Le Corbusier called for strong legislation '*to ensure that a certain quality of well-being is accessible to everyone, regardless of monetary considerations*' (translated by Eardley 1973), linked to the struggles of ever more populated and polluted cities affecting particularly the poor. In order not to limit open and green space to just a few that can afford it, he called for a '*just*' proportion of constructed volume to open space and green volume, mostly consisting of larger, public patches than of small, private lots. However, Le Corbusier did not address questions regarding the quality of open/green space and missed to take into consideration the complexity of ecological processes.

Scarcities and biodiversity loss: Despite these and other initiatives, over the centuries particularly natural but also semi-natural features have often become even more dispersed and isolated elements in urban and neighbouring environments (Sukopp and Wittig 1998). This has been influenced by developments at a wider landscape level. The often scattered, irregular and discontinuous expansion of urban structures such as industrial sites, residential areas or transport infrastructure is deemed to have had major environmental and ecological consequences. The resulting land take, understood as the loss of agricultural, forest and other semi-natural and natural land to urban and other artificial land development (EEA 2006), as well as the fragmentation of landscapes are deemed to be the main drivers of the continuing loss and deterioration of ecosystems and biological diversity in Europe (EEA and FOEN 2011, EEA 2010b). Roughly 14% of all terrestrial mammals, 19% of all the terrestrial and aquatic reptile species and 23% of all amphibians are threatened with extinction in Europe (EEA 2010b). The most recent report on the state of Europe's nature indicates that the status of a high proportion of habitats and species is still deteriorating (EEA 2015:9). Only 16% of the EU's natural habitat types (e.g. bogs, mire and fens; freshwater habitats; grasslands or forests) are considered to have a favourable conservation status (see Figure 1). Particularly agricultural ecosystems are faced with the deterioration of 40 % of habitat assessments and 22 % of species assessments. Reasons are deemed to be both the intensification of agricultural land use and land abandonment at the same time.

In light of these developments, recent research emphasises the importance of preserving and restoring native vegetation also in cities, particularly of a sufficient amount of urban green spaces, due to their role in contributing to halting biodiversity decline (Kantsa et al 2013, Aronson et al 2014). Green areas such as private gardens, parks, tree avenues, green roofs and facades, cemeteries, and also watercourses can be important means in contributing to the conservation of biological diversity, also outside the protection of natural and semi-natural areas of high biodiversity value.

Figure 1: Conservation status of habitats from Article 17 reporting (EU Habitats Directive), 2007–2012 for EU-27 (EEA 2015:51)



Impacts on urban quality of life: The continuing loss has put into focus activities on evidencing and increasing awareness of how biological diversity and 'healthy' ecosystems sustain ecological functions that provide benefits to the economy and human well-being. This in particular applies to cities, due to the strong interplay of socio-ecological systems. It led to the introduction of the ecosystem services concept (MA 2005), underlining the dependency of the economic and social system from the functions the environmental system sustains. This includes for example highlighting the role services such as environmental amenities underpinned by biodiversity can play in increasing property right values, similarly to the exercise undertaken by Olmsted more than 140 years ago. In urban areas, related research has particularly focused on ecosystem services such as climate regulation and the reduction of the heat island effect, recreation and amenity services, air cleansing effects, noise absorption and direct health benefits such as reduced stress and increased physical activity (Mazza et al 2011:105-159). Ecologists have been especially dedicated to research on how the biophysical generation of urban ecosystem services relates to the ecological functions of a diverse range of urban green elements, public and private (Sukopp and Wittig 1998, Schägner et al 2013). Economists, on the other hand, have been looking into monetising the values arising from those services to be integrated into public policy-making and widened cost-benefit analysis, including methods such as hedonic pricing (TEEB 2010, Vandermeulen et al 2011, Gantioler and D'Amato 2013).

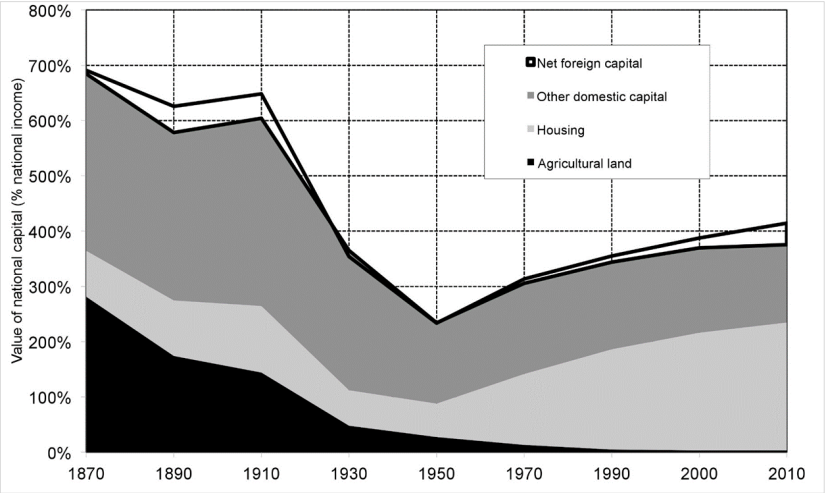
First criticism on the ethical limits of the ecosystem services approach appeared mostly with regard to their economic valuation, including enquiries on what can be valued in monetary terms and the potential impacts on the human-nature relationship (e.g. nature commodification) (TEEB 2010:157). Other aspects referred to potential trade-offs between different services (e.g. recreation and water quality) and disservices (e.g. allergies), and to questions on who bears the costs, for example regarding the appropriate ecosystem management (Jax et al 2013). However, overall questions on equity and justice in the distribution of benefits have so far been of less concern to the discourse, despite evolving structural changes to economic systems and resulting potential dynamics linked to economic inequality.

Economic inequalities: Since 2007, the quality of life of major parts of the urban population has been impacted by a series of economic and financial crises, affecting national economies and public budgets, and resulting in the withdrawal of the social state in parts of Europe. These crises have also contributed to a shift in attention to potentially resulting inequalities in the distribution of income, capital and wealth and their impacts on the economy and society at large. Discussions have been especially fuelled by the book

'*Capital in the 21st century*', published by the economist Thomas Piketty (Piketty 2014). Based on a comprehensive collection of data on the distribution of labour income, capital and return on capital over several decades, he offers the theory that in times of weak growth the relative importance of income from capital will gain substantial importance, and he provides warnings on the potential consequences considering the extent to which wealth has already been accumulated and concentrated.

Figure 2 illustrates how hereby, according to data provided by Piketty (2014), the importance of agricultural land diminished mostly in favour of housing capital, for instance in Germany, from the end of the 19th century onwards. This hints at the increasing importance of the housing sector in providing a flow of income to its owners. It also needs to be noted that the analysis made by Piketty demonstrates that particularly since the 70s of the 20th century private capital not only in Germany has taken up an increasing share of national capital whereas public capital has been decreasing.

Figure 2: Capital in Germany, 1870 - 2010 (Piketty 2014: http://piketty.pse.ens.fr/files/capital21c/en/pdf/F4.1.pdf)



Since its release, the book encountered a range of criticism mostly with regard to the solutions and theories it offered (e.g. capital tax), though less with regard to the robustness of the data provided (e.g. The Economist 2014, Schnaas 2015). Some initial follow-up research to the work bore criticism that the analysis likely overestimated the role of industrial capital and substantially underestimated the role of income from housing capital in increasing economic and in the end social disparities (Rognlie 2015). It underlined the necessity to give a closer look at measures that may impact housing costs, albeit the focus of the study was mainly put on alleviating restrictions to land use. In addition, not necessarily the inequalities revealed by Piketty (2014) are interpreted as a problem to be tackled. A range of economists argue that a degree of inequality in the distribution of income and wealth can be a driving force for innovation and economic development. However, others increasingly fear its consequences and costs both to society and the economy (Ostry et al 2014; Stiglitz 2012; Wilkinson and Pickett 2010).

Spatial disparities: If cities and agglomerations are seen as constructs of social and economic processes, the developments presented by Piketty (2014) and the role of housing specifically raise concerns over the spatial disparities they may cause. Recent research on the gathering of defined social groups in distinct areas, linked to socio-economic factors such as income, indicates the increasing importance of the topic of socio-economic spatial segregation also for European cities (Tammaru et al 2015). Albeit the levels of segregation are defined as relatively modest compared to other parts of the world, according to Tammaru et al (2015:358) '*the spatial gap between poor and rich is widening in all capital cities across Europe*' since 2001, and can be expected to further grow due to the time-lag between structural changes and visible impacts on cities.

The important role environmental factors in this regard can play is for example highlighted by recent research into the question of why East sides of former industrial cities often hold poorer and more deprived population groups. Based on atmospheric dispersion models used to re-establish the historic spatial distribution of pollution, Heblich et al (2016) concluded that pollution distributed by winds from west to east significantly contributed to neighbourhood sorting in the 19th century in the UK. The authors also iterate that this still continues to persist, even when the initial cause disappeared. One of the analysed effects refers to social housing and how the liberalisation might have caused a greater persistence of the sorting, due to the move from a random distribution all over the city to a more concentrated form (Heblich et al 2016:28-29). In addition, research on the effect of socio-economic prosperity on biodiversity in cities suggests that wealthier neighbourhoods are more biologically diverse than others, also defined as luxury effect (Clarke et al 2013, Strohbach et al 2009). A recent, related study for example emphasises that house size, surrounding vegetation and mean neighbourhood income all impact arthropod diversity in indoor environments, irrespective of private green ownership (Leong et al 2016).

Ongoing transformation processes: Both developments, increasing economic inequalities and biological diversity often secluded within a patchwork of islands, hence raise concerns and questions over potentially resulting spatial disparities regarding a fair and just access to (urban) nature and its benefits. This especially applies in light of existing urban landscape transformation processes. For instance, increasing the density of city structures is considered key in addressing several of the challenges arising from urbanisation or shrinking cities (UN Habitat 2009:17). Low densities are often considered a barrier to the development of public transport and reliant on fossil-fuel based private transport. However, at the same time scattered residential areas can be important hubs of urban biodiversity due to the higher amount of ecological niches and diversity of species compared to neighbouring rural areas, characterised by intensified agriculture or densely built-up inner cities (Benton-Short and Short 2008; Sukopp and Wittig 1998). Increased densification activities often leave those urban green areas untouched that are secluded within residential areas or large parks whereas informal areas such as abandoned railway sites disappear. It also links to fears that green urban areas are increasingly privatised in form of green roofs or green walls, or that high-profile projects lead to substantial rise of property prices and rents, resulting in benefits being only enjoyed in some parts of a city and limited to high-income groups, coining the term of environmental or green gentrification (Gould and Lewis 2016).

The role of Green Infrastructure: As a solution to some of the described challenges, the idea of conserving or restoring ecosystems that are connected, characterised by a diversity of species and features, and as such support a stream of functions and benefits, has (again) gained momentum at urban level. In order to address biodiversity conservation beyond a network of areas of high-biodiversity value, the enhancement of Green Infrastructure has been introduced as one of the six targets of the EU biodiversity strategy (EC 2011a). According to its EU definition, the term Green Infrastructure (abbreviated GI) refers to the conservation and restoration of a network of natural and semi-natural areas, environmental features and open spaces. Its key principles include the connectivity of its elements, both public and private, multi-functionality in the provision of benefits, its application at multiple scales, both rural and urban, an ecosystem approach involving a range of stakeholders and a strategic approach considering its implementation before actual development takes place. More importantly, GI has been brought forward as a method that – via applying these principles – can ensure a wider availability and thus access to green spaces and their benefits and as such increase the proportion of the public benefiting from it and contribute to equity in the wealth it provides. However, what the concept means in practice is still largely subject of on-going discussions and

negotiations between researchers and practitioners, including different disciplines from ecology, environmental engineering, landscape architects and economics. The city of Vienna has for example introduced GI in its planning programme of green urban areas, with the declared aim of 'green area justice' (Stadt Wien/MA18 2015a:8). The degree to which GI operationalisation might however contribute to counterbalance an unequal distribution and access to (urban) nature and the benefits it provides for human well-being, and to hence address potential socio-ecological inequalities still requires in-depth scrutiny.

Its planning and other interventions: The developments described above cast doubt on the extent to which issues of economic inequality and especially the potentially resulting spatial 'imprints' can be left to the realm of economics alone. It arises the overall question on the role of planning in seeking solutions particularly in relation to the operationalisation of GI for a just access. Economists emphasise the role of cities as social and economic constructs (Cheshire et al 2014). The value of 'planning control' as state intervention is recognised only and not always to the extent it addresses positive and negative externalities resulting from market failures. This includes ensuring some historic and natural conservation interests of high value objects and areas, and to a limited amount distributional questions. David Harvey, a contemporary US anthropologist and geographer supporting the idea of the right to the city, challenges the standard view that planning, and environmental planning in particular, is a question of intervening to cope with difficulties that could not be solved by the market and especially property ownership (Harvey 1996:374). He emphasises the importance of not solving the problem, but confront and transform processes that gave rise to the problem.

Ways forward in research

In light of the above, it is a key assumption of this work that such transformation processes can only succeed if spatial and urban planning also in relation to Green Infrastructure is more widely interpreted as a policy rather than a technical rendering, which mainly focuses on the interpretation of existing requirements. It is thought that this necessitates the development of comprehensive concepts, including on inequality and justice in relation to environmental features. One of the main aims consequently is to define in what way the understanding of the role of spatial and urban planning can be shifted accordingly and to outline the degree to which a related conceptual and action model can be developed to guide the operationalisation of GI as a strategic planning concept for a just access. In this regard, it addresses foremost urban researchers working trans-disciplinarily on related subjects as well as the different disciplines potentially involved in GI implementation at the urban level, including planners, landscape architects, ecologists, policy-makers and economists.

The development of a conceptual and action model which frames the operationalisation of GI for a just access to urban nature and its benefits opens up a wide field of research, linked to the complexity and the normative character of the endeavour. It requires to dive deeply into important conceptual work, and will still have a strong explorative component which not necessarily leads to the development of an overall, encompassing theory. As such, the conceptual foundations to be explored in chapter C 1 form a vital and also comprehensive part of this research, exposing the extensive reflection process, based on a continuous re-visiting and wrestling with some of its major components and the involved perspectives of various scientific disciplines. Some of the initial lines of thought and existing research gaps are briefly presented below, to better explain the forming of research interests and questions outlined in chapter B.

Understanding the GI concept: As mentioned before, at EU level Green Infrastructure (GI) has been initially foremost developed as a policy concept. It refers to the idea and principle on how to integrate objectives

of conserving and restoring biological diversity into other policy areas, particularly sectoral policies such as transport and energy infrastructure as well as cohesion policy, and increasing related investments. Mell (2015:111) emphasises that a series of publications and events at the EU level raised the profile of GI, '*promoting the Europe-wide application of the concept through a cross-territorial approach to landscape and ecological system management*'. At the same time, when studying how GI understanding is transposed into and adapted to meet local planning objectives in the UK, Mell (2014:620) emphasises the existence of a 'policy-implementation gap' and concludes that '*albeit an under-standing of the global principles of GI is* [slowly] *established, planners need to educate, advocate, and develop the financial and technical capacity of its benefits*'.

As pointed out by Mell (2014), no common understanding of Green Infrastructure yet exists meaning different things depending on the context within which it is used. The GI concept has been shaped by approaches, concepts and movements historically developed to address burning issues on land conservation and development throughout different geographical areas (e.g. greenways for recreational purposes in the US, greenbelt to halt urban growth in the UK, and ecological networks for biodiversity conservation at EU level). With no surprise this has resulted into a wide range of definitions regarding GI and its characteristics or key principles (e.g. Benedict and McMahon 2002:7, Ahern 2007:267, EC 2013a:3, Davies et al 2015). Albeit some analysis of its likely origins has been carried out, a thorough and comprehensive review which outlines to what extent GI in the end differs or not from the concepts and movements historically underpinning its development has not yet taken place. This is thought crucial in getting a better understanding what drivers and current characteristics influence urban green space planning and how they may differ from those elaborated in the framework of the GI concept and as such affect its effectiveness. This will be important part of the work in chapter C 1.1.

A range of studies also make evident that albeit the analysed, existing initiatives are often based on some of the main GI principles and characteristics they rarely are named accordingly (e.g. Mazza et al 2011). Reviews of examples of GI put into practice also seem to indicate that many of the key characteristics are applied on paper only (Naumann et al 2011a, Mell 2008), social and ecological outcomes being more by-products than co-products (LaFortezza 2013:103). How the conceptual ideas of Green Infrastructure can be put into practice for planning and design is thus considered an important area of research, particularly transdisciplinary, if opportunities offered by the concept should not '*be lost in translation'* (Mell 2008:72). In their initial review on GI planning and implementation, also the authors of the GREEN SURGE project highlight that guidance on how to strategically implement GI is still rare, and that this bears the risk of a persisting gap between theory and practice (Davies et al 2015:10). As part of its research, the project specifically aims at assessing the adoption of principles of urban GI planning in existing practices of green space planning across several European city regions (e.g. Miland, Malmö and Edinburgh) (GREEN SURGE n.d.).

Linking GI to issues of inequality and justice: In its initial analysis, the GREEN SURGE project recognises the importance of urban green space accessibility and social equity issues as an emerging subject on the urban policy and research agenda (Davies et al 2015:82). Initial considerations on how this could be strategically approached mainly refer to the support of participatory processes and socially inclusive planning (Davies et al 2015:54-55). Interestingly, researchers could find little evidence that cities adopted a strategic or hierarchical approaches particularly in establishing connectivity as a critical component intertwining both biodiversity objectives and a just access to urban green space. Existing examples either purely focused on ecological connectivity or on greater social accessibility. In addition, criticisms were issued regarding the extent to which connectivity mainly addresses public spaces, neglecting private green albeit part of the GI

system. Many of the existing initiatives still seem to not having taken into consideration the latter and thus having failed to integrate an important part of the GI concept deemed substantially different from previously existing initiatives of urban green space planning.

In line with ideas of Olmsted and proposals made by Le Corbusier on quantitative distributions, current strategic efforts to ensure a just access to green areas across a city often focus on the development of minimum standards on per capita values regarding dedicated public green space. This includes for example minimum standards of 6m^2 to be provided to individuals in the city of Berlin, in an intake area of 500 m and minimum size of 5 ha (Stadt Berlin/Senatsverwaltung für Stadtentwicklung und Wohnen 2013). Minimum sizes of an area are often applied as a quantitative indicator for quality. In their recent analysis regarding the equal distribution of green urban areas in Berlin, Kabisch and Haase (2014:136) for example concluded that in Berlin the required thresholds were achieved in most sub-districts, although at the same time high density areas had disproportionately less urban green areas and an over-representation of immigrants, people of exclusively foreign or not known nationality. Questioning the usefulness of indicators on green space area per inhabitant for assessing their availability for recreational purposes, Grunewald et al (2017) looked into the alternative indicator of percentage of inhabitants within walking distance to green spaces higher or equal 1 ha, and at medium distance to green spaces higher or equal 10 ha. According to their analysis across all German cities with more than 50,000 inhabitants, urban green spaces for recreation are accessible to 73.3% of the population (Grunewald et al 2017:36), with the city of Munich for example performing slightly below this mean value. However, the authors also recognise that this represents only an approximation, and that the complexity increases if issues of a just access to quality are considered.

When it comes to GI as a design rather than policy concept, its understanding have recently been strongly driven by discourses on landscape urbanism and ecological urbanism especially in the US. Landscape urbanism has been described as '*a disciplinary realignment in which landscape supplants architecture's historical role as the basic building block of urban design'* (Waldheim 2006:37). The importance the discourse gives to the productivity of landscape and the functions it performs links back to the ecosystem services, function and benefit approaches used by many GI definitions. However, the design theories, although integrating ecological thinking in a wider sense, have been criticised for missing out on socio-economic problems and aspirations and particularly on questions regarding '*social inequality in relation to (access to) landscape infrastructure*' (De Block 2015:41+45).

Albeit not an entirely new aspect to urban design, awareness on questions of equity not only in the generation, but also allocation of benefits provided by ecosystems have slowly risen with the ecosystem services concept climbing up the urban policy and planning agenda and entering GI definitions. Increasingly, studies emphasise the importance of recognising that the ecosystem services approach is a normative and value-laden concept (Jax et al 2013; Ernstson 2013). This has led researchers to link the concept to discourses of environmental justice. Historically, related discussions in urban areas used to focus largely on low-income and/or disadvantaged groups being more exposed to pollution and hazardous environments than other urban population groups, particularly in the US (Cohen et al 2012; Davy 1997; Harvey 1996). However, it has also been re-defined more broadly to address issues surrounding the distribution of environmental resources, including urban green areas and ecosystem services. The model developed by Ernstson (2013:7) with regard to ecosystem services makes it a question of fairness regarding generation (i.e. which biophysical processes are favoured), distribution (i.e. who benefits from resulting ecosystem services over a spatial and temporal scale) and articulation (i.e. how the value of certain benefits is explained and demonstrated). In Germany, one recent area of collaboration on environmental justice has been on correlations between

social conditions, environmental qualities and health. In this regard, environmental justice, understood as '*prevention and reduction of socio-spatially accumulated, health-relevant environmental burdens, as well as the socially just access to environmental resources*', has become of increased interest to scholars of different disciplines (Bolte and Mielck 2012; Böhme et al 2015). It needs to be noted that although the related research addresses the issue of a just access to environmental resources, it often focuses on defined components such as distributional and procedural justice. However, they have often failed to address more comprehensively the important element of overall access defined for example by property rights entitlements. All these various components will form an important element of the analysis in chapter C 1.2.

Defining a strategic planning concept: In her book '*The Just City*', Susan Fainstein (2010) stresses that spatial planning gives thorough consideration to how consciously create conditions for a better city for all citizens. In this regard, she refers to the importance of equity, diversity and democracy as three main pillars for judgment, and of questions such as '*who gets in*' and '*who gets asked*' over '*who gets what*' driving the analysis (Tonkiss 2011:584). When looking for arguments for a normative framework that promotes a 'just' city, the urban planning theorist outlines how the debates on the subject are currently oscillating between poles that have traditionally driven discussions in urban planning and beyond (Fainstein 2010). Besides the pole of government intervention and letting market forces do their work, it also refers to that between those emphasising the importance of developing 'ideal' communication and negotiation processes resulting in justice or increased equality as a consensual outcome, and those interested in developing a comprehensive concept of justice. Albeit also Fainstein underlines the importance of bringing those differences together, it is argued that recent efforts in urban planning largely focus on the aspect of processes often to the expense of outcomes, i.e. the nature of the urban environment produced (UN Habitat 2009:70). The focus on processes as a flexible mean to address the complexity of planning issues bears the risk that conceptual work on the desired outcome lacks behind. This seems particularly true for conceptual work on a complex issue such as inequality and justice, which is more often left to the realm of the seemingly only by positive statements driven discipline of economics. Another approach of dealing with complexities is thought to be the application of strategic thinking, key component of Green Infrastructure as well as the thesis. According to Albrechts (2006:1152), '*strategic spatial planning is a transformative and integrative, (preferably) public-sector-led socio-spatial process through which a vision, coherent actions, and means for implementation are produced that shape and frame what a place is and what it might become*'.

The initial review of the GREEN SURGE project concluded that many of the existing urban green space planning initiatives arguably take a strategic approach if referring to the adoption of visions, targets and actions (Davies et al 2015:50). However, it also became evident that a comprehensive and foremost concrete outline of what encompasses a 'strategic approach' is lacking albeit representing one of the key principles of the GI concept. The same applies to several of the existing GI definitions, which only generally indicate that a strategic planning and design, particularly in relation to principles such as multi-functionality and connectivity, is seen as a method to ensure a wider availability and access to green spaces, increase the proportion of the public benefiting from it and as such contribute to social equity (Mell 2008:70). However, it remains unclear how this could concretely be implemented. In this regard, the thesis aims at providing a more substantiated outline building on the analysis of chapter C 1.3.

It also needs to be considered that the GREEN SURGE's initial work has largely focused on planning documents and instruments, however has addressed other policy instruments that might be favourable or not to GI planning only to a limited extent. How this links to the understanding of a strategic approach in GI implementation will also be subject of the thesis' research. This could be particularly important if urban green space planning systems should not only address the development and maintenance of public but

also include private green space. In addition, it could also play a crucial role in light of fears issued by Thompson (2012) that the interpretation of landscape as infrastructure results into a technocratic approach which puts engineers and experts at the forefront whereas the general public is excluded from its development, and the intrinsic value of species and nature is neglected. Most likely a mix of instruments will need to come into play and its composition will need further scrutiny as part of a strategic approach to the operationalisation of GI for a just access. In this regard, it is also assumed that a related model framing the operationalisation should support the coherence of actions taken, by being embedded in defined spatial and ethical concepts, such as a dedicated principle of the right to ecological space. This will be elaborated as part of the conclusions in chapter C 2.

In this regard, the aim of the research is not to provide an overall new theory, which proposes concepts of pure and simple justice and looks into the development of absolute terms and laws. The conceptual and action model rather represents a model which is assumed to be a first 'navigation framework' providing a tentative structure and guidance regarding concepts and potentially envisaged actions, mainly in the form of rationales and areas of intervention and based on a first scrutiny. Due to the involved complexity, incomplete conclusions will be drawn which will leave many uncertainties and gaps for further research, and hopefully trigger a range of discussions which will lead to the further inspection of many of its underlying assumptions.

Next to the complexity of issues, the fear particularly of natural scientists, to dive into an area that is value-laden and normative has likely influenced the current lack of research that links the two dimensions of biodiversity loss and inequality and justice. As the philosopher Mario Bunge stated in his '*Treatise on Basic Philosophy – Ethics: The Good and the Right*', for many an unbridgeable gap exists between values and facts (Bunge 1989:71). Values and morals are often considered merely subjective and thus falling beyond 'the hen of science'. However, also Thomas Piketty states in his previously mentioned book that '*there will always be a fundamentally subjective and psychological dimension to inequality*' (Piketty 2014:2-3). Nevertheless, according to the author, this should not stop researchers to systematically and methodically addressing the subject, risking otherwise that people see '*everything and the opposite*' and start a '*dialogue of the deaf*'. This was also one of the main motivations of this work.

B RESEARCH INTERESTS AND DESIGN

B 1 Research interests

Grusky and Kanbur (2011:2) identified three fronts at which work is carried out by researchers committed to understanding issues of inequality, and also applying to the scrutiny of justice:

1. *Defining dimensions,* looking into the equality/inequality/justice 'space' and the various dimensions it consists of, such as endowments, investments and living conditions
2. *Ways of characterising and measuring* equality/inequality/justice, considering a range of parameters that define the multidimensional space
3. *Seeking solutions to a multi-dimensional problem,* consisting of examining approaches to remediate inequality or injustice, aiming at aspects that are causal with many outcomes and can lead to a multitude of changes

The research interest of this work particularly relates to the third front of investigation, which is also deemed one of the most open to heated debate. However, it lies inherently in the nature of spatial planning and design research to look into ways forward rather than focusing on an analysis of the status quo. Key interest of the thesis hence is to gain knowledge on the following overall research question.

Research question	*In what way can the concept of Green Infrastructure be operationalised in urban development and planning for a just access, in light of dynamics of socio-economic inequality?*

The initial hypothesis defines the way forward regarding the research to be carried out. It is the result of an extended thought process, which involved 'crystallising' the problems of inherent interest. As such it was generated from a process of mainly **abduction**, as introduced by the American philosopher C.S. Pierce (Burks 1946). Accordingly, it denotes the starting point from which further research evolves, which will build on a combination of abductive, deductive as well as inductive elements. This means that the initial hypothesis will be modified and sharpened, based on new findings and data. The process has been called retroduction, emphasising its '*constant backtracking nature*' (Miller and Brewer 2003:2).

Initial hypothesis	According to the initial hypothesis, it is assumed that if the **principles and characteristics of Green Infrastructure** are operationalised as a **strategic planning approach** this can effectively contribute to • Preventing or reacting to the unjust concentration of urban nature and its benefits (distributional **justice**), • Facilitating access to it (**equal** access), and • Increasing opportunities to drive its shaping (procedural justice). Especially the question on accessibility is thought to play a key role in addressing dynamics of socio-ecological and economic **inequalities** in relation to spatial disparities. In addition, it is argued that a strategic planning approach includes embedding the operationalisation within a **conceptual framework**, including a dedicated space concept, which allows to take integrated actions across policy areas and instruments.

From a spatial planning perspective, four main components come into play when researching different planning approaches: looking at the problems or puzzles to be addressed, defining objectives to be achieved, identifying methods and recognising the background knowledge which is applied and defines the mindset (Schönwandt and Voigt in Ritter 2005:769-776). If these four components are applied to the research question the following summary can be made on the knowledge the question seeks to acquire.

Problems	*Planning problems usually refer to a situation which is deemed either negative and in need of change or positive and in need of retaining the status quo.* The identified key problem laying at the basis of the research question refers to the potentially detrimental accumulation and concentration, and unequal distribution and access to (urban) nature, and in the end the functionings it supports as well as the benefits it provides for human well-being (socio-ecological inequalities). This is first of all deemed to be substantially influenced by the continuing loss of biological diversity, which not only at the urban scale has often been secluded within a patchwork of 'islands', concentrated in some areas, quite lacking in others, and become of increased 'scarcity'. Distribution and access and resulting socio-ecological inequalities are also thought to be substantially affected by economic inequalities, relating to the issues of property rights and the unequal distribution of wealth, urban land and housing capital in particular.
Objectives	*Planning objectives describe what 'ought-to-be' with regard to a future situation.* The research question aims at finding a way to prevent or counteract the appearance of detrimental socio-ecological inequalities resulting from economic inequalities and biodiversity loss. It refers to ways of determining, preventing or reacting to the unjust distribution of urban nature and its benefits (defining 'who gets what'), to look into ways of providing physical access but also of applying additional bundles of access rights (defining 'who gets in'), and ascertaining integral democratic processes consisting of balanced and checked options in raising voices for its shaping (defining 'who gets asked').
Methods	*Planning methods refer to targeted approaches and instruments that contribute to solving the identified problems and achieving set objectives.* The research question indicates the interest of looking into the extent and in what way the application of the GI concept and its principles and characteristics can contribute to the set objectives. It includes defining ways of operationalising the concept for urban development purposes, for example as a strategic planning approach. There is the need to delineate what exactly this may encompass, from the development of new to the integrative use of formal/informal planning instruments, regulatory or market-based instruments and monitoring approaches. A conceptual and action model will be developed to support related analysis and to be appraised in empirical research, aiming at providing recommendations on rationales to consider and areas of intervention which frame the future operationalisation.
Background knowledge	*Transformative research related to the discipline of spatial planning is oriented towards seeking solutions to complex societal problems, requiring cooperation across disciplines*. The research question suggests that inputs from natural sciences, social as well as economic disciplines are needed for seeking solutions to problems related to the loss of biological diversity, economic inequalities and related consequence for human well-being. Of particular relevance are also philosophical discussions, especially in elaborating on normative notions such as inequality and justice and to provide the means to reflect one's own values. In addition, the interpretation of the GI concept is influenced by a wide array of different disciplines, from landscape, conservation and urban ecology to landscape architecture, geography, urban and spatial planning as well as civil engineering. As GI particularly in Europe has initially been conceived as a policy concept, also political science comes into play, especially with regard to 'methods' facilitating the implementation of the GI concept.

B 2 Research design

The overall structure and the various chapters of the thesis are defined by distinguished tasks, related objectives, methods and other components identified as key in further elaborating the overall research question and initial hypothesis. This section offers an introduction to the related content, and provides an overview of the different chapters, their interlinkages and how they inform each other in Figure 3.

Chapter A	Introduction

Objective: Chapter A introduces relevant urban transformation processes, resulting social challenges and environmental consequences and potential ways forward in addressing related impacts in urban development, including on the role of Green Infrastructure. It describes the overall research problem and sets the scene also with regard to the vision and motivation for the research. It introduces existing key research and gaps, which became visible over the course of the initial analysis, and subsequently informed research interest and design.

Output*:* Problem identification and aim of the research

Chapter B	Research interests and design
B	1 Research interests
B	2 Research design

Objective: Chapter B 1 lays down the overall research question, and offers a first hypothesis that provides a framework for the design of the research strategy. The latter refers to task-specific aims, sub-hypotheses, related research questions and methodologies, outlined in Chapter B 2.

Method: As part of the international doctoral college 'Spatial Research Lab', *research laboratories* were set up in every location of the contributing universities and guest universities joining the process. The set-up consisted of lectures, assignments in the context of the urban 'laboratories' and input from practising experts. It offered the opportunity to work on 'real cases', based on discussions with those involved in solving related problems. It also helped recognising the existence of common topics and regularities across the different laboratories. As such it was important in helping further 'crystallising' the problems or challenges the thesis would like to address, and contributed to the abduction of the initial hypothesis.

Output*:* Initial hypothesis

Chapter C	Developing a model for GI operationalisation
C	1 Exploring conceptual foundations
	1.1 Principles and characteristics of Green Infrastructure
	1.2 Defining equality, inequality and justice
	1.3 Concepts and approaches in developing and planning urban space
C	2 The conceptual and action model for GI operationalisation
	2.1 The model's conceptual entry-point and ethical baseline
	2.2 The model's approach to GI's functional and physical shaping
	2.3 The model's approach to the shaping of governance capabilities
	2.4 Framing a strategic approach to GI operationalisation

Objective: Chapter C 1 provides the conceptual basis for the research to follow. It helps to refine the initial hypothesis, by providing an overview of already existing research and elaborating on key definitions and concepts used within the thesis. It starts with gaining a better understanding of the *principles and characteristics of Green Infrastructure*. It continues with the definition of *notions such as equality/inequality and justice*, linking them to spatial/environmental questions and finally to Green Infrastructure more specifically. This is complemented by insights into key theories, processes and instruments of disciplines that contribute to the active *shaping of the urban space* and/or environment. The aim is to clarify why further research focuses on the *strategic planning approach*, and why a dedicated space concept such as *ecological space* is applied for the framing of GI operationalisation. The respective conclusions inform the drafting of the conceptual and action model in chapter C 2, describing the reasoning that led to its development and its various components.

Method: Key method was the undertaking of a comprehensive *literature review*. It included a word search in (online) libraries regarding published books, peer-reviewed and online academic journals, and the screening of literature references of relevance to the identified key conceptual areas. The search was mainly carried out in English, though important research published in other languages, e.g. German, was also considered. The review was also informed by literature recommendations and expert-input provided by individuals involved in the doctoral college, including professors of various universities, assistants, lecturers, practitioners, fellow PhD candidates, and interviewed experts.

Guiding sub-hypothesis:

1. The GI concept includes some new principles and characteristics inherently different from previous approaches to urban green space planning, and which offer opportunities to address issues of a just access. Clear concepts on the notion of inequality and justice as well as the space to be addressed are in place and linked to those principles in order to inform visions on what should become. The latter represent a key component of a strategic planning approach, given it provides an ethical baseline that can ensure coherence of actions to be taken.

Related research questions:

1.1 *Green Infrastructure:* How has the term evolved? Which definitions exist? What are their main principles and characteristics? What have been the main drivers for implementation? What framework can be used for the further analysis?

1.2 *Equality/inequality and justice*: What dimensions do exist? How can those be characterised? What relevant theories have been developed with regard to environmental/spatial questions? Which dimensions and theories are particularly interesting with regard to the operationalisation of the Green Infrastructure concept and the further analysis?

1.3 *Developing and planning urban space*: What key theories, methods and instruments are proposed by selected disciplines? Why focus on the strategic planning approach and what does it mean concretely? Why may a dedicated space concept such as ecological space be important? Which approaches have been specifically identified for the operationalisation of Green Infrastructure?

Output: Conceptual and action model

Chapter D	Appraising the model for GI operationalisation

D 1 Appraisal methodology

1.1 The appraisal framework

1.2 The appraisal design

D 2 Appraisal findings

2.1 An introduction to the case studies

2.2 Lessons learnt from Vienna, including a cross-check with Munich

Objective: Chapter D aims at providing empirical insights to the application of the conceptual and action model, testing the scenario it envisages in a case study evaluation. Its overall objective is to understand the current application of GI principles and characteristics, and the gap existing between practice, theory and the proposed model. Chapter D 1 starts by setting out the *appraisal framework*, based on the development of distinct judgment areas and criteria guiding the comparison of the divergence. It also sets out the design of the empirical research to follow, including reasoning behind the selection of case studies and the adopted approach, and the defined methodology in collecting and analysing knowledge and data. Subsequently, chapter D2 presents the lessons learnt from applying the appraisal framework to the case study of the city of Vienna, including a cross-check with the city of Munich. The *lessons learnt* consist of rationales and areas of interventions deduced with regard to the revealed relevance of conditions, transformations and needs; disclosed coherence and adequacy of policy interventions; and the observed significance of envisaged outcomes.

Method: The methodology of the empirical research area builds on the development of one main *case study*, the city of Vienna, to compare to a second one, the city of Munich, based on the sub-hypothesis and resulting research questions. The selection was based on socio-economic aspects, approaches to urban green and open space planning and housing policy interventions. The approach of the main case study design relies on the methodology of social area analysis, though it was subject to changes according to the needs of the thesis. Due to the resulting different layers of analysis, a *mix of methods* was applied to collect relevant data at the case study level and for the exploration of identified study areas. Methods include carrying out an explorative online survey addressing the public administrations of Vienna and Munich, and individuals of the general public of Vienna. This is supported by interviews with experts, practitioners, inhabitants, representatives of civil society organisations and public administration, and on-site visits especially in Vienna. The results are combined with findings from document screening and analysis of existing studies for both case studies. The triangulation of methods required the combination of quantitative and qualitative content analysis, based on the development of an appraisal grid.

Guiding sub-hypothesis:

2. As framed by the conceptual and action model, only a strategic planning approach that embeds GI in a dedicated space concept, ecological space, and applies a wider understanding of spatial planning as a policy intervention and process can support a variety of actors in the operationalisation of GI and its integration across relevant policy areas and at different scales. Based on the resulting coherent vision, it allows the identification of relevant rationales and areas of intervention with regard to GI infrastructure status/quality and governance capabilities. These result into the application of an adequate mix of instruments to address dynamics of spatial disparities and contribute to an overall just access to ecological space.

Related research questions:

2.1 To what extent do studied urban conditions and thus problems diverge from those assumed by the conceptual and action model? What *relevance* of issues is hence revealed?

2.2 To what extent do studied visions and objectives informing policy interventions on GI planning and design diverge from those assumed by the model? What *coherence* is hence disclosed?

2.3 To what extent can the studied implementation of policy interventions be considered sufficient compared to what is suggested by the model for GI operationalisation? What *adequacy* is hence disclosed?

2.4 To what extent does the studied stand on envisaged outcomes diverge from that assumed by the model? What feasibility constraints have become visible? What overall *significance* can hence be observed?

Output: Collection of rationales and areas of intervention

Chapter E	Discussion
E 1	Operationalising GI for a just access to ecological space
E 2	Outlook

Objective: Chapter E 1 presents the synthesis of thesis. It will discuss the extent to which a strategic planning approach, as envisaged by the conceptual and action model, and its various components can address a just access to ecological space. It provides concluding guidance on the application of the model, as a 'navigation framework' to the operationalisation of Green Infrastructure. Chapter E 2 identifies further questions and gaps to be addressed in the framework of future urban research.

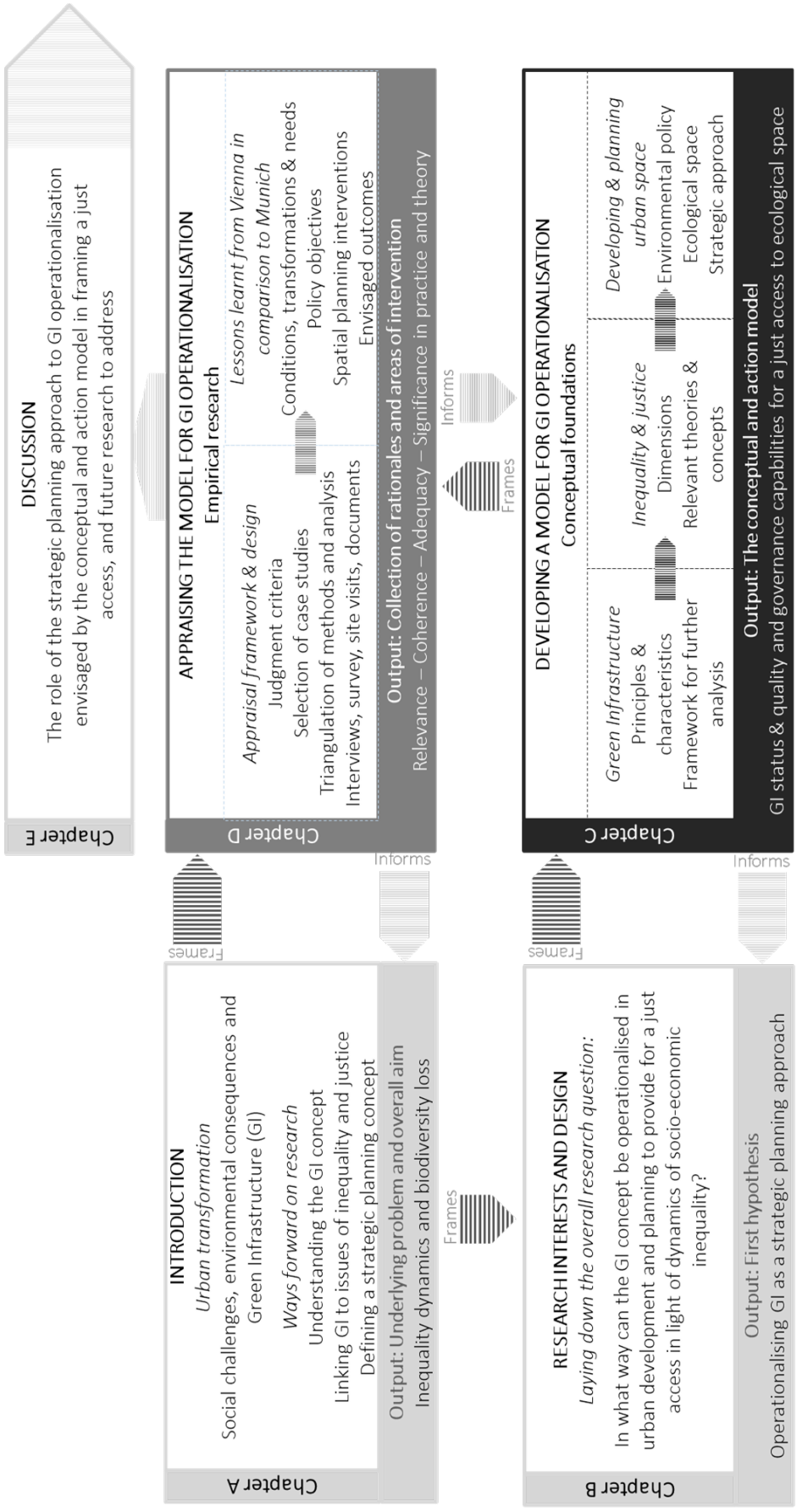


Figure 3: Overview research design

C DEVELOPING A MODEL FOR GI OPERATIONALISATION

C 1 Exploring conceptual foundations

This chapter elaborates on key definitions and conceptual fundaments that need to be clarified as an important basis for the research to follow. Besides further refining the initial hypothesis, it aims at identifying the best way forward regarding the methodology to be applied and informing the drafting of the envisaged conceptual and action model. As previously outlined, it is guided by the following sub-hypothesis and resulting research questions.

Table 1: Analysis framework

GUIDING SUB-HYPOTHESIS 1:
The GI concept includes some **new principles and characteristics** inherently different from previous approaches to urban green space planning, and which offer opportunities to address issues of a just access. Clear concepts on the **notion of inequality and justice** as well as the **space** to be addressed are in place and linked to those principles in order to inform visions on what should become. The latter represent a key component of a **strategic planning approach**, given it provides an ethical baseline that can ensure coherence of actions to be taken.

RELATED RESEARCH QUESTIONS
1. *Green Infrastructure*: How has the term evolved? Which definitions exist? What are their main principles and characteristics? What have been the main drivers for implementation? What framework can be used for further analysis?
2. *Equality/inequality and justice*: What dimensions of inequality exist? How can these be characterized? What relevant theories have been developed with regard to environmental/spatial questions? Which dimensions and theories are particularly interesting with regard to the operationalisation of the GI concept and further analysis?
3. *Urban development and planning approaches*: What key theories, methods and instruments are proposed by selected disciplines? Why focus on the strategic planning approach and what does it mean concretely? Why may a dedicated space concept such as ecological space be important? Which approaches have been specifically identified for the operationalisation of Green Infrastructure?

C 1.1 Principles and characteristics of Green Infrastructure

As mentioned in the introduction and as will become even more apparent in the following chapter, the origins of its principles are various and there is no commonly agreed definition of the term Green Infrastructure. Its meaning often depends in which context it is used and also in which geographical area it is applied. In the context of land management in Europe, the term can be summarised as the conservation and restoration of a network of natural and semi-natural areas and open spaces that contribute to the conservation of biological diversity and at the same time provides a range of benefits for human well-being. Its deeper meaning and interpretation, however, is influenced by a wide array of different disciplines, from landscape, conservation and urban ecology to landscape architecture, geography, urban and spatial planning as well as civil engineering (Benedict and MacMahon 2006). To get a better understanding of GI, it is consequently necessary to look into its historic origins, the existing definitions and principles, how they differ or not from previous movements and link to current policy developments and discourses on urban

design and planning. The core objective is to provide a framework for analysis of the extent to which existing definitions, programmes or projects build on these principles that have a long history of application across different disciplines; to what extent they represent something entirely new and which aspects might still be missing in current interpretations.

C 1.1.1 GI – Historic evolution

The first chapter aims at shedding light on the origins and historic development of the GI concept and its underlying principles. The main aim is to gain insights of the main drivers of development, to what extent they differ across different regions of the world and to what extent they have influenced each other.

C 1.1.1.1 International and US influences

The term 'Green Infrastructure' initially emerged in the United States (US). It is thus often considered that the term's underlying theories, ideas and research have been heavily influenced by the discoveries of a wide range of disciplines in the US, particularly land conservation, conservation and restoration biology and landscape design (Benedict and McMahon 2006, Youngquist 2009, Amati and Taylor 2010). However, the following historic review will stress that the line can rarely be drawn neatly, highlighting the cross-fertilisation of concepts, ideas and movements that have taken place especially across the Atlantic.

Table 2: Historic evolution of Green Infrastructure in the US – 19th century to early 20th century

Time period	Milestones	Primary objectives & key approaches
1850s – 1920s	*Formative years:* × Henry David Thoreau – Importance of preserving some portions of nature unimpaired (1853) × George Perkins Marsh - conservation of forests economically and emotionally justified (1864) × Frederick Law Olmsted – Concept of linked systems of parks and parkways (1887) × John Muir – preservationist of the spiritual value of wilderness (1882) × Gifford Pinchot – conservationist of natural resources provided by forests × Creation of Yellowstone National Park × President Theodore Roosevelt's commitment to land and nature conservation (1901-1909)	*Objectives* • Active recreation and scenic amenity particularly related to (urban) forests • Conservation of resources versus preservation of beauty for future generations *Key approaches* • Land acquisition • Urban public park planning, design & management
1930s – 1950s	*Environmental design:* × Patrick Geddes: Linking the environment and sociology in town planning (1910s) × Biologist/ ecologist Victor Shelford: Preservation of natural areas and buffer zones (1920s) × Benton MacKaye: Appalachian Trail as wide belt of open land to buffer the west from expanding settlement (1921) × New Deal: Several greenbelt communities are planned with emphasis on including green space in urban design and buffering the community from adjacent land uses (1930s) × Aldo Leopold: Concept of land ethic, focusing on the fundamental principles of ecology (1933)	*Objectives* • Active recreation and scenic amenity • Preservation of nature in its 'wild' state • Ethical principles of land use *Key approaches* • Land acquisition • Park planning and management • Linking ecology and design • Greenbelt communities

Source: Adapted from Benedict and McMahon 2006:24-25 and Randolph 2004:96, with additions from Frank 1997, Dick 1995, Nagle 2005, Mossop in Waldheim 2006

Similar to Europe (see next sub-chapter), initial **US land conservation efforts** were strongly linked to the need to conserve natural resources provided by forests. Wider public discussion was particularly fuelled by the speeches of George Perkins Marsh and by his book *Men and nature*, published in 1864, in which he deems the conservation of forests economically and emotionally justified (Benedict and McMahon 2006: 25). He was supported by Henry David Thoreau, who at the same time underlined the '*importance of preserving some portions of nature herself unimpaired*' and emphasised the need of every town having a park not for the economic use of timber but as a '*common possession for instruction and recreation'* (Yongquist 2009:20 and Dick 1995:6*)*. The US environmental movement of the 19th century was also strongly influenced by the writings of botanist John Muir about the value of wild things. Founder and first president of the Sierra Club, he strongly advocated for the 'preservation" of places of wild and inspirational beauty, and as such contributed to the creation of the Yosemite National Park (Krech et al 2004a: 266, Benedict and McMahon 2006: 27, Dick 1995:7-8). In his efforts to establish forest reserves and national parks throughout the US, John Muir was initially supported by forester Gifford Pinchot. Pinchot strongly believed in the need of the national government to take responsibility on conservation policy, and used his relationship with Theodor Roosevelt to strongly advocate for an expansion of related programmes. He also provided the first definition of the term conservation saying that '*conservation means the greatest good to the greatest number for the longest time*" (Krech et al 2004a: 266). As such, he was a proponent of a more utilitarian approach, underlining the importance of a sustainable use of nature's resources. Though representing two different streams of nature protection, in the end efforts by Muir and Pinchot in collaboration with Roosevelt led to the creation of '*150 National Forests, 51 Federal Bird Reservations, 5 National Parks, 18 National Monuments, 4 National Game Preserves, and 21 Reclamation Projects*' (Benedict and McMahon 2006: 27).

Besides conservation efforts, the concept of Green Infrastructure in the US is also strongly based on the idea of **green networks** as developed in the context of urban planning and landscape architecture. At the end of the 19th century, landscape architect Frederick Law Olmsted iterated the likely detrimental impact of 'biological artificial' environment on mental and physical health, and included parks and greenways as a key feature of his plans for towns and cities across the US (Benedict and McMahon 2006:26). Influenced by his travels to Europe, particularly by his analysis of European city structures and streets systems as well as projects such as the 'Unter den Linden' avenue in Berlin, he conceived his idea of a system of linked parks and parkways, intertwining with infrastructure for transport as well as flood and drainage (Csepely-Knorr 2010:672-674, Mossop in Waldheim 2006:165). He believed that a single park would never be able to provide peace of mind, aesthetic scenery and other services to a city's inhabitants, and with this in mind in 1887 designed the Boston's Emerald Necklace (Csepely-Knorr 2010:672-674, Mossop in Waldheim 2006:165). Other landscape architects followed, like for example Horace W.S. Cleveland, who in 1890 planned a network of interconnected parks in Minneapolis and St. Paul.

Following the influence of the UK's garden city movement (see next sub-chapter), the beginning of the 20th century saw the planning of several **greenbelt communities** as part of the US President Roosevelt's New Deal for boosting the US economy. The main objectives were to include green spaces in urban design, which at the same time work as buffer zones to adjacent land uses (Benedict and McMahon 2006: 29). Maryland and Greenhills are examples of towns finally built based on the concept of a system of corridors, buffers and belts of green between neighbourhoods. However, in contrast to the European approach, the Greenbelt movement in the US also took into account ecological aspects influenced by Marsh and Thoreau (Krech et al 2004a: 262-268 and Krech et al 2004b: 622). In addition, around the same period of time, new scientific concepts started to appear leading to the emergence of the new discipline of ecology which looked into the relationships of plant and animal communities and their environment. The forester Aldo Leopold

was among the first to discuss the importance of the diversity of wild plants as visual 'food', and is today known as the founder of wildlife ecology (Krech et al 2004a: 128 and Benedict and McMahon 2006: 30). At the same time, ecology and planning started to be more explicitly linked, particularly reflected in the work of Benton MacKaye and Patrick Geddes (Mossop in Waldheim 2006: 165). MacKay aimed at grounding regional planning in human ecology and combined the need for recreation with the planning of green space corridors building on natural land forms (Mossop in Waldheim 2006: 165, Benedict and McMahon 2006: 29). Patrick Geddes on the other hand, a generalist interested in biology and ecology as well as in town planning and sociology, is thought to have laid an important basis to the development of environmental sociology and town planning as disciplines, albeit his work has also been contested. This for example relates to his passion of the '*structuring of social and (environmental) reality [….] by human beings'* and '*of an 'actively created environment*', but narrowing interpretations of the natural environment to aspects such as food, air quality and light (Studholme 2007:455).

Ecological principles were more comprehensively considered in urban planning and landscape architecture only in the 1960s. Landscape architect Philip Lewis introduced the notion of environmental corridors, which in 1997 he more clearly defined as '*spatial patterns of occurrence of any or all of the combined features of water, wetlands, and steep topography of 12.5% or greater found in an urban or urbanizing environment*' (cited in Murell 2003:1). However, it was Ian McHarg who first strongly advocated for a *design with nature* in his book of the same title. He underlined that form must do more than just follow function, and urban planners need to take due account of natural processes when determining development or non-development priorities (Benedict and McMahon 2006: 30). On the other hand, it is considered that the theories and practices of McHarg also contributed to a schism between environment and design in the landscape architecture discipline (Mossop in Waldheim 2006: 168-169). Making a clear distinction between a self-sustaining and renewing countryside and the dirty, ugly city as well as favouring a *laissez-faire* approach, he was thought to have a strong tendency to anti-planning and anti-design. Later generations of landscape architects, including for example Lawrence Halprin and Dan Kiley, developed a more design and art-focused school with little interest in ecological sustainability, more or less in opposition to the theories espoused by McHarg (Mossop in Waldheim 2006: 168-169).

Table 3: Historic evolution of Green Infrastructure in the United States – from the 1960s to today

Time period	Milestones	Primary objectives & key approaches
1960s – 1980s	Ecology decade: × William H. Whyte introduces greenway concept (1959) × Rachel Carson - emphasis on man's impact on nature and its effects on human well-being (1962) × Range of international conferences and multi-lateral environmental agreements, e.g. CITES × UNESCO Man and Biosphere Programme: Core areas surrounded by zones of compatible land use (1971) × Island biogeography explores the relationship between landscapes and species (1967) × Ian McHarg: Ecology as the basis of design (1969) × Philip Lewis: Landscape analysis looking at environmental corridors and features × Conservation Fund: American Greenways Program × Larry Harris and Reed Noss: Design and protection of regional reserve system	*Objectives* • Active recreation and scenic amenity • Preservation of nature in its 'wild' state • Protecting core areas of wilderness • Designing with nature *Key approaches* • Land acquisition • Park planning & management • Landscape & suitability analysis • Emphasis on linkages, as preserving isolated natural areas not considered enough • International trade and multi-lateral environmental agreements

1990s and beyond	Linkages: × Maryland and Florida: State wide systems of greenways and green spaces × Wildlands project: North American System of interconnected wildlands × Commission on Sustainable Development: Green Infrastructure as one of five strategic areas for sustainable community development × Growing interest in Green Infrastructure as a tool to guide land conservation and development	*Objectives* • Active and passive recreation • Scenic amenity • Farmland protection • Urban forestry and wildlife (90s) • Regional ecological systems, integration of conservation and growth management *Key approaches* • Land acquisition • Floodplain zoning • Greenway planning and management (90s) • Smart growth management tools • Partnership with landowners & trusts (00s) • Participatory decision-making

Source: adapted from Benedict and McMahon 2006:24-25 and Randolph 2004:96, with additions from Frank 1997, Dick 1995, Nagle 2005

It needs to be noted that Ian McHarg's work was heavily influenced by an increasing **environmental awareness** in the general public and ecological knowledge in the scientific community in the 1960s and 1970s (Pankhurst 2010: 17, Dick 1995: 15-18, Krech et al 2004a: 478-480). Publications such as Rachel Carson's *Silent Spring* in 1962 or later on the report of the Club of Rome on the *Limits to Growth* strongly influenced the public opinion on the impact of human activities on the environment and human health (Pankhurst 2010: 17). It also triggered a range of international environmental conferences (e.g. 1968 International Biosphere Conference, 1972 UN Conference on the Human Environment) and agreements (e.g. 1972 Convention for the protection of World Cultural and Natural Heritage Sites; 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES).

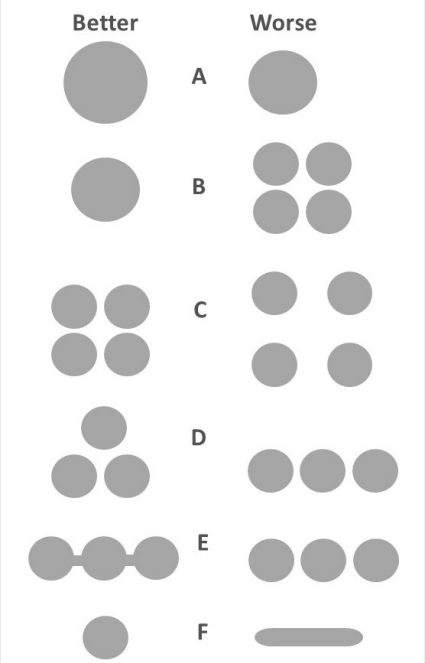
In 1967, Robert H. MacArthur and Edward O. Wilson published their **equilibrium theory of island biogeography** (MacArthur and Wilson 1967), which went on to form an important ecological basis for the development of greenways in the US and ecological networks in Europe (see next subchapter). Based on the study of animal populations, the two biologists set out the theory that the equilibrium between extinction and immigration of a species population on an island is impacted by the distance to other islands and the mainland as well as the size of an island (Schoener T.W. cited in Jorgensen and Fath 2008:2040). The importance of the theory was further influenced by the concept of metapopulations in the early 70s. Following the concept, species do not appear in stable and homogenous populations, but dynamically depending on the varying quality of habitat patches (Jorgensen and Fath 2008:2318, Bennett and Mulgony 2006:27). These assumptions became an important basis for the development of the conservation biology discipline, which with increased habitat deterioration and fragmentation started to focus on the dynamics of suitable habitat patches as 'islands' in a 'sea' of 'inhospitable' habitats.

The theories subsequently also entered land management and planning, linked to the influences of general rules for the creation of nature reserves developed by biologist Jared Diamond using the two concepts (see Figure 4). According to these rules and summarised in simple words, natural reserves best contribute to conservation objectives if they are as large, as round, as close, and as connected as possible. In 1980, the principles were included in the World Conservation Strategy of the International Union for Nature Conservation (IUCN) (Bennett and Mulgony 2006:27).

However, it needs to be noted that the principles have been criticised by ecologists for not taking sufficient account of the impact of the quality of the suitable habitat patches and the degree of 'hostility' or ecological

quality of the overall landscape (Bibby 1998; IEEP and Alterra 2010: 225). This has more recently led to initiatives to increase quality in the wider environment, and has had impacts on the development of the GI concept particularly in Europe (see next sub-chapter).

Figure 4: Principles for the design of natural reserves (adapted from Diamond 1975:143)



Following the (re-)appearance of greenbelt approaches in the US and the development of parkways to meet the recreation needs of city dwellers, the term '**greenway**' was introduced by William H. Whyte starting in 1959, when discussing the planning of open spaces, and became dominant as a term particularly in the 1970s and early 1980s (Little 1990:23-24). It rose as a movement particularly due to the challenges other approaches trying to conserve or preserve open space in urban areas were facing (e.g. mono-functionality). The movement called for the creation of an entirely new infrastructure of green ways (Little 1990:30-32). According to Randolph (2004), prior to the 1980s, the main instrument of land conservation around and in communities of the United States was park and recreational planning. It aimed at identifying and purchasing property for scenic amenity and active recreation, and parks were managed accordingly (Randolph 2004: 95). Over time, increasing environmental awareness influenced design and planning efforts. In this regard, the greenway movement is thought to have been particularly influenced by the appearance of the concept of 'sustainable development'. Defined as the ability '*to ensure that* [development] *meets the needs of the present without compromising the ability of future generations to meet their own needs'* (UN World Commission on Environment and Development 1987), it led to an increased effort in emphasising the economic, social and environmental benefits that arise from greenways to cities, suburbs and the general countryside (Pankhurst 2010: 18, Little 1990: 30).

Greenways were later defined, for example by Little (1990), as a '*linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route*' (Little 1990: 237). This definition is supported by the US President's Commission on American Outdoors in 1987, advocating for greenways as an '*integrated functional network, managed for multiple purposes, linking rural and urban environments*' (Jongman and Pungetti 2004:34-35). However, other definitions of greenways existed as well, hinting at the complexity of the approach as well as suggesting the need of defining common principles and typology. For example, landscape architect Jack Ahern defines them more largely as '*networks of land that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use*' (Ahern 1995: 134). Based on this definition, considered more comprehensive and inclusive, he identified three principles that form the theoretical basis of greenways: 1) greenway resources are concentrated in connected corridors (co-occurrence); 2) social, economic and environmental benefits are inherent to the connectivity, and 3) an often limited spatial area can provide multiple functions (Jongman and Pungetti 2004:34-35).

What followed the appearance of the greenway concept were a range of initiatives promoted by different organisations at different levels. It includes for example the American Greenways Programme launched by the Conservation Fund in 1987 and Maryland's state-wide greenway planning initiative in 1990 (Benedict and McMahon 2006: 34-35). What needs to be noted is that these initiatives were considered an important

shift of land conservation in the United States, from rather remote national parks and protected landscapes to open spaces accessible to urban populations (Jongman and Pungetti 2004:35). The greenways and open space planning of the 1990s, however, often put its emphasis on passive and active recreation, scenic amenity or flood protection, and only to some extent on the conservation of urban forestry and wildlife (Randolph 2004:96).

With rising concerns regarding the global loss of biological diversity (i.e. the diversity of species, ecosystems and genetic diversity) and the entry into force of the UN Convention on Biological Diversity in 1992, increased attention was given to drivers of biodiversity loss such as **habitat disappearance and deterioration** as well as **fragmentation** in the US and other countries. Fragmentation refers to the break-up of habitat patches caused by the development of transport or other built infrastructure, urban sprawl or loss of suitable habitats (IEEP and Alterra 2010: 28, Kettunen et al 2007:13-17). In 1994, the ecologists Larry D. Harris and Reed Noss developed and promoted the design of regional reserve systems built up of different elements such as core reserves, multiple-use zones and corridors in order to address the problem of habitat fragmentation (Benedict and McMahon 2006: 34). It signalled the beginning of an extended scope, focusing again on wildlife habitats rather than mere functionality, and of taking into consideration ecological functions at broader scale (Randolph 2004:95). In addition, communities were increasingly interested in approaches that did not see open space as an afterthought but an integral part of land development, and worked as strategies to manage urban growth (Randolph 2004:95). They were looking for a concept that allowed a combination of both conservation and development efforts.

In the 1980s and 1990s, as a counteraction to urban sprawl, in North America the **'smart growth' movement** was born. Its main principles are the creation of a more compact and integrated urban development (UN Habitat 2009:160), building on discussions related to the Agenda 21 released at the 1992 UN Conference on Environment and Development in Rio de Janeiro (UNCED 1992) and to the planning of a compact city in Europe (CEC 1990). It supports '*increases in density; mixed-use and cluster developments; a variety of housing types beyond detached units; protection of open space, agricultural lands and ecologically sensitive areas; the reduction in use of private and motorized forms of transport; the promotion of public transport systems; and the design and redesign of areas to support such use*' (UN Habitat 2009:160). Maryland, for example, adopted 'smart growth' legislation in 1997 to direct funding that supports the development of infrastructures in certain growth areas and limiting it in others (UN Habitat 2009:160). Despite weaknesses such as requiring significant capacity and organisation, often rather poor and narrow implementation, marginal changes and contested benefits (UN Habitat 2009:161), the 'smart growth' approach laid further fundaments for the development of the GI concept and remains inherently linked to it in the US.

The term **Green Infrastructure** was used for the first time in the early 1980s, defining the vital functions provided by the natural environment, often called ecological services (Pankhurst 2010: 18). In 1999, the US President's Council on Sustainable Development explicitly identified Green Infrastructure as one key strategy to achieve sustainable development (Benedict and McMahon 2006: 35). It has been subsequently advanced in particular by The Conservation Fund (Benedict and McMahon 2002), The Trust of Public Land (2002), the US Environment Protection Agency (2001) and the State of Maryland (2001) (Randolph 2004:95). The resulting definitions and applied principles and characteristics will be further analysed in chapter C 1.1.2 on what GI is and what not, whereas the following sub-chapter will look in more detail at its European origins in comparison.

C 1.1.1.2 European influences

Compared to the United States, Europe's environment has historically been more strongly imprinted by human use. It is thus of little surprise that in a more densely populated Europe with generally less land available, the key focus of land management and conservation at the very beginning was on the conservation of crucial resources.

The book by Hans Carl of Carlowitz on the economics of forestry ('sylvicultura oeconomica') in 1713, arguing for the continuous, consistent and sustainable use of timber and forests, formed an important basis for the emergence of scientific forestry, particularly in Europe (Krech et al 2004a: 262-268). It also led to the first range of nature protection regulations specifically focused on the protection of forests and its resources (e.g. game species, sustainable timber production) in Germany, the Czech Republic, Austria, Hungary and Switzerland. This includes for example the Austrian-Hungarian forest law (Reichsforstgesetz) in 1852, the Swiss hunting and bird protection law in 1875, and the Prussian bird protection law in 1888.

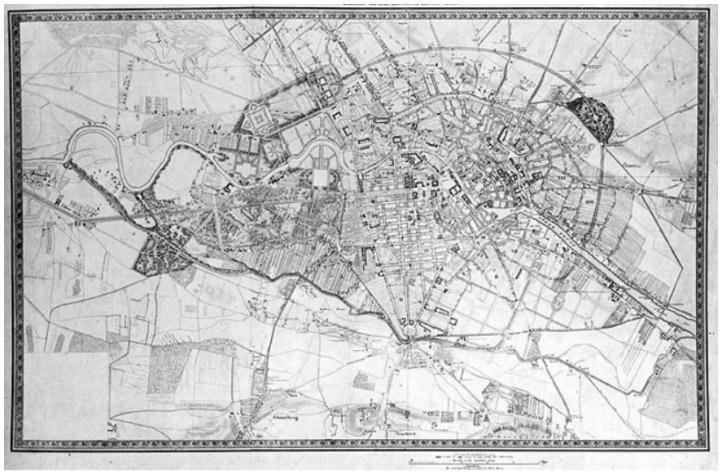
Table 4: Historic evolution of Green Infrastructure in Europe – 19th century to early 20th century

Time period	Milestones	Primary objectives & key approaches
1800s – 1910s	*Natural resources & scenic amenity* × Germany - Hans Carl of Carlowitz and its 'sylvicultura oeconomica' (1713) × Range of nature protection regulations released to safeguard forests and its resources in Germany and Austria-Hungary (1850-1870) × European Colonialisation: Colonial administrations using nature protection instruments × UK - First nature protection regulations on sea birds, wild birds (1860-1880) × Garden & landscape design: Development of a range of publicly accessible urban parks, particularly in UK (1889-1898) × Lennè: First plan of 'greening' Berlin in 1840 × Howard: Idea of green belt introduced in England '*to prevent one town growing into another*' (1892) × Promotion of garden city schemes in the UK and allotment gardens (Schrebergärten) in Germany × First National Parks created in Sweden (1909) × 1st international nature conservation conference in Switzerland and first Swiss national park (1914)	*Objectives* • Protection of forests and related resources • Scenic & landscape amenity • Social objectives *Key approaches* • Nature reserves and national parks • Nature and species protection regulation • Evolution of parks open to the public • Green belts and allotment gardens
1920s – 1950s	*City landscapes* × 1st international congress on housing and urban development in Amsterdam (1924) × London Green belt act (1935) × CIAM and the Athens Charter (1933) × Copenhagen network of green paths (1936) × World War II and German National Socialism × Reichow: The concept of *Stadtlandschaften* (1948)	*Objectives* • Protection of forests and related resources • Scenic & landscape amenity • Recreation & health *Key approaches* • Nature & landscape protection areas • Nature and species protection regulation • Structured and low-density urban areas including small settlements embedded in larger landscape

Source: Own representation based on Dick 1995, Krech et al 2004a:262-268, Amati and Taylor 2010; BFN 2006, Jongman and Pungetti 2004, Jongman et al 2004, Bennett and Mulgony 2006, IEEP and Alterra 2010, Gothein 1926

The range of regulations released for the protection of forests and other environmentally sensitive areas were mainly enforced and managed by government agencies, following a stronger top-down approach than was actually the case in the US. This was often the cause of major conflicts with the rural population due to the enforced limitations on important resources of game, firewood, building materials and other goods (Krech et al 2004a: 262-268). European countries also exported their forestry practices to their then existing colonies, which very often resulted in the inhabitants of colonies being deprived of their basic hunting and settling rights. Great Britain's interest for example in economically valuable tree species left the Indian population with limited access to woodland (Krech et al 2004a: 262-268). Nevertheless, these developments in Europe also had major influences on conservation efforts in the United States. Gifford Pinchot for example, received training at the French forestry school in Nancy and extensively travelled through Germany and Switzerland in his early years of activity (Krech et al 2004a: 262-268). It is believed that this also had some influence on his efforts in persuading the US national government and Roosevelt in particular in taking a key role in implementing conservation instruments.

Figure 5: Lenné's plan for Berlin (Stadt Berlin/Senatsverwaltung für Umwelt, Verkehr und Klimaschutz n.d./a and Hennebo 1970)



As previously mentioned, also the European garden and landscape architecture movements of the 18th and 19th centuries had a deeper impact on the work of US designers such as Frederik Law Olmsted. In the UK, the increased desire of the bourgeoisie for **public spaces** as places for debate and intellectual exchange resulted in the opening of formerly closed garden squares and in the creation of a range of new parks (Gothein 1926: 434). New designs aimed at reflecting a pastoral landscape to counterbalance the struggles of an ever more populated and polluted city linked to industrial development (Gothein 1926: 435-441). In this regard, parks generally started to include a picturesque lake for boat trips, shadowed banks for walks and large meadows for playing, to counteract urban noise and density. The design of such **English landscape gardens and parks** inspired the development of larger parks of a similar style throughout Europe. This included work by Peter Joseph Lenné, who was responsible for the re-design of the Tiergarten Park in Berlin in 1818 and 1840 (Gothein 1926: 435-441). At the time, the Prussian state ministry also required the provision of an overall plan for the development of green public areas in Berlin for recreational use by an increasing urban population. This resulted in the development of the concept of '*projektierte Schmuck- und Grenzzüge von Berlin mit nächster Umgebung*' (projected ornamental and limiting lineaments of Berlin and close neighbourhoods) by Lenné in 1840 (see Figure 5). It can be deemed as one of the first plans to 'green' an entire city, linking existing and newly created parks in the city and creating green boundaries. In the end, these developments also inspired US landscape architect Olmsted during his travels throughout Europe, for instance when creating New York's Central Park in 1854 or Boston's Emerald Necklace. However, in contrast to some European approaches, Olmsted more clearly separated his parks from other urban activities, limiting them by walls and avoiding road construction crossing an area. In addition, it is also said that US and UK garden designers more clearly focused on the public use of the parks, providing larger meadows that were not limited in their use and which differed from regulations on continental Europe (Gothein 1926: 441).

Equally, American movements had a deep impact on some ideas that formed an important basis for the understanding of the GI concept in Europe. Ebenezer Howard (1850-1928), English founder of the **Garden City schemes**, was heavily influenced by his time spent close to Chicago, more precisely by the work of landscape architect Olmsted in Riverside (Krech et al 2004a: 262-268). In reaction to the changes triggered by the industrial revolution, Howard's schemes envisaged a greenbelt to limit urban expansion and as a resource for recreation and agriculture. At the same time, his schemes foresaw the creation of lower density settlements at the urban periphery that included possibilities for gardening. Howard's endeavours are also often described as an attempt to bring English village life back to towns and cities (UN Habitat 2012: 10). The idea of garden cities, however, was not entirely new: in 1874 Countess Adelheid Dohna-Poninska under the pseudonymous 'Arminius' already had developed the idea of small gardens for urban workers in Germany, which a few years later culminated in the allotment garden movement. Similarly, landscape architect Leberecht Migge (1881-1935), inspired by the economist Werner Hegemann and his enthusiasm for the design of American parks, prioritised interconnected park systems that offer a variety of social uses, albeit also highlighting the importance of aesthetic expressions (Haney 2010; Hauck and Czechowski 2015:9). The evolution and development of gardens that support the self-sufficiency of an urban population later on became central to Migge's work, resulting in his 'Green Manifesto' in 1919, which called for garden-making to become a national movement. Due to his biological approach to gardening, influenced by the increasing botanical knowledge of the time, he is today viewed as one of the most important founders of ecological garden and landscape design (Haney 2010).

Before the outbreak of the two World Wars, a range of initiatives took place which had an important impact on international and national nature conservation efforts and as such on the underlying principles of GI in Europe. In 1914, Paul Sarasin organised the first international nature conservation conference. He was also the founder of the first Swiss national park, which followed the creation of the first nine national parks in Europe created in Sweden in 1909. Although influenced by the US movement, European park administrators often intended to limit public access and recreation opportunities in the newly created parks (BfN 2006, Dick 1995). In 1924, **nature conservation and urban development** efforts were for the first time combined at the international congress on housing and urban development. Urban planners and architects emphasised that nature is '*important for outdoor recreation, scenic beauty and its intrinsic value'* (Jongman and Pungetti 2004:9). Similarly, Le Corbusier (1887-1965), a famous representative of the modernist architecture movement arising in the 1920s, stated in 1933, as part of the Athens Charter of the Congrès International d'Architecture Moderne (CIAM), that closeness to '*conditions of nature*' such as sun, space and vegetation is indispensable for physical and '*moral health'* and that those three elements can be considered as the three raw materials of urbanism (translated by Eardley 1973). He also advocated for larger areas of space dedicated to community activities rather than small unit plots as promoted by the garden city movement. However, Le Corbusier as well as modern architecture represented by the Bauhaus school and Mies van der Rohe were focused on latest technological developments, seeing it reflected in the clarity and purity of architecture, and had little use of landscape design (Hill 2006:28-29). Albeit underlining the importance of a compact city, Le Corbusier also expressed his fears of the risks of very high densities and similar to other architects of the Modern Movement asked for an interior town expansion that includes a widening of narrow streets and the demolishing of old buildings considered having no key historical significance (Albers 2006:47-51).

Nevertheless, the idea of a **greenbelt or a network of green paths**, in particular to satisfy recreational needs in otherwise polluted cities, increasingly entered urban development plans. In 1936, for example, the city of Copenhagen approved the plan for a network of green paths (Jongman et al 2004). Some of Howard's

ideas were also partly put in place by Patrick Abercrombie (1879-1957). Supported by the architect later responsible for the County of London Plan (1943) and the Greater London Plan (1944), in 1935 landowners, civil servants and local politicians worked on putting the idea of a green belt around London into practice (Amati and Taylor 2010). It led to the Green Belt Act, basically a loan scheme that allows the London County Council to purchase land for preservation. Due to transatlantic exchange on the subject, the UK greenbelt movement also swopped 'back' to the United States. However, inspired by Marsh and Thoureau, different to the English approach the American greenbelt concept included to a higher degree also ecological components and a stronger interest in biological processes (see sub-chapter on US origins) (Krech et al 2004a: 262-268). Approaches on continental Europe were more strongly influenced by the discipline of landscape ecology as coined by the German geographer Carl Troll (see also C 1.1.2.1 on existing GI definitions), which describes a discipline that looks into the spatial arrangement of landscape elements and how this affects materials, energy and individuals in an environment (Benedict and McMahon 2006:30).

During the time of National Socialism, nature protection in Germany became strongly aligned to notions of scenic beauty and homeland corresponding to the ideologies of the regime. This was reflected in the preamble of the 'Reichsnaturschutzgesetz' (national nature law) in 1935, which stated that without certain changes in mind-sets the protection of the beauty of nature, including for peasants, would not have been possible (BfN 2006). Previous planning ideas relating to a rural and traditionalist interpretation of the garden city schemes or the concept of *Stadtlandschaft* (city landscape) were adapted to the needs of the regime. They were re-interpreted in the framework of the idea of *Heimat* (homeland) and closely linked to a culturally determined landscape and the development of self-contained settlement units (Sohn 2003:121+134). At the same time, the regime opened up its landscape for major developments considered of major public interest (BfN 2006), in particular military and transport infrastructure.

After World War II, nature protection legislation throughout many parts of Europe mainly focused on landscapes strongly imprinted by man, with post-war reconstruction efforts strongly influencing discussions on development and protection needs (BfN 2006). With regard to the reconstruction of Germany, Hans Bernhard Reichow (1899-1874) (re-)introduced the term *Stadtlandschaft* (city landscape). He promoted an organic urban planning that results in the development of '*a new, near-natural city that unites with the native landscape'* (Sohn 2003:120). It included the linear development of residential settlements centripetally linked to a compact centre and embedded in the local landscape, green space being designed for use and closeness to nature to provide the foundation of a dignified life (Sohn 2003:123+125). Historians of urban planning have aligned his interpretation of *Stadtlandschaft* with the ideal (*Leitbild*) of a structured and less densely built town (*gegliederte und aufgelockerte Stadt*). The notion was particularly pursued in the 1950s, though strongly builds on ideas already addressed in the Athens Charter by Le Corbusier.

Table 5: Historic evolution of Green Infrastructure in Europe – from the 1960s to today

Time period	Milestones	Primary objectives & key approaches
1960s – 1980s	*Environment and human well-being* × Post-war economic growth: New Town movement and urbanisation defined by density (1960s-1970s) × Biosphere conference (1968) × UN conference on the human environment (1972) × Directive 2009/147/EC on the Conservation of Wild Birds (1979) × European Bern Convention (1979)	*Objectives* • Protection of the environment and ecosystems for human well-being *Key approaches* • Multi-lateral environmental agreements • Ecological networks development • European nature protection legislation

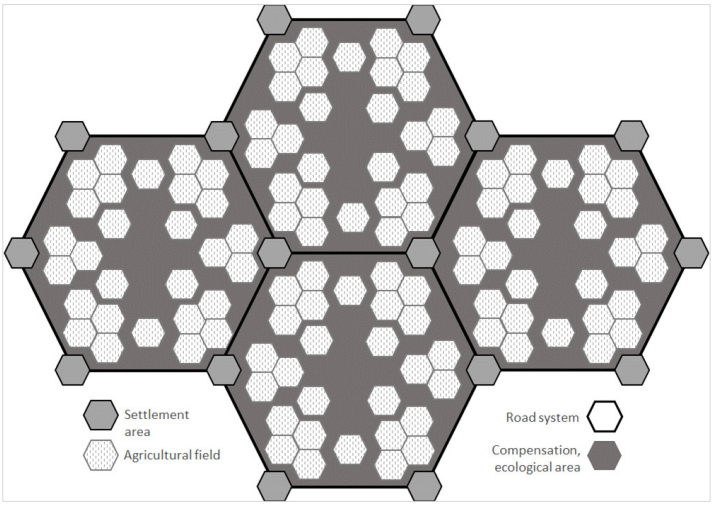
	× Eastern and Central European ecological networks (1983)	• Urban green areas as buffers for high-density areas
1990s and beyond	*Biological diversity and human well-being* × Commission of the European Communities - Green Paper on the urban environment (1990) × UN Convention on Biological Diversity (1992) × Habitat Directive (1992) and Natura 2000 × Pan-European Biological and Landscape Diversity Strategy (1995) × European Emerald ecological network (1998) × GI concept enters UK planning (2000) × European Landscape Convention (2000) × Millennium Ecosystem Assessment (2005) × The Economics of Ecosystems and Biodiversity (2010) × GI approach enters UK (2000) × EU Green Infrastructure Strategy (2013)	*Objectives* • Conservation of biological diversity and ecosystem services and their contribution to human welfare *Key approaches* • Ecosystem approach to conservation • Network management approach • Partnership agreements • Payment for ecosystem services • Habitat banking

Source: Own representation built on Dick 1995, Krech et al 2004a:262-268, Amati and Taylor 2010; BFN 2006, Jongman and Pungetti 2004, Jongman et al 2004, Bennett and Mulgony 2006, IEEP and Alterra 2010; UN Habitat 2009

The steep economic growth of the 1960s and 1970s turned the tide against this movement. In many parts of Europe, particularly the UK, driven by the urgency of 'urban renewal', new towns were shaped into the landscape, imposing as considered by some today, high-rise uniformity, intrusive road structures and high car dependency, situated in a park-like landscape, in order to reduce city congestion and promote regional development (UN Habitat 2009:114, Pankhurst 2010:16). As a contraposition to the structured and low-density approach, the new ideal of urbanity defined by density emerged. 'Densification' and 'interrelations' were translated into high-rise housing, buffered by some green areas, and dominated by oversized road infrastructure systems (Albers 2006:57-58, Krämer 2014).

Following increasing concerns regarding the environmental impact of post-World Wars development and under the influences of the American environmental movement of the 1960s and 1970s, the Stockholm conference on the human environment was organised in 1972. It marked an important shift also in Europe from the protection of natural resources and scenic landscapes to those of ecosystems and their importance for human well-being. The conference was also an important milestone for the development of multilateral environmental agreements and legislative acts that supported the formation of connected protected areas in reaction to an increasingly fragmented landscape. This for instance includes the international binding European Bern Convention in 1979 (Council of Europe Treaty No.104/1979), which under the auspices of the Council of Europe subsequently led to the development of the first pan-European ecological network – The Emerald Network. Also in 1979, Europe's first nature conservation legislation came into force, the Birds Directive (Directive 2009/147/EC), which later formed an important part of the EU's network of protected areas – Natura 2000. At the same time, increasingly urban planning started to include ideas to address some of the environmental problems moving up the political agenda, particularly regarding environmental pollution of water and air, and waste treatment. The approach was however still mainly a technical one focused on physical planning and design of settlements to be carried out by trained experts (UN Habitat 2009:49).

Figure 6: Landscape stabilization approach (adapted & developed based on Mander et al 1988 in Meier et al 2005:532)



Note: The combination of the central place theory of the *Von Thuenen – Christaller – Lösch* model and the theory of polarized landscapes by *Rodoman*, resulting from hierarchical interactions between centres of human activity and of pristine nature, leads to an idealised hexagonal model of rural landscapes.

According to Bennett and Mulgony (2006:13), the birth of the concept of **ecological networks**, key for the understanding how the term GI is often interpreted in Europe, can be rooted in Central and Eastern Europe in the 1980s. The Estonian approach of Ecologically Compensating Areas in mid-1970s and similar programmes of other Eastern European countries (e.g. Lithuania and former Czechoslovakia) were largely influenced by the polarized-landscape theory of the Russian geographer Boris Rodoman (Meier et al 2005). Following his environmental planning theory, also called landscape-stabilization approach, the landscape should be zoned in a way that intensively used parcels are balanced by natural zones that work as a coherent, self-regulating whole (see Figure 6)(Meier et al 2005:532, Bennett and Mulgony 2006:6). The main aim is the designation of territories that function as an ecological compensation to areas heavily used (Jongman and Pungetti 2004:16). The programmes, envisaged to be embedded within a strong national planning system, for many years mainly existed on paper only.

They were partly revived years later for example with the implementation of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) in 1995. Initiated by the entry into force of the UN Convention on Biological Diversity in 1992, PEBLDS has as major objective the establishment of a Pan-European Ecological Network, consisting of '*a physical network of core areas and other appropriate measures, linked by corridors and supported by buffer zones*' (Council of Europe n.d.). Different to other approaches it aims at reaching the conservation of biological diversity by generally safeguarding healthy ecosystems and landscapes rather than focusing on especially valuable sites only. PEBLDS was also influenced by the equilibrium theory of island biogeography by biologists Robert H. MacArthur and Edward O. Wilson (see previous subchapter for more detail), which was a main ecological stimulus for the development of ecological networks in Western Europe (e.g. National Ecological Network of the Netherlands) (Bennett and Mulgony 2006:28). However, different to US approaches the implementation of ecological networks in Europe was mainly driven at a **national and international government level**, whereas non-profit (e.g. land trusts) and private efforts were and are more common place in the United States (Bennett and Mulgony 2006:28).

As part of its commitments to the Bern Convention and to the Convention on Biological Diversity, in 1992 the European Union adopted the Habitats Directive (Council Directive 92/43/EEC). Together with the Birds Directive it forms the pillar of nature conservation law in the European Union, requiring the creation of a **network of protected areas** called Natura 2000. Article 3 of the Habitat Directive explicitly demands the coherence of the network, which has been subject to much scrutiny over its years of implementation (Kettunen et al 2007, Gellermann 2001). The network should be composed of natural habitats and habitats of species of Community interest. In contrast to other nature legislation but similar to PEBLDS, the Habitats Directive, with its aim of '*improving the ecological coherence of Natura 2000 through the maintenance, and where appropriate development, of features of the landscape*' (Article 3 §3, Council Directive 92/43/EEC),

envisages management activities that go beyond designated sites and apply to the wider environment (Kettunen et al 2007:15, Gellermann 2001).

The notion of increased attention to the quality of the **wider landscape** in supporting conservation efforts was also supported by the European Landscape Convention, released in 2000 (Council of Europe Treaty No.176/2000). Defining the landscape as '*an area, […] perceived by people, whose character is the result of the action and interaction of natural and/or human factors*' (Article 1 §a Council of Europe Treaty No.176/2000), the convention underlined the importance of not only taking into consideration the 'best' and most 'highly valuable' landscape areas. As such it also influenced the outline of the European Union's Biodiversity Strategy and Action Plan in 2006 (EC 2006), which forms an important basis for the elaboration of an explicit target on the development of GI later on in 2010 (see C 1.1.2.2). Besides reiterating the importance of adequately implementing and managing the Natura 2000 network, the strategy and action plan emphasised the need to take into account the quality of the wider countryside and marine environment. It explicitly not only referred to the conservation and restoration of biodiversity, but also advanced the concept of ecosystem services for human well-being.

Building on existing approaches such as the description of ecosystem functions or the provision of public goods (Sukopp and Wittig 1998), in 2005 the 'Millennium Ecosystem Assessment' introduced and promoted the **concept of ecosystem services**, which subsequently increasingly entered policy and public agendas (MA 2005). The concept has been developed as a framework to classify benefits provided by ecosystems and to underline their critical role in also supporting long-term economic sustainability (Jax et el 2013).These range from benefits linked to provisional services such as food and material, to regulating services such as water regulation or pollination, cultural services such as tourism or amenity, and supporting services such as nutrient cycling and primary production. What followed were comprehensive studies such as or 'The Economics of Ecosystem and Biodiversity' initiative (TEEB 2010), which played an important role in collecting evidence on the contribution of ecosystems to human well-being. The ecosystem services concept will play an important role in the definition of GI at the European Union level as part of the EU's GI strategy (see C 1.1.2.2), though it was of less importance to the development of the concept in the US.

This is also reflected in GI's initial application in the UK. Parallel to the ecological network approach on continental Europe and influenced by the first initiatives implemented under the concept of greenways and Green Infrastructure in the United States, the **GI concept** first entered Europe via UK local planning. The release of the Commission of the European Communities' Green Paper on urban environment (CEC 1990) also stimulated discussions among policy makers in Europe on the limits and impacts of urban sprawl, and on more sustainable urban spatial forms such as compact cities. In the UK, however, the greenbelt movement as a way of delineating urban edges lost impetus due to its rigidity as a planning tool and its key focus on urban containment rather than on potential benefits for human well-being and nature conservation (Amati and Taylor 2010:11). The GI approach was seen as an opportunity to integrate the sustainable development concept in urban planning. In 2000, the UK Countryside Agency and Groundwork was the first to start outlining the key benefits of GI (Natural England 2009:17). From 2003 onwards what followed was the development of several guidelines on the application of the approach particularly by Natural England (Amati and Taylor 2010:11), the UK government's advisor on the natural environment. Interestingly, these guidelines were closely linked to areas identified by the UK government's growth agenda, which aims at the development of homes to increase affordability in high demand areas and to increase sales opportunities in low demand ones (Pankhurst 2010: 23). In this regard, the government's Sustainable Communities Plan set out a framework for how the growth should occur, leading later to the Growth Point Agenda. It

required the preparation of a Green Infrastructure Strategy by local planning authorities as a core condition for sustainable development (Office of the Deputy Prime Minister (ODPM) 2005 in Pankhurst 2010: 23).

The final advent of the GI concept especially in Europe will be further analysed in sub-chapter C 1.1.2.2, following the scrutiny of existing definitions and underlying principles and characteristics, to describe what movements and initiatives underpin the current implementation.

C 1.1.2 What is GI, and what not?

To better understand the extent to which GI differs or not from the concepts and movements historically underpinning its development, requires an analysis of the term's current definitions, characteristics and principles as well as its drivers of implementation. This will be the main focus of the following sub-chapters.

C 1.1.2.1 Existing definitions and their characteristics

As numerous initiatives and disciplines have contributed to the shaping of its basics principles, there are nearly as **many definitions** of the GI concept. While used by landscape ecology, landscape architecture, urban design, conservation biology, environmental policy, geography and planning-related disciplines, there is no commonly agreed definition of the term. For example, by some it is perceived as an approach or idea, others merely refer to it as a physical structure, according to some it focuses on the urban environment, while others apply it to the broader landscape. It is also subject to continuous discussion between researchers and practitioners (Mell 2008, Weilacher 2015, and BDLA 2015). This sub-chapter will outline and compare some of the most often applied definitions, examining common features as well as important differences, taking into consideration the previously outlined historic origins.

Box 1: On the origins of the term infrastructure

Green Infrastructure is foremost analogically rooted in the general definition of the term 'infrastructure'. According to the Oxford Dictionary, the latter represents '*the basic physical and organisational structures and facilities (e.g. roads, power supplies) needed for the operation of a society or enterprise: the social and economic infrastructure of a country*' (Oxford Dictionary Online n.d.). Other definitions highlight the functioning of infrastructure as a '*collective network of road, bridges, rail lines and similar public works that are required for an industrial economy to function*' (Bélanger 2010: 333).

According to a synthesised, short etymology provided by Gutheil-Knopp-Kirchwald (2012), the term was initially coined from New Latin as 'infra-structure' and mainly used in French in 1875. It had been applied to refer to underlying features sustaining railway constructions and mainly remained part of the engineering vocabulary as a term to describe fundaments of construction work until the 1950s. It then entered military jargon, picked up by the NATO (North Atlantic Treaty Organisation) in its programme for strategic development of military airports, communication channels, air defence systems and pipelines in 1951. From the 1960s and 1970s onwards, the discipline of economics began to further elaborate on the term, influenced by international and development policy, where it referred to pre-requisites for an independent economic development including in relation to education and health. In those years, the discipline, and especially the economist Jochimsen (1966), focused on laying the foundations of a theory of infrastructure as an endowment for the development of a market economy (Torrisi 2009:107). Infrastructure was defined as '*….1. the totality of all earning assets, equipment and circulating capital in an economy that serve energy provision, transport service and telecommunications; we must add 2. structures etc. for the conservation of natural resources and transport routes in the broadest sense and 3. buildings and installations of public administration, education, research, health care and social welfare*' (Jochimsen 1966: 103, Buhr 2010). It might be argued that the second category already lays down basic arguments for the development of a GI approach. After the initial academic work in the 1960s and 1970s, the term entered other disciplines, including geography and spatial planning, and became a commonly and widely used term to also refer to less material features such as the World Wide Web (Gutheil-Knopp-Kirchwald 2012). This has led economics to look into new definitions, introducing for example a functional approach that focuses less on the material components infrastructure provides but the essential functions it delivers (Torrisi 2009:109). This is an interesting aspect that will come into play

in a later chapter of the thesis, when looking into space concepts as an entry point for GI planning and design (see chapter C 1.3.3.3).

In her historic review, Gutheil-Knopp-Kirchwald (2012) also revealed that at the end of the 19th century, development and maintenance of features of urban waste and water management systems as well as healthcare were initially taken care of by townspeople associations. Private companies were mainly responsible for the introduction and management of new technologies such as railway and gas supply systems. Only in the 1950s to 1980s, infrastructure was increasingly denoted to be provided by public authorities to support economic development. Following extended privatisation programmes at the end of the 1980s, its development and maintenance returned largely to private organisations. More recently, shared responsibilities between public and private parties are being pursued, also in light of austerity measures and budget constraints public authorities are facing. These developments are important to consider also in relation to interpretations of the GI concept and its typology of elements.

By using the term Green Infrastructure, its creators likely aimed at underlying that green and un-built spaces are not something nice to have but essential (Benedict and MacMahon 2006: 2), an important backbone for the functioning of societies and economies due the benefits they provide. It can be considered a life-supporting system that '*implies a systemic understanding of interconnected elements rather than isolated spaces*' (Thomas and Littlewood 2010: 8). Similar to other infrastructure, such as for energy provision or water sewage, especially in an urban environment it is described as largely remaining invisible to its users until it stops functioning. And it is more often created out of need than by design (Bélanger 2010: 332+333).

The authors of a report by the EEA (2011) carried out a wider analysis of existing GI definitions in the US as well as in Europe, building on work by Sylwester (2009). Additional insights are available by Naumann et al (2011a). Their work has been used as a basis to gain an overview of existing key definitions, adding some more recent examples, and presented as an overview in Table 6. This will be followed by a more detailed outline of the main **characteristics** inherent to the definitions, partly analysed by the various authors and partly newly added. These include:

- **Scale** at which the term can be applied
- **Disciplines** which have used the term
- **Connectivity** and its importance as a feature,
- **Typology** of structures it consists of
- **Benefits** that are expected
- **Implementation** approaches (to be discussed in chapter C 1.3.4)

Table 6: Selected examples of Green Infrastructure definitions

Definitions	Characterisation	Reference
Green infrastructure is a **strategic approach** to land conservation, a **'smart' conservation** that addresses the **ecological** and **social** impacts of sprawl and the accelerated consumption and fragmentation of open land.	**Disciplines**: Land conservation **Key benefits**: Conservation **Scale**: Landscape **Origin**: US	The Conservation Fund's GI Leadership Programme Benedict and McMahon 2002:7
Green infrastructure is defined as an **interconnected network** of green space that conserves natural **ecosystem values** and **functions** and provides associated **benefits** to human populations. The network consists of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands; and working farms, ranches and forests.	**Disciplines**: Environmental planning **Key benefits**: Multifunctional **Scale**: Landscape **Origin**: US	Randolph 2004:98

An interconnected **network** of natural areas and other open spaces that conserves natural **ecosystem** values and functions, sustains clean air and water, and provides a **wide array of benefits** to people and wildlife.	**Disciplines**: Land conservation **Key benefits**: Conservation **Scale**: Landscape **Origin**: US	The Conservation Fund Benedict and McMahon 2006:1
Green infrastructure is a term that describes the abundance and distribution of **natural features** in the landscape like forests, wetlands, and streams. Just as built infrastructure like roads and utilities is necessary for modern societies, Green Infrastructure provides the **ecosystem services** that are equally necessary for our **well-being**.	**Disciplines**: Environmental planning **Key benefits**: Multifunctional **Scale**: Landscape **Origin**: US	Maryland's Green Infrastructure Assessment Weber et al 2006:94-95
Green infrastructure is a concept that is principally structured by a hybrid **hydrological/drainage network**, complementing and **linking** relict **green areas** with built infrastructure that provides **ecological functions**. It is the principles of landscape ecology applied to urban environments.	**Disciplines**: Urban design, landscape architecture **Key benefits**: Water run-off control **Scale**: Urban **Origin**: US	Ahern 2007:267
Green Infrastructure is the **network** of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect villages, towns and cities. Individually, these elements are GI assets, and the roles that these assets play are **GI functions**. When appropriately **planned, designed and managed**, the assets and functions have the potential to deliver a wide range of **benefits** – from providing sustainable transport links to mitigating and adapting the effects of climate change.	**Disciplines**: Landscape architecture **Key benefits**: Multifunctional **Scale**: Landscape **Origin**: US	Landscape Institute Green Infrastructure Position Statement. Landscape Institute 2013: 5
Green infrastructure uses vegetation, soils, and natural processes to **manage water** and create **healthier urban environments**. At the scale of a city or county, Green Infrastructure refers to the **patchwork of natural areas** that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighbourhood or site, Green Infrastructure refers to **stormwater management systems** that mimic nature by soaking up and storing water.	**Disciplines**: Surface water management **Key benefits**: Water run-off control **Scale**: Urban **Origin**: US	US Environmental Protection Agency (EPA) 2014
Green Infrastructure can be considered to comprise of all natural, semi-natural and artificial **networks** of **multifunctional ecological systems** within, around and between urban areas, at **all spatial scales**.	**Disciplines**: Environmental planning and psychology **Key benefits**: Human health **Scale**: Urban **Origin**: UK, Finland	Tzoulas et al 2007
Green Infrastructure comprises the **networks of multifunctional greenspace** which sit within, and contribute to, the type of **high quality natural** and **built environment** required to deliver sustainable communities. Delivering, protecting and enhancing these networks require the creation of **new assets** to link with river corridors, waterways, woodlands, nature reserves, urban greenspace, historic sites and other existing assets.'	**Disciplines**: Environmental planning **Key benefits**: Multifunctional **Scale**: Urban (and beyond) **Origin**: UK	Government Office for the East Midlands 2009
Green infrastructure is a **strategically planned** and **delivered network** of high-quality **green spaces** and **other environmental features**. It should be designed and managed as a **multifunctional** resource capable of delivering a wide range of environmental and quality-of-life benefits for local communities. Green infrastructure includes	**Disciplines**: Land conservation **Key benefits**: Recreation **Scale**: Urban **Origin**: UK	Natural England Natural England 2010:15

parks, open spaces, playing fields, woodlands, allotments and private gardens.		
Green infrastructure is the living **network** of **green spaces**, **water** and **environmental systems** in, around and beyond urban areas. It includes trees, parks, gardens, road verges, allotments, cemeteries, woodlands, rivers, wetlands and coastal habitats.	**Disciplines**: Urban design **Key benefits***:* Recreation **Scale**: Urban (and beyond) **Origin**: UK	Former Commission for Architecture and Built Environment, today Design Council CABE 2011
Green infrastructure is the network of natural and semi-natural areas, features and green spaces in rural and urban, and terrestrial, freshwater, coastal and marine areas, which together enhance **ecosystem health** and **resilience**, contribute to **biodiversity conservation** and **benefit human populations** through the maintenance and enhancement of **ecosystem services**. Green infrastructure can be strengthened through **strategic and co-ordinated** initiatives that focus on **maintaining, restoring, improving and connecting** existing areas and features as well as creating new areas and features.	**Disciplines**: Habitat and species conservation **Key benefits**: Multifunctional **Scale**: Landscape **Origin**: EU	Projects informing the development of the EU Green Infrastructure Strategy Naumann et al 2011a:5 Mazza et al 2011:29
A **strategically planned network** of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of **ecosystem services**. It incorporates **green spaces** (or blue if aquatic ecosystems are concerned) and other **physical features** in terrestrial (including coastal) and marine areas. On land, Green Infrastructure is present in rural and urban settings.	**Disciplines**: Habitat and species conservation **Key benefits**: Multifunctional **Scale**: Landscape **Origin**: EU	EU Green Infrastructure Strategy EC 2013a:3

Source: adapted from EEA 2011:34 + own representation

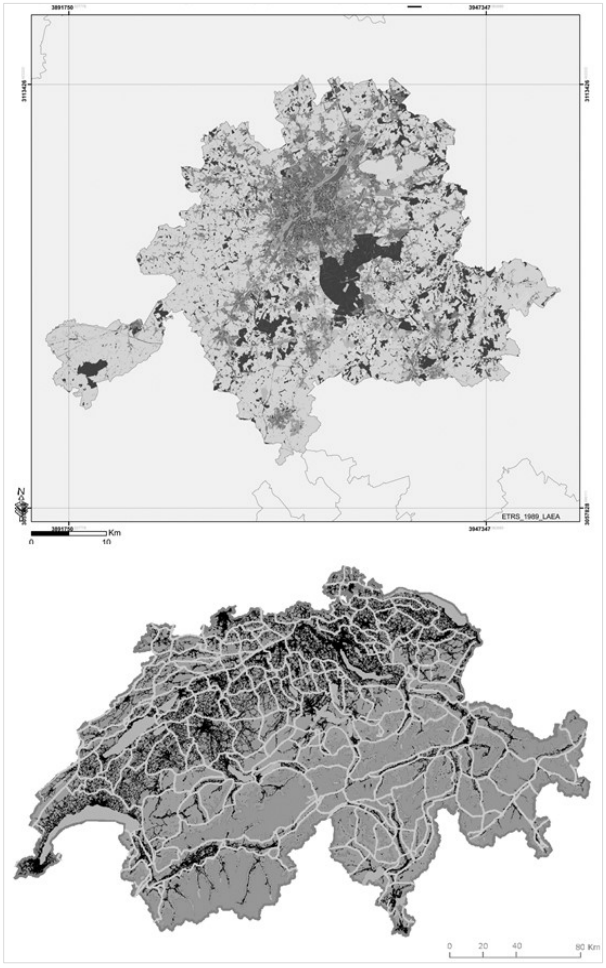
Scale

As has been outlined in the previous chapter on the GI origins, different movements have been responsible for shaping its underlining principles. These have either been strongly rooted in conservation efforts at the landscape level (e.g. ecological networks) or in the design and planning of the urban environment (e.g. greenways movement) (see Figure 7 as an example).

It is thus of little surprise that most definitions can be grouped according to the characteristic whether the term is applied at the landscape or urban scale. Particularly for many existing definitions in the US, the urban scale is a predominant focus. This is for example the case for the term as used by the US Environment Protection Agency (see EPA 2014) or how it has been applied by landscape architects such as Jack Ahrens, who refers to Green Infrastructure as '*the principles of landscape ecology applied to urban environments*' (Ahern 2007:267).

Influenced by the US and the green belt movement, definitions in the UK tend to also look at the urban scale (e.g. Natural England 2010). However, it should be noted that the line can rarely be drawn neatly and that the pursuit of a **multi-scale approach** is increasingly emphasised as a key underlying principle that defines the term, as suggested for example by the European Commission and the Conservation Fund in the US (EC 2013a:3, Benedict and McMahon 2002:7). The multi-scale approach follows the hierarchy theory, which considers systems operating simultaneously at multiple levels. It is for example also applied for transport infrastructure, to iterate that to understand the dynamics of transport at the local level an understanding of the larger system connecting to local elements is needed (Ahern 2007:269).

Figure 7: Brussels' green urban areas (top, black) and wildlife corridors in Switzerland (bottom, grey lines) (EEA 2011:71+83)



According to EEA (2011:30), one of the main differences between its application at the wider landscape and at the urban level is the applied land baseline. The matrices or obstacles in the urban context are mainly composed of built-up land, compared to intensively used agricultural land, built-up areas and grey infrastructure at the landscape level. The differing underlining baseline is considered crucial to define which structures form part of the network, particularly taking into account the various objectives of the concept. For example, though an agricultural field can be counted as an element of urban GI, within the broader landscape it might not be considered as such if it counteracts efforts of GI development to improve species migration for example. In addition, due to its changing objectives and structures, the scale largely affects the set of benefits GI is thought to deliver, as well as the instruments and approaches for its management (EEA 2011:30). These aspects will be analysed in more detailed in the following sections.

Disciplines

Which scale is taken into account when defining the term is strongly linked to the disciplines involved in providing its theoretical basis and driving its application. As outlined before, these in particular include landscape ecology and conservation biology, which for instance have provided the basic principle of connecting different features of the landscape for the support of ecological benefits. However, very different interpretations of the principle of ecological connection exist depending on the country of origin of the underlying science. For instance, the ecological network approach pursued particularly in Central Europe and Germany has been largely influenced by **landscape ecology** based on geographical sciences such as geomorphology and hydrology, as well as botany and architecture (Jongman et al 2004:307, Ingegnoli 2002:11-14). This has resulted in German and Eastern European approaches concentrating on horizontal (chorological or geographical) and regional aspects of its physical planning (Ingegnoli 2002:11-14), and thus physical features, geographical and land use mosaics (Zonneveld 1989:71). Landscape ecology in the US

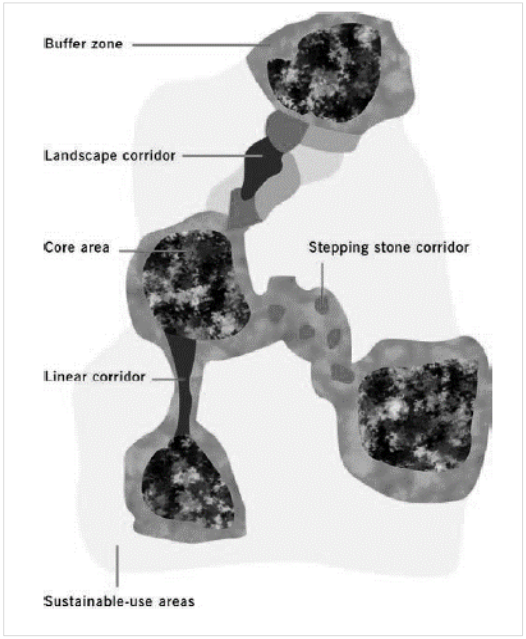
and UK (and in other parts of Europe) has been largely influenced by ecosystem ecology, population ecology and conservation biology. As such, related approaches look at the landscape as a system, and are more interested in vertical biological (topological) processes in the landscape (Zonneveld 1989:71). The often distinguished views of the landscape presented in these and additional models (e.g. Haber 1980, Forman 1995) have been considered one of the greatest limits of landscape ecology in its application, and arise the need to clarify which view is taken when referring to the implementation of GI.

Linking open spaces was also subject to scrutiny by other disciplines such as **urban design, landscape architecture and environmental planning**. These disciplines have been an important driver for the development of the GI concept, and particularly its application at the urban scale (see Ahern 2007, CABE 2011 and Landscape Institute 2013). A key focus was put on physical connections to guarantee wider access to an urban population. As such they were especially crucial in emphasising the importance regarding the interactions of economic, ecological and social actors. However, they also led to an often different interpretation on what can be considered a GI element (e.g. all open spaces versus only natural features) and how the linkage occurs (e.g. physical versus functional linkage).

Connectivity

All of the definitions above include to some extent the notion of Green Infrastructure being an interconnected network consisting of different features. Connectivity is for many a key emphasis of the concept. Others at least underline the need for a critical mass or a certain degree of scale to make the concept effective (e.g. Naumann et al 2011a:19).

Figure 8: Components ecological network (Bennett and Mulgony 2006:5)



Where the principle of connectivity is applied, different interpretations of how it is achieved exist, depending again on the theoretical basis used. The maintenance and enhancement of **ecological connectivity** is essential to definitions that build on the ecological network approach following the equilibrium theory of island biogeography (see previous chapter). This for example is the case for the definitions as developed by the European Commission, the US Conservation Fund, and studies related to it (see Benedict and McMahon 2006, Randolph 2004, EC 2013a, Naumann et al 2011a:5). Albeit no common agreement on the term of ecological connectivity is available, it is most often described '*as the degree to which the landscape impedes or facilitates movement of* [species] *among* [habitat] *patches*' (Mazza et al 2011:81). Building on the ecological network approach, the EC (2013a) definition for example understands Green Infrastructure to consist of core areas, connected through corridors and or/stepping stones to allow species movement between habitat patches. These core areas are considered 'islands' in a 'sea' of 'inhospitable' habitats. Buffer zones and sustainable use areas are used to delineate those elements from the environment they are embedded in (see Figure 8).

However, according to related studies carried out to inform the development of the EC definition, connectivity should be considered as having two main components (Mazza et al 2011:81). This for example includes structural components, which describe the physical relationships between different elements such as patches and corridors; and functional components, which take into account the degree to which the permeability of the landscape for species is effectively increased. The studies argue that habitats do not necessarily have to be structurally connected to be functional. Connectivity can also be improved by reducing the 'hostility' of the matrix and increasing the general quality of the landscape (e.g. addressing existing barriers, distribution of habitats), as well as strengthening the size and quality of core areas (Mazza et al 2011:81, IEEP and Alterra 2010:219, Jongman et al 2004:306, Lawton et al 2010:8-9).

Building on the greenways movement as well as the design of regional reserve systems by ecologists Larry D. Harris and Reed Noss (see previous chapter), the basic components of Green Infrastructure as promoted for example by the US Conservation Fund include hubs and links (Benedict and McMahon 2006:1). According to Randolph 2004 (Randolph 2004:99), the former refer to reserves, native landscape, working lands, regional and community parks; the latter include landscape linkages, conservation corridors, greenways, greenbelts and riparian floodplains. As such related definitions more strongly concentrate on **physical linkages** and not always aim at increasing the permeability of the landscape for species migration. Equally important is the increased GI accessibility for recreation, cultural values, scenic amenity and open space in general. The linkage of open spaces and interconnected elements for the supply of specific benefits (e.g. water retention) play an important role when defining the concept of Green Infrastructure at the urban scale. The definition by the US Environment Protection Agency (EPA 2014) refers to Green Infrastructure as a '*patchwork of natural areas*', concentrated on the supply of flood protection, cleaner water and stormwater management system. As such it rather aims at the conservation and development of a **critical mass** than a sophisticated, elaborated network. This is also the case for many green roofs initiatives. It can be said that definitions at the urban scale frequently apply a more narrow understanding of the GI concept and its key principles, including multi-functionality which will be outlined in more detail further below.

Typology of elements

Besides basic components to describe the degree of connectivity, existing GI definitions describe more or less comprehensively various elements or structures forming the network. The descriptions range from general references to **green or open spaces** to a more accurate outline of **natural and semi-natural features**, depending strongly on the (theoretical) basis of the definition. For example, EPA (2014) defines the 'natural features' composing Green Infrastructure in contrast to 'man-made', built environment, and thus applies a rather wide understanding of the concept 'natural'.

The understanding of EC (2013a:3) with regard to natural and semi-natural features builds on definitions used in EU nature legislation such as the Habitat Directive (see previous chapter) and has also been influenced by the various ecological disciplines supporting the implementation of the Natura 2000 and other ecological networks. While the Habitats Directive provides a rather general outline, stating that 'natural habitats' mean '*terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural*' (Article 1 §b Council Directive 92/43/EEC), the Annex provides a more detailed list of such habitats. In contrast, the Birds Directive envisages the general maintenance or re-establishment of '*a sufficient diversity and area of habitats'* (Article 3 §1 Directive 2009/147/EC). In identifying those habitats, the Directive builds on work carried out by the non-profit organisation Bird Life in determining Important Bird Areas (IBAs). These habitats are recognised as scientifically valuable in several rulings of the European Court of Justice relating to the implementation of the Directive. The network of protected

habitats envisaged by the two Directives, Natura 2000, forms the backbone of Green Infrastructure in Europe (EC 2013a:7). According to studies underpinning the development of the EU Green Infrastructure strategy and its definition (Mazza et al 2011, Naumann et al 2011a), this includes the typology of elements provided in Figure 9.

Figure 9: Typology of Green Infrastructure elements (adapted from Mazza et al 2011:8)

Element	Outline
Core areas	Areas of high biodiversity importance, including large areas of healthy and functioning ecosystems with minimal intervention required, and smaller areas that require management; such as Natura 2000 areas and other protected areas (e.g. IUCN categories I, II and IV).
Restoration zones	Reforestation zones, new areas of habitat for specific species or restored ecosystems for service provision.
Sustainable use/Ecosystem Service Zones	Areas that are managed sustainably for economic purposes, whilst maintaining healthy ecosystems and providing a range of ecosystem service benefits (e.g. multi-use forests and High Nature Value farming systems). Such areas help maintain the permeability of the landscape (i.e. enable species to exist in the wider landscape and move between core areas).
Green urban and peri-urban areas	Parks, gardens, grassy verges, green walls, green roofs.
Natural connectivity features	Ecological corridors (hedgerows, wildlife strips, stone walls), stepping stones (i.e. patches of habitat that enable species to move between core areas), riparian river vegetation, etc.
Artificial connectivity features	Features that are designed specifically to assist species movement, such as green bridges (i.e. bridges that are covered by an appropriate habitat to encourage the movement of animals across them), tunnels and fish passes.

The authors also underline the limits of the typology as many of the elements are likely to often overlap. It also needs to be noted that the study does not consider intensively managed agricultural fields and forestry being part of the wider network, though they can have a role in the urban context. The hierarchy presented by the typology has also been influenced by definitions of naturalness and hemeroby. The former describes the '*degree to which a natural state has been degraded*' (Winter 2012:293), comparing its current state with its natural state (on a broad scale, whether as a continuum or in classes) (Winter 2012: 295-296). Hemeroby, on the other hand, is used to define '*the degree of human influence*' (Winter 2012: 296) and is particularly used to assess ecosystems majorly affected by human impacts. As such, it was also applied by Sukopp and Wittig (1998:257) in describing human influence on urban green areas.

In current discussions on new ways forward in urban design such as on new urbanism, landscape and ecological urbanism, and on the related role of Green Infrastructure, the categorisation by Hunt (2000) into first, second and third nature plays an important role in identifying the focus of its promoters. Landscape urbanism, for example, has been criticised by Thompson (2012:19-20) for focusing merely on the second nature category, referring to landscapes formed by human activities. The author iterates that the movement ignores nature outside direct human influence (first nature) or 'just' created for aesthetic considerations (third nature) (see next sub-chapter on 'Current drivers of implementation' for more details).

The EC (2013a:3) definition only provides a general overview of elements potentially part of a Green Infrastructure in the urban context. The Landscape Institute, which in its definition focuses on the urban scale, also provided a more comprehensive list of what can be considered GI assets, including specific sites as well as wider environmental features (see Figure 10).

Figure 10: Green Infrastructure assets (adapted from Landscape Institute in EEA 2011:7)

Local, neighbourhood and village scale	Town, city and district scale	City-region, regional and national scale
• street trees, verges and hedges • green roofs and walls • pocket parks • private gardens • urban plazas • town and village greens and commons • local rights of way • pedestrian and cycle routes • cemeteries, burial grounds and churchyards • institutional open spaces • ponds and streams • small woodlands • play areas • local nature reserves • school grounds • sports pitches • swales (preferably grassed) • ditches • allotments • vacant and derelict land	• business settings • city/district parks • urban canals • urban commons • forest parks • country parks • continuous waterfronts • municipal plazas • lakes • major recreational spaces • rivers and floodplains • brownfield land • community woodlands • (former) mineral extraction sites • agricultural land • landfill	• regional parks • rivers and floodplains • shorelines • strategic and long distance trails • forests, woodlands and community • forests • reservoirs • road and railway networks • designated greenbelt and strategic gaps • agricultural land • national parks • national, regional or local landscape designations • canals • common lands • open countryside

Many movements that occurred prior to Green Infrastructure and were located in the urban context were often limited to public open and green spaces (e.g. networks of parks, greenways). However, it is very important to note that common to more or less all of the definitions listed in Table 6 is the fact that the concept of Green Infrastructure refers to both privately (e.g. private gardens) as well as publicly owned elements (e.g. public parks) forming up the network.

Expected benefits

The support of **multi-functionality** rather than of individual functions and the provision of a range of benefits rather than a few, weather for human well-being, wildlife or biological diversity, is considered a key principle of more or less all GI definitions. A core assumption is the fact that connectivity or a critical mass of GI elements is considered responsible for maximising benefits due to the new synergies created. Some definitions apply a wider understanding, accounting for all benefits that are provided by its different elements, whereas other definitions narrow it down to those that are created due to the established connectivity (EEA 2011:31). In addition, which key set of benefits is identified depends on the background of the definition as well as the scale it is applied to.

Most conceptualisations of the term Green Infrastructure to a lesser or greater extent take into account environmental, economic and social dimensions when identifying associated benefits. Building largely on the greenways and greenbelt movements, GI concepts in the US and UK particularly emphasise aspects that take into account the potential **needs of the urban population**. These include for example benefits such as recreation, aesthetic pleasure, air and water quality as well as ensuring the protection of wildlife habitats in an urban environment. The US Environmental Protection Agency (EPA 2014), for instance, has taken an even more narrow approach, concentrating mainly on the role of Green Infrastructure in supporting urban storm water management and water purification. This definition has had a major influence on the GI concept being increasingly perceived in the US as a tool that through the conservation and restoration of its elements can provide a more cost-effective solution for services otherwise provided by the built environment (‘grey infrastructure’).

The conceptualisation of Green Infrastructure in Europe is largely based on the ecological network approach, focusing on the landscape scale and ecological connectivity. Influenced by the objectives of EU nature legislation, a key focus of the approach is the conservation and restoration of **biodiversity benefits**, as a way to contribute to human well-being. At its core lies the understanding that promoting connectivity can conserve or restore additional habitat, secure additional species, improve the general quality of the ecosystem or increase its resilience to change (Mazza et al 2011: 105).

The rise of the **ecosystem services approach** (see previous chapter) has subsequently led to an increased shift in attention from ecosystem conservation to ecosystem functionality (LaFortezza 2013:103). It has helped place value on ecological functions, and translated them into benefits in physical health, economic or social terms not only in Europe (Ahern 2007:268) (see Figure 11). It has also provided a new way of 'typologising' benefits resulting from GI implementation, and as such has been increasingly integrated in its definitions albeit initially not a key part of the concept.

Figure 11: Example of typology of ecological functions provided by Green Infrastructure (adapted from Ahern 2007:269)

Abiotic	Biotic	Cultural
Surface: groundwater interactions	Habitat for generalist species	Direct experience of natural ecosystems
Soil development process	Habitat for specialist species	Physical recreation
Maintenance of hydrological regime(s)	Species movement routes and corridors	Experience and interpretation of cultural history
Accommodation of disturbance regime(s)	Maintenance of disturbance and successional regimes	Provide a sense of solitude and inspiration
Buffering of nutrient cycling	Biomass production	Opportunities for healthy social interactions
Sequestration of carbon (and greenhouse gases)	Provision of genetic reserves	Stimulus of artistic/abstract expression(s)
Modification and buffering of climatic extremes	Support of flora:fauna interactions	Environmental education

With the rising of the ecosystem services approach, an increased range of studies started looking into the value of ecosystems and landscapes to society, including albeit more limited in direct relation to GI. Ecologists, environmental engineers or health researchers have been especially dedicated to develop a mounting amount of research on how the generation of ecosystem services relates to the ecological functions of a diverse range of green elements, public and private, including green roofs and facades, private gardens, parks, avenues and watercourses amongst others (e.g. reviewed in Mazza et al 2011: 105-159 or Ten Brink et al 2016). Existing research has particularly focused on urban ecosystem functions and services such as climate regulation and the reduction of the heat island effect (e.g. Bowler et al 2010, Meier and Scherer 2012), air cleansing effects (e.g. Pugh et al 2012, Escobedo et al 2011), stormwater management (e.g. Villarreal and Bengtsson 2005, Wang et al 2013,), noise absorption (e.g. Van Renterghem et al 2015, Brambilla et al 2013) and direct health benefits such as reduced stress and increased physical activity (e.g. Lee and Maheswaran 2011, Maas et al 2009). Studies have also been looking into the wider benefits of social cohesion, especially in relation to 'sense of place' (e.g. Maas et al 2009), community identity (e.g. Hladnik and Pirnat 2011) and place attachment. Other studies shifted to an economic perspective, by defining the value to be determined by the supply and the existing demand raised by populations (e.g. Schägner et al 2013, Gómez-Baggethun and Barton 2013) and resulting contributions to a green economy (e.g. Ten Brink et al 2012). Economists have been looking into monetising the values arising from ecosystem services to be integrated into public policy-making, for example by researching the impact of green areas on housing prices (e.g. Jim and Chen 2006, Sander and Haight 2012) or valuating avoided health costs linked to ecosystem services and air purification (e.g. Escobado and Nowak 2009). According to Gómez-Baggethun and Barton (2013:242) however little evidence on the economic value of **infrastructure/connectivity** has been collected so far, and hence has been identified as one of the challenges to ecosystem services evaluation especially in an urban context.

Overall conclusions on the comparison of some of the most often applied definitions and GI key principles and characteristics will be drawn in chapter C 1.1.3. This will occur in relation to the previously outlined historic origins and the upcoming chapter on current drivers of implementation, to elaborate on the framework that will be applied for further analysis within the thesis.

C 1.1.2.2 Current drivers of implementation

To be able to understand what Green Infrastructure is and what not, besides knowing its origins and gaining insights into existing definitions and characteristics, knowledge on what is driving its current conceptualisation and implementation is needed as well. The following sub-chapter will focus on two main areas of discussion considered most relevant with regard to its further interpretation and implementation: policy and design. Regarding policy, it will mostly focus on drivers that can be considered key in Europe, as the main geographical area the thesis. With regard to planning and design, driving forces from outside Europe will be taken into account to the extent they influence discussions in Europe.

Green Infrastructure as a policy response

The Treaty on the Functioning of the European Union (TFEU) provides the EU shared competences with regard to environmental policy and, according to the principle of subsidiarity, limits actions at EU level to those areas where it can be more effective than at national level (Article 4 §2 and Articles 191-193 TFEU). Hence, the prevalent focus of **EU environmental policy** has been on topics in need of supra-national responses, including key objectives such as the improvement of the natural environment in light of migratory species and cross-border river ecosystems. It provides the main reasoning for taking action on EU nature conservation, with the previously described Birds and Habitats Directives representing its legislative pillars and the implementation of the EU ecological network Natura 2000 being one of its main instruments. It needs however to be noted that key drivers and pressures leading to the loss of habitat and species and thus biological diversity, including habitat loss and fragmentation, overexploitation and unsustainable use, climate change, pollution and invasive alien species (MA 2005), are mostly influenced by land and sea use practices outside areas protected by the two nature conservation Directives. Some of those are subject to interventions in other policy areas of shared competences, such as agriculture and fisheries, transport or territorial cohesion, whereas the scope of action is limited with regard spatial and urban planning policies more directly.

As a contracting party to the UN Convention on Biological Diversity (CBD), in 2001 the EU Heads of State and Government committed to **halt the loss of biological diversity** by 2010. Being aware that coordination and additional support from other policy areas was needed to meet this target, as previously mentioned, in 2006 the EU released a policy framework consisting of headline targets and a comprehensive action plan (EC 2006). This new framework not only focused on the designation and management of the Natura 2000 network but in particular considered defined measures to address the quality of the wider EU countryside (e.g. EU Common Agriculture Policy, freshwater status, principal pollutant pressures) and marine environment (e.g. fisheries) as well as compatibility with regional and territorial development (e.g. Cohesion Policy, environmental impact assessment and strategic environmental assessment). However, although progress was made, in the end the EU was not able to meet its 2010 target (EC 2010a). Pressures such as the intensification of agricultural land use and the abandonment of traditional practices as well as the loss and fragmentation of habitat due to developments continued to persist. This is thought to be mainly linked to key problems such as the slow designation of protected areas, the incomplete application of measures such as

ecological connectivity and the failed integration of biodiversity considerations into other policy areas (Herkenrath et al 2010).

In 2010, the EU agreed on a new target '*to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, restore them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss*' and an accompanying strategy (EC 2011a). As indicated in the previous chapter on GI's historic evolution in Europe, linked to different studies the concept of ecosystem services also gained momentum at the EU level and thus gained a prominent role in the new strategy. One of the strategy's six targets calls for '*ecosystems and their services* [to be] *maintained and enhanced by establishing Green Infrastructure and restoring at least 15 % of degraded ecosystems*'. The strategy also explicitly refers to incorporating GI in spatial planning and calls for resources to be mobilised for its implementation, including the development of incentives that encourage private investment. It promises the development of an **EU Green Infrastructure strategy**, which, following a series of studies (Mazza et al 2011, Naumann et al 2011a, Naumann et al 2011b, EC 2012), was finally published in 2013 (EC 2013a).

Besides providing the GI definition outlined in the previous chapter, the EU Green Infrastructure strategy further expands the importance of GI implementation not only with regard to biodiversity objectives, but also in contributing to the objectives of other EU policy areas such as regional policy, climate change adaptation and management, agriculture, disaster risk management as well as health and consumer policies. In order to secure **appropriate funding** for an optimal condition of the network, the strategy envisages the introduction of the GI concept in the Connecting Europe Facility, an EU instrument that aims at '*providing financial assistance to trans-European networks in order to support projects of common interest*' (Article 1 of EU Regulation No 1316/2013). The GI strategy aims to link the concept to the core network corridor approach applied by the instrument with regard to transport, telecommunications and energy infrastructures. Initial exploratory work on opportunities for a Trans-European network of Green Infrastructure (TEN-G) was carried out in 2016. This includes a first-phase assessment of its costs and benefits building on existing policy and financing instruments, and providing a list of potential priority components although lacking more detailed elaboration of possible design options (Trinomics 2016).

A key EU policy area, not only with regard to GI implementation, is the EU's **regional policy**, which according to Article 174 of TFEU especially aims at the strengthening of the social and economic cohesion throughout the European Union. Its priorities for the period 2014 to 2020 are set in line with the Europe 2020 strategy, the EU's current agenda for a smart/sustainable/inclusive growth (EC 2010b), and include amongst others financial assistance for the preservation and protection of the environment through Green Infrastructure and the promotion of sustainable urban development through integrated actions '*to tackle the economic, environmental, climate, demographic and social challenges affecting urban areas'* (Article 7 §1 of EU Regulation No 1301/2013). It also includes the thematic objective of financing **climate adaptation** measures, which links to the EU strategy on adaptation to climate change (EC 2013b). Initiatives regarding the latter have been key to establishing the GI term at the EU level – the EU White Paper on climate change adaptation was the first to introduce the term in 2009 (EC 2009).

Given the budget of the EU's Cohesion policy takes up a significant share of interventions financed by the EU and although the amount dedicated to the above-mentioned objectives significantly depends on operational programmes developed by individual Member States, it is assumed that they are likely to be a significant driver regarding GI implementation in EU Member States (IEEP and Milieu 2013). As the new financing programme only started in 2014, analysis of how the objectives have been translated into national

and regional operational programmes is not yet available, thus it remains to be seen to what extent this will effectively be the case. Existing studies to support the development of the Green Infrastructure strategy have collected information on GI initiatives at national, regional and local level. However, it should be noted that although they follow some of the main GI principles and characteristics, these initiatives rarely are named as such (Mazza et al 2011, Naumann et al 2011a). At the national level, the term Green Infrastructure itself has only been explicitly and extensively used in UK planning systems, in England in particular. As already indicated in the previous chapter, this is strongly linked to some historic evolutions linked to transatlantic influences. For these reasons what follows is a short overview of the UK's selected approach.

In the UK, each country has its own planning system, which historically is primarily legally based on the *Town and Country Planning Act* (1990) and is undergoing continuous changes and amendments. In 2012, the UK government published its national planning policy framework with the stated aim to make it less complex and more accessible (UK Department for Communities and Local Government 2012). The listed policies should be taken into account when preparing Local Plans and neighbourhood plans. However, it does not aim at dictating how Local Plans should be written, as planning remains the key responsibility of local planning authorities such as county councils, district councils or town councils. The national planning policy framework requires Local Plans to take account of suitable adaptation measures regarding climate change such as through the planning of Green Infrastructure. As part of conserving and enhancing the natural environment, it asks Local Plans to *'set out a strategic approach* […]*, planning positively for the creation, protection, enhancement and management of networks of biodiversity and Green Infrastructure'* (UK Department for Communities and Local Government 2012:26). Interestingly, the document provides separate requirements regarding the protection of green belt land. The government emphasises the green belt's importance in preventing urban sprawl by keeping the land permanently open, underlining that their general extent throughout the country is already established. The government also describes the necessity of defining green belt boundaries, and provides more details on what building developments are allowed and which are not. However, at the same time it fails to describe in more detail the presumed structure of the green belt nor does it make a clear link to GI as a concept.

Prior to the national planning policy framework, certain requirements on GI implementation already existed as part of the UK planning policy. This was mostly linked to Planning Policy Statements (PPS) brought forward by the Planning and Compulsory Purchase Act (2004) (Pankhurst 2010) as well as initiatives linked to the UK government's growth agenda and Sustainable Communities Plan (see previous chapter on historic evolution). First insights into ex-post evaluations of processes that have taken place to implement Green Infrastructure underline that GI thinking can be an exciting and innovative approach, due to its multi-functional and multi-scale stance. However, similar to other planning processes '*translating the theoretical and policy agenda that has developed around GI is proving to be a long-term and adaptive process*' (Roe and Mell 2012:20) though it is believed that evaluation assessments could contribute to closing the gap. This is thought particularly important to fill the vacuum of a clear vision and often unequal distribution of powers in the planning process restricting the implementation of important principles.

Green Infrastructure as a planning and design concept or approach

The understanding of Green Infrastructure in the context of urban-landscape design and planning theories has been strongly driven by discourses on landscape urbanism and ecological urbanism. The discourse on landscape urbanism started as a result of a conference at the Graham Foundation in Chicago in 1997 in the United States (Thompson 2012:7). Initiated by Charles Waldheim and key promoters of related ideas being

landscape architects such as James Corner and Mohsen Mostafavi, the initiative is deeply rooted in academic discussions led by the Harvard Graduate School of Design and the University of Pennsylvania in North America. Two publications have been decisive in further propagating the concept more globally: *Landscape urbanism: A Manual for the Machinic Landscape* (Mostafavi and Najle 2004) and *The landscape urbanism reader* (Waldheim 2006). The latter describes landscape urbanism as '*a disciplinary realignment in which landscape supplants architecture's historical role as the basic building block of urban* design' (Waldheim 2006:37).

The extent to what the discourse has already matured into a clear guide for urban planning and design is disputed, particularly with the appearance of ecological urbanism. The following paragraphs will briefly look into what both discourses include and especially how they link to the interpretation of Green Infrastructure. It is based on ten 'tenets' into which landscape architect Ian Thompson (2012) distilled the discourse on landscape urbanism and to which he replied with questions to launch a critical analysis. Some of the more interesting results of the dispute are outlined below.

Rejection of the binary opposition between city and landscape: Rather than a traditional division between landscape and cities or rural and urban, landscape urbanism rejects the opposition of nature and city, as they are supposedly too intertwined for a clear separation and the separation adheres to an ideal, nostalgic and naïve idea of landscape (Thompson 2012:9-10). The tenet has an impact on defining the typology of elements that form part of Green Infrastructure. Following its assumption, there should be no difference in typologies as in the end the various elements are embedded in matrices that are more or less similar. However, the tenet has been criticised for the homogeneity the approach might result in, leading to a sprawling, low-density, suburban utopia, ignoring existing landscape characteristics and failing to value the past (Thompson 2012:16-19). In this regard landscape urbanism has also been aligned with a felt necessity of constant change, and with regard to this it partly opposes the conservation strategy of GI.

Less concerned with what things look like more with what they do and landscape as machinic: Landscape urbanism underlines the importance of the productivity of landscape as well as the functions it performs (Thompson 2012:12). This includes the services it provides and links back to the ecosystem services or function and benefit approaches used by many of the GI definitions. However, definitions of Green Infrastructure influenced by the ecological network approach often underline the intrinsic value of all species, building on a biocentrist environmental ethic. Thompson criticises Charles Waldheim and James Corner for avoiding a deeper philosophical discussion, by dismissing such notions as 'naïve or irrelevant in the face of global urbanisation' and stating that 'nature' does not exist outside human agency or cultural construction (Thompson 2012:19).

Encouragement of hybridity between engineered and natural systems: Though the essays laying at the basis of landscape urbanism avoid the term 'mechanical', notions of connections and assembly seem to indicate a mechanistic interpretation of landscape (Thompson 2012:12-13). Waldheim also underlines that '*landscape urbanism practices recommend the use of infrastructural systems and the public landscapes they engender as the very ordering mechanisms of the urban field*' (Waldheim 2006:37). According to Elisabeth Mossop, projects such as Fresh Kills in New York or Downsview Park in Toronto '*highlight the way in which the landscape of infrastructure has become the most effective means to explore the relationship between natural processes and the city*' (Waldheim 2006:165). This form of interpretation of Green Infrastructure more clearly links to definitions applied in the US where its role as a more cost-effective mean to 'grey infrastructure' particularly regarding water regulation benefits is emphasised. Ian Thompson fears that this

might lead to a rather technocratic approach, which puts the engineers and experts on the forefront whereas the general public is excluded in the development of Green Infrastructure (Thompson 2012:12-13).

The criticism brought forward regarding landscape urbanism have been partly addressed by a new *-ism*: ecological urbanism. It is mainly based on the publication by Mohen Mostafavi, who already contributed to the landscape urbanism reader, and Gareth Doherty as editors (Mostafavi and Doherty 2010). The design of infrastructure systems remains central for guiding urban development in the context of ever-changing processes, according to many essayists of the publication on ecological urbanism. Similar to technological innovations, the design of 'landscape ecological infrastructure' is seen as an important driver for spatial transformations and as such social innovations (De Block 2015:34), with environment and economy perceived as co-dependent. Others, however, perceive ecological urbanism's interpretation of landscape as infrastructure as an eco-technological approach that bears the risk of not taking design elements sufficiently into account (Clemmensen 2015:34). One interpretation is that this dispute results from different interpretations of **aesthetic functionalism** across the Atlantic, in the United States and Germany in particular (Hauck and Czechowski 2015:3). Hauck and Czechowski (2015:3) describe a mechanistic aesthetic functionalism being predominantly applied in the United States, visualising the landscape as a 'device' to improve especially urban conditions and providing metropolises with Green Infrastructure. Landscape design in Germany is thought to apply an organic aesthetic functionalism and as such aiming at '*reconciling cultural landscapes as expressions of harmonically evolved relationships between nature and humanity with the challenges of urbanisation*' (Hauck and Czechowski 2015:5). In this regard, it in particular relates to landscape urbanism's tenet to reject the binary opposition between city and landscape, also partly in line with the previously outlined notion of city landscape. With no surprise it is thought that landscape urbanism thus has had a strong response in German landscape architecture (Hauck and Czechowski 2015:19).

It should be noted that the term 'Green Infrastructure' rarely appears in discourses of landscape urbanism and ecological urbanism, where '**landscape as infrastructure**', '**landscape infrastructure**' and '**ecological infrastructure**' is more often used (e.g. Bélanger 2016). At the same time, the previously discussed GI definitions also rarely refer to 'landscape' as a central term. No robust information on why the word 'green' was used to coin the concept instead of some of the other word compositions could be found. However, it is assumed that the aim was to open the interpretation and application of the term more widely to different disciplines, not only to those applying the term 'landscape' and including social and economic disciplines. Another reason could have been the fear that sites less influenced by human activities or so called first nature (see previous chapter) could play a minor role in its implementation, which also reflects criticisms of landscape urbanism and its focus on primarily working with elements of second nature. In addition, what is often forgotten in discussions on functionalism and aesthetics in relation to GI interpretation particularly in Europe, is its primary objective of contributing to halting the loss of biological diversity. This objective should provide the basis for all other objectives, such as on the services to be provided – whether including aesthetics as one ecosystem service or, as iterated by some landscape architects, giving it a more prominent role.

C 1.1.3 GI – A framework for further analysis

The previous sub-chapters made evident to what extent the GI concept has been shaped by approaches, concepts and movements historically developed to address issues on land conservation and development.

The analysis indicates that the roots of Green Infrastructure are interdisciplinary, borrowing from different disciplines including in particular landscape ecology, conservation biology, urban and spatial planning, geography and landscape architecture. It also provided important insights into the wide range of existing GI definitions and their characteristics or key principles. This underlines the importance of clearly describing the core characteristics and the theoretical understanding that is applied when using the term, otherwise running the risk of overloading it with meaning and so undermining its effectiveness. However, it can be argued that the difficulty to pin Green Infrastructure down to one specific definition helps to avoid the term becoming reclaimed by one or a few disciplines which then lead its implementation. As has been argued previously, this might be one of the reasons why the notion of 'green' was attached to 'infrastructure' instead of 'landscape' or 'ecological'.

The sub-chapter on the origins of GI has clearly shown that the GI concept was not built from scratch but builds on a long history of different disciplines looking into new ways of conserving and restoring as well as linking natural, semi-natural and environmental features for the maintenance of biological diversity and/or human well-being. As such it might be argued that the GI concept is not really new, but basically a revamp of already long existing principles and an attempt to revive historic design movements and policies. However, the previous sub-chapters also lead to the conclusion that the GI approach attempts in a unique way to combine characteristics and principles that so far have only been applied individually. It could lead to cumulative effects that differ significantly from the outcomes of its predecessors. This in particular relates to questions of scale, considerations given to the hierarchy of impacts, pre-identification before development takes place (see chapter C 1.3.4) as well as multi-functionality pursued by the approach.

The main results of the previous sub-chapters have been summarised in Table 7, according to how different exemplary concepts and movements address defined principles and characteristics related to outcomes and processes. Regarding implementation processes, it also includes first insights gained with regard to the analysis of GI implementation approaches provided in chapter C 1.3.4. These results will provide an important basis and framework for analysis with regard to the research questions further addressed in the thesis.

Table 7: Principles and characteristics of Green Infrastructure compared to other concepts and movements

Characteristics & principles	Green Infrastructure (focus EU definition)	Greenbelt (focus UK interpretation)	Green networks/ greenway (focus US initiatives)	Ecological network (focus European implementation)	City landscape (focus UK and DE interpretation)
Outcome					
Scale	• **Multi-scale** approach • Considers interaction of elements at site-based, neighbourhood and at regional level, following the **infrastructure hierarchy theory**	• Mostly urban scale, aimed at containing urban growth	• Mostly urban scale • Some consideration given to linking rural and urban environment	• Broader landscape level • Some consideration given to urban elements, of high biodiversity quality	• Predominantly focused on the urban scale, though mixing urban and wider landscape elements
Connectivity	• **Physical** and **functional** linkages between hubs • Network approach • Urban: Critical mass or degree of scale	• Focus on creation of connected (outer) belt as buffer zone	• Mainly focused on physical corridors and lines	• Physical and functional linkages, consisting of linear & landscape corridors, stepping stones & high-quality landscape as buffer zone • Species & genetic permeability	• Consisting as a patchwork, using ribbons and wedges • Focus on providing critical mass • Landscape viewed as underlining infrastructure
Functions	• Promotion of **biodiversity** as core objective • **Multiple functions** related to provision of goods; regulative services; cultural services and supporting services	• Focused on very few functions, particularly scenic amenity, natural resources and partly recreation	• Range of functions, with focus on scenic amenity, physical and psychological well-being (e.g. pollution, noise), recreation, urban flood protection	• Promotion of biodiversity as core objective and contribution to human well-being • Less focused on provision of goods, mainly regulating & supporting services as well as cultural identity & recreation	• Changing focus from urban gardening and local food production to aesthetic expressions, recreation and community activities
Typology of elements	• **Protected areas** of high biodiversity value as core elements + restoration zones + connectivity features • From natural and semi-natural ecosystems to agricultural land, **depending on land baseline**	• Open land, mainly of agricultural production, both public and private	• Public parks as central hubs, linked by physical corridors (e.g. parkways, greenways) • Mostly public linear open spaces	• Protected areas as core elements + connectivity elements + buffer zones • Mostly focused on natural and semi-natural ecosystems	• Less clear delineation of elements • Blurring city-landscape binary and uniting systems • Mostly focused on landscape formed by human activities
Processes					
Integration	• **Pre-identified before development** has taken place • Holistic & flexible • **Continuum of strategic choices**, from conservation to development	• Focused on preservation of agricultural land	• Usually integrated after development has taken place • Focus on development of elements	• Integration into land management • Focus on conservation & restoration of elements	• Usually integrated after development has taken place • Focus on development of elements
Approach	• **Cross-disciplinary** approach in theory and practice • **Ecosystem approach** involving range of stakeholders • **Privately/publicly** owned & managed	• Relatively rigid, mostly focused on top-down urban containment Mostly privately owned & managed	• Civil society initiatives & public support • Mostly focused on public ownership & management	• Initially mainly driven and managed by government agencies • Evolving ecosystem approach • Partly privately, partly publicly owned & managed	• Initially modernist planning • Increasingly participative processes & civil society initiatives

The table indicates what will become more apparent in chapter C 1.3.4: In contrast to previous approaches the implementation of Green Infrastructure is rarely considered an afterthought of or in opposition to development. It rather aims at conservation and land development working in concert. In addition, the use of the term 'infrastructure' iterates that, similar to transport infrastructure, it is not sufficient to focus on individual elements, projects, urban scale or just on the wider landscape level. A multi-scale approach is needed to achieve the desired objectives. It also needs to be noted that although principles such as linkages and connectivity have already been applied in other contexts, such as for greenways or ecological networks, the principle was often limited in its application to a certain scale, element or for the provision of individual benefits. The ecological network concept for example was often limited to the wider landscape and rarely applied in the urban context. The greenways movement on the other hand concentrated strongly on physical linkages for recreational and aesthetic purposes rather than ecological connectivity and the conservation of biological diversity. Furthermore, often already existing approaches are used to (over-)emphasise individual or a narrow range of functions and benefits, whereas Green Infrastructure in many definitions underlines the importance of multi-functionality. These include abiotic, biotic and cultural functions or lead to the provision of ecosystem services. The concept of ecosystem services has only rather recently been included in some GI definitions. This is due to the fact that it offers a way forward in identifying a clear set of benefits provided by the network. Additionally, the GI approach is seen as one way of putting the ecosystem services concept into practice. In contrast to many concepts and movements applied in the urban context, GI also emphasises the importance of taking into due consideration privately owned and managed features, strategically as part of the infrastructure network and beyond the site or neighbourhood level.

One particular aspect that is often lacking in the conceptualisation of the term is its interaction with the built environment. Definitions refer to its potential in shaping development and allowing a 'smart' growth, especially in relation to 'grey infrastructure'. However interlinking the planning and design of Green Infrastructure more closely with characteristics of the built environment (and vice versa) particularly in the urban context and housing is an aspect that seems not to have gathered sufficient attention yet. The interactions of ecological and technological systems have been the focus of an increasing amount of research in environmental engineering; urban design and planning have also historically taken into consideration interrelations between the built and natural environment. However, such interactions have mostly been researched at the site-level and within the boundaries of each discipline, and up to today have failed to intensively intertwine at the conceptual level.

Besides looking into key GI characteristics and its general historic development, the chapters have also provided insights into what the drivers of implementation have been, showing that the drivers have often been as various as the concepts and movements themselves. Similar to the development of other infrastructures, it has more often been initiated out of need than of design. At the wider landscape level, it started with the need to protect nature for the resources it provided. In some parts of the world, it then shifted to nature's underlying emotional value in conserving wild and inspirational beauty, which later led to the development of what are still often clashing streams in nature protection: 'the preservationists' and the 'conservationists'. At the urban scale, landscape architects were concerned with human well-being, mental and physical health in particular when planning urban green spaces. With the appearance of the environmental movement in the 1960s and 1970s, attention shifted further to the impact of human activities on the environment and human health, leading to a range of international policy initiatives that in particular promoted the concept of sustainability. It was the development of related movements that added '*ecological justifications for green space preservation or development*' (Amati and Taylor 2010:144) to the urban scale. Under the new lens, for instance a re-evaluation took place regarding spaces to preserve

in the context of the UK greenbelt movement, causing a shift from mainly preserving industrial agriculture for its 'openness' to sub-urban gardens for its variety and biological diversity (Amati and Taylor 2010:144).

More recently, discourses on landscape urbanism and ecological urbanism have increasingly influenced interpretations of GI principles and characteristics in design and planning theories. Landscape urbanism has taken a rather technocratic and mechanistic perspective when speaking of landscape as infrastructure. This perspective strongly links to the definition of Green Infrastructure adopted in the United States, where it is frequently viewed as a cost-effective means to provide benefits to the urban population for example regarding water regulation. However, it is feared that this viewpoint puts its implementation largely into the hands of environmental engineers rather than in the hands of the general public. Another issue subject to discussion is the vision proposed both by landscape urbanism and ecological urbanism, where urban and the wider landscapes seemingly dissolve into one and the same thing, rejecting the rural-urban binary. This vision is criticised for neglecting the role of natural elements and wilderness. At the same time, it is also questioned for the extent to which it allows aesthetic and design elements to play an important role.

Often forgotten in such discourses in urban and planning theory is the role of policy as an important driver, albeit with different emphasis depending on the country of origin of the concept or movement. In Europe, the development of ecological networks was largely policy driven, with the government playing a prominent role both in nature conservation and in spatial planning, thus taking a widely top-down approach for an extended period of time. Linked to its libertarian roots, in the US local initiatives and the engagement of civil society were more decisive in creating, for instance, the greenways movement. This also explains why international environmental agreements influencing the GI concept (e.g. UN Convention on Biological Diversity) often had a higher impact in Europe than in the United States.

The intertwined presentation of policy and design movements that have driven the development of the GI concept until today might suggest a level of cross-fertilisation and collaboration that in reality was rarely the case. Though historic developments have similarly influenced discourses in both areas, the shaping of principles and characteristics has often occurred in parallel, without major contact between the different disciplines involved and not always in direct relation to the term Green Infrastructure. We have seen that, at least for its conceptualisation, key characteristics such as multi-functionality, functional connectivity of its elements at different scales, its strategic approach addressing both public and private elements before actual development takes place and its contribution to sustainability and/or well-being have appeared. However, the results of this first analysis also reveal what was emphasised already in the introduction: what the concept actually means in practice is still largely subject of on-going discussions and negotiations between researchers and practitioners, particularly in different disciplines (Mell 2008). How the conceptual idea of Green Infrastructure can be put into practice for planning and design is thus an important area of transdisciplinary research, provided opportunities offered by the concept are not '*lost in translation*' (Mell 2008:72).

C 1.2 Defining equality, inequality and justice

In the introduction, the thesis already indicated the complexity of issues evolving from notions such as inequality. This applies even more so when linking it to the complexity of ecological processes. In addition, natural scientists' hesitation to dive into an area that is value-laden and normative has likely influenced the current lack of research linking the two dimensions. According to the philosopher Mario Bunge and his "*Treatise on Basic Philosophy – Ethics: The Good and the Right*", for many an unbridgeable gap exists between values and facts (Bunge 1989:71). Value judgement is mainly considered a matter of taste and opinion, quite different from factual and empirical judgement. However, Bunge underlines that value judgments can also follow reasoning, based on experience and using empirical data. He reiterates that scientists make value judgements all the time, for example when evaluating their own work but also in disciplines such as biology, where verdicts on what is 'good' for example for human health or the biosphere are issued on a regular basis. And he considers economics the '*parent*' of all value judgement disciplines (Bunge 1989:76-77). This makes intellectual honesty in openly declaring one's values a prerequisite for science and research (Bunge 1989:77). It also requires continously reflecting and questioning these values, with the same impetus dedicated to research.

In order to systematically approach the subjects of equality, inequality and justice, and to provide a conceptual basis for subsequent steps of this work, the following chapter will look into:

- What equality, inequality and justice mean, independently and in relation to one another
- Which dimensions exist and how they can be characterised/measured (the equality/inequality/justice space)
- How those dimensions address environmental/spatial questions

Although concerns regarding rising economic inequality, regional disparities and their potential individual, local, national and global impact have led to an increased interest into the topic, related research often specifically targets for example methodological questions of measurement or philosophical discussions on its political implications. General conceptual work, which takes into account findings of various disciplines has been limited so far. For this reason, the thesis uses the book '*Poverty and Inequality*' by the editors Grusky and Kanbur (2006) as a backbone for its conceptual work. The book consists of a series of essays by economists, sociologists and philosophers, which shed light on some conceptual basics linked to applied questions on poverty and inequality. These will be complemented by insights on contemporary discussions related to more specific issues and approaches of relevance to this research (e.g. related to environmental and spatial questions).

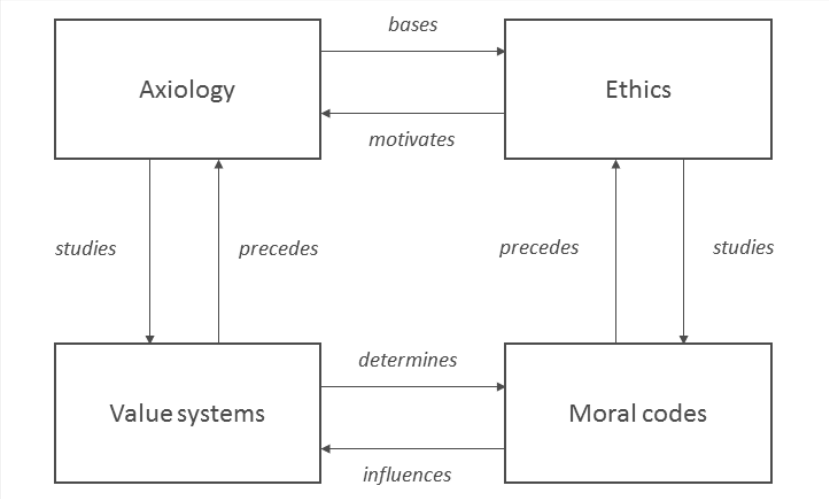
Grusky and Kanbur (2006) concentrate on disciplines such as economics and sociology in their initial outline of inequality dimensions, given they consider them to be the most sustained in their commitment to understanding poverty and inequality. This especially applies to the three fronts of enquiry initially mentioned in chapter B 1, i.e. research on defining dimensions, measuring and seeking solutions. This chapter on equality, inequality and justice will also include an analysis of how inequality has been addressed in philosophical discussions particularly in relation to political theories. This requires a brief introduction into some philosophical fundamentals laying at the basis of the different notions that will be introduced in later chapters. It is thought important due to some of the theories of relevance to the hypothesis of this work being grounded in philosophical concepts, and due to the perceived need to provide the philosophical means to increase awareness of one's own values.

An introduction of value systems and theory, ethics and ethical doctrines, following Bunge (1989)

Inequality, if foremost understood as being 'different', is not per se bad or good. It depends on whether society and its actors perceive those differences of being fair or just. This is influenced by social and political processes and the visibility of the perceived injustice, and is inherently linked to an individual's and society's **value system**. As such questions on what we consider valuable or to have value are normative in nature and form are central part of the philosophical and ethical discourse.

Different philosophical views exist on how values and value judgments link to moral and ethical decisions and concepts. The philosopher Mario Bunge (1989:290) describes axiology or **value theory** as a part of philosophy that builds on different disciplines, psychology and sociology in particular, rather than being a component of a range of treatises, including theology and ethics. Value theory rather presupposes and partly overlaps with ethics, which studies moral codes influencing value systems (see Figure 12). In this regard, he emphasises the role of value theory as a science-oriented philosophy (Bunge 1989:62). His "*Treatise on Basic Philosophy – Ethics: The Good and the Right*" will be used to provide some initial insights into moral philosophy, to outline how the applied ethical doctrine can impact the way notions such as equality, inequality and justice can be interpreted.

Figure 12: Relations between ethics and value theory and their referents (adapted from Bunge 1989)



One focus of discussions by value theorists, which is important for a better understanding of the different dimensions and approaches to equality/inequality/justice, relies on the notion of whether something is valued for its own sake (i.e. **intrinsical or inherent values**) or for the sake of something else (i.e. **extrinsic or instrumental values**). Bunge assumes that all values are extrinsic, as he describes them as not detachable from its bearers (Bunge 1989:12+62). He however emphasizes the need to distinguish between means and ends, whereby the instrumental value refers to the value of a mean rather than an end, though the distinction cannot always be clearly made. The persistence of the dichotomy between intrinsic-extrinsic in many discussions and policies (e.g. EU biodiversity policy) is likely rooted in the feared risks that without this separation an object might only be valued as a means to an end when defining it having extrinsic value. Health, for example, might only be valued as a means to the end of higher productivity rather than as a general goal for human well-being. Another fear likely occurs due to the assumption that by binding values so strongly to an evaluating subject, all values would be defined as purely 'subjective', in a way of being a matter of taste and opinion.

However, the philosopher argues that values are inherently linked to **human needs and wants** and as such can have different roots: biological and social. Biological values can be visceral (e.g. need for adequate food), environmental (e.g. need for clean air) and mental (e.g. need for orientation). Social values can be economic (e.g. want for productivity), political (e.g. want for self-government) and cultural (e.g. want for

advancement of knowledge) (Bunge 1989:16). In this regard, Bunge (1989:35-36) makes a clear distinction between:

- Primary needs, being a matter of life and death and thus defined as *primary values*
- Secondary needs, being a matter of health and sickness and thus representing *secondary values*
- Legitimate wants, being a matter of happiness or unhappiness and defined as *tertiary values*, as long as not detrimental to an individual, social group or society
- Fancies, not legitimate desires, seen as *quaternary values*

Primary and secondary needs are described as basic needs, being key to human survival, whereas legitimate wants are considered important for human well-being. Both basic needs and legitimate wants are defined as 'objective' from a value perspective, as they cannot be faked and are thus considered genuine. However, Bunge (1989:38) specifies that these values can be relativistic, given the truthfulness of value judgments depends on the context within which they are used. He also iterates that it is by far easier to determine what people want (e.g. through survey and questionnaires) than their genuine basic needs (Bunge 1989:34). At the same time, he underlines the importance of ranking values and quantifying them, though this might not always be possible. However, it can be done if one distinguishes between 'genuine' values as rooted in basic needs (bio-values and socio-values) and 'subjective' values as rooted in desires (psycho-values), and taking into account the complexity of systems (Bunge 1989:89). He also emphasises that matters of value can be supplemented by calculation, but that this does not replace argument, experience and sentiment (Bunge 1989:89).

Values put at the forefront of discussion influence how moral rights and duties are defined (see Figure 12). Bunge (1989:97-95) for example deduces moral rights from rights to realise primary, secondary and tertiary values, whereas he interprets moral duties as duties that help others to achieve related values. According to the philosopher, moral norms can be described as rules of social behaviour, which are applied when self-interests (rights) conflict with other-interests (duties) (Bunge 1989:97-95). He also states that all moral problems, whether personal or social, are norm or value conflicts, and for their solution moral principles need to be applied (Bunge 1989:111-112). He concludes that this cannot be done without ranking values and norms, and taking into account that related solutions will always benefit some and bear costs to others, and include the payment of a price for uncertainty.

A moral code in this regard represents a set of norms, which have an order of precedence and are commonly linked to a meta-norm (Bunge 1989:115). In the case of the ethical doctrine proposed by Bunge, the survival and well-being of humankind represents the supreme good, given the latter represents a value held high across social groups and society at large. He uses it to build moral norms and an ethical doctrine that applies the meta-norm of 'enjoy life and help live', and calls it 'agathonism', derived from the Greek noun meaning 'good` (Bunge 1989:111-117). How this more exactly relates to resulting perceptions on equality/inequality and justice will be discussed in the subsequent chapter C 1.2.1.1, when comparing it to other approaches. Other ethical doctrines, representing theories about moral codes, apply different supreme goods based on distinct primary and secondary values. This includes for example Socialism and its primary value of equality as a primary value, or libertarianism, which puts liberty and legal justice at the forefront (Bunge 1989:198).

Besides categorising **ethical doctrines** according to what each considers a supreme good, they can be studied by either looking at the **content** provided (i.e. their collection of moral principles) or the methods applied (i.e. the way they propose and justify those principles) (Bunge 1989:198). With regard to **methods**, this especially refers to where a doctrine positions itself along the line of aspects such as monism to pluralism; motivism, intuitionism to cognitivism; objectivism to subjectivism or individualism; holism to systemism; or consequentialism to deontologism (see Annex I for more details on the different methodological aspects). In his regard, for example the ethical doctrine of **agathonism** often argues for the adoption of moderate approaches. As a cognitivist, Bunge (1989:201-217) still does not deny the emotional roots of moral judgements. He also iterates that systemic ethics, as his preferred methodological approach, attempts to navigate between the two poles of individualism and socio-centric ethics, viewing individuals as both autonomous and heteronomous beings that determine society but also the other way around. He underlines the dangers of society crashing the individual within holism, but also calls individualism a more destructive and dissolvent ideology as it weakens and cuts bonds that keeps society together. He also adopts a qualified, moderate consequentialism, warning of a too radical interpretation of consequentialism as well as deontologism.

The last two approaches in particular play an important role in explaining the **reasons behind taking or not taking action to remediate inequality**. From a deontological perspective, a person can feel morally obliged to act linked for instance to the perceived continuous infringement of a personal value-system and or the wish to uphold human rights ('normative account'). Consequentialism explains the moral need to take action on inequality due to the feared consequences by not doing so ('consequentalist account') (Grusky and Kanbur 2006). In this regard, for example Wilkinson and Kate (2010) published in their widely discussed book '*The spirit level: Why equality is better for everyone*' a detailed account of the potential costs of inequality – linked to community life and social relations, mental and physical health, educational performance or social mobility. Similarly, the economist Joseph Stiglitz provided an account on the price of inequality to society (Stiglitz 2012). Other researchers more specifically focus on the impact of inequality on economic growth. A person may also not feel the need to act on inequality because of the expected positive consequences. It is for instance often argued by some economists that income inequality can play an important role in driving innovation and entrepreneurship, due to the incentive it provides to take risks for climbing up the social ladder.

According to Bunge (1989:198), methods are not sufficient to formulate any concrete moral norms. For example, consequentialism only argues that moral norms need to be formulated based on concerns regarding the consequences of certain actions – it does not provide any hint at what the best or worst consequences might be. Here, the moral, **content-related -ism** come into play (Bunge 1989: 224-394). According to the philosopher, the ethical doctrines can be divided into two main streams: those taking an individualistic/egoistic stance and those taking an altruistic stance. To the former belong ethical doctrines such as libertarianism (e.g. liberty as summum bonum) or contractualism (e.g. selfish individuals in need of social agreements). The latter partly includes utilitarianism (e.g. either egoistic by maximising individual utility or universalistic by 'pursuing the greatest happiness of the greatest number') and also refers to the doctrine proposed by Bunge, agathonism (see Annex I for more details on key content and criticism of the different doctrines).

The **author of this thesis** to a large extent supports the ethical doctrine presented by Bunge and its criticism regarding other theories, although with some restraints. For instance, Bunge (1989:37) argues that 'life' is valued due to the needs and wants it is able to satisfy. However, this puts a strong focus on cognitivism

when defining the value of life and likely underestimates the role of moral feelings not easily attributable to any consequence of an action. As an example, it does not help explaining why people jeopardise their own life in rescuing complete strangers. Bunge himself underlined the particular importance of the scientific discipline of biology in identifying genuine basic needs, and join criticisms of ignoring those needs (Bunge 1989:122). At the same time he argues, that only those animals with some moral knowledge about right and wrong, which are thus subject to moral and legal codes, can be considered moral agents (Bunge 1989:108). His account of which species to include was rather limited at the time. Since then the related scientific knowledge on cognitive abilities has expanded and in this regard the author of the thesis emphasises the importance of revisiting some of Bunge's assumptions on the subject. How different ethical doctrines and representatives have addressed equality, inequality and justice/injustice more concretely will be set out in the following sub-chapter on the philosophical discussions behind these different notions.

C 1.2.1 Dimensions of equality/inequality and justice/injustice

C 1.2.1.1 Philosophy – A question of equality and justice

Focus

'Equality', 'inequality' and 'justice' are strongly disputed notions in philosophical discussions on moral and political theories. Very strong opposing tenets have resulted in the 'temptation' of exclaiming that '*when* [competing theologies] *attack their rivals, they seem completely successful, the result being a mutual self-destruction*' (Pojman and Westmoreland 1997:2). These disputes have probably resulted in philosophy and political philosophy in particular losing importance when it comes to defining ways forward on the beforementioned areas of conceptual work. In this regard, the perceived less 'moral' and more practical approach of sociology and anthropology have often taken on this role, though building on philosophical discussions.

Philosophical theories pay particular attention to the **notion of equality** – how it could be achieved and what exactly this would encompass. There is agreement that equality does not mean all people becoming equal, for instance in terms of size or having the same abilities. Humans being equal relates mainly to the fact of equal worth (Pojman and Westmoreland 1997:1). In this regard, two central debates have been driving philosophical work on equality: the 'internal' debate between egalitarians on what should be 'equalised' and the external debate between egalitarians and non-egalitarians, with the latter doubting the magnitude of the moral significance of equality (Pojman and Westmoreland 1997:2). The dispute among egalitarians particularly relate to three main ways of achieving equality: 1) everyone is brought up to the level of the best off, 2) everyone is brought down to the level of the worst off, 3) the worst off are brought up and the best off are brought down to a level where they both meet (Pojman and Westmoreland 1997:5). The notion of 'inequality' is often used to apply a different perspective regarding the disputed theories on equality. Debates on 'justice' on the other hand are most often used to shed light on distributional issues of benefits and burdens.

According to Pojman and Westmoreland (1997:2), who have aimed to provide a recent anthology on the subject, theories on equality are usually divided into formal and substantive types. Formal theories look into defining **processes** leading to equality, whereas substantive theories are focused on the **content** of the equality to be achieved by looking at characteristics and metrics. The two editors of the book '*Equality*' have provided an overview of contributions made to the related debate by classical philosophers, and have collected essays that reflect different sides of more recent debates. The main findings have been elaborated in the brief history below.

Brief history and key theories

The classical philosopher Aristotle (384-322 B.C) thought of moral philosophy as a practical means for achieving a good life (Pojman and Westmoreland 1997:17). A **good life** does not build on the achievement of subjective preferences but is reflected in the realisation of true goods. Considering ethics a practical instrument, he did not aim at providing an exact account on how to achieve this sort of life. Similarly, he was interested in a formal approach of describing justice and equality, setting the frame for many theories to come (Aristotle, *Nicomachean Ethics*: 17-24). He identified two kinds of justice: *distributive justice* and *corrective justice*. The former is related to the distribution of benefits and burdens in relation to **worth and merit**, whereas the latter to the solution of conflicts. Considering justice the greatest moral virtue, he presumed it as being similar to equality. Justice is achieved when equals are treated equally and unequals unequally, stating that justice gives what someone deserves. He hence proposed a *proportional* equality, where relative distributions occur, rather than a *numerical* equality, which not necessarily has to be just (Gosepath 2011).

Centuries later, Thomas Hobbes (1588-1679) became a strong opponent of Aristotle's theorems, emphasising that there is **no objective 'Good'** – with good basically standing for objects of desire, and evil for aversions (Hobbes 1651:26-36). He derived the worth of a person by his/her ability to satisfy the desires of others, and considered individuals merely equal due to their capability of organising in order to bring down the stronger and thus making superiority baseless. This rather gloomy understanding of equality with regard to humankind was later antagonised by another classical philosopher, Jean-Jacques Rousseau (1712-1778). In his '*discourse of the origins of inequality*', he pictures humankind in its primitive state as free and equal in its relationship with nature, and holds entering into property responsible for the appearance of inequality (Rousseau 1755:37-45). He also argues that property rights fuel inequality by the resulting need for recognition, respect and social status. As there is no going back to the primitive state, only entering into a social contract can ease some of the burdens of people's existence. David Hume (1711-1776) focused on the issue of 'justice' as a human convention, which needed to be developed due to people's tendency towards selfishness and limited generosity, and conditions of scarcity (Hume, *An Enquiry concerning the Principles of Morals*: 46-49). He saw major risks of basing distributional decisions predominantly on notions of merit as it includes a vast uncertainty of which merit to account for. The main reasons include the '**natural obscurity' of the idea of merit**, and the self-conceit of individuals. In this regard, he followed an emotivist doctrine of values and morals, which leaves little room for cognitive value judgement to be taken in light of reason (Bunge 1989:73). Due to their perception of selfish human beings, both Hobbes and Hume interpreted morality as a social control device, mostly concerned with duty, authority and respect (Bunge 1989:131). The elaborations of Rousseau and Humes were followed by the Manifesto of Equals (Manifeste des Egaux) by Francois-Noel Babeuf (1760-1797) and Sylvain Marechal (1750-1803) after the French Revolution. They advocated for a welfare floor to be equal for everyone, and held the state responsible for those who could not take care of themselves (Pojman and Westmoreland 1997:49-52). In later years, Babeuf concluded that equality must be achieved mainly through revolution, rather than only securing a minimum of welfare. In this regard, his ideas later inspired the German economist Karl Marx (1813-1883) in his outline of a socialist society.

Rarely do egalitarians go to the extent of Babeuf. Consequently, substantial questions remain on which inequalities are morally defensible and which are not and who decides based on what criteria whether inequality is 'deserved' or not. The readings provided by Pojman and Westmoreland (1997) mostly indicate **parameters** such as distribution of primary goods, resources and economic wealth as well as power, prestige, social class, opportunities and needs (Pojman and Westmoreland 1997:9). It often remains either a

debate as to whether a certain magnitude in the distribution of certain goods and wealth is still justified, for instance the rich owning a disproportionate amount compared to the poor, or to what extent an equality in political powers can be achieved. In this regard, Felix Oppenheim (1970:55-65) underlines the importance of looking at all three stages of distribution – the initial stage, the application of the rule and the final distribution.

In the 1960s in particular, a range of writings were published which set the basis for key theories in the 1970s that continue to drive discussions on equality and inequality today (Pojman and Westmoreland 1997:91-133). This for example relates to questions on the **role of the state**: socialists and liberals called forth interventions, whereas libertarians and conservatives wished to limit its role. In his paper on '*The idea of equality*', Bernhard Williams (1962:91-102) underlines the importance of taking into account moral concerns on inequality in political decisions. Despite being difficult to grasp, related discussions remind us of our common needs and humanity, according to the author. He identifies three areas of inequality to be considered: needs, merits and equal opportunities. Robert Nozick (1974) on the other hand argues that examining needs and merits for certain goods is not sufficient but that their allocation should be the focus of interventions. J.R.C Lucas (1965), as outlined in his essay on '*Against inequality*', believes that the value of inequality is overestimated, though he agrees on equal respect for humans.

Based on the initial discussions of Bernhard Williams on **equal opportunities**, a range of writings appeared that dealt with the subject (Pojman and Westmoreland 1997:137-179). These writings basically discuss two different ideas of equal opportunities, referred to as weak and strong equal opportunity. The former addresses a formal and meritocratic approach that is mainly concerned with the opening up of job positions to people with talent, ignoring their starting point in life. The latter focuses on the provision of equal life chances for life fulfilment or achievements, and requires compensation measures depending on people's starting point. Based on those writings, the ideal of equal opportunities gained increased popularity in the political discourse of the 1960s and 1970s, as it was considered more easily applied in practice. However, it also stirred debate on what can be considered truly egalitarian, due to concerns regarding its promotion of meritocratic hierarchies and its dependency on how well a person is able to compete within a society.

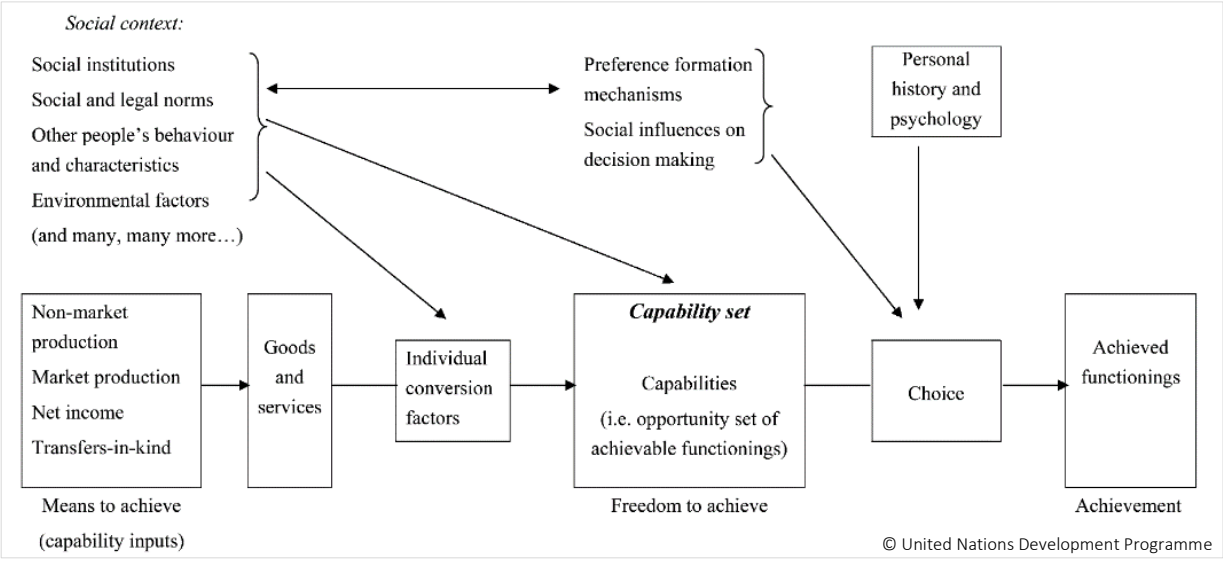
The debate on equal opportunities also informed one of the most comprehensive discussions on justice and equality, provided by John Rawl in 1971. His work '*Theory of justice*' still fuels many of the current debates on the subject. Building on the line of work of contractualist philosophers, he introduced the theory of a **hypothetical contract** that is set forth by bargaining parties discussing fundamental terms of societal association behind a '*veil of ignorance*' (Rawl 1971: 184). The latter helps to limit advantages or disadvantages arising from natural chance or social circumstance. In this regard, he builds on the theory of social contract already more comprehensively addressed by Rousseau and also Immanuel Kant (1724-1804), the latter in his writing 'Doctrine of Right' as part of his '*Metaphysics of Morals*' (Rauscher 2012). Rawl thinks that objectivity and impartiality in the bargaining process are ensured by the participation of rational and self-interested agents, which in the end seek a contract on whose fairness all agree ('justice as fairness'). He considers two main principles of justice (Rawl 1971:185):

1. *'Everyone will have an equal right to the most extensive basic liberties compatible with similar liberties for others.*
2. *Social and economic inequalities must satisfy two conditions:*
    a. *They are to the greatest benefit of the least advantaged (the difference principle).*
    b. *They are attached to positions open to all under conditions of fair equality of opportunity'.*

According to Rawl, the justice someone deserves is not determined by meritocracy but is institutionally laid out. Justice hereby is achieved through the equal distribution of social primary goods, including liberty and opportunity, income and wealth. He is therefore regarded to belong to the group of contemporary resource egalitarians. In contrast, welfare egalitarians such as Kai Nielsen and R.M. Hare focus on equal life fulfilment and preference satisfaction as a main outcome (Pojman and Westmoreland 1997:9). Another point raised in opposition to Rawl's '*Theory of Justice*', for example by Wallace Matson (1983:196), favours the importance of a bottom-up process over his proposed top-down process. In this regard, the philosopher Mario Bunge defines Rawl's 'veil of ignorance' as a misleading fiction, given society is not composed of alien individuals and no assembly where no-one knows someone else could realistically be convened. Impartiality should rather be secured by active popular participation (Bunge 1989:192).

Current philosophical discussions on inequality have been particularly driven by work of Amartya Sen and Martha C. Nussbaum, informing political sciences and endeavours on inequality in economics and sociology. In his work '*Equalities of what*?' in 1980 Sen introduced his theory of capabilities (Sen 2006:30-46, Nussbaum 2006:47-75). He criticises the utilitarian framework used by welfare egalitarians, which measure well-being by asking for current preferences and their satisfaction, neglecting the issue of adapted preferences (see sub-chapter on economic inequality for further information). At the same time, Sen contrasts Rawl's approach by shifting philosophical thinking from the distribution of resources and primary goods to those of **basic entitlements** that make people 'truly' capable to do and to be. According to Nussbaum (2006:57), those fundamental entitlements encompass '*essential features of the structure of a just society*'. These set of capabilities is assumed to be influenced by means such as goods and services (e.g. income) as well as the social context (e.g. social institutions, social norms), and depending on the choices leads to the achievement of determined functionings (see Figure 13).

Figure 13: Relations between means to achieve, capability set and resulting functionings (Robeyns 2005:98)



Sen himself restrains from providing details on the content of those 'capabilities', mainly arguing that they need to be defined in the context of a democratic process. Martha C. Nussbaum, though embracing Sen's notion of capabilities, underlines the need to provide a basic list including central requirements of a life with dignity and social justice. Nussbaum (2006: 58-59) drafts a first list of ten fundamental capabilities (e.g. *being able to laugh, play and enjoy recreational activities; or control over one's environment*), but em-

phasises that it reflects general goals, is open-ended and should be subject to ongoing revision and rethinking in order to allow plurality regarding its interpretation. She also argues that, in contrast to a list of fundamental human rights, her list of capabilities restrains from giving the illusion of agreement, it focuses on groups rather than individuals, making references to duties and not just rights both in the public and private sphere (Nussbaum 2006: 58-59).

More recently, the philosopher Mario Bunge, who looked into the practical application of ethics particularly in light of technological development, put at the forefront of his discussions on equality the question of '*What equality is best conducive to enjoy life and help live?*'(Bunge 1989:181). In this regard, he underlines that the preservation of the environment is independent of questions of equality, as the former is needed for survival of humankind. Nevertheless, he also emphasises, that freedom, brotherhood and justice can only exist amongst equals, thus giving equality precedence over it (Bunge 1989:181). This is reflected in his statement that '*in a society of unequals, the powerful are freer than the rest*' (Bunge 1989:185). Albeit defining radical and literal egalitarianism as not desirable, Bunge advocates for the principle of a **qualified equality**. The latter is described by the following norm: '*All human beings have the same rights to use the natural, economic and cultural resources of their society as they see fit and as long as they respect the same rights of others. All human beings have their duty to do their best to take care of themselves and to contribute to the well-being of their fellow humans as well as to the pursue of the survival and advancement of humankind. The sole inequalities justified in the distribution of goods and services are those which are to the benefit of all*' (Bunge 1989:182). With regard to 'use', he iterates that this refers to access or use and not to private ownership, implying the right to use but not of excluding others. He notes that this is particularly important for any irreproducible good such as land, as for instance privately owned land excludes people from space needed to remain in good health and severely restricts the aesthetic enjoyment of nature for many (Bunge 1989:183). In this regard, justice becomes a matter of '*adjusting the distribution of **benefits and burdens** in agreement with the available resources*' (Bunge 1989:187). It puts emphasis on the importance of not focusing merely on the distribution of benefits (e.g. money, goods and services) but also of burdens (e.g. environmental pollution) (Bunge 1989:372).

Bunge heavily criticises theories by the economists Friedrich A. Hayek (1899-1992) and Milton Friedmann (1912-2006), relying on the market for an efficient and thus just distribution of goods and services (see also next sub-chapter on the economic dimension). He emphasises that in reality a market is rarely fully efficient and even less just, for example in cases where the demand is significantly higher than the actual supply as is often the case with regard to the distribution of land (Bunge 1989:190). According to Bunge, justice can be achieved by an **integral democracy**, which is not restricted to the political sphere but enters the economic and cultural spheres as well. Democracy is understood as self-management, accompanied by knowledge of basic needs and legitimate aspirations and taking into account the abilities of the members of a social group (Bunge 1989:190-192). However, integral democracy is incompatible with unrestricted property rights, an idea which, according to Bunge, is particularly propagated by contemporary libertarians. He argues that it causes a division of society into propertied and the rest, and jeopardises the right to life of the property-less (Bunge 1989:374).

Measurement approaches

As mentioned previously, theories on equality can be divided into formal and substantive types. Formal equality is often translated into a formula to describe how notions of justice can be achieved (Pojman and Westmoreland 1997:2, Gosepath 2011). Only if a variety of the factors are quantifiable and commensurable does the formula become usable in measurement approaches. It is usually the task of substantive equality

theories to provide content. However, related discussions are often normative in nature and thus little interested in questions of **'objective' measurability**. Mario Bunge is an exception, given he emphasises the importance of 'axiological objectiveness' or 'genuine values', as outlined in the previous section. He iterates that values can be ranked, quantified and translated into a cardinal or metric scale. For instance, numbers can reflect the degree to which basic needs are met and to which they are generated (Bunge 1989:83). According to Bunge, this is particularly important when intuition of good and bad fails.

Philosophical theories have also been translated into measurement approaches by other disciplines. The capability approach by Sen and Nussbaum has been used as the theoretical basis of the Human Development Report and Index, published by the United Nations Development Programme (UNDP n.d.). Following thinking that the approach corresponds to the Aristotelian tradition in defining universal elements of good life, basic entitlements that help creating respective conditions represent one dimension the human development report and index try to capture. 'Environmental sustainability' is one such condition and is measured by indicators such as changes in forest area or population living on degraded land. Other attempts, such as for example by economist François Bourguignon, look at combining welfare equality and the capability approach, translating it into a multi-dimensional vector function for index development (see subchapter on economic dimensions of inequality) (Bourguignon 2006: 67-102).

Potential links to environmental/spatial questions

Although ethics has traditionally focused on the relationships amongst human beings, the rather recently developed field of environmental (or ecological) ethics takes into consideration human to non-human nature relationships. Based on the two before mentioned disciplines of deontological ethics and consequentialism, related discussions have focused on distinguishing between an inherent moral or intrinsic value (if we feel direct moral obligations towards beings) and instrumental value (if our moral obligation is linked to the impact we have on beings and their value due to our treatment or interaction with them) (Jax et al 2013:261). Some scholars consider that the differentiation between inherent and instrumental values is not sufficient in catching the complexity of **human-nature relationships**. They apply additional categories such as fundamental and eudemonistic values (Jax et al 2013, Chan et al 2016). The former are derived from conditions that are fundamental for life on earth, for example such as the provision of oxygen. The latter is based on the Greek term of 'eudaimonia' used by Aristotle (384-322 BC) in his book 'Politics' and was translated as 'living a flourishing life' (Kraut 2017). They reflect conditions that are objectively necessary for living a good life for current as well as for future generations. In recent research, they have more specifically been described as including relational values, derived of relationships and responsibilities including to nature (Chan et al 2016).

Similar to the capabilities approach discussed previously, it is argued that eudemonistic values are not limited to subjective preferences. For example, a garden tree not only has value due to the aesthetic preferences someone derives from it, but can have a deeper meaning for the quality of life it supports. In this regard, it can be argued that these values reflect 'objective' entitlements. This is for instance reflected in one of the central human capabilities proposed by Nussbaum, namely of '*being able to live with concern for and in relation to animals, plants, and the world of nature*' (Nussbaum 2006:58-59). It also follows the previously described arguments on the existence of 'genuine values' that derive from basic needs and legitimate wants by Mario Bunge. He presents a sample of human rights and duties, which includes for example the right to enjoy the environment and the duty to protect it (Bunge 1989:396). At the same time,

he argues that social problems such as environmental degradation and pollution gain a first order of magnitude, as without an environment supportive of the survival of humankind any discussion on equality and justice would be obsolete (Bunge 1989:113).

'Environmental justice' is another distinguished notion of equity related to the environment. Historically, discussions on environmental justice in urban areas used to focus largely on low-income and/or disadvantaged groups being more exposed to pollution and hazardous environments than other urban population groups, particularly in the US (Ernstson 2013, Walker 2012:17-24, Cohen et al 2012, and Davy 1997). In Germany, the term, translated either into '*Umweltgerechtigkeit*' or '*umweltbezogene Gerechtigkeit*', has been mainly interpreted as taking into account the risks of being exposed to defined environmental burdens such as air pollution and noise emissions rather than looking specifically at the distribution of those burdens, particularly due to ethnic reasons (Maschewsky 2004:10). Walker (2012:39-76) mainly defined it as a claim-making process, including on features such as:

- **Distributive justice**: e.g. referring to recipients, which environmental quality is distributed and the principles of distribution
- **Procedural justice**: e.g. availability of environmental information, inclusion in decision-making processes
- **Recognition**: e.g. taking into due consideration cultural and institutional processes, or respect

Environmental justice studies particularly in the US have revealed that ethnic minorities can be disproportionally burdened with negative environmental impacts such as air or noise pollution, or especially lack certain environmental qualities and resources. However, less is known of what biophysical and social allocation mechanisms exist regarding the provision of services and benefits provided by ecosystems (Pickett et al 2011). To take due account of a just distribution of those benefits, environmental justice has for instance been re-defined more broadly as '*the spatial distribution of environmental goods and ills amongst people, including the 'fairness' in the distribution of environmental well-being*' (Ernstson 2013:8, Low and Gleeson 1998:102). With regard to the ecosystem services approach, it has been linked to questions on the fairness in generation (i.e. which biophysical processes are favoured), to those on distribution (i.e. who benefits from resulting services over a spatial and temporal scale) and on articulation (i.e. how the value of certain benefits is explained and demonstrated) (Ernstson 2013:8).

In relation to urban planning and design for example of public (green) spaces, similarly to Walker (2012), the anthropologist Setha Low argues that **urban social justice** should not only be a question of distribution, but also of procedure and interaction justice (Low 2013). The latter refers to the '*quality of interpersonal interactions in a specific situation and place*', including aspects such as truthfulness and respect (Low 2013:7+8). His approach largely builds on his criticism of the model offered by Susan Fainstein, which uses as a basis Lefebrve's right to the city but, according to Low, fails to put diversity at the centre of the discussion. It also builds on thinking by Ruth Fincher and Kurt Iveson on the role of planning in the struggle for spatial justice (Low 2013:4+5). Both approaches are outlined in more detail in the sub-chapter on '*Sociology – Inequality of classes'*.

With regard to the planning and management of cities, the geographer Graham Haughton has linked questions on equity and justice more closely to the idea of sustainable development. He emphasises that sustainable development '*is about recognizing and accepting our responsibilities not just for where we live, but*

more widely for the environment at a global [and temporal] *scale*' (Haughton 1999:235). In his attempt to provide a normative framework, he distinguishes between five equity principles:

- *Inter-generational equity*, referring to the respect of the needs of future generations
- *Intra-generational equity,* addressing contemporary equity and social justice, not merely focused on redistributive questions
- *Geographical equity*, giving consideration to external impacts outside the jurisdictional domain, whether at a neighbourhood or global level
- *Procedural equity,* developing a framework of democratic political processes and responsibilities using multiple democratic and participative forms and channels
- *Inter-species equity,* highlighting the critical importance of preserving ecosystem integrity and maintaining biodiversity

He sets those five principles in relation to four main approaches in planning and managing cities, in order to analyse to what extent they have been implemented. Insights into the results are provided in the conclusive chapter C 1.2.2 to this section, due to their relevance to the application of theories regarding GI implementation for a just access.

Another approach has been iterated and outlined by Benjamin Davy, a legal scholar working on issues of spatial planning, property rights and land management, and focusing on environmental land use disputes in particular. According to Davy, the interpretation of what can be defined as 'just' is mainly related to subjective preferences and circumstances (Davy 1997:255-277). Consequently many different concepts of justice exist and a planner by choosing one particular concept will likely encounter the wrath of those having a diverging one. In his book '*Essential Injustice*', he selects three different concepts of justice to describe a planner's dilemma with regard to the task of distributing benefits and burdens, adopting the following principles (Davy 1997:256-257):

- *Elitist or libertarian justice*, promotes the 'strong' and is based on the main norm of maximising liberty (e.g. Friedrich A. Hayek)
- *Utilitarian justice,* promotes the 'most' and is based on the main norm of maximising happiness (e.g. Jeremy Bentham, John Stuart Mill, and contractualists such as Hobbes)
- *Social justice*, promotes the 'poor' and is based on the main norm of minimising pain (e.g. John Rawl)

Albeit admitting to not catching the complexity of the notion of justice, he applies the three categories to describe the potential consequences of applying one particular concept of justice. A plan that fulfils the main criterion of efficiency can have distributive impacts that favour either the 'strong', the 'most' or the 'poor', according to Davy (1997:255-267). Having operated in the '*machine of planning*', the planner will recognise that pursuing one grand scheme of justice will likely not satisfy representatives of other spheres of justice. Davy states that this dilemma has resulted in many social engineers abandoning the quest for justice for good, underlining that pure and simple justice is not achievable (Davy 1997:277). In this regard, he iterates the importance that the planner focuses on questions of injustice rather than justice, as it reduces the risks to easily discard the complaints of people applying a competing notion. Not merely being the result of denied justice, the notion of injustice allows one to put the focus on the victims rather than on those that should be favoured. Davy also underlines the importance of recognising that some injustice will always occur and is inevitable, linking to the title of his book '*Essential Injustice'* (Davy 1997). With

regard to the distribution of environmental burdens and resources throughout a city in particular, he criticises the principle of equal-share, emphasising the need for neighbourhoods of lower environmental quality, i.e. having a higher environmental burden and/or less environmental resources (Lange 2015:53). He argues that such places are needed for social-political reasons, in order to counteract the process of low-income groups being displaced from certain neighbourhoods or a city, given the disappearance of affordable housing. He also underlines that related spatial disparities should be kept to a minimum, and that neighbourhoods should continue to offer a humanly dignified environment (Lange 2015:54).

Comparing Davy's interpretations and ideas of justice/injustice to the outline and criticisms of ethical doctrines provided by Mario Bunge (see introduction to chapter C 1.2.1 and Annex for more details), gives the impression that the author favours utilitarianism as a basis for his approach. This particularly relates to his emphasis on notions such as happiness, preferences and efficiency, limiting the discussion on justice and injustice to 'subjective' values and not taking a clear stance of what utility actually means. Davy rejects absolutism in favour of relativism, refusing notions of a simple and pure justice and emphasising the existence of many different concepts where none takes precedence over another. As such, he does not consider the possibility of moderate relativism, as proposed by Bunge, which leaves room for genuine values, for instance arising from basic needs, underpinned by scientific findings such as on the detrimental health impact of air pollution. His idea of essential injustice recognises that for any decision taken by the planner there will always be costs involved. However, he refuses to offer any concrete moral compass according to which it can be decided who is going to bear those costs and who is likely to lose.

C 1.2.1.2 Economics – Income and wealth inequality

Focus

Distributional questions are central to many theories in economics, although existing schools have interpreted related dimensions and ways of measuring differently, and have consequently suggested different forms of remediation or avoided doing so. First of all, it needs to be noted that utilitarianism lays at the basis of the discipline of economics. As such, it views the balance of individual pleasure and pain as a compass for moral action, whereas welfare represents the total of a group's utility (see introduction to chapter C 1.2.1 and Annex for more details). Jeremy Bentham and John Stuart Mill can be considered founders of utilitarianism, introducing its main principle of greatest happiness for the greatest number (Driver 2014). The worth of an action is determined by the utility it procures and thus the value of the outcome of an action. As iterated by the philosopher Mario Bunge, utilitarianism largely focuses on subjective preferences, pleasures and notions such as individual happiness and social welfare (Bunge 1989:41-43+236-240). In this regard, Bunge argues that what utility exactly means remains unclear and that by assigning numerical values to subjective values '*everything and the opposite may be proved*' (Bunge 1989:42). As such, according to the philosopher, it remains morally empty and is no safe basis for efficiency and justice (Bunge 1989:238+241).

Although utilitarianism is a common red threat to all economic schools, different interpretations exist. This is for example the case with regard to who judges the utility that has been achieved. According to the neoclassical school, only the individual is able to judge. Changes regarding an individual's utility are measured by looking at their preferences in an existing market, and are not subject to further moral scrutiny. The school of ecological economics does not assume consumer sovereignty, but looks for other sources of normative criteria such as sustainability requirements (e.g. Common and Stagl 2005:9-11). Behavioural economics still poses the individual at the centre, but differs from the notion of its overall rationality (e.g.

Simon 1982). Institutionalists still highly value rationality, but underline the influence of social institutions and rules (e.g. Chang 2011).

When it comes to determining the overall welfare, there seems to be agreement among some schools that simply adding up utilities is not sufficient, but that the relative positions of individuals need to be taken into account. It goes back to the idea of Aristotle linking justice to merit (see previous sub-chapter), though the focus on how merit is to be judged can be different depending on the economic school. Neo-classical economics in particular promotes **efficiency** regarding the distribution of resources as a means to realise welfare. This is determined by relative positions or pareto optimality, representing '*a situation where it is not possible to increase a person's utility without reducing that of one or more persons*' (Common and Stagl 2005:11, Hussen 2004:329). Ecological economics argues that not only efficiency but also distributional and ethical concerns should be considered. According to Herman Daly (1996:22), one of the major proponents of the school, this also concerns intergenerational equity.

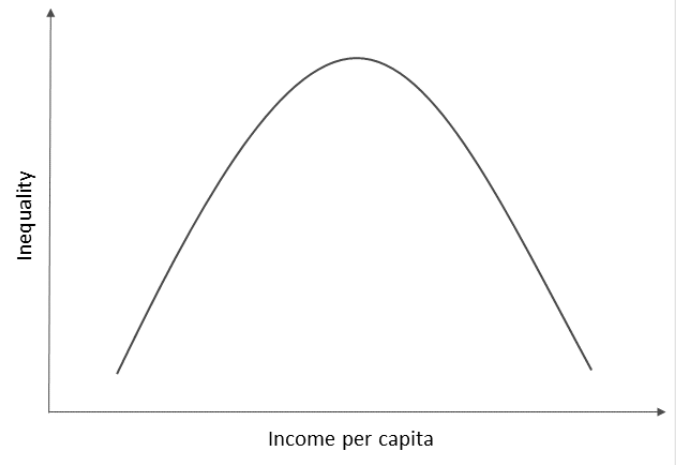
With regard to **inequality**, the main focus of economics has historically been on the distribution of income, capital ownership and wealth. In an economic system of input and output to consumption, production and investments, income represents a periodical flow of money, goods and services. It can result from labour and capital. Capital represents the stock on which the economy builds at a given point in time. Different interpretations exist on what it includes and what not (Common and Stagl 2005:91-92, Piketty 2014:45-48). There is agreement that it refers to durable capital such as tools and machinery or real property in the form of buildings used for production. It becomes more disputed regarding residential real estate and financial capital, as both often deemed 'unproductive' capital. Sometimes the definition of capital is limited to assets that can be owned by private and the public and exchanged on a market, resulting in hesitance in applying the term with regard to the labour force (i.e. human capital) as well as certain goods and services provided by the environment (i.e. natural capital). Capital is then interpreted as accumulated wealth, whereas land or natural resources as wealth can only be appropriated, following discussions of property by John Locke (1632-1704) (Waldron 2016). Others apply the term capital more widely to all stock that contributes to the functioning of the economy and as a store of value, even if not traded on a market, and link it more closely to the notion of wealth.

Brief history and key theories

The issue of distribution particularly of **land and natural resources** was one of the key questions driving classical economics. Representatives of the classical school of political economy included well-known representatives such as Adam Smith (1772-1790), David Ricardo (1772-1823) and Robert Malthus (1766-1834). The idea of the economy being made up of classes, rather than of individuals, was pertinent to the school and affected theories along with the driving question on how to feed an increasing population (Hussen 2004:201-207). For Malthus the primary thread was overpopulation. He followed the postulates that only a fixed amount of agricultural land was available and that population growth was limited by the availability of food for subsistence (Hussen 2004:201-205). If unchecked, population growth would lead to a downward trend regarding overall living standards, as technological development could only to a certain extent combat land and resource scarcity. Doomsday views on the distribution of wealth at the end of the 18th and beginning of 19th century also convinced Ricardo that in the long-term the greatest share of wealth should fall to capitalists, given their investment in economic growth (Chang 2014:117, Piketty 2014:5). He was afraid that with a steady growth of population and their output, land would become increasingly scarce, thus resulting in increasing land prices and rent to landowners (**principle of scarcity**) (Piketty 2014:5). Though technological progress proved these predicaments mostly wrong and led the neo-classical school

to their notion of the substitutability of human-made and natural capital, it is argued that postulates by Malthus and Ricardo hold some truths in light of current real estate price developments (Piketty 2014:6; Rognlie 2015; Hussen 2004: 205-207). Different to Ricardo, after the industrial revolution Karl Marx (1818-1883) argued that most of the national income should go to the labour class. Steady economic growth linked to a technological development that mostly profited those owning industrial capital accompanied by stagnation in labour income, led him to the publication of his two major works, '*The Communist Manifesto*' and '*Capital*' (Pojman and Westmoreland 1997).

Figure 14: Kuznets curve on the development of inequality (based on Kuznets 1955)



With the steep recovery of the economy in the years after the two World Wars, a new theory on the development of inequality over time gained prominence. In 1955, Simon Kuznets (1901-1985) laid down his hypothesis that income inequality would automatically decrease the further an economy progressed, independent of any policy interventions (Chang 2014:324, Piketty 2014:11). The theory was integrated in the so called **Kuznets curve**, which predicted an increase in the initial years of development and a downward trend for the following years of economic growth (see Figure 14). It corresponded to the philosophy of the 'Golden Thirties', following reconstruction of the economy after the economic crisis in the 1920s. It is best reflected in the slogan 'a rising tide lifts all boats', attributed to the former US President J.F. Kennedy. Kuznets curve and the aphorism became a dominant paradigm for centuries to be followed, despite the limits underlined by Kuznets himself, stating that '*some of it possibly* [might be] *tainted by wishful thinking*' (Kuznets 1955:26). Years of research evaluating the theory show very mixed evidence (e.g. with regard to the economic development of Asian and Latin American countries and persisting income inequality) and emphasised the important role of a strong civil society and welfare state in contributing to the shape of the curve (Robinson and Acemoglu 2002; Piketty 2014).

Nevertheless, it needs to be noted that Kuznets, different to other historical economic models, for the first time managed to build his theory on a larger dataset of information on income distribution, though he himself emphasised that the empirical information might still be limited (Kuznets 1955:26). Although largely focused on the United States, he was able to rely on a newly developed series of national income accounts. Previous statistics to determine income for taxation could be quite creative, for example in France, where in the 19th century the distribution of the number of doors and windows was used to determine a household's wealth (Piketty 2014:12). It is thus no wonder that between the 1960s and 1980s, conceptual work regarding inequality focused on the question of how to **measure inequality**. Grusky and Kanbur (2006:4-12), in their analysis of the last thirty years of research on distributional questions in economics, defined the period as the first important phase of conceptual work on inequality. This regarded the general development of measurement approaches, of their philosophical basis, their units to be considered (e.g. individuals or households) and discussions on how to take account of social interactions. Key contributions to the debate were initially provided by Antony Atkinson in '*On the measurement of inequality*' in 1970 (Atkinson 1970) and by Amartya Sen in '*On economic inequality*' in 1973 (Sen 1973). Antony Atkinson later cooperated with Thomas Piketty on enlarging the dataset of available information regarding

the distribution of income, capital and wealth in a set of countries (Atkinson and Piketty 2007 + 2010), whereas Sen further elaborated particularly on the capabilities approach, for instance in his work '*Equality of what*?' (Sen 1980) (see previous sub-chapter on Philosophy – A question of equality and justice). With regard to the contribution of social interactions, in the 1970s the economists Akerlof (1970), Spence (1973) and Stiglitz (1975) laid the ground of their theories on the role of imperfect and asymmetric information, for example in influencing bargaining powers, and the necessity of public intervention. They were awarded The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in 2001.

At the same time, the neo-classical school gained further importance in the political arena, and questioned the importance of discussing distributional questions. This can be seen reflected in a headline provided by the economist Milton Friedman, one of the school's representatives, in 1970: '*The social responsibility of business is to increase its profits*' (Friedman 1970). Following a wave of **de-regulations and privatisations** promoted by neo-classical economists particularly of the Chicago school and a range of economic crisis in the 1980s and 1990s, unsurprisingly the second phase of inequality research mostly dealt with an intensive policy debate regarding the role of the market versus the role of the state in addressing the issue (Grusky and Kanbur 2006:8). Some previous concepts on measurements, particularly regarding the development of inequality indices, were consolidated and applied, and increasingly more data became available. The authors identified the third phase of research as bringing new conceptual ferment, starting at the end of the 20th century (Grusky and Kanbur 2006:8). This particularly referred to some conceptual problems that (re-)appeared.

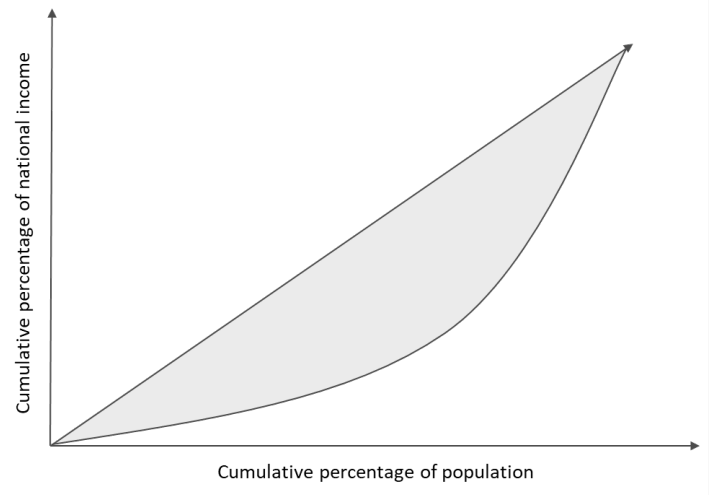
Initially, most of the economic analysis on inequality focused on models of rational preferences by individuals, which are fixed and unaffected by personal, cultural or institutional circumstances. However, slowly new approaches emerged, due to the increasing impact of research by behavioural economics, which studies the influence of psychological and social factors, and to collaboration with the discipline of sociology and political philosophy. The limits of asking people their current preferences and levels of satisfaction have been translated into the notion of **adaptive preferences** (Grusky and Kanbur 2006:10). It takes account of the possibility that people adapt preferences according to a situation, for instance to make it more bearable. This factor has also been brought forward by Piketty in his analysis on income and capital inequality, restraining from the use of household surveys and underlining the importance of collecting more robust information via national tax systems (Piketty 2014). Inquiries of preferences, though also of behavioural experiences, merely focus on what people want (or how they behave), and largely overlook the question why people want what they want.

Another increasing aspect of concern refers to the focus on **individualism** in inequality measurement. Although it allows the break-down of inequality to the individual level rather than targeting the household unit, the approach fails to see individuals in relation to each other and thus makes it difficult to take a comparative perspective. Attempts to address the problem include the formation of groups that put people in relation to others, with the challenge ahead to identify socially meaningful groups, according to Grusky and Kanbur (2006:10-11). The last key conceptual issue currently debated refers to the felt necessity to add further dimensions to economic inequality, beyond the distribution of income and capital. In this regard, conceptual work mostly links to those by Sen and Nussbaum on capabilities and approaches such as the Human Development Index (see previous sub-chapter). However, it is also accompanied by much debate on how to transpose different dimensions and their relationship in a quantitative description of inequality.

Measurement approaches

As discussed briefly in the previous historic review, measurement approaches have represented a major area of research in economics regarding inequality. Existing examples mostly focus on the distribution of wealth and especially income, given data on the latter are more often ready available. What follows is a short overview of the most important measurement approaches, and stringent questions linked to them raised by researchers and practitioners.

Figure 15: Determining the Gini coefficient (based on Gini 1921)



The most commonly used approach is known as the **Gini-coefficient**. It was named after the Italian statistician Corrado Gini (1884-1965) and is considered a synthetic index (Gini 1921). It compares the distance of a real life curve (Lorenz curve) to an equal distribution of income/capital (represented by a 45-degree line) regarding the relative proportion of overall national income/capital owned by a defined cumulative percentage of the population (see Figure 15). The Gini coefficient ranges from 0 to 1, the former meaning that all national income has been equally distributed, whereas in the latter case one person would actually own 100 per cent of national income/capital (OECD 2011a). These extreme values cannot be found in real life. Usually, the coefficient ranges between 0.2 and 0.4 regarding the distribution of labour income, from 0.6 to 0.9 regarding capital ownership and 0.3 to 0.5 for income from labour and capital (Piketty 2014:266). These variations make evident what also data produced by other measurement approaches often show: capital/wealth inequality is usually higher than income inequality. Numbers can vary substantially, depending on the factors taken into account, not only whether income from capital and/or labour and capital ownership is considered. Considerations regarding the labour force (e.g. working population, inclusion of self-employed) or accounting for public income redistributions (e.g. net income considering tax and benefits) can also play a major role, as do those on capital (e.g. forms of capital included).

The Gini coefficient is deemed quite complex to calculate and criticised for being rather sensitive to changes that occur in the middle of the income distribution (e.g. Chang 2014:327-328). In this regard, for example the economist Gabriel Palma proposed to look at changes at the extreme ends, calculating the ratio between the income going to the top 10 percent and the income going to the bottom 40 per cent (Palma ratio) (Cobham and Sumner 2013). Another often used income inequality indicator divides the income going to the richest quintile or 20 per cent of a population by the income going to the poorest quintile or 20 per cent of the population (quintile share ratio, S80/S20). Similarly, **percentile ratios** compare the income of two different groups, e.g. the 10^{th} percentile to the 90^{th} percentile (P10/P90). Although they allow to more easily calculate and explain income inequalities, they are not deemed very sophisticated in their analysis. This explains the attempts to further 'decompose' existing indices such as the Gini index in additional dimensions. This is for instance the case for **generalised entropy indices** and the **Atkinson indices**. The former measure the distance to maximum disorders/diversities for given dimensions. The latter focuses on quantifying social utility resulting from the redistribution of income, by looking at people's adversities for certain inequalities and giving higher importance to preferences at the lower income level. Similarly, the

economist Francois Bourguignon argues that inequality measurement needs to capture multiple dimensions, beyond income and wealth, and has translated his theory into a vector function (Bourguignon 2006:76-102). It includes endowments (e.g. power to affect political decisions) and conditions (e.g. health conditions) that are not subject to individual control, as well as individual preferences. His aim is to set the focus not only on income distribution but also on the reallocation of endowments, for example by targeting the appropriation of infrastructure and human capital skills in favour of the least well off regarding income.

The indices provided above, although attempting to capture multiple dimensions, aim at representing inequality in a single numerical index. Piketty (2014) recognises the worthiness of such indices particularly in the communication of inequality, but underlines their limitations for a more in-depth analysis of how social and economic conditions and interrelations affect different levels of income. In his analysis on the structure of inequality he thus decided to focus on distributional tables including information on the various deciles and centiles in total income and total wealth and according to **classes** (Piketty 2014:266). The approach slightly shifts from the individual perspective, prone to many economic measurement approaches, to one of classes. It can be seen as an attempt to capture socio-economic relationships, influenced by theories of inequality in the field of sociology.

Potential links to environmental/spatial questions

Economists increasingly emphasise that cities are social and economic constructs and the built environment merely the visible result of social and economic interactions and processes (Cheshire et al 2014; Harvey 2000). As such they argue that economic considerations should play a more important role in urban development than they currently do. This perception is particularly strongly pursued by representatives of the neoclassical school of economics, where the balancing of costs and benefits by individuals and organisations is considered to be substantially responsible for the shaping of the urban environment. It is also the main area of interest to urban economics, which is particularly concerned with how efficiently the urban '**real property**' is exchanged on a market of demand and supply. The latter refers to the exchange of all goods that are considered not moveable and defined by property rights (Harvey 2000:20). The price remains the main signal for changes in conditions which affect the demand (e.g. changes in taste, income, and transport methods) and supply (e.g. developable land, age and status of buildings) for land and buildings. It also needs to be noted that the price for 'pure' or **undeveloped land** is deemed to be essentially driven by demand given the supply of land is considered fixed. As such, following increasing demand, it is assumed that the 'productivity of land' can be increased through the additional use of capital (e.g. buildings, floor rate) (Harvey 2000:35). Besides conditions of demand and supply and their influence on exchange efficiency of real property, the notion of efficiency in the combination of production factors also comes into play, meaning that pareto optimality is thought also to be influenced by how efficiently urban land and capital are combined.

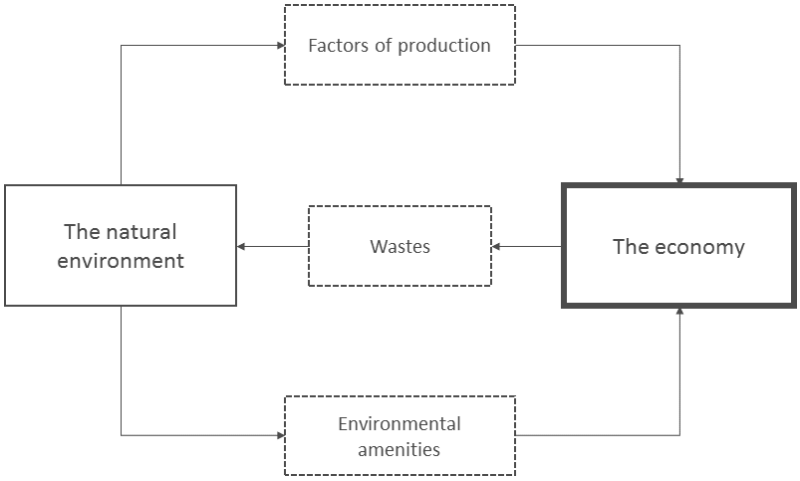
Furthermore, how supply and demand of real property proportionally respond to changes in certain conditions are also considered of major interest with regard to defining economic efficiency. In urban economics, the study of relationships between this so called **elasticity**, for example in the supply of land (e.g. influenced by designation of greenbelts), new housing and price volatility is often a major area of research (Cheshire et al 2014:83-88). How proportional changes of income can impact the demand for housing space and private gardens is also often the subject of analysis (Cheshire et al 2014:88-101). In this regard, also the degree to which two goods are considered substitutes, whether linked to individual preferences or technology, comes into play and is captured by the elasticity of **substitution**. Neo-classical economics gen-

erally assumes that all assets, including technical and natural assets, are interchangeable, although different perceptions exist on what rates are realistic. With regard to real property development, for instance the elasticity in the substitution of developing on brownfield instead of greenfield is one area of dispute, linked to questions on the costs of development and their impact on the supply.

According to urban economics, the various decisions related to issues of demand, supply, elasticity and substitution can create certain **patterns of urban land use**, especially if firms and households are considered as the main actors. According to the Von Thuenen model, developed by the German economist in 1856, if transport costs are considered as the main determinant of general accessibility to different demands (e.g. production factors, working opportunities, recreational facilities or schools), in a homogeneous land this leads to the development of concentric zones (Harvey 2000:215-246) (see chapter C 1.3.1 on urban development for more details). Other factors can also come into play, including comparisons with the expected opportunity for rent (e.g. revenues, amenities) as well as conditions of concentration and complementarity (e.g. ready supply of skilled labour force, traffic congestion, contact to complementing firms, libraries, cultural facilities, cultural backgrounds). Historic developments, topographical features as well as market imperfections, which might be obstacles for preferences being fully expressed, are mostly seen as additional factors that can affect those urban land use patterns (Harvey 2000:220-224).

Limited considerations given to **environmental features** in shaping urban patterns reflect perceptions of the neo-classical school of economics that the natural environment mainly contributes to the economy either as factor of production or by providing environmental amenities (see Figure 16). In addition, it assumes that in a situation of perfect market conditions (freedom of choice linked to self-interest, perfect information, competition due to large amount of buyers and sellers, mobility of resources and clearly defined ownership rights) exchange efficiency will lead to the pareto optimal outcome, also regarding urban land use (Hussen 2004:6). Nevertheless, the school recognises that in practice obstacles exit that can also lead to **spatial disparities**. What these obstacles to a pareto optimal distribution are, often very much depends on interpretations of the economic school involved. Deficiencies mostly relate to the fact that the perfect market conditions rarely exist in real economies. This either refers to issues of taxes, subsidies and government control or imperfect information and competition, which are assumed to affect market mechanisms and the price as a signal for pareto optimal distribution, for example of resources. In addition, it is recognised that the price system also fails to reflect all the costs and benefits, particularly occurring to society as a whole. These are treated as external to the market mechanism and are reflected in the term '**externalities**'. It refers to situations where '*the actions of some individuals have direct (negative or positive) effects on the welfare or utility of individuals, none of whom have direct control over the activity*' (Hussen 2004:54). For example, a public gardener creates positive externalities by raising the property values of a neighbourhood due to the aesthetic garden he/she creates. An automotive producer induces negative externalities linked to the use of automotives that contribute to

Figure 16: Neoclassical perspective on the relationship of natural environment and human economy (adapted from Hussen 2004:4)

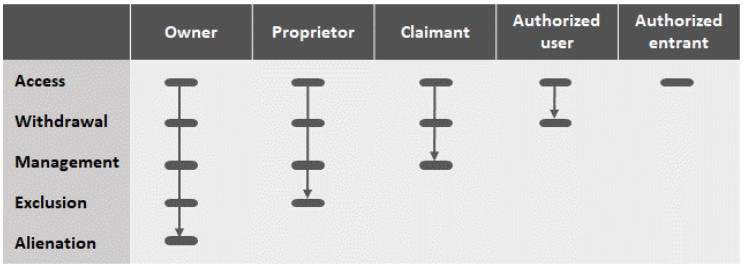


air pollution, and leads to health costs occurring to society at large. Issues of property rights and **public goods** are considered the main reasons leading to externalities. A good is defined as 'public' if it is non-rivalrous, i.e. the increase in its consumption by one individual does not reduce the consumption by another individual, and non-excludable, i.e. an individual cannot be restrained from using or consuming it (Common and Stagl 2005:325-326). These conditions are deemed, for example by the neo-classical school, to lead to the free-rider problem, basically a condition where scarce resources are treated as a free good. The main reasons are deemed to be the openness of a good for all to use and/or its scarcity not being reflected in the price due to some costs not having been internalised (Common and Stagl 2005:326, Hussen 2004:63).

This situation led Garret Hardin to develop the phrase of the '**tragedy of the commons**' in a scientific article in 1968 (Common and Stagl 2005:339) in which he referred to the tragedy of over-grazing on common land, i.e. land that is rivalrous but commonly used and thus not-excludable. He deemed the open access to land in European feudal agricultural systems responsible for situations of over-grazing, leading in the end to reduced food production. The article fuelled the assumption that environmental externalities can be addressed by schemes that especially assign private property rights, referring mostly to ownership rights by individual and firms. This work helped another approach to gain prominence, the so called Coase theorem (Hussen 2004:92). The theorem basically iterates that an optimal level of environmental pollution can be achieved by **assigning property rights**, independently whether to the polluter or to the one suffering pollution. It is assumed that either it increases the polluter's willingness to pay a certain amount to the owner suffering pollution, in order to be able to continue. Or the one suffering pollution is willing to pay a certain amount to the polluting owner, to reduce the level of pollution, all subject to reasoning on the occurring incremental damage and resulting control costs. The role of the state would be reduced to the activity of assigning private property rights.

However, the theorem rises a range of questions. These go from inquiries on the extent to which the end justifies the mean and the ethical aspect of 'the-polluter-pays' principle, to the magnitude of transactions costs resulting from multi-faceted real-world situations (Hussen 2004:94-95). In addition, it neglects solutions potentially resulting from **common property schemes**. In this regard, an abundant amount of research was carried out by the political economist Elinor Ostrom on the role of formal (e.g. government) and informal institutions (e.g. traditions) and the bundle of property rights to be applied (see Figure 17). The philosopher Mario Bunge underlines the importance of public goods for the welfare of the members of a social group to all members of society. He agrees with Aristotle's view that a state exists for the sake of a good life, and thus deems the management of public goods a legitimate function of the state. Its role is hereby described as one of controlling the quality of the management rather than directly managing them (Bunge 1989:375-377).

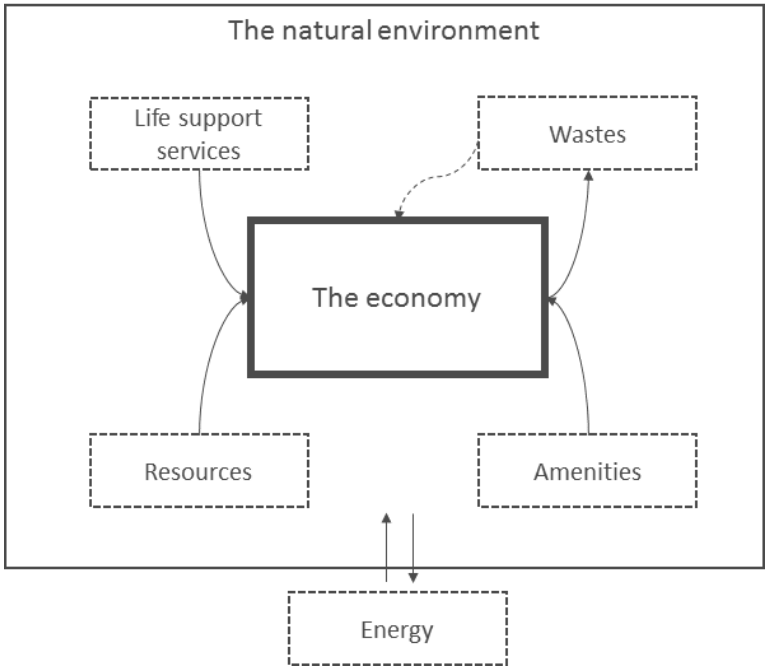
Figure 17: Property bundles and positions (adapted & developed based on Colding and Barthel 2013:159, building on Schlager and Ostrom 1992:252)



Note: The Figure refers to individual bundles of rights, which are frequently held in a cumulative manner by individuals with different positions. According to Colding and Barthel (2013:159), these rights include *'rights of access (i.e. the right to enter a defined physical area and enjoy non-subtractive benefits); withdrawal (the right to obtain the resource units or 'products' of a resource'); management (the right to regulate internal use patterns and transform the resource by making improvements); exclusion (the right to determine who will have an access right, and how that right may be transferred); and alienation (the right to sell or lease either or both of the above collective-choice rights)'.*

In view of the previously outlined obstacles to economic efficiency, some representatives of the neo-classical school of economics have also recognised the role of the state in addressing market failures. Urban economics underlines the need for '**planning control**' in order to deal with defects of the market economy (Harvey 2000:174, Cheshire et al 2014:80-81). Not always are individuals considered to be the best judges in the pursuit of welfare due to their inadequate knowledge of a situation. This is for instance the case when certain developments potentially impact the needs of future generations (e.g. historical and natural conservation interests), oversupply needs to be avoided or a stable policy framework for the development of urban infrastructure is needed. The need for planning control can also arise with regard to addressing negative and positive externalities. The former particularly refers to tackling noise, air pollution or congestion impacts, for example by restricting land use forms through zoning. The latter can for example arise through the creation of complementarities (e.g. schools, public transport systems). In particular, the provision of public and collectively used goods is arguably an important aspect of planning control. This includes transport, education and health infrastructures as well as public parks and protected areas. Distributional questions might also necessitate planning control, for example in the case of a private owner wishing to sell part of his garden for development, which would result in revenue for an individual and the developer, however might decrease general welfare in the neighbourhood (Harvey 2000:175-180). At the same time, the neoclassical school in particular underlines potential risks arising from too much planning control and from government failure. For example, it is often emphasised that regulations, taxes and subsidies provided by the government and potentially influenced by lobbyist groups might actually distort preferences, which are then inadequately reflected in demand and supply and the price system. Also it is argued that the state does not correspond to the ideal actor that always seeks the greater good. However, it also needs to be noted that government failures have often been used to promote the need to depoliticise the economy (Chang 2014:388-396).

Figure 18: Ecological economics perspective on the relationship of natural environment and human economy (adapted from Common and Stagl 2005:87)



The main argument by the school of ecological economics is that market failures are actually the norm rather than the exception. The correction of individual market failures is considered not sufficient to proceed sustainably. Consequently, it emphasises the need of **governance**, as a broader notion than government (Common and Stagl 2005:87). Notably, the school has a different view regarding the relationship of the natural environment and human economy (see Figure 18). It describes the human economy as a subsystem of the **natural environment**, making it not an afterthought of economic development but laying it at its basis. This also results in the natural environment not only being viewed as a factor of production or being directly capitalised as amenity services. It follows arguments by the previously introduced philosopher Mario Bunge on the importance of ensuring a favourable environment for human survival and well-being as first order moral norm.

The school also restrains from assuming linear relationships, underlining that similar **natural laws** have to apply for the economy, being a subsystem of the natural environment. This refers to aspects such as complexity, dynamic changes and related insecurity and lack of stability. In doing so, the school underlines the limits of efficiency models that are based on rationality, linearity and proportionality alone. For these reasons the school also pays particular attention to the **moral limits** of exchange markets. According to the school, distributive efficiency not necessarily implies a fair and equitable allocation (Common and Stagl 2005:361). Whereas neoclassical economics generally limits inequality to that of income and puts it into the realm of political decisions due to its normative character, ecological economics underlines the importance of securing fairness and **equity** similar to activities that address market failures. With regard to the relationship of efficiency and equity, it emphasises the importance of analysing intra-temporal (or also intra-generational) and inter-temporal (or also inter-generational) equity. The former looks into the relationship of inequality, economic growth and environmental quality, starting from the current situation and asking questions on potentially necessary redistributions. The latter looks into the consequences of current activities for future generations and the extent fairness and justice can be considered regarding the costs and benefits for generations yet to come.

An approach in addressing inter- and intra-temporal efficiency-equity questions refers to the subject of deficiencies in market prices and potential costs and benefits not captured by the market (e.g. public goods). Markets, particularly in relation to scarce resources, should reflect all opportunity costs, i.e. the costs arising from using one additional unit of a good and giving up a unit of another good. The development of **shadow prices** that reflect to a large extent all opportunity costs is considered one way forward in addressing related distortions, for example in cost-benefit analysis. Although largely based on the notion of economic efficiency, economists have developed related methods that attempt to capture the total economic value of ecosystems. Ecosystems in this regard are broadly viewed as being part of natural capital, the latter an economic metaphor for physical and biological stock of resources on earth (TEEB 2010:187+xxxvi). Existing frameworks attempt to include a wider range of preferences than is usually the case in economic evaluation, and to capture them by linking it to methods that look at the willingness to pay for those preferences. How this is applied with regard to the concept of ecosystem services and GI implementation is discussed in chapter C 1.2.2.2 in more detail.

C 1.2.1.3 Sociology – Inequality of classes

Focus

Sociology is another discipline that has historically pursued the study of inequality. The diversity of dimensions which have been used to define social inequality is reflected in the distinction between **vertical and horizontal social inequalities** (Hradil 2012). The former refer to inequalities with regard to higher or lower social status, particularly related to aspects such as education, income and job characteristics. The latter refer to inequalities in relation to different life styles and milieus, considering aspects such as age, gender, or immigration background. More generally, social inequality refers to differences in the distribution of resources which results in a distinct access to defined life and individual fulfilment chances (Hradil 2012). Although social inequality is often taken as synonymous to social injustice, at what point social inequality can be defined as just or unjust has to be subject to further research in social sciences, according to Hradil (2012).

In addition, often the notion of **social cohesion** comes into play, in particular as a policy objective referring to a desirable end of decreasing social inequality. Though there is a long history of studying the concept

across different disciplines including sociology, the term is still considered elusive due to a high degree of specialisation and fragmentation, also regarding its measurement (Bruhn 2009: 31+47, Friedkin 2004:409). In addition, it can not necessarily always be directly related to issues of social inequality. For example in the framework of social network analysis, research on social cohesiveness more generally refers to the study of the degree of interactions and ties amongst and between individuals and members of a social group (Bruhn 2009:46). It is considered influenced by multiple dimensions such as kinship, interpersonal agreement or resource inequality (Friedkin 2004:421). As a policy objective, a cohesive society has been described as '*one which works towards the well-being of all its members, fights exclusion and marginalisation, creates a sense of belonging, promotes trust, and offers its members the opportunity of upward social mobility*' (OECD 2011b). Following these definitions, social inequality only represents one component of social cohesiveness.

An approach that distinguishes the discipline of sociology from others, and economics in particular, is that of the **class-model perspective**, especially related to vertical social inequality. Though the discipline also looks into research regarding income based, socio-economic and prestige inequalities, the class-based approach has been deemed particularly interesting, as it paves the way for new interpretations of inequality in economics. The class-based approach refers to models that divide the population in mutually exclusive categories, usually defined by employment status and job characteristics. The employment status represents a group's strength of commitment to the formal labour force. It also refers to occupational distinctions such as labourer, craftsmen, cleric or professionals. Job characteristics on the other hand are deemed useful to identify the market power and life chances of individuals belonging to a certain group, and are often described by qualities such as amount of authority or type of employment contract. It is often argued that classes described by these qualities are partly institutionalised, rather than representing nominal or statistical categories, and consequently are a closer reflection of reality than other, often more abstract classifications. Within the field, however, a strong debate is ongoing on how to define the boundaries of different population classes.

Brief history and key theories

Grusky and Kanbur (2006:13-26) have distinguished three key phases that describe important evolutions in the development of the class-based approach. A structuralist rationale to class-based models characterises the first phase, mainly in the 1950s to 1980s. Initially, the identification of class categories was mostly seen as a metaphysical and intellectual endeavour, and solutions to problems were developed that still today drive discussions on inequality throughout different disciplines. These refer to multidimensional instead of one-dimensional measurements, the shift in focus from outcomes to capabilities and the issue of adaptive preferences. Initial research particularly concentrated on class formulations based on a **package of structural conditions**, including for example the level of education, income or health. It mostly built on the theories of the German Sociologist Max Weber (1864-1920), who described social classes as indicators of life chances, i.e. opportunities that a given set of endowments offer and can also be obtained by ways such as preference or 'luck' (Weber 1946). It is assumed that Weber's interpretation of social classes also reflects his understanding of the clear separation of three moral spheres. This includes the private sphere (which holds norms applicable to every individual independent of his role in a society), the professional sphere (norms applied in each profession) and the public or civic sphere (including norms related to actions that influence matters of public interest). However, for example Bunge (1989:161) rejects the theory of the autonomy of each moral sphere, iterating that this potentially leads to misuse in order to justify immoral actions in one sphere. He differently concludes that for example no social welfare exists without individual welfare. Weber's view on social classes was also supported by followers of the Marxian economic school,

who further pursued Karl Marx's notion of classes rather than individuals making up the economy, and as such becoming the centre of analysis (Chang 2014).

Many of today's criticism of a structural class-based approach links to the fact that it takes a future perspective, neglecting decisions taken before a certain status is achieved (e.g. educational background of parents). In addition, it focuses on a limited range of endowments and outcomes, working with a small set of logical combinations regarding the impact of different parameters on life chances. The aim is to reduce the complexity of a multidimensional space, by focusing on a number of dimensions considered manageable. However, this bears the risks that resulting models are based on a set of assumptions of the social world difficult to put to test.

In the second phase, from the 1980s to the end of the 1990s, sociologists such as Pierre Bourdieu (1920-2002) and Bryan R. Wilson (1926-2004) introduced a culturalist rationale for class models. They considered classes not merely constellations of structural conditions, but viewed them as **socially closed groupings with distinctive cultures**. These groupings were thought to result from processes such as workplace and residential segregation. Regarding the content of class cultures and their relationship to structural conditions, three main positions have become evident, according to Grusky and Kanbur (2006:20-23):

- *Culturally prescribed means*: Distinct cultural prescriptions within a class allow taking what are perceived reliable and economically viable decisions, in pursuing an end important to all classes. For example, individuals of a working class could follow rough prescriptions questioning the necessity of higher education, and look for other means to achieve recognised goals of social status. This could relate to fears that the required investments would lead to a downward social mobility, due to the lack of financial backup should it not work out as expected.
- *Culturally prescribed ends*: Distinct cultural prescriptions lead to a different valuation of ends to be achieved. Due to the means available, certain ends could not be perceived as achievable or desirable and thus could result in a re-orientation regarding pursued ends. For example, individuals of a working class could rather wish to achieve the alternative objective of respect and dignity in opposition to mainstream objectives such as securing high status jobs.
- *Maladaptive culture*: Different to the previous two positions, where cultural prescriptions seem to positively serve the pursued end, the third approach assumes the development of class cultures that have a negative impact on a class's end. Constraints regarding certain capabilities could lead to the appearance of counterproductive and dysfunctional personality types.

Since the end of the 1990s, in the third phase of class-based sociological work, many of the existing foundations of class analysis have been revisited. It goes as far as **questioning class formation** altogether, for example by sociologists Terry N. Clark and Seymour M. Lipset (Clark and Lipset 2001). These fundamental criticism led to a series of research that aimed at empirically assessing the foundations of class-based models. It included testing to what extent the multidimensional space of inequality could be reduced to a small number of institutionalised classes, characterised by a combination of endowments and outcomes. Another research area refers to the question to what extent class membership seriously affects group behaviour and attitudes and consequently outcomes independent of individual characteristics. Sociologists have also started to particularly look into the formation of (maladaptive) class cultures and the contribution of neighbourhood effects in particular.

It is interesting to note that, quite irrespective from each other, the disciplines of sociology and economics have developed new approaches to the subject of inequality which have a close affinity, for example regarding the notion of adaptive preferences. However, Grusky and Kanbur (2006:27-29) also emphasise that there is value in further interdisciplinary collaboration, particularly on subjects such as shifts in the division of labour and its impact on inequality (e.g. deindustrialisation, computerisation), maladaptive cultures and irrational behaviours (e.g. link to behavioural economics), and capabilities and inequalities measurement (e.g. focus on endowments instead of outcomes which reflect individual preferences).

Measurement approaches

Generally, sociology has put less focus on the development of measurements than has done the discipline of economics in relation to inequality. Approaches in sociology often use headcounts of individuals and/or households to determine either inequality regarding certain conditions or inequality of life chances. The data can for example relate to defined social classes, as introduced above, or other forms of social stratification, e.g. race, ethnicity, age or gender. Depending on the research area, approaches can address a wide range of issues or be specifically narrowed down to certain aspects to define social inequality. This includes variables with regard to health, education, empowerment, human and labour rights or environmental quality, but also income and wealth when analysing socio-economic relationships. When it comes to linking questions of social conditions, environmental quality and health for pursuing environmental justice at municipal level, in Germany researchers have for example suggested the collection of data and development of indicators on social conditions (e.g. percentage of long-term unemployed), environmental conditions (e.g. exposure to street noise, particulate matter and public green spaces) and health (e.g. percentage of overweight and obesity cases or cases of cross motor dysfunctions) (Böhme et al 2015:34). It highlights the importance attributed to capturing multiple dimensions, which is usually not deemed achievable by the application of one measurement approach, and cannot be easily transformed in a composite index.

One of the few composite indices which has attempted to seize these multiple dimensions is the Human Development Index, developed by the United Nations Development Programme (UNDP). As previously mentioned, it builds on the theory of capabilities according to Sen and Nussbaum, and aims to capture human well-being in a breakdown of different indicators. These address aspects such as long and healthy life (e.g. child malnutrition, life expectancy), knowledge (e.g. literacy rate, education quality), decent standard of living (e.g. long-term unemployment rate, trust in other people) or environmental sustainability (e.g. population living on degraded land, natural resources depletion) (UNDP n.d).

Similar to criticisms of synthetic indicators on income/capital inequality, the question remains to what extent composite indices on social inequality allow a more in-depth analysis regarding social relationships in groups or classes. In addition, the choice of the dimensions to include as well as their relative weight is also subject to much dispute.

Potential links to environmental/spatial questions

One focus of discussions regarding interrelations between social inequality and spatial structures refers to the subject of **neighbourhood segregation**. With regard to class-based models, residential or neighbourhood segregation has been identified as one important aspect of ‘closure’ which can lead to the development of distinctive class cultures, due to spatial isolation and consequently disproportionately higher interaction among certain social groups (Grusky and Kanbur 2006:19-27). Neighbourhood segregation refers both to the process of the creation of spatial disparities, selection and final segregation as well as to the

distinct distribution of population groups in a defined space (Lange 2015:17). Bertelsmann (2010:9) has for example differed between:

- *Demographic neighbourhood segregation*: Spatial differentiation of the urban population linked to aspects such as age, type of household or lifestyle.
- *Ethnical neighbourhood segregation*: Spatial differentiation due to nationality and ethnical background.
- *Social neighbourhood segregation*: Spatial differentiation linked to socio-cultural aspects such as income, education, job characteristics and unemployment.

Historically, a large amount of research regarding neighbourhood segregation focused on classes of poverty and their spatial segregation. In particular, the interest of researching a social class defined as 'underclass' led to heated debates amongst scholars of urban poverty, according to the sociologist William J. Wilson (Wilson 2006:103-116). He argues that this mostly links to its misuse in practice, and the failure to relate the notion to a robust theoretical basis and a systematic framework. Consequently, Wilson argues for continued systematic research on the subject, and provides initial conceptual work. In his theory of the social transformation of the inner city, he links the structure of social inequality to social behaviour in a certain neighbourhood, conditioned by opportunities, constraints and social psychology. He distinguishes between exogenous factors (e.g. racial discrimination, changes in the economy) and resulting endogenous factors (e.g. urban migration, employment and income distribution, social isolation). According to his hypotheses, these factors lead to certain structural (e.g. weak labour force attachment) and socio-psychological (e.g. limited aspirations) outcomes, also emphasising the importance of the social environment.

However, it needs to be noted that the question to what extent other contextual effects (e.g. occupational) play a role in determining class cultures is also subject to further research. In addition, it is also argued that theories brought forward by sociologists mostly look at social relationships and fail to take relationships to the built environment sufficiently into account. Wilson also argues that researchers '*have yet to demonstrate the complex ways that the environment or neighbourhood milieu directly and indirectly affects the social outcomes, including the cumulative effects* […]' (Wilson 2006:116). In this regard, a study by economists of the University of Harvard provides some more recent insights, focusing on the impact of neighbourhoods on the equality of opportunity and related income outcomes particularly for children. It shows that placing children of poorer households into better standing neighbourhoods in early childhood can result in a substantive increase of future income, suggesting that '*the integration of disadvantaged families into mixed income communities are likely to reduce the persistence of poverty across generations'* (Chetty et al 2015).

Yet limited comprehensive evidence on the effects of neighbourhoods on social outcomes have also triggered criticisms by economic scholars. Cheshire et al (2014) for example view the development of neighbourhoods as a result of interactions and 'fine-grained' sorting of variables regarding land, labour and the housing market, by individuals who rationally balance benefits and costs. Consequently, they see the concentration of 'poor' people in some neighbourhoods mainly as a result of reduced housing costs. While they agree that there is some sort of link between deprived neighbourhoods, and poor economic and social outcomes, they believe it less a direct or indirect result of it and more relevant at the family and individual level (Cheshire et al 2014:56). In this regard, they argue that urban policy-makers and planners should be less concerned in '*socially engineering*' mixed neighbourhoods, as it could be counterproductive because of the distortion of social relationships beneficial to the poor (Cheshire et al 2014:65-72). The focus in

reducing spatial disparities should rather be on people than on transforming places, as spatial disparities are believed to mainly result from income inequality and individual preferences.

Criticisms by Cheshire et al (2014) link to planning concepts such as a 'compact city' in Europe or 'smart growth' in the United States, which include the principle of developing mixed(-use) neighbourhoods that promote social and economic diversity within cities as a means of counteracting inequalities (see also chapter C 1.1.1 on GI's historic evolution). In their book '*Planning and Diversity in the City: Redistribution, Recognition and Encounter*', for example the previously introduced sociologists Ruth Fincher and Kurt Iveson emphasise the importance of urban planning paying attention to the creation and nurturing of a **diversity of 'habitats'** to address spatial justice (Fincher and Iveson 2008:28+37). In contrast to other proponents, however, Fincher and Iveson consider different layers of diversity, reflected in three main goals for social justice (Low 2013:5). With regard to redistribution as a first 'social logic', they emphasise the importance of focusing on social access rather than only on physical access in the distribution of material goods or resources. This particularly refers to considerations of equity in the planning processes (Healey 2010:722-724). On the second objective of recognition and encounter, they argue that identities are formed in an urban context, and that no assumption should be made on which identity or social group is important (e.g. child-friendly city). Thirdly, places of encounter should be defined as open places where people can explore diverse and shifting identities, and which should consequently not be 'pre-identified' for certain groups (Healey 2010: 723). However, the authors face criticism due to their omission in addressing aspects of physical shaping and of design principles regarding places of encounter (Healey 2010:724).

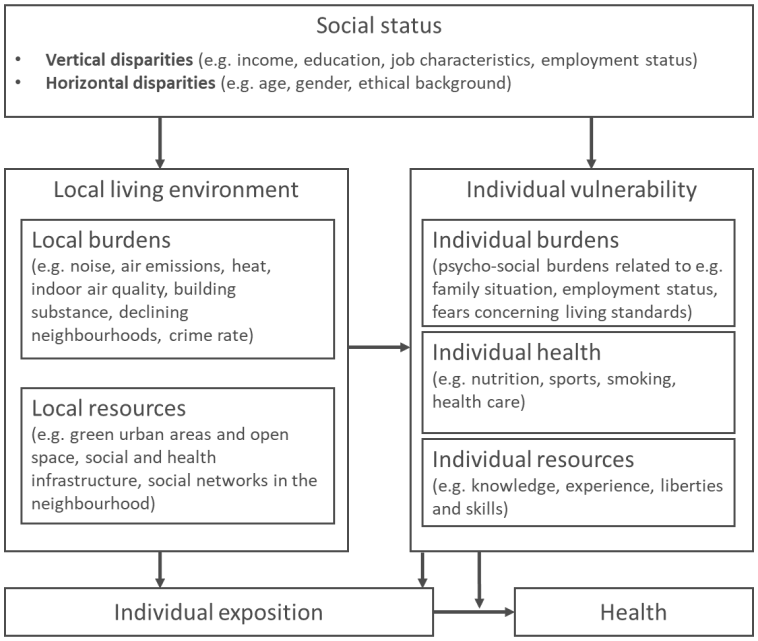
In contrast to other approaches with roots in sociology, Susan Fainstein in her book '*The Just City*' (Fainstein 2010) emphasises the importance to move from a normative approach of individual and cultural preferences to a **more objective approach** albeit also more utopian. She reiterates the importance that planning gives thorough consideration of how to consciously create conditions for a better city for all citizens (Low 2013:5). In this regard, she refers to the importance of equity, diversity and democracy as three main pillars for judgment, and of questions such as '*who gets in*' and '*who gets asked*' over '*who gets what*' driving the analysis (Tonkiss 2011: 584). One example brought forward includes the Battery Park City in New York, which in her view produced some positive outcomes regarding equity and diversity, as the project enhanced the city's tax base and is a source of revenues to the city, but lacked democratic engagement in its development. In an essay dealing with the subject of resilience and justice, she also outlines more comprehensively the importance of clearly stating and deciding who benefits and who will likely lose out regarding outcomes of planning processes (Fainstein 2015). In this regard, she criticises the use of the term 'resilience' in planning, as obfuscating and a hindrance in addressing the question of winners and losers. Understood as '*looking for ways to manage in an unbalanced world*', she notes that the notion accepts an unbalanced world rather than seeking solutions to decisions and activities that lead to unbalances. In this regard, she also questions the role of participatory processes in achieving better outcomes (Fainstein 2015:165).

The notion of resilience represents a centrepiece of the **ecosystem services** concept, as it is deemed that the contribution of biodiversity to the provision of ecosystem services is highest where aspects of resilience are taken into account. However, despite rising attention, the related knowledge of ecologists still remains rather limited. Nevertheless, the ecosystem services concept is an area where increasingly collaboration between social sciences and ecology is taking place, though the subject of inequality has been addressed only to a limited extent. The concept of **social cohesion** has recently figured more prominently, a term often stipulated as a policy objective especially at the European Union level (EC 2011b). In a report highlighting the social and health benefits of nature and biodiversity protection in the EU, for example the role of a

shared access to urban green spaces in contributing to social cohesion was explored, referring to the dimension of increased inclusion, order and of reduced inequality as well as to the dimension of bonds and trust, place identity and attachment (Ten Brink et al 2016:136). A project on European GI planning and implementation (see chapter C 1.3.4) identified social cohesion as one of the policy objectives at which the concept aims, whereby it has been defined '*as the capacity of a society to ensure the welfare of all its members, minimising disparities and avoiding polarisation. People from different backgrounds should have an equal chance to participate in decision-making, should have similar life opportunities and equal access to services, including, access to green spaces*' (Davies et al 2015:14). However, it is thought that social cohesion bears the risk of being too wide of a concept to strategically guide the implementation of Green Infrastructure, due to the many factors making a contribution and the less immediately evident links to environmental objectives.

Another recent area of collaboration between social and environmental sciences has been on correlations between social conditions, **environmental qualities and health**, (Böhme et al 2015, Hornberg et al 2011, Bolte and Mielck 2012, Lange 2015). It relates to the previously introduced notion of environmental justice, however specifically interpreted as '*prevention and reduction of socio-spatially concentrated, health-relevant environmental burdens, as well as the socially just access to environmental resources*'. This interpretation has become of increased interest to scholars of different disciplines in Germany, albeit so far it has been less taken up in municipal practices (Böhme et al 2015:28). In order to systematically describe interdependencies and linkages with regard to social conditions, environmental qualities and health, researchers have for example developed the model presented in Figure 19. It is based on assumptions that individual health is first of all impacted by the local environment and related environmental quality a person has access to ('variations in exposure'). Secondly, it argues that personal health is also determined by how social conditions influence the individual vulnerability to environmental burdens ('impact modification'), depending for example on the socio-psychological prerequisites, the individual health situation and knowledge and awareness (Böhme et al 2015:45). In a recent diploma thesis focusing on operationalising environmental justice in urban development and planning, the model, which mainly supports the description of a current situation and related linkages, has been transposed into a model of action (Lange 2015:61). Although the updated model in this regard picks up different components of justice, including *distributional justice* by reducing a determined amount of local environmental burdens or *procedural justice* by increasing individual capabilities and participatory opportunities, it fails to address comprehensively one important element, namely equal access.

Figure 19: Model describing linkages between social status, environmental quality and health (adapted & translated from Bolte et al 2012 in UBA 2015:46)



What consequences it might have of not taking into due consideration questions of **overall equal access**, can be illustrated by the recently formed notion of '*environmental gentrification*' or '*green gentrification*'.

Already in the 1980s, interest was high in researching potential tensions between inequality and environmental questions, especially with regard to the distributional effects of environmental policy by economists (e.g. Zimmermann 1984, Merk 1988). Related research predominantly focuses on issues of who bears the costs and who reaps the benefits of a policy aiming at a cleaner environment, in particular with regard to taxes (e.g. Serret and Johnstone 2006). It has also often resulted in a view largely similar to Benjamin Davy's previously outlined idea of accepting some injustice with regard to the distribution of environmental 'burdens', for example to allow the existence of worse-off neighbourhoods, which however would be able to offer affordable housing to different social groups (see chapter C 1.2.1.1). Harvey (1996: 386) used the words 'impeccable economic logic', to describe a similar proposal to develop a second noxious facility in an impoverished area, for optimal lowest cost allocation as it would have less impact on property values.

This criticism was picked up by Gould and Lewis (2016) in their book '**Green Gentrification**', where the authors emphasise the role of what they call the green growth treadmill in contributing to gentrification caused by the creation and restoration of environmental amenities. It relates to the call of increased economic growth and the promise that this will generate increased revenues for environmental improvements (Gould and Lewis 2016:34-35), according to the previously indicated slogan that a 'rising tide will lift all boats' (see chapter C 1.2.1.2). Following the authors, it has however rather resulted in '*economic benefits being redistributed* [socially] *upward*', and '*environmental hazards downward*'. They emphasise that it is now '*favouring greening as a form of growth or improvement*', which generates taxes, revenues and profit and quality of life (Gould and Lewis 2016:34). However, related interventions rather result in the displacement of lower income groups to neighbourhoods with low environmental quality, and make the new environmental amenity available to new inhabitants with adequate resources. The authors support this claim by describing and analysing in detail a range of examples concentrating in Brooklyn, New York. Gould and Lewis (2016:171-172) conclude that a 'just green enough' approach might be needed and that developments should be driven by an environmental justice 'masterframe', which empowers civil society and emboldens public policymakers, by ensuring equity in both processes and outcomes.

C 1.2.2 GI – Relevant theories and concepts for a just access

C 1.2.2.1 A synopsis of results

The previous chapter aimed at providing a basic understanding of how two important fronts of conceptual work on equality/inequality and justice, namely defining their dimensions and ways of characterising and potentially measuring them, have been addressed by the disciplines mostly committed to its research. Although insights from philosophy, economics and sociology have been outlined separately, it is evident that the line cannot always be drawn neatly and that different scholars have not hesitated to borrow from different disciplines. Table 8 offers an overview of the main results of the analysis and the dimensions treated so far in this work.

Table 8: The equality/inequality and justice/injustice space – an overview

Discipline	Key focus	Measurement	Environmental/spatial link
Philosophy	• Equality and justice as main components of the debate, either with regard to relevant processes or outcome • Aristotle's proportional equality related to worth and merit laid fundament for theories and disputes to come, whether in opposition or support • Equal opportunities and justice formed by social contract rather than meritocracy more specific and recent notions • Major streams of discourse on outcomes: welfare egalitarians focusing on life fulfilment and preference satisfaction and resource egalitarians interested in distribution of primary goods • More recent discourses of outcome refer to the distribution of capabilities and basic entitlements	• Related discussions mostly focused on ways of transposing formative approaches into formula and of filling them with content • Formula used to provide structure to some theories on genuine values • Theory of capabilities transposed into Human Development Index	• Environmental ethics and the value of non-human nature • Instrumental values and the distribution of material goods • Fundamental and eudemonistic values to capture complexity human-nature relationship • Theory of capabilities: control of the environment & relationship with other species • Environmental justice: generation - distribution - process, related to ills and benefits • Accepting essential injustice with regard to environmental and land use disputes
Economics	• Main focus on the distribution of income, capital ownership and/or wealth, and related inequalities • Different economic schools battling over solutions to distributional challenges, e.g. efficiency and consumer sovereignty versus equity and sustainability; resource and land scarcity versus substitutability of human and natural assets • Predominant view for many years: inequality will solve itself with economic growth and increased income (Kuznets curve) • Followed by first phase of conceptual work in 60s to 80s: measurement approaches, their philosophical basis, units to be used and influence of social interactions • Second phase in 80s to 90s: Intensive policy debate regarding the role of the market versus the role of the state in addressing inequality • Third phase from 90s: Doubts regarding rational preferences and development of the notion of adaptive preferences; consideration given to multiple dimensions of inequality and individual versus class based approaches in studying inequality	• Focus on inequality (rather than injustice) as more easily measurable and less subject to individual preferences • Most famous: Gini coefficient - compares the distance of a real life curve to an equal distribution of income/capital • Further decomposing dimensions of inequality: generalised entropy indices and Atkinson indices – measuring the distance to maximum disorders/diversities or social utility from redistribution • Less complex, but also less sophisticated: percentiles ratio - compare the income of two different groups, e.g. the 10th percentile to the 90th percentile • Distributive tables of income as compromise between simplicity and in-depth analysis	• Cities viewed as social and economic constructs, where built environment visible result of social and economic interactions • Urban economics – how the balancing of costs and benefits shapes demand & supply and thus creates patterns of urban land uses • Efficiency of markets defines pareto optimality in the distribution of urban real property, influenced by elasticity and substitution effects • Neoclassical school: planning control only necessary to balance out market failures, with risks of occurring government failures • Addressing market failures also by looking at total economic value of ecosystems as part of natural capital • Ecological economics: moral limits to markets as distributive efficiency not necessarily implies a fair and equitable allocation; introduces notion of justice, keeping utilitarian basis
Sociology	• Distinction between vertical and horizontal inequalities • Class-based inequality, related to population divided into mutually exclusive categories, e.g. defined by employment status and job characteristics • Initially focused on class formulations based on a package of structural conditions that help describing life chances • Recent disputes on class-based models regard: – the analyses of a complex multidimensional space by applying a limited amount of classes; – identification of endowments & outcomes, and – their relationship to class cultures as well as maladaptive cultures • Other forms: socio-economic & prestige inequality • Social cohesion often described as a (policy) objective, though elusive, referring to degree of interactions and ties amongst members of a social group	• General retentivity in the use of measurement approaches • Mostly focused on headcounts of individuals and/or households to determine either inequality regarding certain conditions or inequality of life chances • Linkage to theory of capabilities and Human Development Index	• Neighbourhood segregation and development of distinctive class cultures: the role of neighbourhood mix and spatial diversity • Spatial justice to be achieved by redistribution of resources, equity in related processes and access as well as recognition of shifting identities and encounter places • The just city: questions on 'who gets in' , 'who gets asked' over 'who gets what' • Need of identifying and accepting winners and losers instead of accepting an unbalanced world (resilience) • Recent focus on linkages between social conditions, environmental quality and health • Tensions between social justice and environmental questions: environmental or green gentrification

While it might seem that notions of equality, inequality, justice as well as injustice can be used interchangeably, one being the flip-side of the other, the previous outline demonstrates that this has rarely been interpreted in this way and that different disciplines have decided to focus on a certain dimension of the space for a particular reason. Beyond the realm of philosophical discussions, ideas of equality seem to have been mostly abandoned, considered a notion too disputed and too difficult to put into practice. This also relates to the fact that it is often associated with the idea of bringing people up to the same level, independently of merit and preferences and related to all matters of life. Less often it includes taking the stance of considering all people of equal worth or applying a qualified equality, as suggested by Aristotle and more recently Mario Bunge. In political philosophy and in relation to the development of policies and their instruments, the idea of equal opportunities has become more prominent and has often been replacing equality. The notion refers to the opportunity to compete in a given market or society, according to its most basic interpretation, and is understood of offering equal life chances if interpreted more progressively.

The focus of economics on issues of inequality rather than equal opportunities or even more so on matters of justice is also of little surprise. Objectively measuring the first is considered possible and reflects the shift of attention in economics from the application of social science instruments to seemingly more objective mathematical endeavours. As has been iterated, inequality per se is neither bad nor good, it rather depends on whether related differences are perceived as just. Questions of justice as well as injustice on the other hand closely link to an individual's and society's value system and are considered normative in nature. Subjectivists, including most of the current economists, however argue that related moral codes are as subjective as values and thus mainly a matter of preferences, taste and opinion. It led Benjamin Davy to the conclusion that in a situation where different concepts of justice compete with each other accepting inevitable injustice is one way forward in order to avoid the capitulation of the land use planner in front of a grand scheme of justice. However, he fails to provide guidance on the level of 'essential injustice' and who is likely going to bear it for what reasons. He also applies 'the fiction' that otherwise the planner will be solely driven by rational preferences linked to matters of efficiency, unaffected by personal, cultural or institutional circumstances, and in this regard follows the tradition of the main-stream neoclassical economist.

Subjectivist approaches leave little room for genuine values, as criticised by Mario Bunge. It bears the risk that discussions on what is 'just' becomes a matter of '*everything and the opposite*', as iterated by the economist Thomas Piketty. Far from calling forward a pure and simple justice and applying absolute terms, new approaches have appeared that call on the development of more 'objective' criteria in helping to make value judgments on what is fair and just. Linked to the issue of adaptive preferences, the economist Amartya Sen and the political philosopher Martha C. Nussbaum developed the theory of capabilities, to shift the attention from the distribution of primary goods to that of basic entitlements which provide the prerequisite for people to truly do and be. Rather than iterating the importance of an equal starting point, as is the case for concepts of equal opportunities, it focuses on the outcomes to be achieved. Capability principles such as on being able to have good health, to be adequately nourished and to have adequate shelter rises questions on what settings and activities are needed for full implementation, and what rights and duties this implies.

Another approach considers basic needs and legitimate wants proposed by the philosopher Mario Bunge. According to Bunge, the emphasis on basic needs rooted in biological, psychological and social necessities allows a clear ranking based on their 'axiological objective' or genuine contribution to the survival of humankind and human well-being. At the same time, he encourages the testing and review of related values

and moral codes, based on scientific findings for instance provided by biology or neuropsychology. Justice then becomes a matter of adjusting the distribution of related rights and duties (or benefits and burdens) albeit in agreement with the available resources. In this regard, he puts emphasis on the importance of not only looking at the quantity to be distributed and in what manner this occurs, but also to take due consideration of the status quo of the 'cake' to be distributed.

Justice in the context of urban development and planning, particularly in relation to social justice, has not only be interpreted as a matter of distributive, but also procedural justice and equal access. This has been transposed by the urban planning theorist Susan Fainstein into looking for answers to three main questions, namely of 'who gets what', 'who gets asked' and 'who gets in'. Mainstream urban economists argue that various decisions related to issues of demand, supply, elasticity and substitution are likely to deliver the most optimal outcome in a situation of perfect market conditions. However, some also recognise that market failures, particularly related to the issue of public goods such as air quality and areas of high biodiversity areas, might necessitate government intervention such as planning control. The school of ecological economics goes as far as underlining the importance of securing fairness and equity beyond questions of efficiency, particularly regarding the relationship between inequality, economic growth and environmental quality.

A closer interrelation between notions of justice and the environment is given by the concept of environmental justice. The term appeared and has been mainly applied for many years in the United States to describe the unequal distribution of environmental quality linked to factors such as racial discrimination and social conditions, and the felt injustice linked to the impact it has on the well-being of defined populations groups. The normative approach has only more recently entered academic discussions in Europe, mainly in relation to interdependencies between social conditions, environmental qualities and health, particularly in Germany. However, it has only to a limited extent be taken up in municipal practice. It is assumed that the concept so far had only little resonance also in research, due to the assumption of its causes being mainly related to ethnical and less to socio-economic factors, and of a higher environmental quality offered in European cities compared to those in the US. In light of potentially increasing levels of economic inequality in Europe, a shift of attention might occur, similar to the subject of socio-economic spatial segregation that has increasingly caught the interest of the social sciences community (see introduction to the thesis). It also rises questions to what extent the focus on the aspect of improving planning processes for a consensual outcome compared to the development of a comprehensive concept of justice might be sufficient in addressing related challenges.

C 1.2.2.2 GI principles and conceptual linkages to questions of inequality and justice

Linking conceptual discussions on equality/inequality and justice to environmental and spatial problems and questions contributes to work on the before-mentioned third front of research on inequality and justice, that of **seeking solutions**. The previous sub-chapters provided a first outline of ideas and conceptual work that have been pursued, though not considering yet how they more closely relate to the concept of Green Infrastructure. This concluding section will indeed look more closely into theories and concepts that might be of particular relevance and might be applied to GI operationalisation. This especially refers to three important principles of the concept and their potential link to questions of inequality and justice:

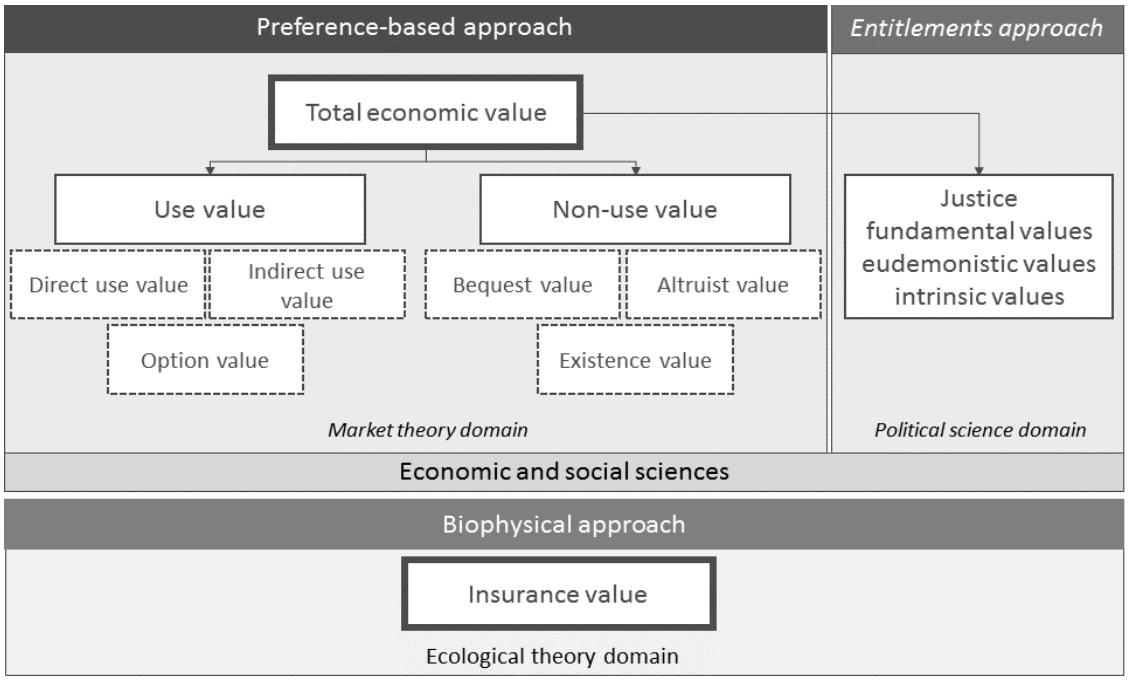
- **Multi-functionality** and related questions of **distribution**
- **Connectivity** at different scales and its relationship to questions of **access**
- **Ecosystem approach** and its relation to **procedural questions**

Multi-functionality and distributional questions

The concept of ecosystem services, used by a range of GI definitions, most strongly relates to the issue of multi-functionality regarding expected benefits, and the distributional processes involved. Initially, the concept was especially used to underline the importance of ecosystems and biodiversity in sustaining life and human well-being. This related to frameworks such as those provided by the Millennium Ecosystem Assessment (MA) or the sustainable livelihoods approach (SLA) regarding questions of poverty alleviation in developing countries (TEEB 2011a:37-38). The focus increasingly shifted to emphasise the importance for long-term economic sustainability and thus to the application of an **economic framework**, which links the value of ecosystem services to key determinants such as supply and demand and thus preferences also with regard to distributional questions.

The Total Economic Value framework represents the most common standard valuation approach to capture the socio-economic outputs derived from ecosystem services (Pearce and Moran 1994). It distinguishes between use values and non-use values (see Figure 20). The first include values of direct (e.g. food and water) and indirect use (e.g. soil fertility), as well as option values (i.e. value linked to the potential future benefit). The second group goes as wide as including values that individuals derive for knowing that future generations will benefit from ecosystems (bequest value), others might benefit (altruist value) or knowing that species and habitats exist (existence value). In the context of '*The Economics of Biodiversity and Ecosystem Services*' (TEEB) initiative, the Total Economic Value framework is considered a **preference-based approach** within the domain of market theories (TEEB 2010:192). It follows the assumption of neoclassical economics that these instrumental values can be translated into positive statements following existing economic models.

Figure 20: Framework for the estimation of nature's value (adapted & developed based on TEEB 2010:191)



Interestingly, TEEB (2010:191) also considers intrinsic or deontological values part of the preference approach, although they are described as inherently normative and thus belonging to the domain of political science rather than market theory. As the same could be said about the previously introduced eudemonistic and fundamental values, they have been added to the framework. However, differently as suggested by

TEEB (2010:191), the thesis does not consider them as preference-based approaches, but one of **entitlements**, building on the previous outline on the importance of an 'objective' definition of basic entitlements and capabilities. In addition, as presented in Figure 20, both preference-based and entitlement approaches are not considered as the main domain of either market theory or political science, but subject to valuation by both economic and social sciences. Regarding other ways forward on the estimation of nature's value, TEEB (2010:187) also added the so called insurance value, as part of **biophysical approaches**. It refers to the value of ecosystems to maintain benefits for the future, depending on their healthiness and resilience to change. Ecological resilience has been explained as an ecosystem's ability to maintain its basic structure and function over time when facing internal change and external disturbances (Townsend et al 2002, Cumming and Collier 2005, and Mazza et al 2011). The notion represents a centrepiece of the ecosystem services concept, as it is deemed that the contribution of biodiversity to ecosystem services provision is highest where aspects of resilience are taken into account. Differently to TEEB (2010), the thesis considers it important to put the insurance value at the basis, following thinking of ecological economics, where the environmenal system underpins social and economic systems.

A range of qualitative, quantitative and monetary **valuation methods** have been developed to determine the socio-economic value of ecosystem services with regard to the framework provided above. Monetary approaches range from market valuation (e.g. when existing market prices are used to indicate a value) to revealed preference (e.g. when prices of alternative markets are used to reveal a value) and stated preference methods (e.g. when prices of hypothetical markets are used to state a value). Quantitative methods focus on presenting quantitative data on biophysical (e.g. quantity of air purified) and socio-economic processes (e.g. created employment). Qualitative methods provide a narrative description of values revealed by experts or inhabitants (e.g. focus groups, surveys, interviews). As such ecosystem services valuation is deemed useful in conveying monetary information (e.g. avoided costs) as well as quantitative information (e.g. level of air purification) to **policy instruments** adopted at the local and regional scale, including cost-benefit analysis, multi-criteria analysis, strategic environmental assessments (SEAs) and environmental impact assessments (EIA) (Vandermeulen et al 2011).

Hedonic pricing is used as one method to determine the **monetary value** of amenity services provided by ecosystems. It is assumed that functions such as air purification, noise abatement, recreation opportunities or beauty can enhance a neighbourhood's attractiveness, leading to effects on property values. The scarcer an environmental feature (e.g. urban river) and the higher the demand the more this is considered positively reflecting in selling or renting prices, being higher than at sites where the feature is not offered. The amenity of a site is not only influenced by environmental features, such as air quality, open landscape or private gardens, but also structural (e.g. age of a house, number of rooms or floor space) and neighbourhood factors (e.g. level of traffic, accessibility, school quality or demographic and cultural aspects) (Gantioler and D'Amato 2013:192). Consequently, different attributes are included as variables in any related statistical analysis or analysis of geospatial data, in order to allow the relative measurement of the level of correlation as well as their dependency or independency (Hussen 2004:150-2). As it is assumed that benefits arising from certain ecosystem services decline as the distance between beneficiary and places of generation increases, economists also often apply so called spatial discounting rates to take account of the spatial disparity between generation and distribution (TEEB 2010:235).

Mostly, the hedonic pricing approach as well as similar methods such as the travel cost method (e.g. measuring the willingness to come up for certain cost to reach an environmental feature) have been used to estimate and underline the value associated with environmental attributes. This is the case for instance

when used as a proxy in relevant cost-benefit analysis of projects and programmes, and when descriptively highlighting potential benefits the development of a feature might bring. However, rarely have the risks linked to increased property prices particularly in situations of already high demands and scarce supply been considered more profoundly, albeit initial warnings have been raised (EC 2012:26-27, Gantioler and D'Amato 2013:192). Initial ethical questions linked to the ecosystem services approach have been interested in the importance of describing who benefits from the services provided by an ecosystem and where potential trade-offs and disservices need to be considered, and who bears the costs, for example regarding the appropriate ecosystem management (Kettunen and Ten Brink 2013:20). Other questions mostly relate to the ethical limits of economic valuation, discussing what should be valued and what considering potential impacts on the human-nature relationship (e.g. commodification) (TEEB 2010:157). In light of increased recognition that a pareto equilibrium, i.e. where some are gaining but no one loses, is rarely met in reality, questions on how gains and losses impact different income groups have become more important. It resulted into the exercise of applying equity weighting, which takes into account that the loss of particular ecosystem services might impact more greatly on those falling beneath defined income levels (TEEB 2010:237).

However, overall questions on equity and justice in the distribution of benefits have so far been of less concern, given their normative character and the focus of existing valuation approaches on logical-rational models that depict the complexity of reality. More recently, as already indicated in the introduction, a range of researchers have started to emphasise the importance of recognising that the ecosystem services approach is a normative and value-laden concept. As such it is faced with controversies regarding which values are highlighted and which obscured, and who is impacted in what way by decisions related to ecosystem service provision (Jax et al 2013). It is noted that the ecosystem services approach mainly helps to articulate instrumental values and that the latter became the main language used to describe values linked to ecosystems. Other value dimensions are feared to be excluded, mainly linked to the perceived tangibility and seemingly usability of the instrumental value approach (Jax et al 2013). As described in chapter C 1.2.1.1 on philosophical approaches to equity and links to environmental questions, it resulted in initial attempts to introduce different value concepts such as relational values so that '*environmental decisions will better account for our relationships with nature and many notions of a good life*' (Chan et al 2016). According to Ernstson (2013), however little research is yet available that particularly links the framework of ecosystem services to discussions on environmental justice. His suggested way forward will be outlined in more detail when discussing the GI principle of an ecosystem approach and procedural justice.

Connectivity and questions of accessibility

As mentioned in the introduction, already the landscape architect Frederick Law Olmsted argued that the development of physical parkways should help improving access to New York's Central Park from different quarters of the city. Since then the network approach, particularly promoted in the context of the development of ecological networks, has gained further prominence in designing urban green and open space and also represents a key characteristics of the GI approach. The concept of developing dots or hubs and links or corridors has been deemed effective in creating a fine-grained net that supports easy physical access and thus reachability to a city's urban nature.

In this regard, the approach is often one of spatial design, which looks at the potential spatial patterns to be adopted, and their performance regarding defined criteria. Such an attempt has for example been made with regard to the potential modern design of park systems, breaking spatial patterns down into archetypical examples to be found in different European cities (Lörzing in Babalis 2005) (see Figure 21). This includes

historical 'patchworks', consisting of isolated dots of green open space, 'ribbons' or linear green and blue elements cutting through a city, and (inner-city) 'belts' which limit access or development. More recent patterns, characterising cities of the 20th century and beyond, are considered 'wedges', used to separate fingers of a radiating city, and 'networks' conceived by parks as hubs and recreational physical links. The criteria against which performance was mostly judged related to the park system's recreational potential. Albeit it is a tentative, qualitative assessment, it reflects an expert's view on the role of the network approach particularly in providing easy access to urban green space.

Figure 21: Matrix of urban green spatial patterns and their recreational performance (adapted & developed based on Lörzing in Babalis 2005:54-55)

	Patchwork	Ribbon	Network	(Outer) Belt	Wedge
Experience of natural environment	∧	↗	∧	↑↑	↑↑
Linking natural elements	∧	↑↑	↗	∧	↑↑
Experience of authentic environment	∧	↗	∧	↗	↗
Linking authentic elements	∧	↗	↑↑	∧	↑↑
Suitability for static recreation	∧	∧	∧	∧	∧
Suitability for active recreation	∧	↗	∧	↑↑	↑↑
Suitability for circuit recreation	↑↑	∧	↑↑	↗	↗
Density of recreational use	↑↑	↗	↗	∧	∧
Variety in recreational experience	↑↑	↗	↑↑	∧	∧
Easy access from the city	↗	↗	↑↑	∧	↗
Feeling of public safety	↗	∧	↗	∧	∧

Note: ↗ indicates good/high performance, ↑↑ indicates very good/high performance, and ∧ a comparably poorer or equal performance

The example above also shows to what extent the focus in spatial planning and design was on the physical distribution of especially public areas, to guarantee some degree of access to urban green space. In recent time, research on case studies in European and US cities focused on the extent to which distinct population groups have limited access to public urban green areas (Kabisch and Haase 2014:130). In a range of European cities, per capita values on dedicated public green space exist. These standards especially relate to the notion of defining accessibility by the provision of a **critical mass**, rather than the strategic development of a network. This includes for example minimum standards of 6m^2 public green space to be provided to individuals in the city of Berlin, in an intake area of 500 m and minimum size of 5 ha (Stadt Berlin/Senatsverwaltung für Stadtentwicklung und Wohnen 2013). For the city of Vienna, the minimum per capita standards differ depending on the scale they refer to: a minimum of 3.5 m^2 are envisaged at the close neighbourhood level, increasing to additional 4 m^2 at residential area level and district level, summarising to 13 m^2 if the regional level is taken into account (Stadt Wien/MA18 2015a). Accessibility is further defined by standards regarding distances to public green area, e.g. 250 m in the close neighbourhood and 1000 m to 1500 m at the district level.

However, the critical mass approach has first of all been criticised of not taking sufficiently into account how the access might differ across social groups. In this regard, a recent study by Kabisch and Haase (2014)

looked into dissimilarities between different beneficiaries of public green urban area by applying a transformed Gini-coefficient. Rather than measuring income inequality, as presented in chapter C 1.2.1.2, it was used to characterise quantitatively the degree of equality in the distribution of the amount of urban green space. The researchers were able to demonstrate that the required threshold of a 6 m^2 access per inhabitant in close neighbourhood of the city of Berlin was achieved. However, their spatial analyses showed that, despite the achievement, high density areas had disproportionately less urban green areas and at the same time an over-representation of immigrants. The comparison of the actual with a perfect equitable distribution of public urban green areas across beneficiaries resulted in a very high Gini coefficient, amounting to 0.8, with 0 representing a perfect equality and 1 a perfect inequality (Kabisch and Haase 2014:136). The distributional analysis was mostly focused on quantitative aspects, albeit the authors outlined the importance of taking into due consideration preferences for different urban green area characteristics across different groups of society, and provided a descriptive outline.

Questions of **spatial disparities regarding quality** of public urban green areas, also in relation to issues of connectivity and access, are less often addressed. Minimum standards regarding the size of urban green space are envisaged to help taking into account some degree of quality, e.g. by introducing sizes of less than 1 ha at the close neighbourhood level and proposing sizes of 3 to 10 ha or 10 to 50 ha at the district level in the city of Vienna (Stadt Wien/MA18 2015a). Otherwise, existing standards mostly focus on the subject of what preferences are raised by social groups or individuals, and consequently, as criticised by Fainstein (see chapter C 1.2.1.3), fail to go beyond arguments of subjectivity and to provide more 'objective' criteria. Another point of dispute on the quality of public green areas refers to the degree of maintenance of public parks. The latter particularly occurs in light of limited public financing on the one hand, and increasingly private support on the other hand, distributed unequally throughout the urban public/private park system, and potentially affecting the sought quality (Low 2013).

In addition, it needs to be noted that most of the examples provided above address the spatial distribution of public rather than **private urban green space**. The distribution of the latter is currently rarely subject to much research. Most of the principles and standards proposed today are also focused on the **site level**. This for example is the case regarding standards such as the biotope area factor (BAF or BFF-Biotopflächenfaktor) proposed by the city of Berlin (Stadt Berlin/Senatsverwaltung für Umwelt, Verkehr und Klimaschutz n.d./b). It is envisaged to be applied to formal landscape plans to drive the development of urban green space for new developments in especially densely built-up areas, although also works as a voluntary environmental standard with regard to already existing development. Similar to standards such as gross floor area, it sets requirements regarding the proportion of an area to remain 'ecologically effective', ranging from semi-open surfaces (weighting factor - WF 0.5), green roofs (WF 0.7) and walls (WF 0.5) to green courtyards (WF 0.7 to 1.0). Also principles developed for example with regard to the idea of city landscapes largely focused on designing local landscape for use on private/semi-private site to conglomerations of individual buildings (see chapter C 1.1.1.2). It is one of the major criticism posed by some architects today to representatives of modernist urban planning: the focus on individual buildings or their conglomerations, shifting attention to qualities on the (private) site rather than their distribution over the city (Gehl 2010:4). It also links to criticism brought forward by Graham Haughton (see chapter C 1.2.1.1) with regard to the application of equity principles in relation to one of four analysed approaches to planning and managing cities, namely 'redesigning cities'. Central idea of the approach is the need for a redesign of cities, in order to move towards a sustainable development. In this regard, the approach is seen to focus less on bringing nature back into the city but on the creation of a city based on human terms, with less impact on the surrounding landscape and external areas (Haughton 1999:238). According to Haughton (1999:238),

equity principles are not explicitly but implicitly part of the approach, though only to a limited extent on a geographical and procedural scale. In this regard, it might be argued that the GI principle of a multi-scale approach represents an attempt to particularly address the aspect of geographical equity, neglected by design approaches mostly focused on the urban/site scale.

Besides looking at connectivity and access from the human perspective, the **ecological perspective** also takes the movements of other species through the (urban) fabric into account. In this regard, the urban matrix has often been considered hostile, albeit over the years this perception has been many times revised by ecological findings regarding species who have adapted to their habitat (Aronson et al 2010, Kantsa et al 2013). Most often the provision of a critical mass of defined abiotic and biotic environmental features has played a more important role than the development of a network. Connectivity of the landscape, consisting of core areas, buffer zones, stepping stones and sustainable use zones have generally been principles mostly considered at the wider landscape level. It needs to be noted that in the case of ecological networks, the effectiveness of corridors in increasing species permeability has been partly proved, depending on size and characteristics (Vergnes et al 2011, Saura et al 2014). To what extent a more sophisticated construction consisting of different elements contributes to the promotion of biological diversity is still subject to research (EC 2012:9). In this regard, some lessons are likely to be learned from the ecological network approach applied at the wider landscape level: similar approaches on connectivity at the urban scale for human purposes should not forget the quality of the surrounding landscape in promoting the **functional, rather than structural, permeability** of people in accessing green urban areas.

Ecosystem approach and procedural questions

Questions on fairness in procedures and participative processes are closely linked to the concept of the ecosystem approach, inherently adopted by some of the GI definitions. Introduced on the political agenda by the Convention on Biological Diversity (see chapter C 1.1.1.2), it is conceived as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It recognises that humans, with their cultural diversity, are an integral component of ecosystems, and that thus a **diversity of stakeholders** needs to be involved in the decision-making process. Recognition of the complexity of ecological, social and economic processes interacting within the GI concept, has likely led to most of the GI definitions implicitly, if not explicitly, laying participative processes at the basis of its implementation.

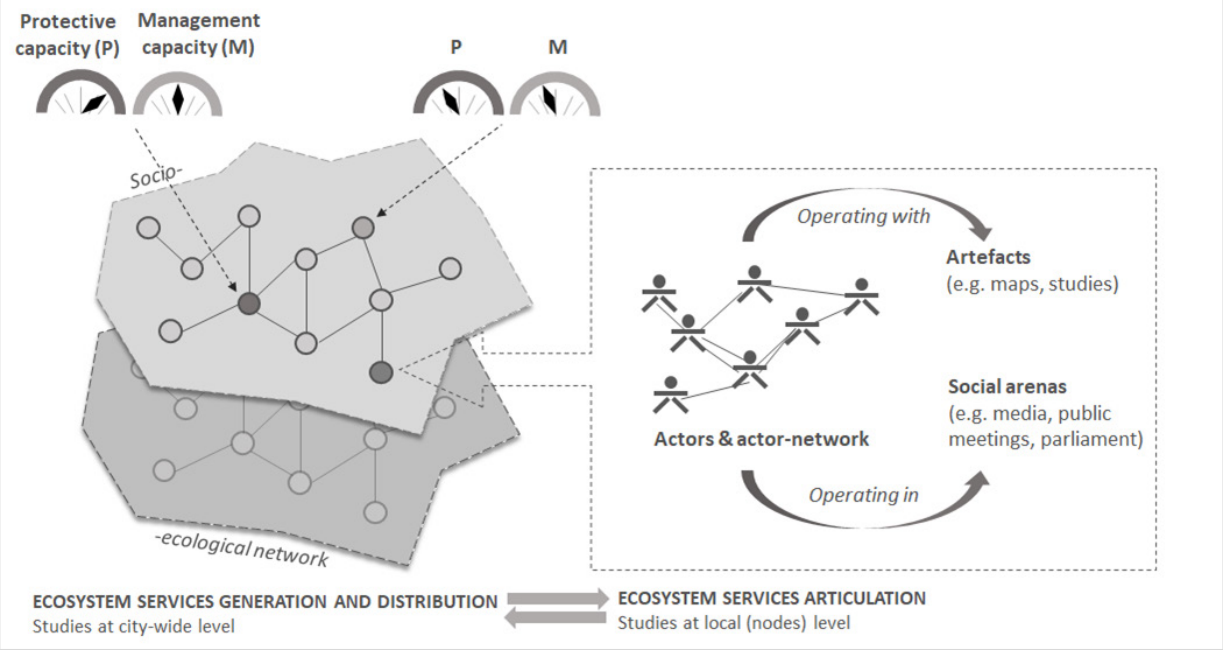
Both in relation to philosophical and social approaches to inequality outlined in chapter C 1.2.1, several theories and concepts have been presented that inherently link discussions on spatial and environmental inequalities to **procedural characteristics and participative processes**. Building on her ethnographic research on urban parks, plazas, and gated communities, the previously introduced anthropologist Setha Low argues that processes of negotiation and decision-making strongly influence how fairness is perceived by individuals (Low 2013:6). Albeit the outcome is important, the risk exists that it is biased by how (un)fair the process that led to a certain outcome has been perceived. One of the six guidelines resulting from her work, refers to the necessity of considering that '*access is as much about economics and cultural patterns of park use as circulation and transportation, thus income and visitation patterns must be taken into consideration when providing access for all social groups*' (Low 2013:10). Low's work again builds on conceptual frameworks provided by the sociologists Ruth Fincher and Kurt Ivenson, introduced in chapter C 1.2.1.3. Fincher and Iveson (2008) largely focus on the notion of diversity, for instance regarding social groups and the way they are represented in participative processes. Different to Low, the authors attempt providing some more specific decision rules for planning, e.g. looking at the equity in expenditure allocation across different areas

of a city or applying a checklist of participating social groups. Albeit at the same time they emphasise how content-specific related decisions are, the decision rules have been criticised of often not leaving enough leverage for doing exactly that (Healey 2010:724).

Susan Fainstein is more sceptical regarding participative processes in promoting social and environmental justice (see chapter C 1.2.1.3). Central focus of her theories of justice in spatial planning is the upholding of **healthy democratic processes** (e.g. Fainstein 2010). In this regard, she follows partly prerequisites addressed by Rawl in his theory of justice, where he iterates the importance of choosing principles of justice behind a 'veil of ignorance' (see chapter C 1.2.1.1), institutionalising the process rather than building on the notion of meritocracy. On the other hand, she also picks up criticism by Martha C. Nussbaum, underlining that in real life rarely do people meet at equal terms, regarding competencies, level of needs or willingness to cooperate. In this regard, also participative processes in the social contracting tradition have their limits and those need to be taken into account, also in planning. Also the geographer George Haughton lists procedural equity and participative processes as one of his five principles in achieving a just city (see chapter C 1.2.1.1). However, he also expresses his initial reluctance in including it as a separate principle, due to his '*deep concern that some forms of participation can undermine rather than support democratic processes of engagement*' (Haughton 1999:236). He argues, that participative processes need to apply multiple forms and channels within an appropriate framework beyond legalistic and bureaucratic procedures.

More closely linked to GI, and more precisely the ecosystem services concept, is the framework provided by Henrik Ernstson, who combines the physical shaping of a network generating biophysical processes with its social shaping (Ernstson 2013:7). He has developed a first framework that should help structurally **linking ecosystem services provision to environmental justice**. According to the author, the benefits people derive from ecosystems are closely entangled with social and political processes. This not only decides how ecosystem services are generated (i.e. which biophysical processes occur), but also how they are distributed (i.e. who benefits from them over a spatial and temporal scale), and how their value is articulated (i.e. how the value is explained and demonstrated). He uses two models to reflect these different aspects.

Figure 22: Framework for studying the social production of ecosystem services (adapted & developed based on Ernstson 2013:11)



As visualised in Figure 22, he applies a spatial social-ecological network model, in order to gain a wider perspective on the generation and distribution of ecosystem services. It includes to first translating the urban landscape into an ecological network consisting of nodes and connections, rather than looking at individual and isolated urban green elements. He adds existing protective and management capacities as a second layer to his model, due to their strong influence on the generation and distribution of ecosystem services across the network (Ernstson 2013:12). Protective capacities refer to the level of resistance of nodes and connections to disappear, influenced by the existence of biophysical barriers (e.g. steep hills), civic efforts (e.g. initiatives), public strategies (e.g. zoning) and technical processes. Management capacities refer to the entitlement of carrying out management practices to sustain ecological flows. The second part of the framework refers to the values made visible in the articulation process. According to the author, the application of an actor-network framework allows an analysis of how biophysical processes gain value and become prioritised in certain urban areas (Ernstson 2013:12-13). He suggests that empirical research can help tracing competing actors-network. Case study analysis can lead to the identification of actors, the means involved and how they favour certain ecosystem services, as well as the access to participative processes.

By combining the two models, Ernstson (2013:14) assumes that it should be possible to exam how socio-ecological processes impact the generation and distribution of ecosystem services at different scales, and how they impact different population groups. It provides an understanding through which processes environmental injustice operates, linked to ecosystem services. Questions remain how to test the framework in empirical analysis via the application of case studies. In addition, the author emphasises the need to more clearly analyse the distribution effects, linked to questions of access to benefits and property rights.

C 1.3 Concepts and approaches in developing and planning urban space

This last section of the chapter on conceptual foundations first of all looks into key theories and definitions of disciplines that contribute to the shaping of the urban space and/or environment, the different assumptions that are made, the processes this can involve, key models that are used and instruments that have been developed. This especially includes but is not limited to areas such as urban development, environmental policy as well as environmental and spatial planning. It will highlight potential differences in perspectives and approaches across those areas, and the role they play within the thesis and with regard to the operationalisation of Green Infrastructure.

The objective is to clarify for what reasons GI operationalisation as a strategic planning concept is selected, what the main differences to an urban development approach are, what role environmental policy plays in defining a strategic approach and what aspects of spatial planning need to be considered. With regard to the latter, this chapter for example explores different space concepts to determine which interpretation might be considered key in visualising the outcome or 'the-ought-to-be' of the urban shape, and guiding GI operationalisation for a just access. The section also further investigates what approaches different studies have specifically identified regarding GI implementation and what additional lessons also exemplary studies provide. As it represents the last part of the conceptual foundations, most of the conclusions directly inform the development of the conceptual and action model to be presented in chapter C 2.

C 1.3.1 Urban development – an issue of forces

How a settlement area has been shaped often depends on the design concepts that have historically or more recently been pursued. Those often assume that urban development occurs according to defined development stages, impregnated by key uses (e.g. industrial city) or concepts (e.g. new town movement) (Lichtenberger in Sukopp and Wittig 1998:25). Increasingly cities and towns are not only studied in isolation, but in relation to neighbouring areas, to the regional (e.g. metropolitan areas or poly-centric city regions) as well as global level (e.g. world cities). Also for these reasons, it is thought important to outline the most important concepts and models pursued with regard to urban development, what role the environment and urban green areas more specifically have played, and how this conceptually influences the further research of the thesis. As mentioned in chapter C 1.2.1.2, economists as well as sociologists are keen on iterating that cities are social and economic constructs, whereas the built environment represents the visible result of social and economic interactions and processes, physically shaped by disciplines such as architecture, engineering, design and spatial planning. The term urban development captures this wider perspective, taking into account all changes to a city's structure, which makes it also an interesting vantage point for the thesis.

The difficulty of **defining urban development** already starts with the term 'urban'. What it includes, what exactly defines a city or a town, much depends on a country's culture, on historic developments and languages involved. At the administrative level, what is urban, a town or city is usually determined by population numbers and administrative borders. According to an outline provided by the German reference book on land use planning ('*Handwörterbuch der Raumordung*'), it usually refers to thresholds of 2000 to 5000 inhabitants (Wolf in Ritter 2005:1048). According to the outline, what follows are characteristics such as the horizontal and vertical compactness of the settlement area, at least with regard to its core and taking a predominantly central-European stance on the subject. Generally, it can be said that the definition of the

term is strongly contextual, influenced by the problem of interest or the question that is addressed. According to the reference book, urban development more specifically refers to changes to the structure and spreading of the urban population, employment and its distribution as well as land use, either at a city wide level or down to singular neighbourhoods (Friedrichs in Ritter 2005:1059-1066). Recognising the magnitude and complexity of processes and theories involved, it outlines two major directions of analysis when looking at urban development: structural and spatial.

The 'structural' approach is concerned with changes in five key dimensions: the demographic, economic, social, political and fiscal dimension. According to Friedrichs (in Ritter 2005:1059-1066), at least in the German speaking part of Europe, the demographic analysis of urban development is focused on the way urban population change, determined by migration as well as birth and death rates, is affected by economic and demographic factors. The economic dimension is assumed to be mostly concerned with changes regarding the employment structure of a city, considering factors such as job availability, skills level of those seeking employment, and sectoral changes such as for example the disappearance of production and service sectors. The social dimension is described as mostly interested in observing immigration patterns of ethnic minorities and potentially resulting spatial segregation (see chapter C 1.2.1.3). In more recent years, issues such as conflicts between groups with different ethnical backgrounds, and poverty have gained further importance. The fiscal dimension is described as addressing issues related to the municipal balance sheet of financial input and output, and how these are affected by municipal competences (e.g. taxation). The political dimension is portrayed of being mostly concerned with the provision of an appropriate framework whether for investments, accessibility to land use or for cooperation of different stakeholder groups such as private investors, neighbouring municipalities and civil society groups. Friedrichs (in Ritter 2005:1065-1066) recognises that the urban political system has more recently moved to an approach of urban governance, due to the diversity of stakeholders involved, but fails to shade light on how this relates to the role of urban policy.

The 'spatial' approach is the second major direction of analysis regarding urban development described by Friedrichs (in Ritter 2005:1059-1066). It is deemed interested in the spatial consequences of structural changes, and to what extent they can be explained. According to the reference book, related theories can be divided into three main groups:

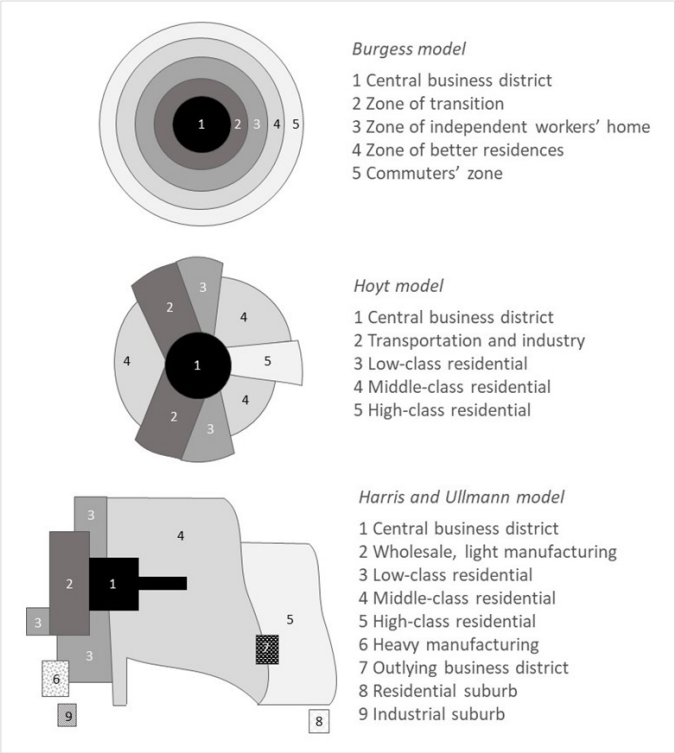
1. Classic models, explaining urban spatial structures
2. Phase-models, focusing on the dynamics of urban development
3. 'Pure' analysis of change, working without the occurrence of phases

Classic models are mostly based on the Von Thuenen model, which links urban spatial development mainly to the occurring costs of transport when seizing the fruits of agricultural labour on a central market (see chapter C 1.2.1.2) (Harvey 2000:215-246). It includes theories that assume that the central business district drives the further development of urbanisation, based on rationales that compare potentially resulting (monetary) benefits to the potential costs occurring to individuals (Park, Burgess and McKenzie 1925:50). In 1925, this led for instance Ernest Burgess together with other representatives of the Chicago school of sociologists to develop a model that presupposes a city developing in concentric zones (see Figure 23). It was influenced by socioecological ideas prominent at the time. This includes for example the idea of decisions taken rationally by self-interested individuals in a free market, and the idea of the 'strongest' mainly influencing social development, partly in line with social Darwinism (Lichtenberger 1998:22-25). In addition, the movement adopted terms frequently used in botany in order to describe urban population changes.

This includes for example 'succession' to refer to the replacement of defined groups or 'invasion' to address the first appearance of a social group in a defined area.

Besides the Burgess model, between 1925 and 1945 two additional socio-ecological models appeared: the sector model by sociologist and economist Homer Hoyt and the multiple nuclei model by Chauncy Harris and Edward Ullman (see again Figure 23). More or less common to all three models is the assumption that the competition at the biotic level of ecological positions (e.g. natural resources, material artefacts, traditions and customs) and at the cultural level (e.g. conflicts, social and individual adaptation linked to communication and consensus) between distinguishable social groups leads to a defined urban structure (e.g. concentric zones or sectors) and developments (e.g. dynamics caused by succession and invasion) (Bökemann 1998:197). The Hoyt model however puts a particular emphasis on the role of transport infrastructure (Friedrichs in Ritter 2005:1064). The Harris and Ullman model strongly considers additional aspects such as the spatial distribution of workplaces (Lichtenberger 1998:24).

Figure 23: Socioecological, classical models of urban development (based on Park, Burgess and McKenzie 1925; Hoyt 1939; Harris and Ullman 1945; building on Knox and McCarthy 2014)



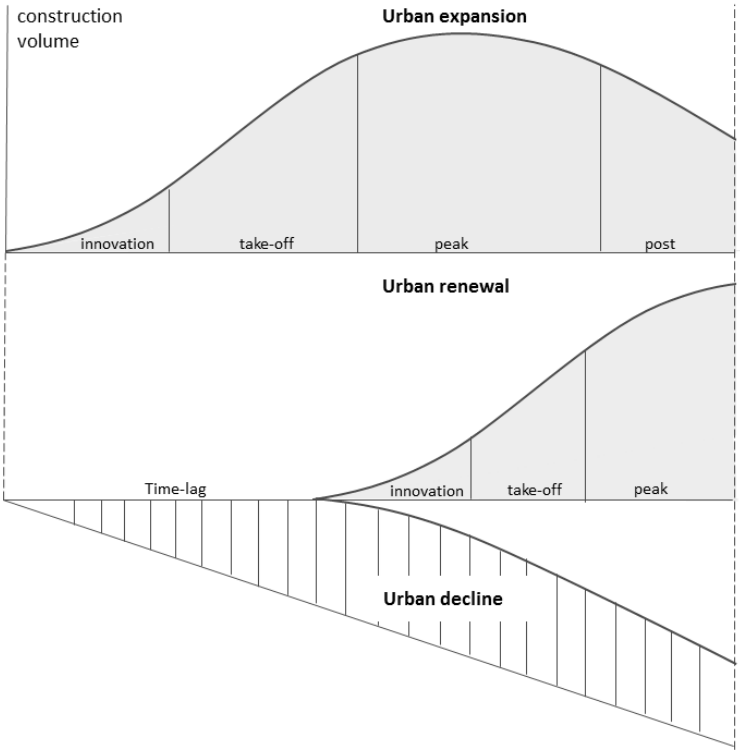
Some of the limits of the Von Thuenen model have already been outlined in chapter C 1.2.1.2, such as the lack of consideration given to historic developments or topographical and environmental features. Also all of the presented classical models largely build on ideas and experiences made in the United States, failing to consider patterns of urban development in other parts of the world. Often far from reality, they also assume that cities are rather closed socio-ecological entities, which are clearly separated from neighbouring municipalities and surroundings (Bökemann 1998:197). However, they made an important contribution to driving research on socio-ecological theories, including on the development of the social area analysis by Eshref Shevky and Wendell Bell in 1955 (Lichtenberger 1998:24). The approach pictures the city consisting of homogeneous parts that are clearly distinguishable regarding defined economic, social and cultural characteristics which describe the urban population. According to its proponents, the larger a city the more clearly 'natural areas' or neighbourhoods are delineable, linked to people's similar standard of living, lifestyles and ethical backgrounds. Building on urban geography and human ecology in the United States, in the 1960s social area analysis further developed into factorial socio-ecology. Albeit building on the previous theories, the way in which the statistical analysis studying 'natural areas' is undertaken differs from previous attempts. Whereas social area analysis works with a 2-dimensional matrix, factorial socio-ecology moved to a multi-variable factorial analysis. It resulted into sophisticated quantitative, statistical approaches to describe the distribution of the urban population across the city.

One of the main criticism of the approach refers to its assumption that the results of the analysis might actually correspond to the reality of urban natural milieus. This does not have to be the case, given for

example statistical categories not necessarily correspond to existing social groups (Lichtenberger 1998:24). Its robustness also depends on the concepts used and causal relationships assumed as part of the analysis. In addition, a strong linkage to physical structures is missing, though individual variables are usually considered (e.g. age of housing, public housing). The same applies to aspects going beyond human ecology and including the environment more broadly as well as urban flora and fauna, which are often substantially undervalued. According to Lichtenberger (1998:32+35), one reason is the influence of spatial structural models and the limited consideration they give to urban green spaces, due to their classification as areas with low rates of monetary return. In the US, vacant land was considered as non-existing as always put to use. Nevertheless, one of the merits of the factorial socio-ecology is the enlarged perspective it allows to take on the causes of segregation. Introduced by the Chicago school of sociologists, the term initially was mainly interpreted as the spatial 'closure' of social groups linked to their desire of distancing from what is un-known and closing in on what is known (Bökemann 1998:198). Later on, it resulted in the development of three dimensions of segregation: social, demographic and ethical (see also chapter C 1.2.1.3 on sociology and dimensions on equality/inequality and justice).

Phase-models of urban development presuppose that changes to a city's structure occur in defined phases, for instance explained by demographic and economic developments. The German reference book on land use planning introduces the empirically tested example of a model consisting of four main phases - urbanisation, suburbanisation, desurbanisation and reurbanisation (Friedrichs in Ritter 2005:1064). These can be divided into overall eight different stages based on defined population changes in a city region (functional urban region), which affect the two main city components of the 'ring' and the 'core' differently. Another phase model, proposed by Elisabeth Lichtenberger, assumes a dual cyclical development which consists of two key changes: urban renewal (in German '*Stadterneuerung*') and urban expansion (in German '*Stadterweiterung*') (Lichtenberger 1990). The model assumes that development processes are not unilateral but bipartite and cyclical (see Figure 24). The author of the model iterates that changes are triggered by at least two either political, economic, technical, social or constructional parameters. The cycle starts with the innovation phase of urban expansion, mainly related to the provision of newly built houses and design experiments. During the take-off phase new areas are unlocked and architectural design becomes standardised. The peak phase is characterised by a diversification of construction types and forms of land use. In the post phase, urban development suddenly halts, and is postponed to a later cycle of urban expansion, which should help explaining why different building fabrics continue to exist in parallel. There is a time-lag between the beginning of urban expansion and urban renewal, albeit otherwise being complimentary processes. The time-lag is described as the main cause for urban decline, which consequently is

Figure 24: Bipartite, cyclical model of urban development (adapted & translated from Lichtenberger 1990)



described as not only a structural phenomenon but forming part of the dynamics of urban development. With regard to urban green/nature, Lichtenberger (1998:29) iterates that the ecological outline of an urban area is influenced by political decisions and the way they impact the urban building fabric, as well as structural changes of the urban society living within that fabric. The latter is thought important due to the effects it has on 'bio-ecological' activities carried out by the population, for example with regard to investments in the management of urban green, the acceptance of spontaneous vegetation or recreational activities pursued (Lichtenberger 1998:29).

Classical and phase-models of spatial analysis of urban development have in common that they assume a more or less linear process, whether unilateral or bipartite, influenced by human decisions and actions. According to Friedrichs (in Ritter 2005:1059-1066), the remaining group of **'pure' analyses** takes the perspective that urban development is far too complex to be captured by theoretical linear models and is focused on analyses of change not necessarily assuming clear cause-and-effect chains. Integrative part is the idea of unpredictable phenomena and the application of the complexity theory, including notions such as dynamic networks, self-organisation and adaptation (Eckardt 2009:15-19). Even more than the other two groups, the 'pure' analyses group questions the extent to which urban development processes can actually be strategically governed, and the influence of urban policy.

The outlined approaches of modelling or describing urban development have in common the importance they attribute to human actions and decisions, whether of market participants, planners, representatives of the municipal administration or citizens. However, they address only to a limited extent the effects and role of policy and political systems. Mainly rooted in geography, they predominantly aim at explaining what forces and processes lead to what kind of distribution patterns, leaving the impression that certain developments are set in stone or can only be influenced to a very limited extent. According to Langhagen-Rohrbach (2010:19-20), in recent years social geography has put an increased focus on the activities and decisions of those actively participating in urban development, and what might limit or enhance their scope for action, but the analysis remains descriptive. He envisages opportunities arising from an applied geography, which informs spatial planning on spatial patterns resulting from social activities, for example by shading light on historical developments. This could provide important insights regarding actors and forces that can be considered key in ensuring a defined spatial development. However, the suggested approach bears the risk of neglecting spatially important instruments beyond 'traditional' spatial planning, given it does not sufficiently consider the overall political dimension and different policy areas, including on the environment.

C 1.3.2 The role of environmental policy

The previous sub-chapter already indicated that the described models often ignore the key role **environmental and ecological components** can play in shaping urban development. This refers to the impact of topographical features, soil composure, urban climate, water bodies, flora and fauna as well as biotopes. Historically they often were major drivers of development (e.g. cities being built closely to estuaries, riverbanks, high biodiversity areas etc.), and representatives of spatial disciplines (e.g. landscape architecture) have increasingly focused on some key aspects. However, in the last decades environmental elements have been frequently regarded as a by-product to take care off for health, aesthetic and other reasons rather than being considered bearing structures of urban development. Besides neglecting environment's role, the analysed models also very often picture urban development as a force of nature which only to a

very limited extent is directed by objectives, programmes and instruments. However, at the EU level GI mainly represents an environmental policy concept. It is hence considered important to shade light on how environmental issues are approached from a policy perspective and how they are interlinked with economic issues, in order to get a better understanding of what relevant concepts and instruments might be especially important for the further research.

In the United States and United Kingdom, managing the relationship between the environment and society usually is part of **environmental (land use) management**. It has been defined as '*the means of controlling or guiding human-environment interactions to protect and enhance human health and welfare and the environmental quality*' (Randolph 2004:3). It refers to a rather vast field of activities and involves a wide range of actors, including from the private sector (e.g. corporate environmental management), public authorities (e.g. environmental law and planning) and civil society (e.g. environmental groups). According to Randolph (2004:3), depending on a society's values, and the resulting ethics and policy framework, actors can get engaged in managing the environment either to:

- Reduce the risks of natural hazards to society
- Deal with the impact of pollution on human health
- Guarantee the sustainable exploitation of natural resources
- Safeguard functioning of natural systems and ecosystems

The existing ethical basis, governance cultures and approaches not only are assumed to influence how actors get engaged, but also what role is attributed to market powers, the state or civil society in shaping the human-environment relationship. It ranges between a clear focus on market participation to public authorities which are responsible for providing a framework to market interactions or heavy state control.

In central Europe, environmental management is often set equal to **environmental protection**. This is more narrowly interpreted as the identification and handling of environmental problems caused by an industrial society, rather than looking into opportunities that might arise by gaining a better understanding of the relationship between the environment and society. In this regard, environmental policy has for example been defined as the sum of all public measures that have as objective to remove, reduce and avoid environmental problems and hence contribute to environmental protection (Jänicke et al 1999:16). Other definitions have not limited it to public activities, but emphasise the role of business and civil society in 'governing' the relationship and highlight the importance of considering humans as integrative part of the environment (Kösters 2002:13).

Environmental policy was evoked as an individual discipline of political science in the 1970s, rooted in an increasing awareness of environmental problems and its potentially detrimental impacts on human health (see C 1.1.1 on the historic evolution of the GI concept). It was initially based on the development of distinctive environmental policy programmes, including in Germany in 1971 and the 1st European Environmental Action Programme in 1973 (Jänicke et al 1999:16; Jänicke and Volkery in Ritter 2005:1179). It also shaped the development of the field of **environmental law**, which in the early stage summarised a range of environmental regulations that either were newly created or put under the auspices of appearing environmental frameworks. Differently to environmental policy, environmental law and related research is described as targeted at the interpretation and enforcement of existing law, rather than concerned with the quality of current, potential or future law (Jänicke et al 1999:21). Both environmental policy and law would ideally build on research provided by environmental sciences (e.g. biology, meteorology, climate science,

geology) on actual impacts, causal relationships or scenario development for informed decision-making, albeit to what extent this takes place is subject to dedicated research (e.g. policy-science interfaces).

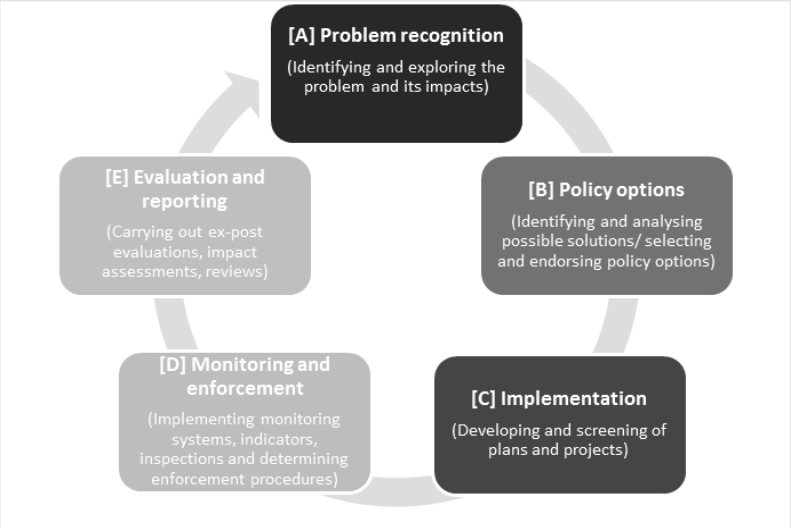
In parallel to the historic development of environmental policy and law, also disciplines such as **environmental and ecological economics** emerged. Environmental economics is mostly considered a specific field of neo-classical economics. However, differently it recognises the existence of market failures more than other representatives of the discipline, particularly in relation to public goods and the environment (see chapter C 1.2.1.2 on the economic dimension of inequality for further details). The discipline is especially interested in the negative impacts economic activities can have on the environment (e.g. negative externalities), and which instruments are most efficiently suited in counteracting those impacts, including environmental policy and regulation. The school of ecological economics takes a different stance. As indicated before, representatives describe the economic system being embedded into a social system and the latter into an environmental system, underlining the dependency of the first two on the latter. In addition, ecological economics iterates that market failures do not only exist but are actually the norm. It leads most of its representatives to the conclusion that governance – including actors such as governments, public authorities and civil society – plays a by far more important role than most representatives of environmental economics would agree upon. In this regard, it has a strong root in **political economy**, which is especially interested in studying in more detail the relationship between the economic system, law and political system. It takes strong consideration of moral philosophy and consequently also underlines the normative and value-laden side of economic decisions and activities.

The application of a policy-oriented stance within the thesis requires a brief introduction into key concepts and approaches of political science beyond environmental aspects, also due to their relevance for the research methodology. Firstly, the difference between polity, politics and policy needs to be explained, as often they are still used interchangeably. Whereas 'polity' refers to the organisation of a political system (i.e. institutional, organisation and normative framework), 'politics' describes processes of conflicts and compromises, power distribution and interest articulation (Jänicke et al 1999:49). 'Policy' addresses issues of content, including objectives, programmes, measures and instruments, and represents the main focus of the policy analysis. Rather than researching directly the overall organisation of a political system or processes of power establishment, **policy analyses** concentrate on a defined area (e.g. environmental policy, transport policy, health policy). The analyses however is not limited to scrutinising policy content, measures and potential impacts. It also takes into consideration actors and actor constellations and their influence on the decision-making process. Overall objective is to identify results and get clarity on the effectiveness of public intervention (Jänicke et al 1999:51).

At the centre of policy analyses commonly lies the **policy cycle** (Jänicke 1999:52). The different steps of the cycle can slightly differ, depending on the selected model. One version is presented in Figure 25. It exemplarily describes key stages of a policy cycle and their main objectives. It needs to be noted that in reality those stages do rarely occur linearly, but rather overlap or include additional stages. However, it represents an important analytical framework that allows to gain structured insights into the involved processes (Bassi et al 2011). This is also influenced by potential interrelations of different policy areas. According to Jänicke et al (1999:52), the policy cycle model supports the analysis of parliamentary top-down and bottom-up decision-making processes as well as administration driven processes. This already applies to the analysis of the problem recognition stage [A], which focuses at what point problems are identified as such and set on the policy agenda. It is assumed that the process can be externally driven, for instance by media coverage or actions taken by other countries. It can also be pushed internally by administrations for example

influenced by increased availability of scientific information or an increasing number of involved experts and stakeholders. It is also strongly impacted by the values that define individuals of a group or society, and can have a strong psychological component also with regard to environmental problems (e.g. environmental psychology). The stage of identifying and endorsing policy options [B] concentrates on the study of which objectives are pursed by what range of actors. According to Jänicke et al (1992:59), the often diverging objectives increase the difficulty or make it impossible to identify optimal instruments which help to address the selected (environmental) problem.

Figure 25: The policy cycle (adapted from Bassi et al 2011:70)



The authors nevertheless offer a first typology of policy instruments, and Table 9 provides an overview of the identified groups and their key strengths and weaknesses particularly in relation to the degree of state control.

Table 9: Typology of environmental policy instruments

Group	Instruments	Degree of state power	Key strengths & weaknesses
Regulatory instruments	- prohibitions & obligations - limits - permits - product standards - process standards - environmental criminal law	high	*Strengths* - allow fast removal of an environmental problem - straightforward and clear outputs - reliability & practicability linked to enforceability *Weaknesses* - often resulting in a compromise at the absolute minimum - risks of weak enforcement, e.g. due to influence by interest groups - can increase administrative burden
Planning instruments	- development plans - land-use plans - landscape plans - clean air plans - waste control plans - water supply plans	high to middle	*Strengths* - address the environment more widely - are consensus seeking and contribute to consolidation - contribute to strategic developments with reduced state control *Weaknesses* - high complexity - strongly affected by imbalance of powers - decisions influenced by dependence on income streams
Market-based instruments	*Public revenues* - environnemental taxes - environnemental charges - licences & certificates *Public expenditures* - tax reliefs - subsidies - green procurement	middle	*Strengths* - reduced (administrative) costs + increased efficiency - internalisation of external costs - economic incentives to go beyond minimum required/ flexibility *Weaknesses* - possible violation of polluter-pays principle, sense of justice, and equity principles - distortion of market powers and competition - unsure outcome
Cooperation Instruments	- negotiations - networks - formal & informal contracts - industry agreements - written commitments	middle to low	*Strengths* - reduced (administrative) costs - flexibility in determining content of commitments - rapid implementation

			Weaknesses - legally not-binding and limited 'protective' capacities - focused on singular problems - risk of agreements limiting competition
Information instruments	- information & awareness rising by public authorities - standardised corporate reporting - eco-labelling - environmental education	low	*Strengths* - contribute to long-term behavioural changes - support informed decision-making by individuals - influence agenda setting of environmental problems *Weaknesses* - slow response time - information provision alone not sufficient for long-term changes - uncertain outcomes

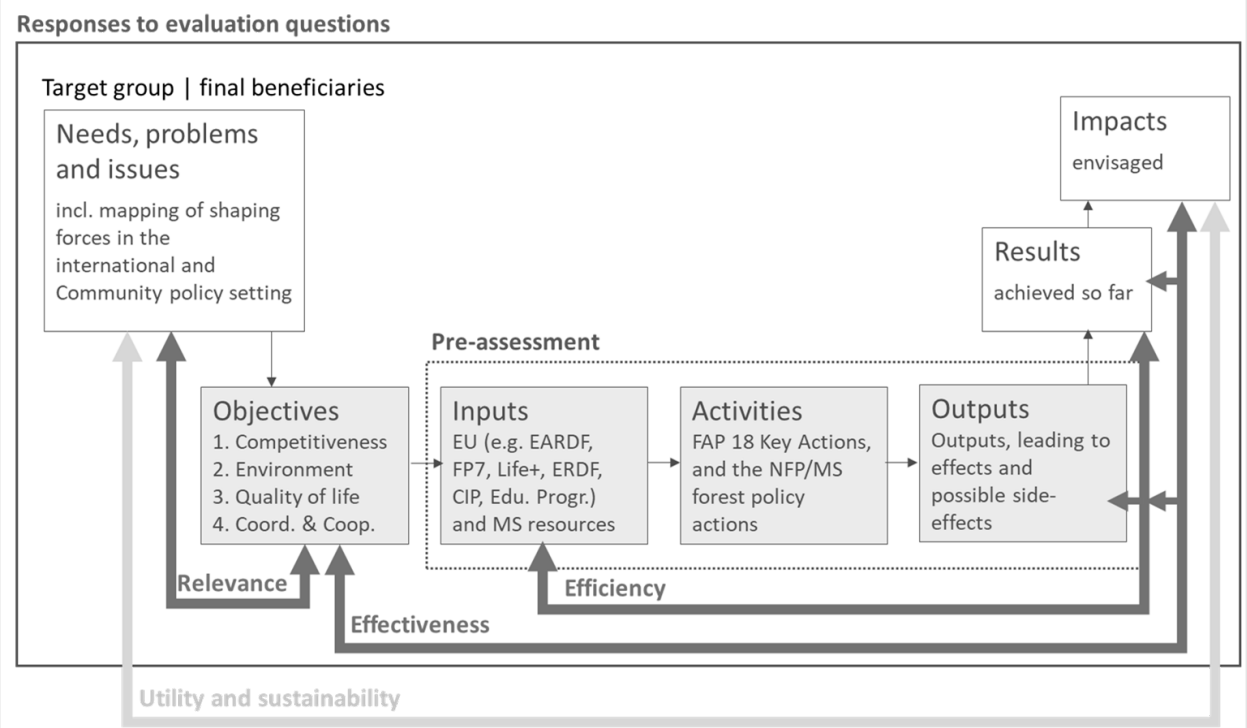
Source: translated and modified based on Jänicke 1999:99-105 with additions from Kösters 2002:200-212

The typology lists planning instruments as a dedicated group, given it includes legislative instruments (e.g. building law) as well as more informal approaches (e.g. planning guidelines) (see the following chapter C 1.3.3.4 on spatial planning for further details). This shows the limit of such categorisations, given some policy instruments substantially cross the line between the different categories. Jänicke et al (1999:99-105) also emphasise that likely the adoption of a mix of instruments is required to ensure the effectiveness of policy interventions. The authors also argue that the communication of how instruments are selected and of the way decisions on policy measures are taken can be essential in reaching identified objectives. The effectiveness can also be decisively influenced by processes of implementation.

It is often the perceived key role of the public administration to focus on the implementation stage [C] of decisions, which have been subject to scrutiny and to a more or less lengthy parliamentary process. Public administrations, its various departments and offices can nevertheless impact the policy cycle and final implementation already at earlier stages. This especially links to the increasing weight given to expert and stakeholder information, for example in relation to ex-ante evaluations of proposed legislation. Of particular interest to the analysis of the implementation phase remains the question how the public administration intermingles with other actors, existing key actor constellations and their influence on the successfulness of plans and projects. The latter ideally would be subject of comprehensive monitoring and enforcement systems [D] and the application of a range of indicators which contribute to the evaluation process at a later stage [E] of the policy cycle.

In this regard, it needs to be noted that **policy evaluation** has gained increasing importance as a scientific field and sector. Ex-post evaluations not only study the implementation process of a decision but also look at other steps of the policy process, based on a list of defined criteria and often in combination with an ex-ante evaluation to inform the future development of instruments. The intervention logic model presented in Figure 26 is an example of a framework that has been applied to describe causal relationships in the ex-post evaluation of a policy instrument, the EU Forest Action Plan. It provides an overview of the logical links that have guided the evaluation to inform on identified key aspects of an intervention: Relevance, efficiency, effectiveness, coherence, and the EU added-value. The degree to which objectives set by the plan meet needs, problems and issues expressed by stakeholders determine the relevance of an action. Efficiency on the other hand is defined by the extent to which planned outputs and/or results were achieved with the best possible combination of inputs. Effectiveness is delineated by the level according to which the objectives have led to the desired outputs and results, and consequently envisaged impacts. The coherence is determined by the extent to which the intervention and those in other policy areas (horizontal) and at different governance levels (vertical) are contradictory to the outlined objectives. A series of evaluation themes and questions informed the analysis according to the intervention logic model.

Figure 26: Intervention logic model applied to the ex-post evaluation of the EU Forest ActionPlan (adapted from EFI et al 012:50)



To summarise, policy evaluations aim at understanding how successful a public intervention has been, how the means employed have actually fared, whether not only initial objectives have been met but also whether resulting impacts have addressed identified needs and problems, and also whether the latter are still actual or have changed. It is usually followed by a decision whether the means employed need to be partly or completely overhauled or scrapped altogether, usually leading to a restart of the policy cycle.

Although the evaluation process might seem straightforward, it comes along with several biases, which are also subject to dedicated research (e.g. Howlett and Ramesh 2003). It starts with the definition of success and failure and according to which criteria and with what means it shall be assessed. For example, a cost-benefit analysis does not necessarily reflect the actual efficiency or effectiveness of an action, as some information such as externalities might not have been considered. And even if this was the case, the success might still be interpreted differently depending on the actor involved. This might be the case not only in substantive terms (e.g. output in form of infrastructure), but also procedural terms (e.g. fairness, justice), which at minimum play an equal important role in determining success or failure. Related interpretations are also influenced by those responsible for the evaluation, either formally or informally. In addition, problems and needs might be rather elusive and objectives of an intervention formulated rather vaguely, which complicates the assessment. Identifying the actual output can already be considered difficult. This even more so applies to the identification of causal relationships with regard to the potential outcome and impact, particularly considering they imminently can be very small. Moreover, understandings of causal relationships might have been already severely affected by how a topic was set on the agenda, the solutions that have been offered and in the end how much time was given to different options to mature or not before the assessment takes place.

In this regard, it can be questioned to what extent a rather superficial 'judgment' frequently offered by policy evaluations can lead to informed decision-making, or to what degree a more profound screening might be needed. Public consultations were deemed one solution to the problem of superficial scrutiny,

scientific policy analysis another. All these critiques more largely link to the approach of 'public management' or 'new public management', which has been borrowed from the corporate world and refers to the **rational, efficient and strategic governance** of public sector activities (Jänicke et al 1999:68-72). It questions the extent to which management by SMART (Specific/ Measurable/ Accepted/ Realistic/ Timebound) objectives and application of performance indicators and benchmarks captures the reality of a less rationalist policy world dealing with complex social, ecological and economic processes.

It can be said that the same holds true for **planning processes**, if related instruments are defined as policy instruments. Planning theory and practice with regard to regional and urban development policy often still largely incorporates the ductus of the economically self-centred, rational individual and the notion of efficiency. This can be illustrated by referring to Bökemann (1999:328-329), who describes public authorities dedicated to regional and urban development as 'multiple product' enterprises, which are responsible for efficiently developing the potential uses of locations and distribute them according to regional policy objectives. The potential uses are described to be determined by the combination of production factors such as land, infrastructure and land division, and the scope for action is determined by the existing budget, planning and operational capacities. Spatial planning, at regional and urban level, is described as responsible for the development of concrete projects and final outputs, according to determined budgetary and legal constraints. However, the extent to which it comes close to capturing complexities and realities needs to be considered. This particularly relates to the role attributed to political structures and interests.

In this regard, it can be concluded that the thesis follows the understanding that planning processes and means form part of policy processes and options, and consequently that more than a mere technical perspective on planning is needed. A policy science approach is also considered important, given that at the EU level the implementation of Green Infrastructure was initially developed as a policy tool. However, the thesis adheres to political economy by being less interested in seemingly objective and value-free, mathematical economic analysis based on an assumed rational behaviour of market participants. It also puts emphasis on the importance of studying different pressures and interests that take the 'human'-factor into account, given dealing with value laden and normative subjects such as inequality and justice.

C 1.3.3 The planning of the ought-to-be

Some define planning as the process of basic problem solving, involving the definition of objectives, the collection of information and knowledge, the formulation and evaluation of alternatives as well as projects and designs that help achieving those objectives (Randolph 2004:16). The German reference book on land use planning refers to planning as the systematic process of developing action goals and courses of action over a longer period of time (Fürst and Ritter in Ritter 2005:765). The authors distinguish between different types of planning, based on distinct characteristics. These refer to planning focused on a delimitating topic (e.g. spatial planning, environmental planning), task (e.g. water management, transport planning), institutional involvement (e.g. interdisciplinary, sectoral or integrative planning), maturity (e.g. long-term or short-term planning), quality of control (e.g. positive and negative planning) and level of control (e.g. operative and strategic planning). They also conclude that no unified concept of planning exists.

According to Bunge (1989), policy represents only a first set of principles, which in the end should guide plans, decision and actions. He iterates that '*a policy without plans to implement is like a constitution without legal codes*' and that '*plans and strategies guide the evolution of a system from its present state to a*

prescribed goal state' (Bunge 1989:341). Also others emphasise that the focus of planning lies on the achievement of future objectives (Langhagen-Rohrbach 2010:1). Though no unified concept exists, there seems to be an agreement that it is interested in steering the process from a current state to a future 'ought-to-be'. Also for these reason, it became of major interest to this work, given it inherently requires to look into ways forward rather than characterising and measuring the status quo.

Due to the inherent link to GI operationalisation, the chapter starts to address the subject by looking into the defined approach of environmental planning and the challenges linked to it. This will be used as an argument to describe why strategic thinking might be needed, what it encompasses and what other ways forward have been proposed especially to address complex issues in planning. It then focuses on identifying appropriate space dimensions which help to inform the framing of GI as a strategic planning concept, and outline the understanding of spatial planning adopted with regard to its operationalisation.

C 1.3.3.1 Approaches to planning – the challenges linked to environmental planning

According to Randolph (2004:18), environmental planning can be understood as the process of planning human-environment interactions for the protection and enhancement of human health or well-being. It is assumed to mainly adopt a rational-comprehensive approach. Hence, he argues that most processes of environmental planning include defined steps, such as:

1. Scoping
2. Identification of issues/opportunities/concerns
3. Analysis of the planning situation
4. Formulation of alternatives
5. Assessment of impacts
6. Evaluation and selection of plan, and
7. Implementation/monitoring/evaluation/modification

The different phases do not necessarily occur sequentially, and might even run simultaneously albeit with different emphasis. It can also be argued that the described basic logical steps are similar to the stages of the policy cycle, which on the other hand resemble those of management processes – evaluation status quo/ setting of objectives/ define measures/ implement measures/ monitor and evaluate. They are considered useful in providing structure to the analysis, although in practice they rarely occur linearly and are open to all sorts of diversions and changes in focus, as already mentioned previously. In addition, Randolph (2004:18) also emphasises the participatory elements these steps include in environmental planning, as they envisage the involvement of the public into the decision-making process in order to take sufficiently into account different perspectives and often conflicting values. In environmental planning, these steps also involve elements of an incremental-adaptive approach, due to some inclination towards short-term objectives and small sequential actions, linked to assumed challenges such as limited knowledge and uncertainty.

Approaches to environmental planning are also impacted by differences in local planning culture. This is important to keep in mind particularly with regard to the interpretation of GI as a planning concept, given the term was initially coined in the United States (see chapter C 1.1.1.1). In the US, planning is usually understood as a task that is undertaken as part of sectoral planning such as urban, transport, land use and environmental planning. Planning is '*organized along sectoral lines as opposed to engaging a stronger, more comprehensive approach*', according to a comparative analysis of planning processes in Germany and the

US by Schmidt and Buehler (2007:60). The authors link it to ideological and cultural differences regarding approaches to governance, the higher availability of land and lower settlement densities. Hence, it is not surprising that in the US one of the main principles of GI is commonly interpreted as integrating infrastructures of different sectors (see chapter C 1.1.2.1). The comparative analysis of Schmidt and Buehler (2007:61) also reveals that US' land-use policies are predominantly defined by the private sector, and the planner consequently often performs the task of 'developer', rather than balancing potential spatial disparities. The latter is only deemed justifiable to the extent it addresses market failures and does not hamper the private market. In addition, planning often focuses on increasing, for example, environmental amenities or providing other incentives in order to secure funding in the competitive race for tax revenues, due to the fact that most local council revenues stem from local tax sources, particularly from taxing of property rights. Spatial planning in Germany can be considered more comprehensive, providing a framework that includes general guidelines as well as specialised, sectorial planning in relation to the environment. However, it is also described as often constrained by the reduced administrative and financial leverage and less open to '*individual entrepreneurship and public participation*' also with regard to environmental planning (Schmidt and Buehler 2007:64).

In this regard it needs to be noted that especially on continental Europe environmental planning is often interpreted as being one sector of spatial planning, transposing environmental objectives into overall spatial planning. If however interpreted as environmental policy instrument, planning is perceived as either addressing the environment more comprehensively in form of development, land use plans or building laws, or sectoral plans dedicated to specific environmental 'media' (e.g. air, water, habitats). At the EU level, it also provides for important legislative frameworks regarding strategic environmental assessments (SEAs) (Directive 2001/42/EC) and environmental impact assessments (EIAs) (Directive 2014/52/EU). Particularly the latter commonly aim at integrating environmental concerns into other policy areas (e.g. energy, transport, industry, agriculture or forestry), based on the conventional approach of **managing environmental problems**. Ritter and Wolf (1998:15) deem that the growing interest in environmental protection by the planning disciplines was responsible for a revived importance attributed to spatial planning in the 1980s. Comprehensive forms of planning, reflected in the development of all-inclusive masterplans, in the 1960s had lost importance as increasingly spatial planning had been reduced to the delivery of projects in different sectors (Maurer in Ritter 2005:759). However, especially the need of applying land-use plans and open space planning at local level for environmental protection led to a revival of spatial planning. Ritter and Wolf (1998:15) at the same time iterate that those plans were mainly focused on keeping space clear from development and consequently represented negative-planning. The latter refers to all planning that absorbs potential negative developments by applying restrictions (Lendi 1996:40-41).

This also more specifically applies to the sector of **landscape planning**. Following for example the German federal nature conservation law (Art. 9 BNatSchG), landscape planning has as main task to concretise the objectives of nature conservation and landscape protection at the local and supra-local level, and draft decisions and measures that support their achievement in light of their importance for human livelihood and recreation. According to the German Federal Agency for Nature Conservation (2013), on the one hand the main tasks of landscape planning are composed of 'traditional' nature conservation measures (e.g. area protection), which imply little to no land use for a small extent of areas. On the other hand, they include the regulation of impacts for a sustainable development (e.g. compensation measures), which affects extensive to intensive land uses on a broader scale. It hereby targets a range of environmental 'media' (e.g. water, soil, air, noise, climate, flora & fauna, habitats) as well as recreation and landscape aesthetics. This interpretation of landscape planning largely corresponds to a rather reactive approach, particularly with

regard to intensive land use development. Following for example the definition of Bowyer et al (2009:16), a more proactive landscape planning system would '*guide development, ensuring it is channelled into appropriate localities, minimise negative impacts and maximise benefits for the environment and communities*'. Considering landscape planning as '*one element in a policy chain*', it should facilitate developments that integrate a range of needs, including nature conservation.

The branding of environmental or landscape planning as negative planning indicates its interpretation as a conventional approach of managing environmental problems, rather than as an effective contributor to and designer of development. As more pointedly formulated by the contemporary US anthropologist and geographer Harvey (1996:374), most often environmental planning represents the attempt of managing environmental problems only to the extent of clear evidence of serious damage and to the extent they are quantifiable in monetary terms. However, he challenges the standard view that environmental management and planning is a question of intervening to cope with difficulties that could not be solved by property ownership. Harvey (1996:397-402) emphasises the importance of not focusing on solving the environmental problem, but confront and transform processes that gave rise to the problem.

C 1.3.3.2 Dealing with complexities – the role of strategic thinking in planning

The understanding of what planning encompasses, especially as a policy-administrative process, has been changing over the years, impacted by social, economic and cultural developments. Historically mainly interpreted as heavy state control and command economy, on continental Europe and Germany in particular it shifted from the overall political planning process in distributing wealth (including land) at the beginning of the 1960s and 1970s to the role of counterbalancing externalities where needed in the 1980s and 1990s (Fürst and Ritter in Ritter 2005:768). As iterated previously, this evolvement has likely contributed to the continuing application of planning processes to different policy areas, including for example transport, energy infrastructure, local building, land use plans and the environment. According to Randolph (2004:16), with regard to the United States planning evolved *'from a design profession applied to urban form to a broader skill set applied to a range of problems and objectives*'. It shifted from planning as regulation in the 1920s, which included urban zoning, command and control as main government actions, to planning as integration of policy, science, collaboration and design starting in 2000, which saw the '*rebirth of design innovation informed by science, policy and collaboration*' (Randolph 2004:17)

These historic developments also include the evolvement of a rational planning approach applied by the first generation of planners to an approach focused on the design of planning processes by the second generation, and a system approach taking into account aspects of subjectivity and uncertainty applied by the third generation of planning disciplines. Initially, the system approach was introduced by the second generation in order to address so called 'wicked problems'. Rittel (1972:392-393) defined 'wicked problems' as those being overall very unique, having no definite formulation, no clear separation of solution and problem, no exhaustive list of or final solution, no clear cause-effect chains that influence the ought-to-be, no applicable correct/false and hence no possibility of testing. It resulted into an increased emphasis on the importance of taking into due consideration one's own subjective perspective and the way it influences the planning approach. In addition, one way of responding to the increased complexities presented by 'wicked problems', related uncertainties and the subjectivity of approaches in urban development and beyond, was to put an increased effort into developing 'ideal' communication, negotiation and decision-making processes to reach a consensual outcome. However, some urban planners (e.g. Fainstein) and urban development institutions (e.g. UN Habitat) have started arguing that this has likely happened to the detriment of the outcome, as already outlined in the introduction of the thesis.

In recognition of this shortcoming and by emphasising the subjectivity of defining what might be a negative or a positive status quo, Schönwandt et al (2013:24-28) call for a detailed scrutiny of what might be considered an actual problem (**problems first!**), as part of a third generation of planning theories. In this regard, Schönwandt and Voigt (in Ritter 2005:769-776) first underline the necessity of uncovering the background knowledge of participants in planning processes. It influences which set of problems are used to describe a current state, envisaged objectives and hence also the final selection of methods, leading to a multitude of planning approaches. Schönwandt et al (2013:24-28) also put emphasis on the practice of 'problem deferment', to either get at the heart of the matter or to a problem that seems manageable. It assumes that identifying and outlining problems and applying problem deferment at the beginning of the planning process results in a higher satisfaction of participants regarding the output of the process (Hemberger 2014). It can however be argued that the emphasis of the 'problems first' theory on the subjectivity of problems, the resulting multitude of perspectives on planning approaches still puts a large focus on the importance of negotiation and communication processes. It bears the risk of not allowing to take a clear stance or undertaking a ranking of the problems at the forefront to be solved.

Nevertheless, increasingly influenced by new findings and theories in physics, chemistry and biology, it is important to note how the mechanistic-deterministic perspective of the first generation of planners, who assumed the rationality of decisions, has slowly changed into the system perspective of the third generation. It emphasises the importance of dealing with complexity, dynamism, self-organisation, chaos and the unknown (Fürst and Ritter in Ritter 2005:768; Scholl 1995:104). In this regard, theories of complex networks are introduced in Box 2 in more detail, due to the interesting perspective they offer on interpreting the network approach of GI and its operationalisation.

Box 2: Introducing theories of complex networks

General theories of networks and related complexities can offer important insights regarding considerations on how to strategically approach the planning of the GI network. Related research has been looking into the architecture of complex networks and their potentially shared organising principles across a variety of disciplines and subjects, from the world-wide-web to the functioning of nerve-systems. Overarching studies have been especially collected and driven by the physicist Albert-Làszlò Barabàsi and his team at the Notheastern University Center for complex network research (USA), who have developed and explored the theory of scale-free networks.

According to Barabási and Bonabeau (2003), up until the 1990s networks were thought to occur randomly, building on models of the mathematicians Paul Erdős and Alfréd Rény. The model of random networks assumes links between nodes being arbitrary, and nodes having approximately the same amount of links, for they distribute around averages. Based on initial empirical research of the world-wide-web in 1998, the scale-free network theory argues that for a high variety of complex network systems some nodes have a larger amount of links than do other nodes, leading to the existence of hubs. According to the theory, the main reasons are dynamically evolving networks of unequal nodes and the appearance of preferential attachments to certain nodes. Where new nodes appear they mostly link to already well-connected ones, generally favouring early nodes in a 'the rich getting richer' process. This process is assumed to usually occurr linearly, i.e. a node connects twice as likely to a node that has twice as many connections as a node close-by. If it happens faster than linear, it likely leads to the development of 'winner-hub takes it all' scenarios. The authors use the citation of scientific articles as an example, arguing that the most cited ones likely stimulate researchers to read them more often and consequently also cite them more often. Recently, theories of scale-free networks have also been used to discuss dynamics of economic inequality, arguing that the wealthier a person gets the more opportunities he/she gets to even get wealthier (e.g. linked to costly financial consulting, higher safety nets to take risks), if no 'brakes' are included to stop the reinforcing feedback loop (Espinosa 2016).

In addition, according to Barabási and Bonabeau (2003), scale-free networks can also be considered likely more resilient to accidental changes albeit more vulnerable to specific attacks. Due to the way nodes are connected, the disappearance of a node not necessarily leads to the complete disruption of a system. However, this might be different if an important hub disappears. To some extent it is comparable to the hypothesis of keystone species introduced in community ecology and conservation

biology. Keystone species are thought to have a large impact on an ecological community for a range of reasons, their disappearance causing a large shift in ecosystem composition. According to a recent paper published on the universal resilience patterns in complex networks, complex systems described as a multidimensional parameter space '*give rise to diverse and unpredictable behaviour*' (Gao et al 2015:311). The authors tested a network-based theoretical mathematical framework to depict a system's resilience. Their results indicate that structural components such as the density, heterogeneity and symmetry of complex systems are key factors in determining the proneness of a system to perturbations (Gao et al 2015:311-312). As such the results support the argument that excessive levels of concentrations throughout a network of variables can be detrimental to the resilience of a system. This could be important aspects to consider with regard to the strategic planning of a GI network as a socio-ecological, complex system.

Another approach in dealing with the complexity of socio-economic problems refers to the application of strategic thinking. According to Scholl (in Ritter 2005:1123) with regard to planning it refers to the process of reflecting overall intentions, implementation of objectives, and development of actual options, all framing future developments. It also includes giving due consideration to a limited amount of resources regarding time, financing and personnel, an awareness of risks and recognising that there will be unknowns and surprises. Historically, the notion of strategic thinking evolved from the development of military strategies which had to work with a finite amount of resources allowing at the same time to swiftly react to changing circumstances. It entered the corporate world as a mean to structure the achievement of overall objectives, largely in the 1950s. With regard to planning, in the 1960s and 1970s it was mostly interpreted as a comprehensive form of planning reflected in the development of all-inclusive masterplans (Albrechts 2006:1149). It subsequently lost importance, due to the previously described changing understanding of planning, such as its increasing focus on the delivery of projects in different sectors. Following Albrechts (2006:1149) and Scholl (in Ritter 2005:1123), developments such as an increasing awareness of complexities linked for example to environmental concerns, rapid and seemingly random development as well as insights into the limits of urban expansion and growth in solving spatial problems and the increasing constraints regarding available resources, have led to a revival of strategic (spatial) planning. At the same time, both authors agree that no common definition of strategic spatial planning exists, ranging from long-term to higher-level and conception planning.

Albeit iterating that strategic spatial planning needs to be tailored to circumstances of content and underlying socio-economic conditions, Albrechts (2006:1155-1162) proposes five key characteristics to describe strategic spatial planning concepts, procedures and tools as opposed to traditional planning:

1. *Selective* – Focused on a few issues that really matter rather than being comprehensive and trying to integrate a wide range of problems. Some decisions and actions are considered more important than others.
2. *Relational-annex-inclusive* – Less focused on objects and form, but working with relational concepts of space and place and thus particularly interested in relations and processes.
3. *Integrative* – Vertical and horizontal integration not only of objects and functions but also processes across different levels and parts of government.
4. *Visioning* – Visualises in word and pictures what a place could or should be in the future based on the solidity of analysis and the creativity of design. Normative in nature, and context, place and time specific. Rooted in understanding basic processes that shape places.
5. *Action oriented* – Active force in enabling change as strongly related to action and implementation.

The author summarises his definition as follows: '*Strategic spatial planning is a transformative and integrative, (preferably) public-sector-led socio-spatial process through which a vision, coherent actions, and means*

for implementation are produced that shape and frame what a place is and what it might become' (Albrechts 2006:1152).

Scholl (in Ritter 2005:1127) also labels the following steps important with regard to the evaluation and development of **strategic spatial planning processes**:

1. Exploring (e.g. involved actors and potential conflicts)
2. Getting an overview (e.g. using data and plans)
3. Continuous evaluation of the status quo (e.g. resources, outputs)
4. Consideration of available reserves (e.g. personnel and financial capacities)

Although his description puts the planner still at the centre stage of strategic planning, the author also emphasises that a robust strategy can only be guaranteed by the involvement of actors that are impacted by its decisions and actions. It might be argued that the key reason why increased importance is given to participation and stakeholder involvement links to the recognition of taking into due account possible differences between what spatial 'identity' is strategically envisioned on paper or top-down (e.g. growing metropolitan area), and which local conditions and circumstances, ranging from actors-networks to values systems, ideas and beliefs, drive visions in the practical, every-day life of inhabitants or bottom-up. In this regard, Randolph (2004:32) underlines the rising importance of the planner playing the role of designer and visionary as well as facilitator of public involvement. He iterates that this should not '*replicate the utopian planning of the past*' but help a community discover and make visible their vision and explore the means to achieve it as part of a collective process ('*designing is making sense together'*). Randolph (2004:32) hereby describes the planner not as mere facilitator, but as important information source, which offers '*creative and visual alternatives*' and '*organises attention to possibilities*'. At the same time, related to the importance of not losing out of sight outcomes, it is thought essential that the planner is aware of its own values, the ethical system he/she upholds, and of how this defines the values that are pursued.

C 1.3.3.3 Spatial dimensions framing planning, and the ecological space concept

The previous sections on environmental planning and planning approaches already hinted at the magnitude of definitions and conceptual understandings that might exist with regard to planning. A further layer of complexity is added when the term 'spatial' is added. This is especially the case with regard to its interpretation in the German speaking part of Europe, as translation of the word 'Raum'. For example, in the German reference book on land use planning Blotevogel (in Ritter 2005:834-841) distinguishes between eight definitions of 'Raum' or space. They range from its common understanding as a concrete and object-related space observed by individuals or group of individuals to seven scientific interpretations relating to philosophy, physics, geography, economy, sociology or environmental psychology. The selected definition can strongly influence the perspective that is taken, and frame activities quite differently.

This for example includes the definition of **space as a formal, organisational structure** (Blotevogel in Ritter 2005:833-834). The space is described as a two- to three-dimensional metrically organised framework, consisting of objects that can be accurately pinpointed (e.g. using a coordinate system). This concept of space is for example applied by the previously described socio-ecological, classical models of urban development (see chapter C 1.3.1), which use variables such as sites, relative positions, distances and involved transport costs to draw up a map of urban development. Some of its risks have been addressed previously, including what impact the selection of variables can have on what is considered relevant or not, resulting in potential blind spots for example with regard to environmental components. The former space concept

also closely relates to the notion of **relational space**, which is determined by the relative positions of objects. It plays an important role in geography, especially with regard to non random patterns and related spatial autocorrelation analysis, building on the law coined by Waldo Tobler that '*everything is related to everything else, but near things are more related than distant things*'' (Tobler 1970 in Miller 2004:284). What is related is defined by correlation of variable attributes and their geo-spatial closeness, limiting the analysis to relations between objects that can be geographically located.

Another concept refers to **space as perceived by subjects and as determined by their activities** (Blotevogel in Ritter 2005:834-836). Space is defined by how it is sensed by individuals and how this impacts their behaviour. This concept is most often applied in disciplines focused on individuals or groups of individuals, e.g. environmental psychology or social geography. Different to definitions used by mathematics and natural sciences disciplines, it refers to the understanding of space developing within a subject, linked to its sensations, experiences and imagination. It is described as psychological environment or habitat, in contrast to the objective, geographical spatial environment. However, by focusing on the subject human being and mainly defining space linked to its sensations and activities, the concept mostly neglects how space might be 'sensed' by other living organisms. Albeit related scientific studies, for example on how space is experienced via echolocation of microchiroptera bats or migrating bird species, are subject to interpretation by human beings and consequently include a subjective component, they demonstrate that the interpretation of space becomes even more complex if its function as a habitat for other species is taken into account.

Also the **social space** concept presented by Blotevogel (in Ritter 2005:836-838) is mainly related to its interpretation by human beings as a social species. It pictures space as a social construct of reality, whereby terrestrial-material characteristics work as a substrate for its development. However, the latter only gains importance when it is linked to the social world (e.g. economic area, administrative area). As a result for example sociology often limits its perspectives to interactions between individual and grouped subjects, likely underestimating interactions with the material world. The author distinguishes between the following main social space concepts: social-psychological (e.g. felt space), symbolic (e.g. consisting of artefacts which carry meaning), organisational and political (e.g. territorial areas), relational economic area (e.g. determined by variables such as transport costs, competition), economic field of force (e.g. determined by variables such as values, principles) and matrix of socio-economic factors (e.g. space not as final result of social interactions but part of it or its expression). Theories with regard to the latter often form the basis of discussions on spatial disparities and segregation, also previously discussed in chapter C 1.2.1.3. Some representatives argue that the social space not necessarily needs to be a derivation of the physical, terrestrial space but can result from communication systems and patterns (e.g. based on programmes by planning authorities) (Klüter 1986). Others argue that the influence of the physical world on the social space cannot be ignored, for example with regard to the impact of climate and vegetation zones on the development of societies (Stichweh 1998).

Blotevogel (in Ritter 2005:833) states that the human-environment relationship has been scientifically approached following three main perspectives regarding the concept of **terrestrial space and the natural environment of human beings**. These refer to space viewed as a set of interactions of natural and anthropogenic factors (landscape ecology perspective), as a result of historic processes of landscape design (cultural-genetic perspective) and as a field of process related to human activities (social-geographical perspective). According to the author, generally the concept of terrestrial space was useful in providing a scientific basis for spatial planning, particularly during its peak time in the 1970s. It is also the definition of space often

adopted in environmental planning. However, Blotevogel's description of the terrestrial space also strongly reflects the perspective taken by geography or chorological landscape ecology. As highlighted in chapter C 1.1, in the US and UK as well as some parts of Europe a more topological stance is adopted with regard to landscape ecology. Space is studied as a system of vertical biological processes. Whereas the focus on chorological relationships over longer distances of land units can imply a more linear approach, the topological perspective leads to a more systemic attitude towards studying interactions. Similarly, the interpretation provided by Blotevogel can be described as a rather limited binary perspective of the human-environment relationship, which distinguishes between 'us' (human beings) and 'them' (environment, nature), rather than an all-encompassing system of interactions between abiotic and biotic factors, of which human beings are one component, albeit with an increasingly heavy impact.

Although the previously outlined definitions to a larger or smaller extent take the physical space into account, they often take a predominantly **anthropogenic stance**, influenced by the scientific disciplines applying those concepts. At the origin of the definition of space lays what is perceived as such by the subject human being. Space mainly interpreted as a social construct is likely one of the reasons why theoretical reflections on the concept have not gained momentum in environmental and biological sciences as it did for landscape ecology or other disciplines. For example, in the context of the ecosystem services approach (see chapter C 1.1) increased effort is put into evidencing how ecosystem elements, processes and functions provide the substrate for social and economic development, and their cultural importance. However, only some initial discussion on the significance of 'social space' is taking place, especially in relation to the significance of 'place' as historically rooted and with a distinguished identity. This is for example the case with regard to nature conservation and landscape planning measures such as biodiversity offsetting and habitat banking. Key objective of related measures remains the securing of biodiversity benefits potentially resulting from compensating human development on an 'off-setting site'. Already its biodiversity benefits are disputed, e.g. by Curran et al (2014) who collected evidence on how current forms of offsetting are unlikely to match old-growth reference sites due to the significant length of time it takes to restore an ecosystem. The complexity in measuring and comparing equivalency of off-setting additionally increases if social equity is taken into account, according to a report on the potential use of habitat banking in the EU (eftec et al 2010:82). The study however provides little insights into the relevance of the topic, beyond arguments of carefully considering who bears the costs of loss and who collects the benefits of gain with regard to offsetting measures.

Hayward (2013:1-2) makes a more specific attempt in linking inter-human environmental ethics and the concept of space with basic principles of ecology, by introducing the concept of '**ecological space**' as a particular '*way of seeing*'. The concept adopts the definition of ecological niche, to hint at its 'functional' nature, instead of working with the term 'habitat', which suggests a physical expansion. An ecological niche consists of a multi-dimensional space of environmental variables that determine reproduction opportunities, available resources, likelihood of being consumed by predators, competitiveness and cooperation and consequently a species' persistence (Townsend et al 2002). It describes the space that distinct characteristics of identified variables (e.g. range of temperature, necessary soil nutrients) impose on a species. Hayward (2013:3) also differs between fundamental and realised ecological space, similar to the ecological niche concept, to describe that there is a difference between the space of fundamental functions allowing species and species groups to exist, and the space they actually live in. With regard to the human species, he argues that they have by far expanded their realised compared to their fundamental niche, given technological and social developments have helped adapting habitats to their needs. However, Hayward (2013:3) also iterates that, albeit this sets humans apart from other species, they '*are not exempt from*

ecological constraints'. In addition, the expansion of the realised 'ecological space' by some individuals or group of individuals might have occurred to the detriment of others.

Hayward (2013:5-9) also distinguishes between **using, occupying and commanding ecological space**, to link ethical questions on actors' conduct and institutional frameworks to the concept. According to the author, the 'use' of ecological space or its 'functionings' can either be 'endosomatic', if it directly contributes to the sustenance of the human body, or 'exosomatically', if not used for the immediate nourishment but for productive purposes. Expanding the use of ecological space has not to be geographically limited, for example with regard to the production of medicine based on natural components retrieved from abroad. The author also states that ecological space can be occupied without using its 'functionings'. 'Occupation' is described as the result of social norms and thus representing a purely normative category that allows others to be excluded from exercising an option, also beyond of what could be used by the occupying individual. Finally, the 'command' of ecological space refers to the right to create or extinguish rights of exclusion without necessarily occupying space. This can for example be the case when holding a range of financial assets, which allow to easily trade land without occupying it. In this regard, Atkinson (2015:103) similarly underlines the importance of distinguishing between property ownership, which not necessarily is unequally distributed, and control conveyed through economic wealth when discussing issues of economic inequality and potential ways forward. Also Hayward (2013:8) concludes that economic wealth '*effectively represents command of ecological space*'. At the same time, he iterates that the human right to a sufficient amount of ecological space and the duties not to deprive others, to protect against deprivation and to assist those who have suffered deprivation takes overall moral precedence, due to the biophysical necessities it links to (Hayward 2013:10). This largely corresponds to the ethical doctrine pursued by the philosopher Mario Bunge (1989) (see chapter C 1.2.1).

Blotevogel (in Ritter 2005:840) argues for a dynamic application of the concepts of space in spatial planning, depending on the challenges to be addressed, but at the same time recognises the difficulty of translating multi-dimensional thinking into practice. With regard to human-environment relationships, landscape ecology and their interpretation of space has had a remaining impact on landscape planning and the development of concepts such as open space and urban green area, although it can be argued that it mostly refers to a physical appropriation. Inherently, the not yet largely applied concept of ecological space combines different notions of space, such as the multi-dimensional idea of the social space as well as a relativistic approach. The adoption of the concept also allows to shift attention to the quality of provided ecosystem 'functionings' for both humans and other species rather than only the physical expansion. It will hence form an important basis for guiding GI's functional and physical shaping and will be further discussed when elaborating the conceptual and action model for the operationalisation of GI as a strategic planning concept.

C 1.3.3.4 The wider interpretation of spatial planning, its methods and instruments

The outline of the challenges associated with various planning approaches and of the different concepts of space indicate the difficulty in clearly defining spatial planning, its theories, methods and instruments. As has been iterated earlier, **interpretations** of what spatial planning includes are strongly influenced by existing socio-economic and environmental developments, related value systems, and as such by the decision-making culture of a society and the governance culture of a political system. This is for example illustrated by the historical development of spatial planning in Germany over the last decades (Ritter and Wolf 1998:6). At its peak time in the 1960s, it aimed at rationally 'organising' space, according to what were believed clearly identifiable demands and seemingly robust predictions. According to Ritter and Wolf

(1998:7), it was a time of economic boom, following the recovery from the two World Wars, and this allowed the implementation of distributional measures without substantial changes to property rights. The German Federal Spatial Planning Act was a legislative measure which came into force in that period of time (1965). Linked to the planning of towns of high-rise uniformity which promoted high car dependency, and an increasing awareness of the impact of human activities on the environment and health in the 1970s (see chapter C 1.1.1), however the general public started to loose trust into comprehensive forms of spatial planning which pursued the notion of an ideal urban form. Spatial planning at the federal level, but also down to the local level, steadily lost importance, also related to a phase of de-regulation that hit decision-making in the 1980s. This went to the extent that the focus shifted from spatial planning to development, applying an inherently economic viewpoint (Langhagen-Rohrbach 2010:7). In addition, specialised planning for defined sectoral policies gained importance, for many representatives to the detriment of an overall spatial planning approach.

According to Langhagen-Rohrbach (2010:122-131), not only its changing interpretation but also the lack of a **coherent planning theory** represents an important reason for why spatial planning seems to have lost importance as a policy instrument during the last decade. It relates to thinking that such a theory would facilitate the integration of a range of topics and issues into planning (Schönwandt et al 2013). Ritter and Wolf (1998:40) however iterate that the only overall applicable theory refers to its aim of seeking an answer to defined spatial problems, and that additional distinct theories should only be developed to the extent they contribute to solving appearing social problems. Similarly, Lendi (1996:146) emphasises that a clear theory does not exist and that spatial planning is made up of a series of decisions, as a guiding and controlling public task, which is subject to ethical scrutiny. However, according to Langhagen-Rohrbach (2010:122-131) this bears some risks. To begin with, these refer to spatial planning's continuing loss of purpose as a guiding and controlling public task, due to liberalisation and de-regulatory processes resulting into a range of problems mainly to be solved by market forces (see chapter C 1.2.1.2). Risks also link to the limits of existing planning methods and instruments to quickly address evolving socio-economic and ecological developments. This rises questions regarding the effectiveness of the spatial planning process and instruments.

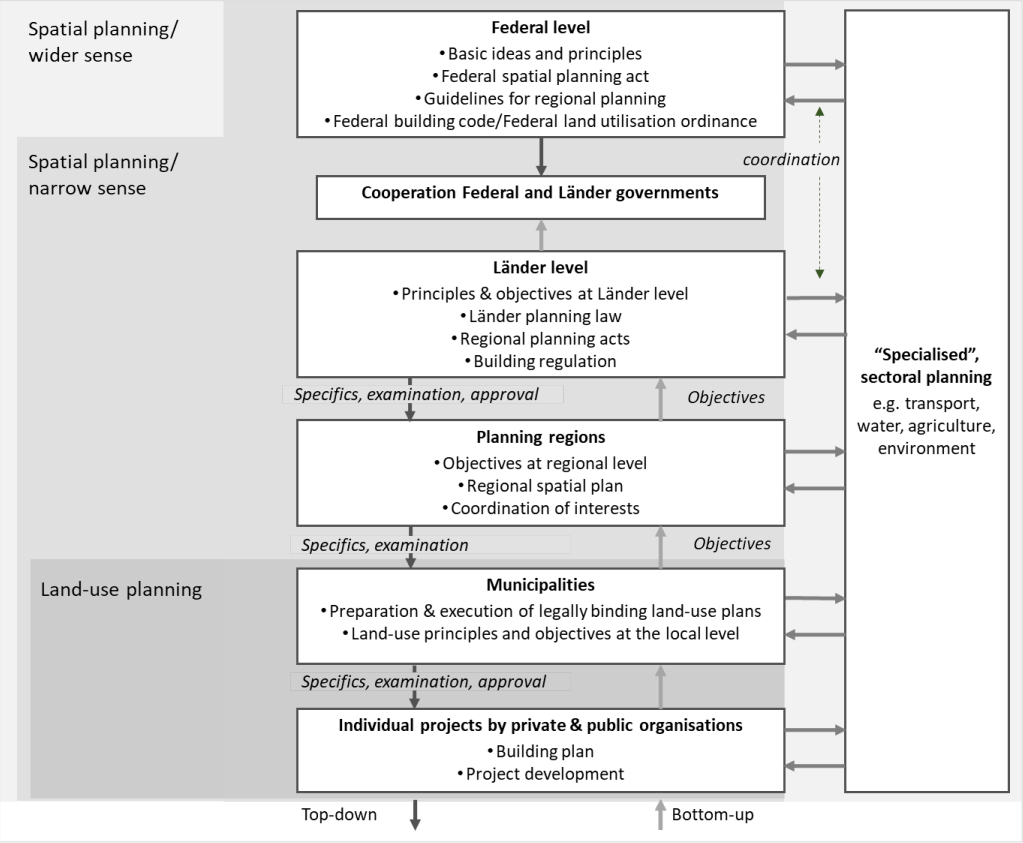
In the previous sections, terms such as planning, environmental planning, land-use planning, regional planning, landscape planning and spatial planning have been introduced. Not necessarily those terms can be used interchangeably, but can represent one facet of the other, depending on the interpreting discipline and planning culture. The Council of Europe Conference of Ministers Responsible for Spatial/Regional Planning (Council of Europe 1983) provided an interesting overall **definition of spatial planning** in its European Regional/Spatial Planning Charter: '*Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy*.' Although the Charter is not legally binding, it emphasises the importance of considering the European dimension of spatial planning as a mean of contributing to the spatial organisation of Europe, of helping to address problems that go beyond national borders and to create a feeling of common identity.

When defining spatial planning, Ritter and Wolf (1998:17) distinguish between **spatial planning in a wider sense** (in German 'räumliche Planung') and **spatial planning in a more narrow sense** (in German 'Raumordnung' or 'Raumplanung'). The first consists of two main layers influencing each other reciprocally:

- Physical planning, with regard to the distribution of object-related resources (e.g. land and buildings). Main characteristics are its formal/legislative approach and graphic description.
- 'Virtual' planning, understood as the setting-in-motion of social processes of self-organisation and consensus building. Main characteristics are informal, legally not binding forms of organisation as well as management and moderation tasks.

The second refers to dedicated legal and formal instruments of an overarching and integrative nature. It consists of regional spatial plans and framework legislation at the national level, and land-use and building plans at local level. Ritter and Wolf (1998:4) and Turowski (in Ritter 2005:897) conclude that specialised spatial planning dedicated to specific policy sectors forms part of spatial planning in a wider sense but not if interpreted in a more narrow sense. Figure 27 provides an overview of how spatial planning can be interpreted and what instruments this might include, exemplarily based on the German spatial planning system.

Figure 27: Defining spatial planning, based on the German spatial planning system (adapted & developed based on Schmidt and Buehler 2007:58, including Turowski in Ritter 2005:898)



In the introduction to their book on **methods and instruments of spatial planning**, Ritter and Wolf (1998:1) iterate that a planning instrument's main purpose is the achievement of defined objectives (implementation), whereas planning methods indicate ways of reaching answers to formulated questions (definition). The authors also underline that not always the line between methods and instruments of spatial planning can be drawn neatly and that different sets might be applied, depending on the context within which they are used, including planning theories, planning law, planning culture and socio-political structures. They also emphasise that the gap between practice and research is particularly small when issues of methods are discussed, and that methods leave scope for action to planners, different to instruments, which have to be applied within the limits of spatial planning law. Hübler (in Ritter 2005:637) also underlines that the

selected method decisively influences the output of spatial planning or related research, due to the inherently subjective components they include. In addition, the author argues that 'open-end' processes/methods, which are not related to a concrete 'object' bear the risk of not necessarily being time-bound and thus lacking behind in intergenerational questions of justice and equity.

The German reference book of land-use planning (Hübler in Ritter 2005:637), Ritter and Wolf (1998:2) and Langhagen-Rohrbach (2010:91) also distinguish between formal and informal spatial planning instruments, next to instruments which specifically apply to defined planning sectors. Formal spatial planning instruments include those that have been transposed into spatial planning law and regulations, and as such have been 'formalised' (e.g. building regulations, environmental impact assessment). The different authors iterate that formal spatial planning instruments are often considered too rigid and inflexible, which has resulted in an increasing interest into informal instruments. According to Hübler (in Ritter 2005:639), key characteristics of informal spatial planning instruments are their informality, their orientation towards seeking consensus and acceptance, and their persuasive rather than prescriptive nature. Langhagen-Rohrbach (2010:91) argues that these characteristics allow to transpose innovations more quickly, address problems more transparently, increase related awareness and gain broader public acceptance. Potential drawbacks refer to their very uncertain effectiveness, due to their non-binding character, their focus on reaching compromises rather than effective solutions to a problem, and the often resulting lengthy decision-making process (Danielzyk in Ritter 2005:469). In practice, formal and informal planning instruments are often used interchangeably and cannot be clearly separated. Very often formal spatial planning instruments have once been informal. Currently, informal planning instruments are particularly applied with regard to forms of strategic planning. This includes for example regional planning concepts or overall urban concepts and principles ('Leitbild' in German), and the application of test-planning, the latter being a form of experimental planning involving a range of stakeholders/experts and resulting in the identification of planning scenarios and options. Table 10 provides an overview of the main differences between formal and informal spatial planning processes and instruments.

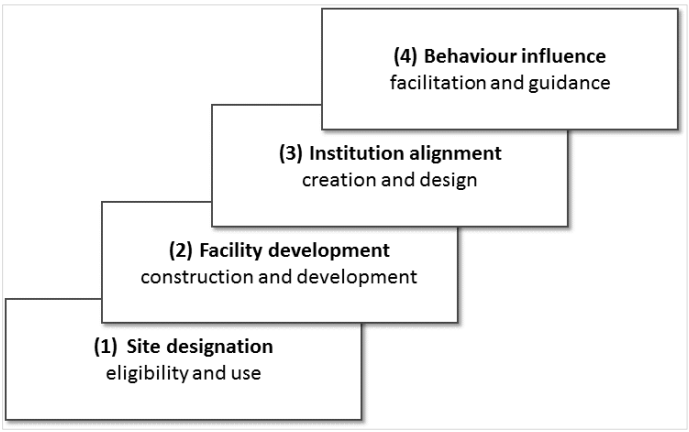
Table 10: Main differences formal and informal spatial planning processes and instruments

Category	Formal processes and instruments	Informal processes and instruments
Planning product	Precise formal requirements, either in written, graphical or cartographic format	Open design, adapted to the needs for achieving the desired effects, no final definition
Scope	Linked to administrative units, from national to regional and local governance	Across (administrative) borders/spaces based on a common problem, scope defined by the initiative
Duration	Depending on legal requirements, linked to the involved object	Depending on initiative, roughly 1-2 years, e.g. test planning
Organisational structure	Process steps and timelines defined by law and regulations	Open design, adapted to needs in achieving the desired effects
Operational structure	Parties and stakeholders to be involved, identified by law and regulations	Open design, adapted to needs in achieving the desired effects
Financing	Clearly determined, usually public	Negotiable, including private and public financing and across administrative units

Source: translated and adapted from Grams 2015:132

Jung (2008:29) more broadly defines spatial planning as the coordination of all activities with spatial impact, and spatial planning instruments as all means of intervention. He has transposed key stages of intervention into a **'quadriga' of spatial planning**, relating to both formal and informal processes and instruments, depending on the various stages of planning. According to the author, this allows taking a wider perspective on the processes and instruments involved in spatial planning, and identifying areas of intervention which would not become visible by merely focusing on formal instruments. As illustrated in Figure 28, key steps include first the identification of a site, which refers to the application of formal spatial planning instruments such as land-use plans and environmental impact assessments, as well as the development of specific concepts such as on urban green areas. The second step represents the facility development phase, which can refer to both the construction of buildings as well as the restoration of urban ecosystems. The third stage involves either the creation or the change of institutions involved in the process, including capacity building, and the identification of responsibilities and tasks. This might for example refer to the hiring and training of staff for the management of newly protected areas or the creation of an agency responsible for the management of transport infrastructure. The last stage involves interventions that influence the behaviour of a population and consequently their impact on a defined space. It ranges from behaviours related to housing, use of urban green areas or road traffic, and includes both incentives and prohibitions that either stimulate a desired behaviour or limit undesired forms. Whereas the first two stages can be defined as object-related, the last two stages have a strong social focus. Also with regard to these steps, it can be argued that in practice they likely rarely occur linearly. In addition, it can be assumed that the object-oriented stages can quite influence institutional alignments and behaviours. For example, defined road infrastructure development might further favour individual car use.

Figure 28: Quadriga of spatial planning (translated from & based on Jung 2008:78)



To summarise, the previous outline shows the diversity of interpretations that exist when it comes to defining spatial planning, its methods and instruments. It also denotes how informal planning instruments have been used as means of expanding the scope of spatial planning beyond the margins set by formal spatial planning processes, and in the long-run have influenced their shaping. However, it also suggests that the involved disciplines have been hesitant in openly researching the effectiveness of formal instruments, and in indicating substantial changes to formal planning processes. Such suggestions seem to be often offered by those economic disciplines interested in further reducing state interventions with regard to urban and regional development. There also seems to be an inherent understanding that spatial planning, as a discipline, is mostly dedicated to the interpretation and enforcement of existing spatial planning law and regulations. It seems comparable with the relationship of environmental law and policy, outlined in the previous chapter: The first describes itself as targeted at the interpretation and enforcement of existing law rather than concerned with the quality of current, potential or future law, which is deemed of central interest to environmental policy. Also for this reason, the thesis will apply a wider definition of spatial planning, in line with the definition issued by the Council of Europe (1983) and Jung (2008). It is interpreted as a category of policy interventions that cut across regulatory, cooperation and information instruments and thematic areas (see chapter C 1.3.2). This opens it up to scrutiny from a political science

perspective, including political structures and interests, and also to the normative and value-laden side of (economic) decision-making and activities.

C 1.3.4 GI – Development and planning approaches

The previous sections first introduced the field of urban development as an interesting vantage point for the thesis, given it offers a wider perspective on the transformation processes shaping a city's structure. However, the offered models predominantly aim at explaining what socio-economic forces and processes lead to what kind of distribution patterns, giving the impression that certain developments are set in stone or can only hardly be influenced. Besides integrating environmental aspects only to a limited extent, they also take into little consideration the role of policy and political systems. Hence, it was decided to put emphasis on approaches of a political economy, given dealing with value laden and normative subjects such as inequality and justice. This encompasses being less interested in seemingly objective and value-free, mathematical economic analysis, based on an assumed rational behaviour of market participants, but rather highlighting the importance of studying different pressures and interests. The latter also resulted in an interest in spatial planning approaches regarding GI operationalisation, given their focus on shaping and framing processes from a current state to a future 'ought-to-be'. However, a wider understanding of spatial planning is applied to open it up to scrutiny from a political science perspective, and including considerations on the adequacy of policy interventions, political structures and interests.

These results arise questions on how the GI concept fits to discussions on urban development, environmental policy, definitions of space and spatial planning, and its methods and instruments. It needs to be reiterated that at the EU level GI was initially foremost developed as a **policy concept**. It refers to the rise of an idea and principle on how to integrate objectives of conserving and restoring biological diversity into other policy areas, particularly sectoral policies such as transport and energy infrastructure as well as cohesion policy, and increasing related investments. At the beginning, it marked especially a change of language linked to the hope of a resulting change of perspective, to be achieved by underlining the importance of environmental policy objectives in supporting social and economic development. Mell (2015:111) outlines that a series of publications (e.g. EU Green Infrastructure strategy) and events at the EU level raised the profile of Green Infrastructure, '*promoting the Europe-wide application of the concept through a cross-territorial approach to landscape and ecological system management*'. In this regard, it could be argued that it represents the attempt of achieving an objective that so far has been 'neglected' to overall spatial planning: a framework that lays down common principles of environmental or landscape planning on a Europe-wide scale.

The increasing formalisation of the concept is slowly resulting into its transformation from a concept to a policy instrument, understood as a means to achieve defined policy objectives. However not only due to its legal status, it might still be far from being defined a **spatial planning instrument** in the wider sense. As has been emphasised in chapter C 1.1 on GI principles and characteristics, no common understanding of GI yet exists meaning different things depending on the context (e.g. country, discipline etc.). There have been attempts in further streamlining and narrowing down the policy concept to a few principles, to avoid that it could mean anything and the opposite. Mell (2015:106) however argues that concrete agreements of what GI means should be developed at the local level, and otherwise consider the concept as continuously evolving. In Table 6.1 of Mell (2015:108), he summarises the variety of principles discussed, but also illustrates some common denominators across different global regions.

Interestingly to point out are especially those principles that more specifically refer to the **implementation process**, including for example integration policy (referring to the extent to which GI is discussed in different policy areas), holistic planning approach (arguing for the consideration of a wide range of issues), and GI application in government, regional and advocacy policy. According to Mell (2015:108), especially advocacy policy can be an important driver for the transformation of GI as a policy concept into its concrete implementation, bringing into focus the role of advocacy agents in promoting the concept (e.g. Federation of German Landscape Architects). As has been mentioned in the previous section, not always a clear difference between a (spatial planning) instrument and method can be identified. This also applies to the GI concept. Many principles relate to objectives such as sustainability, multi-functionality, connectivity or accessibility, indicating its instrumental character due to its focus on implementation of objectives. Other principles refer to the way forward in delineating objectives such as an integrated policy delivery focus or holistic planning approach. Albeit the GI concept does not yet match definitions of spatial planning methods and instruments and remains vague on how a range of principles can be put into practice, several initiatives exist that aim at further transposing the concept into overall spatial planning systems, outlining its difference to existing approaches especially linked to green and open space planning.

According to Randolph (2004:98-99), GI differs from conventional green and open space planning by being '*proactive not reactive, systematic not haphazard, holistic not piecemeal, multijurisdictional not single jurisdictional, multifunctional not single purpose, and multiscale not single scale*'. The author builds on key principles identified by Benedict and McMahon (2002) and further developed in Benedict and McMahon (2006), which have been introduced in chapter C 1.1.2. Different to more conventional planning such as for greenways, one of the key principles of GI is to plan and design open space '*less than an afterthought of development, and more as an integral part of the land development process and growth management process*' (Randolph 2004:95). As such, it is conceived by Benedict and McMahon (2006:41) as framework that can help shape growth and at the same time identify where expanded conservation might be needed.

A range of the definitions provided in chapter C 1.1.2.1 emphasise that an appropriate planning, design and management is needed for the GI concept to become effective (Landscape Institute 2013, Natural England 2010, EC 2013a, Naumann et al 2011a, Mazza et al 2011). Strategic and coordinated initiatives or a **strategically planned and delivered network** can be considered key principles of the GI approach. However, frequently a clear description of what this actually means in practice is often lacking. Benedict and McMahon (2006:109) provide a description of different steps to be taken, including the development of a shared vision and clarification of goals, the development of a blueprint ('greenprint') to create a spatial vision of the envisaged future, working at the same time closely with stakeholders to be potentially affected. As an example of GI put in practice in the US, Maryland's GreenPrint Programme is often mentioned as one of the first blueprints for GI (Benedict and McMahon 2006:35; Randolph 2004:101). Working with satellite imaging and GIS technology, an inventory of the state of GI elements was developed. Subsequently hubs and links were ranked following an evaluation of aspects such as ecological value and vulnerability. Accordingly, the state of Maryland carried out targeted acquisitions and other conservation measures. However, it remains unclear to what extent other criteria related to social aspects and the built environment were taken into account in the evaluation of hubs and links.

According to guidelines provided by Ahern (2007:275), urban GI can only contribute to sustainable development if it recognises the opportunities of linking itself to infrastructure development, and not by only aiming at avoiding or minimising its impact, but looking at a range of different functions to be provided. The approach builds partly on the before mentioned increased understanding of GI as a tool that more

cost-effectively complements or substitutes 'grey' infrastructure as a natural solution (EC 2013a:2). In his guidelines for planning and designing an urban GI, Ahern (2007) also describes in more detail of what he defines as **strategic thinking** with regard to the implementation of the network. An approach is viewed as strategic, if it takes '*appropriate* [account] *of the spatial context and planning goals'* and includes accordingly '*protective, defensive, offensive or opportunistic strategies*' (Ahern 2007:271) (see Figure 29).

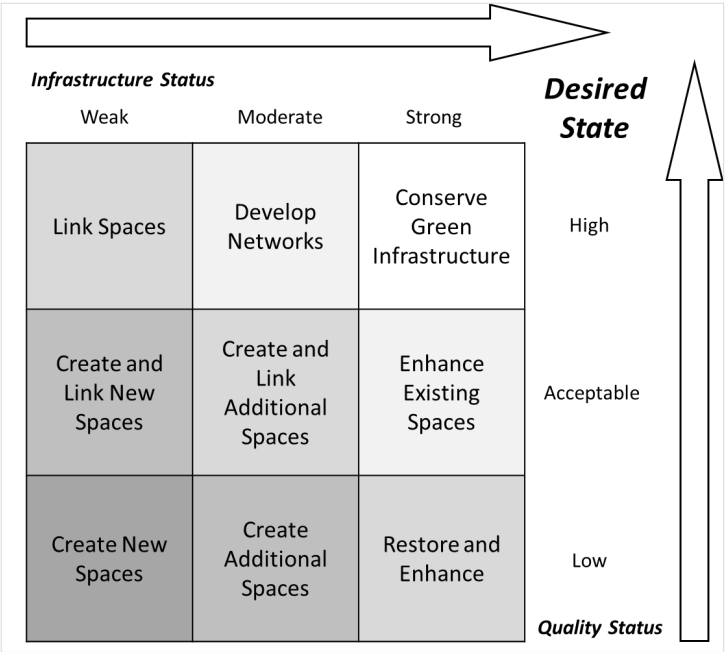
Figure 29: Typology of planning strategies for Green Infrastructure (adapted from Ahern 2007:271 based on Ahern 1995:140)

Protective	Defensive
Taking preventative actions to preserve well-functioning, intact landscape elements before they are threatened by change or development: • World Heritage Areas • National Parks • 'Big' patches of native vegetation • Nature preserves	Implementing actions to defend landscape elements that are suffering from development pressure: • Regional, local parks • Buffer zones • Environmental impact mitigation • Corridors that are pressured from adjacent land use(s)
Offensive	**Opportunistic**
Taking remedial or restorative actions to reintroduce abiotic, biotic or cultural functions where they do not currently exist: • Ecological restoration • Brownfields • Daylighted streams • Bioremediation	Recognizing the potential for non-contributing landscape elements to be managed or structured differently to provide specific functions: • Many greenways • Most urban/Green Infrastructure • Transportation and utility infrastructure

According to Roe and Mell (2012:3), strategic options in planning GI can be identified on a '***continuum of possible choices***' between creation and conservation of respective elements, depending on the desired quality and function or status to be achieved. Both processes are considered interlacing and overlapping. Based on this assumption, the authors have construed development options as part of a GI strategy, linking it to a desirable direction of change (see Figure 30). According to the provided framework, the simple creation of new spaces will likely have a weak impact regarding infrastructure or especially connectivity status, and its quality. The conservation of elements is assumed to come nearest to the desired status of a strongly connected infrastructure of high quality. The interplay also results in the application of a hierarchy of linkages similarly to built-up infrastructure, as for example the linking of spaces in a deprived area is assumed to be more important than creating and linking new spaces. In a nutshell, it can be argued that securing the existing already connected network comes before enhancing and restoring elements, and the latter before linking and creating additional or new spaces.

How these interpretations compare to previous approaches, e.g. greenways or greenbelts, have been already summarised in Table 7 of chapter C 1.1.3, when providing a synopsis of GI principles and characteristics. The most important key aspects include that GI implementation is rarely considered an afterthought of development, but rather aims at conservation and land development before development takes place, based on a continuum of strategic choices of conservation and creation. It also involves the empowerment of numerous stakeholders already in the forming of vision and goals and over a long-term process. Several of the GI definitions indicate that a strategic planning and design of the network, particularly in relation to principles such as multi-functionality and connectivity, is viewed as a method to ensure a wider availability and access to green spaces, increase the proportion of the public benefitting from it and as such contribute to social equity (see also chapter C 1.2.2.2). However, no outline exists how this can concretely be put into practice.

Figure 30: GI strategy development options and desirable direction of change (adapted from Roe and Mell 2012:6 and Davies et al 2006:26)



What follows is a more detailed scrutiny of two exemplary studies of GI implementation and planning of urban green areas, as they provide important additional insights in defining what strategic planning encompasses with regard to GI operationalisation for a just access.

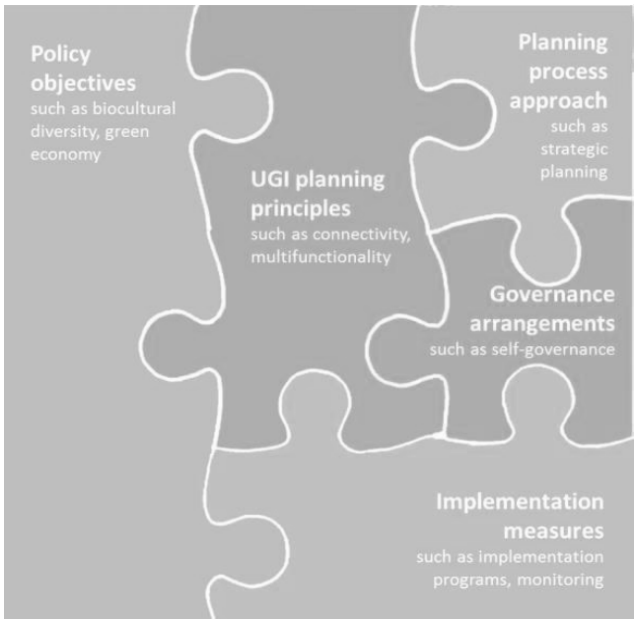
Exemplary study 1: The GREEN SURGE project

The increased interest in defining what GI means in practice led to the launch of a major international project, the so called GREEN SURGE project. Financed by the European Union's research and innovation programme, the project aims at collecting evidence on GI planning and implementation as a way of connecting green spaces for biodiversity, human well-being and the green economy (GREEN SURGE n.d.). Part of the research specifically focuses at **assessing the adoption of principles of urban Green Infrastructure (UGI) planning** in existing practices of green space planning across several European city regions, identifying main gaps and determining what could be barriers and what opportunities for further implementation (Davies et al 2015:7).

In order to get a better understanding of UGI planning, the researchers have developed the conceptual framework presented in Figure 31, which interweaves different components addressing the planning content (policy objectives and UGI planning principles), planning processes (planning process approach and governance arrangements) and implementation of objectives and measures (implementation measures). According to the framework, identified policy objectives such as in relation to biodiversity conservation, climate adaptation, green economy or social cohesion strongly impact the (local) interpretation of **UGI planning principles**.

In this regard, the authors focus on a set of four main principles: network/connectivity, delivery of ecosystem services/multi-functionality, infrastructure integration, and multi-scale approach. These principles largely correspond to those already described as key principles as part of the thesis. Whereas according to Davies et al (2015:14) 'integration' in particular refers to the integration and coordination of urban green with other infrastructures both in physical and functional terms, chapter C 1.1.3 and the previous section conclude that the principle also signifies GI being taken into consideration before development takes place as well as operating on a continuum of strategic choices of conservation and creation. In addition, many of the existing GI interpretations consider the approach to the planning process an integral part of its principles, whereas the framework developed by GREEN SURGE lists them separately. Following Davies et al (2015:15), important characteristics of the **UGI planning process** are its strategic, inter- and transdisciplinary as well as socially inclusive approach. 'Strategic' is understood as to be based on long-term spatial visions and informed by actions and means of implementation that are flexible over time. The addition of governance arrangements as another building block of the framework aims at indicating the inclusiveness of GI decision-making, involving multiple actors, according to the authors. The final block of implementation measures should support translating the general planning process and government arrangements into concrete measures with real-life impacts.

Figure 31: GREEN SURGE. Conceptual framework for UGI planning and governance (Davies et al 2015:13)



The conceptual framework forms the basis of the subsequently carried out comparative case study research, which involves 20 cities across Europe (e.g. Malmö, Edinburgh, Linz or Milan). Relevant research questions relate to the main hypothesis that the term GI has not yet spread widely across Europe but that existing approaches of green space planning have adopted some principles of the concept. The results seem to confirm this assumption. According to Davies et al (2015), only a few cities have explicitly used the term GI. Regarding the uptake of content-related UGI planning principles in urban green space planning, **multi-functionality** is one aspect that figures prominently, independent of whether GI is mentioned explicitly. However, the analysed cities have been less dedicated in determining how multi-functionality can be achieved, although larger and ecologically important areas as well as their connections were recognised as an important means to secure it. Regarding **connectivity**, the added value of physically and functionally linking urban green space was recognised by most of the analysed cities, particularly in view of establishing coherency for biodiversity protection, recreation and climate change adaptation. Less evidence was provided regarding a strategic or hierarchical approach in establishing ecological connectivity, for example by distinguishing between core areas of high biodiversity values, corridors, and stepping stones. Several of existing urban green space plans either purely focus on ecological connectivity or on greater social accessibility. The **integration** of UGI with other infrastructures was most often considered with regard to stormwater management, although otherwise it played a minor role in the studied planning systems. No reference regarding the application of a pre-development principle was available, likely given it was not subject to the definition of integration provided by the project. Similarly limited resonance in planning systems could be found with regard to the **multi-scale** approach of GI planning.

When it comes to the identified policy objectives, **biodiversity** plays a role in most of the analysed urban green space planning systems, though the most comprehensive plans do not focus on biodiversity in particular. The concept of ecosystem services is not always necessarily framed, though similar notions such as ecological functions or the recollection of benefits have been applied. As part of the research, some interviewees also stated that **social cohesion** aspects are largely included in planning documents, although the analysis revealed only a few explicit references made especially in documents on green space conservation and development, including on similar terms such as social justice, segregation, inclusion and integration.

The strategic component of UGI planning processes was addressed in most of the planning systems that have been analysed. This at least refers to how **strategic** has been defined with regard to the project, i.e. the existence of long-term spatial visions supported by action plans and implementation means. In this regard most of the existing urban green space planning approaches of the analysed cities seem to address the subject. However, some aspects of strategic spatial planning outlined in the previous chapter C 1.3.3.2 have not been considered as part of the analysis of this category. This for example includes the involvement of stakeholders already in the forming of visions and goals, and considerations and evaluations regarding the availability of resources and capacities. Regarding **specific strategies and tools** for UGI planning, the study underlines the diversity of existing approaches. Some of the analysed cities focus on the most problematic areas (e.g. brownfield areas), others on protecting the most valuable ones (e.g. protected areas). To a very large extent, all urban green space planning systems still focus on public green spaces. With regard to their **implementation strategies**, only a few cities so far give high political importance to social aspects, leaving much room for improvement, according to the authors. Especially the aspect of equality is still rarely pursued in green space concepts. Neighbourhood planning approaches have been mentioned being useful with regard to an increase in social inclusion related to the planning of urban green spaces. In addition, participatory processes and the role of urban agriculture have been identified as important elements of research regarding the aspect of social cohesion.

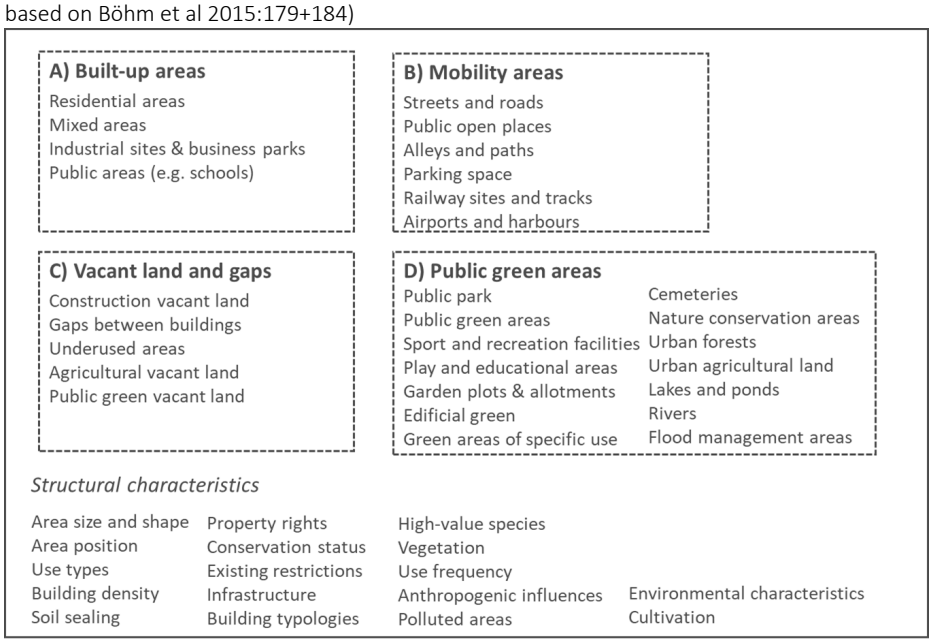
To conclude, although the study identified urban green space accessibility and equity considerations regarding its distributions as an emerging subject on the policy and research agenda, no concrete considerations have become visible how this could be strategically approached beyond the support of participatory processes. In addition, the research has largely focused on planning documents and instruments, however did only address to a limited extent other policy instruments that might be favourable or not to UGI planning. This can be deemed particularly important considering that most urban green space planning systems address foremost the development and maintenance of public but not private green space. In this regard, many of the existing initiatives seem to have failed to integrate an important part of the GI concept deemed substantially different from previously existing initiatives of urban green space planning. Though the study iterates that many of the existing urban green space planning initiatives arguably take a strategic approach, if referring to the adoption of visions, targets and actions, a comprehensive and foremost concrete outline of what encompasses a 'strategic approach' is lacking.

Exemplary study 2: Tools for a dual inner development

Insights from the previously outlined GREEN SURGE project provided little evidence on a strategic or hierarchical approach applied by the studied municipalities in physically shaping a network of urban green areas or GI. Some cities described the application of quantitative standards to guide the implementation, such as size of an area, walking distance or urban green area per head targets. However, German municipalities

indicated a missing application of qualitative standards, in the framework of a recent study on the potentials of a dual inner development, referring to densification processes to be linked to the parallel development and qualitative improvement of open and urban green spaces (Böhm et al 2015:97+170). Furthermore, only one third of the 41 German municipalities, which were interviewed as part of the study, stated that they apply urban green area classifications (Böhm et al 2015:172). In light of the identified lack of qualitative standards and urban green classification systems, the authors developed two interlinked tools to help municipalities in identifying potential reserves for a dual inner development, and in evaluating their nature conservation potential. Interestingly, the latter is based on structural characteristics that allow to define their suitability to sustain certain functions, in line with the previously outlined ecological space concept. Hence the tools will be introduced briefly, although they do not specifically address the GI concept.

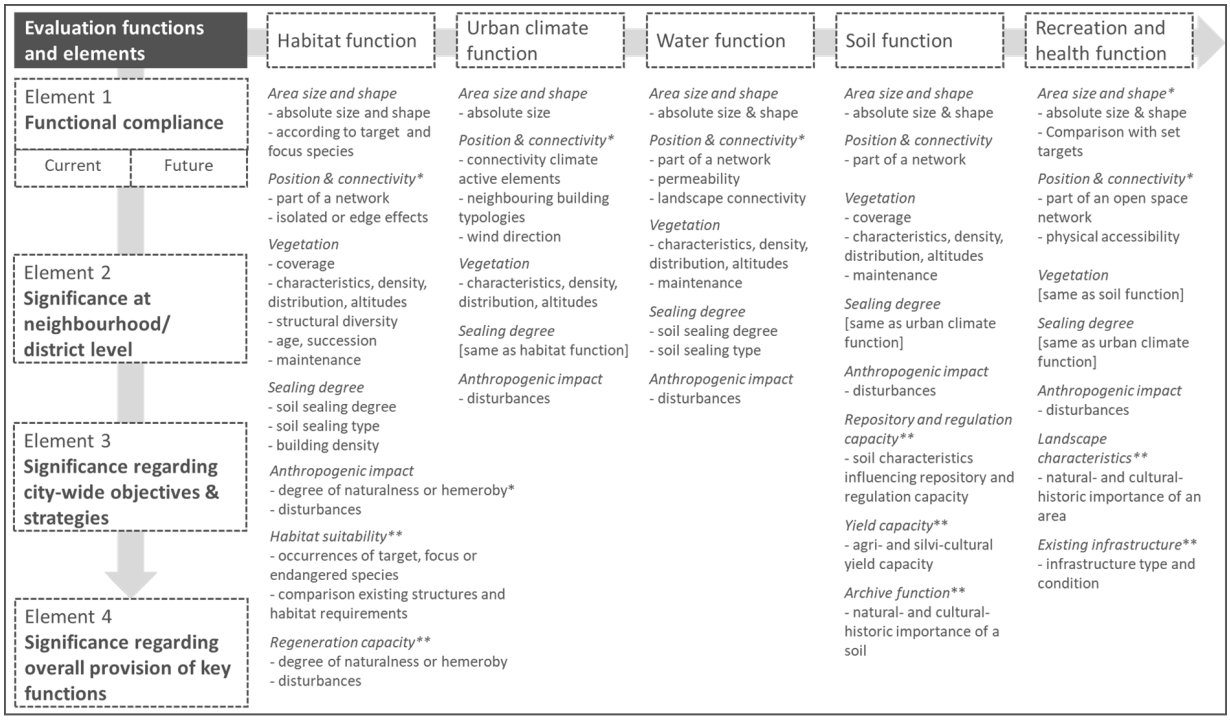
Figure 32: Identifying potential reserves for dual inner development (translated & developed based on Böhm et al 2015:179+184)



The first tool includes four main areas of action, according to which a classification of areas for dual inner development can be carried out (see Figure 32). These include *built-up areas* (e.g. increasing quality and quantity of existing urban green especially of industrial sites), *mobility areas* (e.g. revitalisation and renaturation of streets and roads), *vacant land and gaps* (e.g. temporary urban green), and *public green areas* (e.g. protection of existing areas, increasing quality by avoiding over-use). The four units are informed by *structural characteristics*. This is based on the assumption that characteristics such as vegetation, anthropogenic influences or use frequency can be as important as the size of an area in defining standards which describe the quality of urban green (Böhm et al 2015:30). As such, they also inform the application of the second tool, which helps identify the nature conservation potential of the reserves.

Whereas the first tool allows to put together a pool of potential reserves, the second one aims at the valuation of the identified areas based on their suitability to sustain functions provided by ecosystems, including being 'experienced' by the urban population (Böhm et al 2015:194). It consists of four steps described as process elements for evaluating the nature conservation potential of the reserves (see Figure 33).

Figure 33: Evaluating the nature conservation potential of reserves for dual inner development (translated from & developed based on Böhm et al 2015:195+205-207)



Note: *indicates that at least one aspect of a criterion is function-specific, ** indicates a function-specific criterion

The first step refers to the evaluation to what extent an individual site currently and likely in the future contributes in providing a range of functions (functional compliance). The authors have focused on five key functions, although emphasising that further elements can be added to the list, depending on a municipality's needs. The list so far includes functions such as habitat provision, urban climate impact, water quantity and quality provision, safeguard of soil diversity, as well as recreation and health support. The second element is focused on evaluating the significance of an area and the functions it might provide at the neighbourhood/ district level. It is followed by an assessment of how a reserve contributes to city-wide objectives and strategies (evaluation element 3), and concludes by looking into how it influences the overall provision of identified key functions (evaluation element 4). Whereas the first element of the evaluation process should help in carrying out an assessment of individual areas, the following steps are described as contributing to a more strategic planning at the neighbourhood as well as city-wide level (Böhm et al 2015:194).

Besides representing a first attempt in providing a more comprehensive approach for assessing the quality of urban green areas, especially the focus of the second tool on functions in addition to area size and shape makes it also interesting for **assessing GI as part of the ecological space concept**. This refers for example to aspects such as soil regulation capacity or agri- and silvi-cultural yield capacity. In addition, aspects linked to the criterion '*position and connectivity*' address a key principle of the GI concept. The method of considering not only the individual site but its impact up to a city-wide level also reflects to some degree the multi-scale approach proposed by many GI definitions. Putting nature conservation at the forefront of the evaluation is also supportive of the biodiversity objective inherent to the GI definition at the EU level. At the same time, the authors also necessitate the step of taking into account structural characteristics at the early stage of pooling reserves for dual inner development, including interesting aspects such as property rights, existing restrictions, existing building typologies and density.

According to the authors, the tools should support a decision-making process that balances economic, ecological and social interests. In this regard, they describe at least the first tool of pooling reserves as value neutral (Böhm et al 2015:177). Albeit the second tool allows the ranking of different sites based on the distribution of a maximum amount of points regarding their nature conservation potential, it restrains from weighting particular aspects. The authors emphasise that municipalities should decide whether this might be an appropriate step, linked to their specific situation (e.g. ecological baseline, expected population development), strategic positioning and objectives as well as overall urban concepts and principles. Albeit being important arguments, if it is assumed that biological diversity underpins the provision of a range of functions and ensures their provision for future generations the habitat function could have been higher valued by giving it additional weight. In addition, although a wide range of aspects are used to describe functions considered key at the urban level, only a limited amount has been included. This only partly reflects the multi-functionality principle proposed by the GI concept. Overall, it can be argued that the authors hesitate to take a clear stance on the expected outcome. The adoption of the notion of 'dual inner development' also indicates that the physical shaping of a green urban area network is less seen as a baseline for future development, but more as a by-product, risking to limit its role regarding pre-development considerations, another GI key principle. It differs from the ethical baseline that puts the environment at the centre stage as foundation of social and economic development. Most importantly, it needs to be noted that both tools are directed at identifying suitable sites, but do not provide guidance on ways forward in designating them and or developing related 'facilities'. The strategic approach is mainly concerned with the analysis of the suitability of sites beyond individual elements, and less with actions to be adopted based on the evaluation.

C 2 The conceptual and action model for GI operationalisation

Following the thesis' research interests and design, the conclusions of chapter C 1 on the three identified key areas of conceptual foundations – GI key principles and characteristics, notions of inequality and justice and urban development and planning approaches – are used to inform the development of a conceptual and action model. In a subsequent step, it will be applied as a framework for the empirical research, in order to gain insights into its possible application. According to van Stigt et al (2015), research suggests that a framework which enhances the weight given to values attributed to environmental quality might be more useful than supplying local policy-makers with additional and improved knowledge about the impacts of an urban plan. One might say that a framework allowing a new narrative is needed. In this regard, the overall aim of the model is to give weight and support the interpretation of objectives linked to GI operationalisation. It also aims at supporting coherence, by suggesting an ethical baseline and by framing approaches, methods and instruments that can be adopted for a just access, especially in light of dynamics of socio-ecological and economic inequalities.

C 2.1 The model's conceptual entry-point and ethical baseline

The notion of **ecological space** represents the first key component that lays out the conceptual basis of the model. As outlined in the previous chapter when discussing different 'space' definitions, it represents a multi-dimensional space concept, which goes beyond referring to physical expansions (e.g. habitats, green areas) and considers the complex of environmental variables that impose a defined space on a species. According to Hayward (2013), the introduction of the concept offers a new mind-set for reflecting objectives to be achieved by putting the provision of ecological 'functionings' at the forefront rather than the expansion of an area. What variables define the ecological space depends on the species central to the analysis, including but not limited to human beings. For example characteristics such as clean air, clean water, amount of light, sense of orientation, beauty etc. can all come into play when defining the ecological space needed for humans to thrive in an urban environment. Other, narrower 'functionings' might be considered with regard to the ecological niche occupied by other species.

According to Hayward, overall the concept allows highlighting the fact that human beings are also subject to **ecological constraints**, differently to assumptions on the substitutability of human made and natural assets drawn by some economists (see chapter C 1.2.1.2). Although the ecological space concept does not exclude that important 'functionings' might be provided by purely human made structures, it emphasises that those might limit solutions to a specific, not widely targeted, end-of-pipe service provided to humans. For example, the functioning 'clean water' could be mainly guaranteed to an urban population by water purification plants. However, it could also be supported by ensuring lower levels of water pollution through production requirements (e.g. reduced amounts of herbicides and pesticides to be used in agricultural production) or by the conservation of wetlands providing water purification functions. This would for instance help 'enlarging' the ecological space not only of humans but also of other species impacted by pollution levels.

Hayward (2013) does not provide a detailed definition of **'functionings'**, although the previous examples provide a first indication of the main difference to functions. In line with investigations on function and 'functionings' in ecology by Jax (2005:641-642), the term function can be more closely related to a defined

role within a system (e.g. functional group of decomposers in an ecological system), to interactions between two objects or processes (e.g. as a function of the disappearance of a species another species vanished) or an attribute to a system linked to its use or purpose especially for human beings (e.g. water purification function or service). The term 'functioning' refers to a change of perspective from individual parts, roles or functions to the complex system of interactions or the '*sum of processes that sustain a system*' (Jax 2005: 642). In this regard, ecological space also differs from the concept of ecosystem services, as the latter takes a predominantly human stance regarding the 'functions' to be supported.

In the framework provided by the ecological space concept, **GI would take up the role of a backbone**, responsible for providing basic and a variety of different 'functionings' for a range of species, including the human species. Its operationalisation would not only refer to measures addressing its physical expansion, albeit of key importance, but would take into account actions that more widely contribute to the safeguard of ecological space's 'functionings'. This could for example include the provision of old building structures or artificial devices and refer to the management of artificial lighting, in order to conserve favourable habitats for birds in an urban environment (see also example of stork nest support in Figure 34).

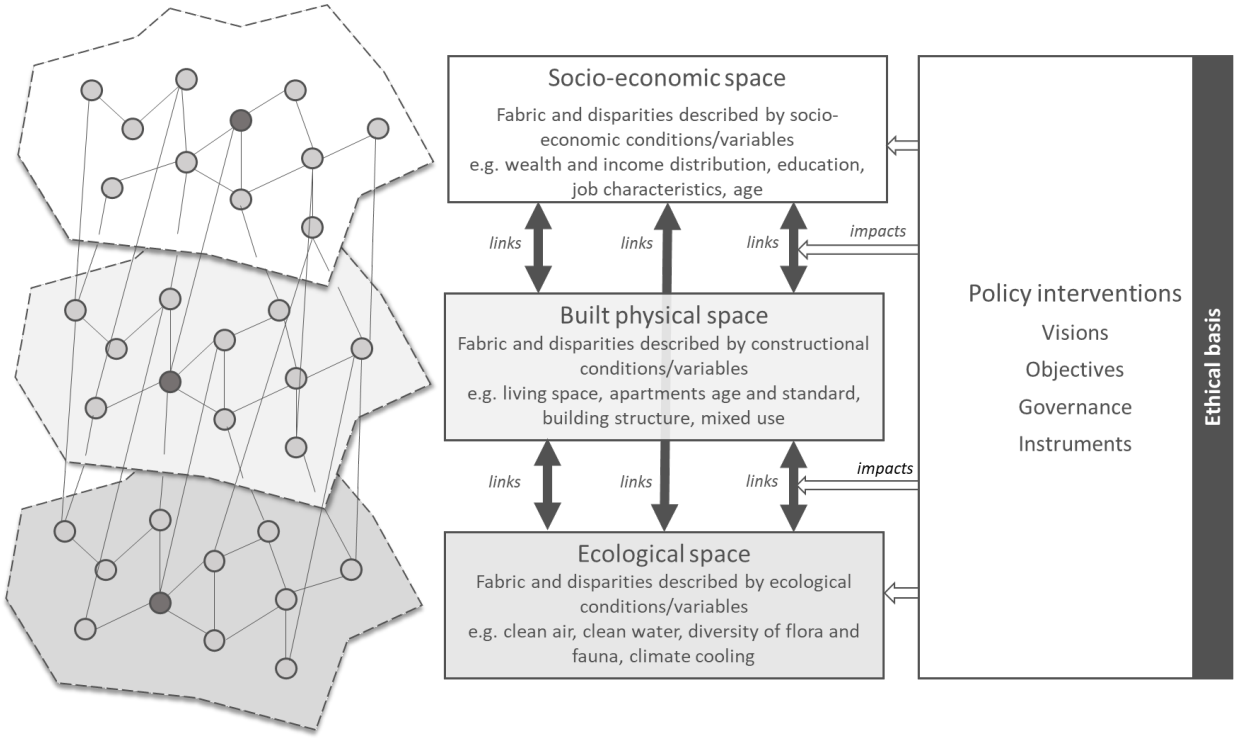
Figure 34: Artifical stork nest support, Rust (AT)

The approach of describing GI as part of the ecological space concept can facilitate its **integration** across objectives, measures and instruments which impact the ecological space more widely. This is also the case regarding the coordination of urban green area development and other infrastructure planning in both physical and functional terms (e.g. green-grey infrastructure coordinated development for water management). In addition, it can support the principle that GI is taken into consideration before development takes place (see chapter C 1.1.2.1). For example, policy-makers or planners might focus on the uptake of measures that reduce traffic levels and air pollution for a particularly affected neighbourhood before considering the establishment of green corridors combined with cycling infrastructure, providing air cleansing effects and linking specific neighbourhoods to defined recreational areas. In the case of newly, more densely constructed neighbourhoods ecological space of high quality could be created by drastically limiting road traffic and car parking, reducing the size and linearity of streets and conserving existing informal recreational green patches and places, rather than pursuing the development of a central, larger park. Of course these examples strongly simplify measures and impacts to be considered, but outline how working with the concept of ecological space, including GI as a strategy which supports the provision of its 'functionings', could widen perspectives in urban development and planning.

The previous examples also show how the ecological space is strongly intertwined with the built, physical as well as the social space and the other way around, especially in an urban setting. The **built physical space** hereby refers to the fabric that can be described by constructional conditions and variables, including for example building structures and typologies, design, housing age and standard, available living space or transport infrastructure. The **socio-economic space** refers to the fabric of human social interactions and

activities, for example described by socio-economic variables such as wealth and income distribution, education, job characteristics, households, gender or age. Although they have been separated in seemingly distinct dimensions, the three spaces rather represent a viewpoint that can be taken with regard to a complex network of interactions, or work as an entry point for policy interventions (see Figure 35).

Figure 35: The conceptual model of the ecological space and its interlinkages with other dimensions



Note: The conceptual model describes the potential entry points for policy interventions such as visions, objectives, governance and instruments, based on a defined value system. In the thesis, it puts the ecological space at the centre stage arguing for the right to a defined ecological space as well as the duty of not constraining that of others. Policy interventions and their impact on the fabric of ecological space can be claimed just or unjust based on evidence how these rights and duties have been affected. It emphasises the 'relational' nature of the different spaces by visualising them as networks, consisting of interdependent conditions/variables and with preferential links and hubs.

The conceptual model presented in Figure 35 aims at emphasising the importance of taking into account potential linkages and components, which so far might not have been sufficiently considered by other space concepts adopted in sociology, geography, planning or economics. This for example refers to criticism that sociology often underestimates the impact of the physical environment, economics sets itself largely apart from ecological aspects or that ecology undervalues social conditions. Albeit the focus of attention might be given to one of the three spaces, the model implies that linkages to the other two need to be considered. This is thought particularly important with regard to dynamics of socio-ecological and economic inequality.

If the **network perspective** is taken to describe the nature of the different spaces, one can argue that the network theories such as the theory of scale-free networks can be applied (see Box 2). The latter implies the assumption that variables of networks are not randomly occurring and distributing around averages, as assumed for example in geography (see discussions in C 1.3.3.3). The theory of scale-free networks is not also limited to correlations linked to the terrestrial surface (see Box 2). In addition, it argues that unequal nodes or hubs exist, which are characterised by a larger amount of links, due to reasons such as dynamics of nodes and preferential links. This means that within a network concentrations of variables might take place, favouring some and neglecting others, and that such concentrations might be self-reinforcing. In Figure 35 such hubs have been highlighted exemplarily in dark grey. For example, with regard to the

socio-economic space this might relate to the concentration of capital ownership which creates even more opportunities to get wealthier, as indicated previously when explaining the concept of scale-free networks. When it comes to the built physical space, it might relate to the development of defined infrastructures which favours some city's compared to others, increases their attractiveness to business and workforce, and triggers further investment. It can also relate to the issue of high-density housing of a defined typology being pursued in particular areas given preferential links such as low land prices and low resistance barriers. Regarding the ecological space, the example of Indianapolis in the US might be used. According to Ernstson (2013:9), due to the value of trees in providing shade, noise protection and air filtration, which is recognised by high-income groups, a higher amount and larger stands of trees had been developing in the respective areas. They had been lacking in lower income areas especially also due to the costs involved. In order to support city-wide services of pollination, seed-dispersal and pest control as well as regional biodiversity, a programme was introduced to (re)connect existing forest islands. Given the limited amount of personnel, financial and administrative capacities available and to most effectively support the delivery of the before mentioned city-wide benefits, the development of new tree corridors occurred in those areas where a certain 'aptitude' was already provided, i.e. in high-income areas with large stands of trees. Though in the long-term low-income areas will likely profit from city-wide services provided by the connected forest areas (e.g. pest control), they will have limited access to other benefits whose distribution occurs mostly close to the site where they are generated and immediately available (e.g. shading).

It is of particular interest to this thesis to understand what role a strategic approach to GI operationalisation can play in counterbalancing **excessive disparities** in the ecological space (including socio-ecological inequalities), linked to dynamics of disparities across the built-up physical and especially socio-economic space, in particular in relation to economic inequalities. At the basis of the model lies the assumption that excessive levels of disparities or inequalities can have negative consequences and costs regarding community life and social relations as well as mental and physical health. In this regard, justice represents the equitable distribution of benefits and burdens, following the norm that '*all human beings have the same rights to use the natural, economic and cultural resources of their society as they see fit and as long as they respect the same rights of others*. *All human beings have their duty to do their best to take care of themselves and to contribute to the well-being of their fellow humans as well as to the pursue of the survival and advancement of humankind. The sole inequalities justified in the distribution of goods and services are those which are to the benefit of all*' (Bunge 1989:182). Inequalities take mainly into consideration disparities affecting human individuals and society, as does the guiding notion of environmental justice. They hence represent just one aspect of the concepts applied within the thesis.

The ecological space denotes the entry point for potential policy interventions to be considered in the framework of this work. This builds on the understanding that the 'functionings' of the ecological space address important basics needs and legitimate wants for human health and well-being. In this regard, the conceptual entry-point differs from a utilitarian approach by not being limited to preferences but linked to a **defined value system**, which puts the environment at the centre stage (see the philosophical introduction in chapter C 1.2.1). This follows the distinction made by the philosopher Mario Bunge, which ranks values depending on whether they arise from basic needs, which are rooted in biological, social, and psychological necessities key to human survival; legitimate wants, which can be considered important for human well-being; and fancies. It is argued that the ecological space 'functionings' can 'genuinely' contribute to the *supremum bonum* of the survival of humankind and human well-being. 'Genuine' means that they address needs that are authentic and cannot be faked, though they can be relativistic due to value judgments being influenced by the context within which they are made.

If the example of water purification functionings is further stretched, different to the construction of water purification plants, GI strategies such as the restoration of wetlands or protection of groundwater sources can effectively contribute to the delivery of a wider range of 'functionings' and hence basic needs and legitimate wants. This for example refers to air purification processes provided by urban forests. Plant construction can also reduce the ecological space of other individuals if resources required for its construction are taken into account, both at the site level as well as further abroad. Another example refers to the designation of water protection areas. In Southern Germany, close to the Alps disputes have been increasingly emerging due to the requirement of expanding water protection areas in some municipalities to ensure clean water supply for other municipalities further downstream, limiting possibilities of development by the former (Geiger 2015). These examples highlight that the realised 'ecological space' by some individuals or group of individuals might limit that of others, requiring an ethical basis to inform relevant decisions. In this regard, the concept of ecological space can be linked to the model of the ecological footprint, which refers to '*the area of biologically productive land and sea required to produce the renewable resources a population consumes, and assimilates the waste it generates using prevailing technology*'(Wackernagel et al 2006:104). With regard to its ethical roots, it could be argued that the ecological footprint represents a moral duty, describing rules to help others achieve their values, e.g. resources for the next generations to come or the conservation of a variety of species. The thesis however argues that the concept of ecological space offers a larger ethical basis by encompassing moral rights as well, i.e. the right to realise defined values. With regard to the ethical doctrine proposed by Mario Bunge, it would relate to the realisation of values linked to basic needs being superior to legitimate wants and especially fancies. It includes the right to a fundamental niche of ecological space taking precedence over extensively expanding the realised niche. This interpretation on the ethical roots of the concept of ecological space would follow the guiding moral principle of 'enjoy life and help live' brought forward by the philosopher. It would encompass the right to a defined ecological space as well as the duty of not constraining that of others. Inequalities would only be justifiable if they are to the benefit of all. For example, it would include both the duty of reducing pollutants such as nitrogen oxides or particulate matters as well as the right to clean air in an urban environment.

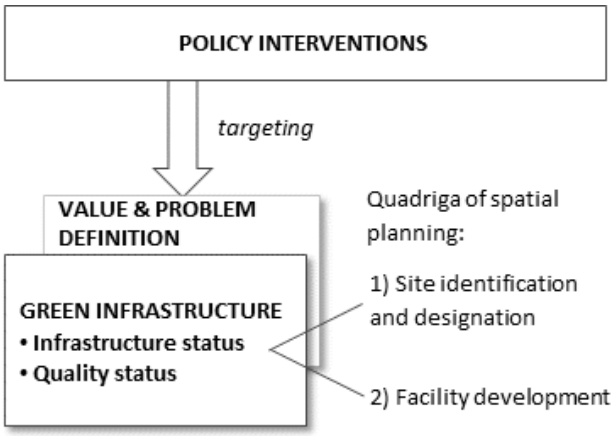
According to Mario Bunge, one of the challenges with regard to value judgments is that it is by far easier to determine what people want (e.g. through survey and questionnaires) than their genuine basic needs (see chapter C 1.2.1). It gets even more complicated with regard to defining the necessary ecological space of other species, putting emphasis on the importance of scientific endeavours which inform the identification of the latter. In this regard, the thesis also adheres to the principle that the right to ecological space occurs within boundaries of ecological niches necessary for the survival of other species, also in light of the potential detrimental impact the continuing loss of the diversity of species, genes and ecosystems can have on the survival and well-being of humankind. The latter is informed by recent research on the universal resilience patterns in complex networks, introduced in the previous chapter (see Box 2). It highlighted how the resilience of complex systems depends on their density, heterogeneity and symmetry and how excessive levels of concentrations throughout a network of variables can be detrimental to the resilience of a system, linking back to the assumptions issued with regard to the detrimental impact of excessive disparities. All these notions form the ethical basis of the perspective that is taken with regard to policy interventions.

C 2.2 The model's approach to GI's functional and physical shaping

Policy and especially planning interventions can first of all directly impact the **GI's physical and functional shape**, influencing the quantity and connectivity (infrastructure status) as well as quality (quality status) of its elements, and as such the ecological space available (see Figure 36). It represents the area spatial planning and its sectoral approaches such as landscape planning have mainly been focusing on. As indicated in the previous chapter C 1.3.3.4, according to Jung (2008:29) related interventions can be understood as actions suggested by the planner either with regard to identifying and designating a defined site use or non-use (site designation) or the subsequent construction and development of facilities (facility development).

In the case of site designation this refers to the application of instruments such as land use plans and also more specifically to the protection of natural and semi-natural areas. Facility development not only refers to the physical construction of facilities such as national park centres but also for example to the implementation of national park management plans. In this regard, as indicated previously, Jung (2008) applies a wider understanding of spatial planning. This interpretation also especially suits GI operationalisation, as part of the ecological space concept, given it allows to take due consideration of how interventions also impact 'functionings' rather than only the physical expansion.

Figure 36: Policy interventions relating to GI physical and functional shaping



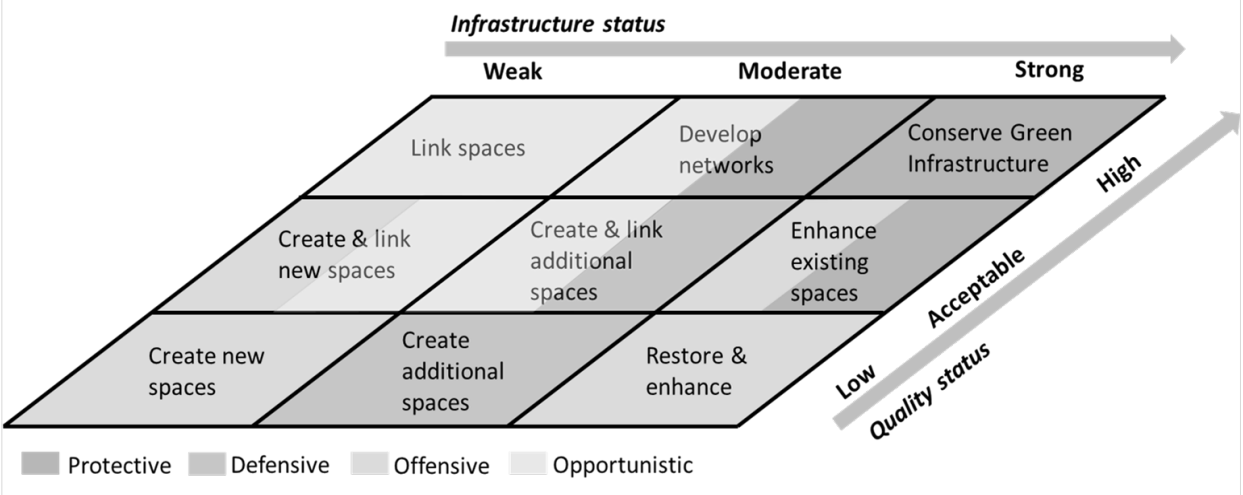
Note: Before focusing on policy interventions that primarily target GI - infrastructure and quality status, actions might be considered, which target how different conditions are valued and hence problems defined.

In addition, the thesis argues that even more widely it needs to be considered that policy interventions can impact GI's physical and functional shaping even before a defined use or non-use is assigned. Existing policy interventions, based on **defined values and problem definitions**, can affect eligibility criteria by influencing how a site is actually valued or which means are selected to target the access to the 'functionings' of ecological space. This refers for example to overall policy strategies and objectives on 'inner before outer development' and how they impact values regarding what can be considered a 'reserve' for development. It can also lead to the application of alternative policy interventions such as regulations on air emissions, measures to decrease pollution in a defined part of a city or focusing on the development of public housing in defined areas due to existing disparities regarding access to 'functionings'. Different to Jung (2008), hence the model suggests interventions much earlier than those proposed by the author, further widening the sphere of action for spatially relevant impacts. It can be seen as step that allows shifting the focus to root causes that initially might have required the functional and physical shaping of Green Infrastructure, similarly to the 'problem first' approach introduced in chapter C 1.3.3.2.

Previously introduced insights from the GREEN SURGE project (see chapter C 1.3.4) have shown that little evidence on a **strategic or hierarchical approach** applied by the studied municipalities in physically shaping a network of green urban areas or Green Infrastructure could be found. Albeit the study indicates the application of some kind of strategy to public urban green area development, it is either mostly concerned with the development of problematic areas (e.g. brownfield sites) or the conservation of most valuable

ones (e.g. protected areas). Furthermore, though the dual inner development tools by Böhm et al (2015) and their focus on functions are interesting approaches for assessing GI status and quality as part of the ecological space concept, as argued in chapter C 1.3.4, the authors hesitate to take a clear stance on the expected outcome. With regard to the developed model, the thesis thus suggest to go one step further than the identification of reserves and the focus on dual development, but to build on strategic approaches of GI operationalisation suggested by Roe and Mell (2012:6) and Ahern (2007:271). Both argue that GI implementation should be based on a **continuum of possible choices**, between creation and conservation of respective elements, between offensive and defensive measures. Their approaches have been combined in Figure 37.

Figure 37: Green Infrastructure planning strategies according to desirable direction of change (own development based on Mell 2012:6 and Ahern 2007:271)



The model consists of nine roughly **distinguished options**, considered to have different impacts on infrastructure status, i.e. the extent connectivity or linkage has been ensured, and on quality status, i.e. the range of 'functionings' securing 'liveability' which have been provided. These postulates a certain hierarchy of options between:

1. GI conservation (e.g. protective measures to avoid disappearance of hubs and links)
2. Establishing an entire network (e.g. identification of hubs and creation of corridors)
3. Linking spaces (e.g. establishing corridors)
4. Restoring & enhancing (e.g. brownfield development)
5. Creation of additional space (e.g. recreational buffer zones close to a protected area)
6. Creation of new spaces (e.g. newly created park or habitat)

This hierarchy is based on the general assumption that **conserving existing places takes precedence over creating new ones**. It builds for instance on previously mentioned research that highlights how current forms of designating offsetting sites are unlikely to match old-growth reference sites due to the significant length of time it takes to restore an ecosystem and the low probability in achieving population similarity (Curran et al 2014). In addition, it can be assumed that conservation is more cost-effective than restoring and enhancing or creating new spaces (e.g. Gantioler et al 2014, Mazza et al 2011). In this regard, it applies the environmental precautionary principle, which stipulates that even without a robust scientific evidence preventive measures should be taken in light of potential risks, irreversibility and remaining uncertainty.

The different options broadly reflect different strategies that have been identified by Ahern (2007:271), and which have accordingly been added to the model. The slightly rephrased strategies include:

- Protective strategies: Generally refer to taking preventative actions to conserve well-functioning, connected elements before they are exposed to disruptive development. They influence the level of resistance of elements to disappear. Options such as the conservation of GI and partly the development of networks and enhancement of existing sites can be classified as such. It includes measures such as the designation as potential conservation areas (e.g. natural or semi-natural areas within parks) or protected areas (e.g. national parks, world heritage sites, Natura 2000 sites) as part of urban land use and landscape plans. At the urban level, it can also include the safeguard of agricultural or silvi-cultural yield supporting a city, or of other areas that support specific functionings. It can also refer to the protection of historic monuments, for example as important habitats for bat populations, or to management measures which hinder access to vulnerable areas.
- Defensive strategies: Generally refer to the implementation of actions to defend elements which could be suffering from detrimental development pressure. They help conserving other areas of high infrastructure and quality status. Defensive strategies refer to options such as creating and linking additional areas, and include for example the creation of buffer zones such as the development of high intensity recreational areas. It can also include measures regulating detrimental environmental impacts which might affect an area, e.g. water and air pollution.
- Offensive strategies: Generally allude at taking remedial or restorative actions to reintroduce a range of functionings where they do not currently exist. These include options such as the creation of new spaces as well as restoring and enhancing elements. Potential measures are ecological restoration and brownfield development, as well as supporting the shift from intensive to extensive forms of agri- and silvi-cultural land use, or 'unsealing' activities.
- Opportunistic strategies: Generally allude at elements to be managed or structured differently to provide specific functions. Options such as creating and linking new and additional spaces, linking spaces in general and further developing networks can be classified as such. Opportunistic strategies can include measures which increase the critical mass for specific functions, for example the development of green roofs or vegetation for water retention and management. It also refers to measures such as establishing climate cooling corridors or creating cycling and vegetation corridors that link areas for recreational opportunities.

Options and measures do not necessarily have to belong to a single defined strategy, but can for example be both protective and defensive (e.g. Natura 2000 network) or protective and opportunistic (e.g. national park management plans including the development of trail systems that avoid vulnerable areas). It reflects a continuum of choices, between conservation, restoration and creation.

How the model might be applied can be illustrated by the following example. As part of the study on tools for dual inner development, Böhm et al 2015 collected a range of good practice examples. One of the examples described in more detail includes the development of the 'Paul-Gerhardt-Allee' quarter in Munich, Germany (Böhm et al 2015:168-168). It refers to a former railway area of 33 ha, consisting of a range of industrial buildings, transport sites and vacant land, which shall be transformed into a mixed-use area including housing (roughly 2,400 apartment units for 5,500 inhabitants) and working space (for around 800 people). The new building and integrated urban green plan envisages building types consisting of u- or other shaped blocks with courtyards providing for private and public open spaces (Stadt München/Referat für Stadtplanung und Bauordnung 2017a). Besides a more centrally laid out park, the buildings open up to

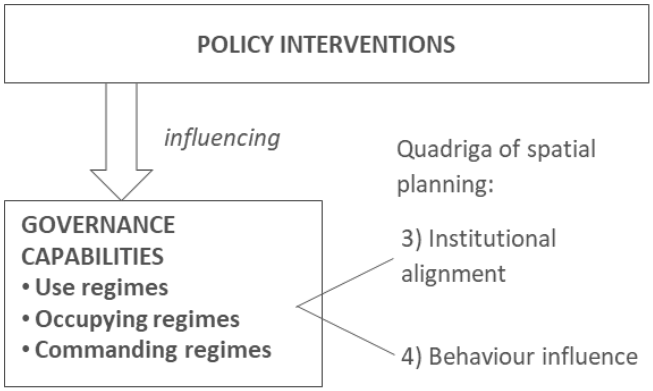
a landscape park for recreational use, close to the remaining railway tracks. In this regard, the unsealing and creation of new urban green space can be interpreted as an opportunistic strategy given it was argued that they represent climate relevant areas and contribute to an increased quantity of intensively used recreational area. The latter can also be seen as a defensive strategy as it guides recreational interests particularly to those areas. The former railway vacant land area also consists of important habitats for species such as the sand lizard (*Lacerta agilis*) and the endangered blue-winged grasshopper (*Oedipoda caerulescens),* and is formed up by dry grasslands and semi-dry grasslands connecting to habitats further north and west of the city. Those habitats have been partly conserved along the south and east borders of the planning area, representing thus a protective strategy. At the same time, extensively used meadows and woody area work as buffer zones to those habitats, applying again a defensive strategy.

This rough, exemplary assessment does not allow to reveal to what extent strategies have been run that are not directly connected to the development or conservation of urban green area, but which nonetheless could contribute to the establishment of an 'ecological' infrastructure. For example, the question remains whether a protective strategy could have been applied to some of the old buildings or individual tree stands. The application of the previously presented tool for evaluating the nature conservation potential of reserves for dual inner development by Böhm et al (2015) could also have proofed interesting to gather information on the quality potential of the envisaged recreational areas, particularly if not limited to the recreational function alone. In addition, the description does not include considerations on how building typologies and other built-up area influence the available ecological space. Few insights into socio-economic aspects of the quarter and the surrounding neighbourhood have been included in the illustration of the good practice example, regarding for example expected household sizes, income groups, educational background or age cohorts. Some of the urban green area is also envisaged for private use though the extent remains unclear. In this regard, the described strategies also do not provide guidance on whether a different approach might have been applied depending on the identification of existing disparities regarding not only the ecological space, but also the built and socio-economic space. The extent to which this will be feasible shall be further tested as part of the empirical research.

C 2.3 The model's approach to the shaping of governance capabilities

With regard to Jung's 'quadriga' of spatial planning interventions, besides the previously mentioned first two 'physically impacting' steps of site designation and facility development, it includes the two 'socially impacting' steps of institution alignment and behavioural influence. As previously outlined (see chapter C 1.3.3.4), other representatives define this layer of spatial planning in a wider sense as the 'virtual' planning or the setting-in-motion of social processes of self-organisation and consensus building. More specifically, the thesis looks into institutional alignments determining governance capabilities, arguing that policy interventions can also impact related capabilities to use, occupy and command (see Figure 38). These capabilities affect and are affected by the different, previously outlined dimensions of space and existing disparities. It also takes into account arguments brought forward on procedural justice with regard to the environmental justice concept.

Figure 38: Policy interventions relating to GI governance capabilities



Note: Policy interventions are assumed to influence institutional alignments which determine defined governance capabilities linked to the use, occupation and commanding of space.

As has been mentioned in the previous chapter, Hayward (2013:5-9) distinguishes between **using, occupying and commanding ecological space**, in order to link ethical questions to the concept. With regard to the use of the ecological space, the approach differs from notions of direct and indirect use values of the Total Economic Framework (TEF) presented in chapter C 1.2.2.2, the latter mainly referring to the value derived from the consumptive or non-consumptive nature of a 'function' (e.g. palm oil being a direct use value as it can be consumed whereas climate regulation representing an indirect use value). Rather than linking it to consumption and preferences, the ecological space concept distinguishes between the use of 'functionings' of the immediate biophysical environment, which help maintaining life, and the use of 'functionings' outside those immediate or one might also say basic needs. Based on this understanding, it can for example be argued that preference should be given to agricultural production of food close to the city and directly sustaining an urban population over for instance an intensive agricultural production going mainly into export. In addition, Hayward's understanding of the term also allows to take into consideration and value the ecological space used and needed by other species. According to the author's ecological space concept, the second category, occupying, represents a purely social, normative category, building on norms that are recognised as valid by society, such as property rights, but holding no facts about the natural world (Hayward 2013:7). It enables people to potentially use an ecological space though this has not to be necessarily the case. Foremost it allows to exclude others from its use. The category of commanding, on the other hand, includes the capability of creating or extinguishing rights of exclusion. It refers to the possibility of occupation without necessarily doing so, similarly to holding a seat for someone else to occupy. This might be for instance the case for financial funds holding a large amount of real estate property without actually occupying it.

Besides the quadriga of spatial planning interventions, Jung (2008) also introduces the concept of regimes and budgets. The application of regimes and budgets is thought to help further widening the perspective of where spatial planning can intervene, based on how a defined measure in a relevant category influences an individual's actions and consequently their spatial impact. Building on Heidemann (2002), he argues that planning interventions can either expand or restrict options for taking action by impacting individual outfits available for life conduct, so called budgets. They for example relate to means (e.g. machinery, financial means and land possession) and individual capabilities (e.g. experience, skills and knowledge). Secondly, beyond the individual outfits, **regimes** provide conditions that impact an individual and influence his opportunities to act. These includes for instance the category of 'social interaction' (e.g. prohibitions and allowances or price settings) and 'sites' (e.g. quantitative spatial distributions). The previously introduced categories of governance capabilities such as use, occupation and command can be seen as mostly fitting into the category of regime of social interactions, and less into available budgets regarding aspects such as skill and knowledge. It adopts the wider understanding of capabilities as entitlements, which make people capable of doing (see chapter C 1.2.1.2), irrespective of whether an individual decides to act on it or not and of what 'budgets' are present. Consequently, though the term regime is attached to the different types of governance capabilities (see Figure 38), this should be interpreted as entitlement rules.

The approach of **entitlement rules** also represents an attempt in providing a framework that links governance capabilities, at least to some extent, not only to entitlements for human beings but also for the environment and its biota more largely, albeit still under the auspices of social norms. This takes into consideration discussions on the extent to which legal mechanisms can be applied that confer rights on nature (or future generations) as a distinguished party and the related role of stewardships (e.g. government, communities). For example, Schlosberg (2013) argues for an extension of the environmental justice concept to the natural world, by allocating a right to a just share of essential resources and some form of inclusion in political processes to organisms and systems. This rises many questions on potential serious conflicts, although the ecological space approach might help solving some of those by focusing on 'functionings' rather than on the distribution of individual goods and services, and helping to bridge governance boundaries. Related examples already exist, such as with regard to the sharing of water functionings in South Africa, where prevalence was given to the safeguard of reserves to provide water for basic human needs as well as for the protection of aquatic ecosystems, over individually held property rights (Reid and Nsoh 2014:132).

The term **governance** is used to highlight that the before mentioned capabilities are not limited to what are often seen as two principal actors, namely the public sector (government) and the private sector (market represented by companies and consumers), especially with regard to issues of property rights. It also relates to the GI principle of adopting an ecosystem approach, referring to the need of involving a diversity of stakeholders in the decision-making process (see chapters C 1.2.2.2 and C 1.3.4). Governance can usually be interpreted differently depending on the discipline involved. According to Benz (in Ritter 2005:404-408), for example sociology's understanding of the term involves a self-regulating system of interactions beyond state and government (e.g. governance of common property resources). With regard to policy research (see chapter C 1.3.2), governance more generally refers to the evolvement of control mechanisms and planning (Alisch 2015:8). It considers the difficulty of top-down planning of different policy areas, including spatial planning and urban development, arguing that those affected rarely passively accept but actively and dynamically 'digest' related measures. Governance hereby is understood as all forms and mechanisms of coordination between more or less autonomous parties, whose actions are interdependent given they are either restricted or supported by each other's actions (Alisch 2015:8). From a general descriptive and analytical perspective, governance concerns a system of rules leading to different social forms of action coordination, including the application of hierarchical systems, the adoption of market mechanism consisting of suppliers and consumers, the undertaking of negotiations in contractual systems and the consensus seeking in community processes (Alisch 2015:7). More normative are notions such as 'good governance', which aims at defining characteristics of 'good governing' to allow an evaluation of the negotiation processes occurring between state, economy and society (Alisch 2015:8), or 'strong governance' if the focus is put on self-organising systems of cooperation (see chapter C 1.3.2). The emphasis is often set on processes rather than the outcome. For example the good governance of public institutions is frequently interpreted in the rather narrow sense of new public management (see again chapter C 1.3.2).

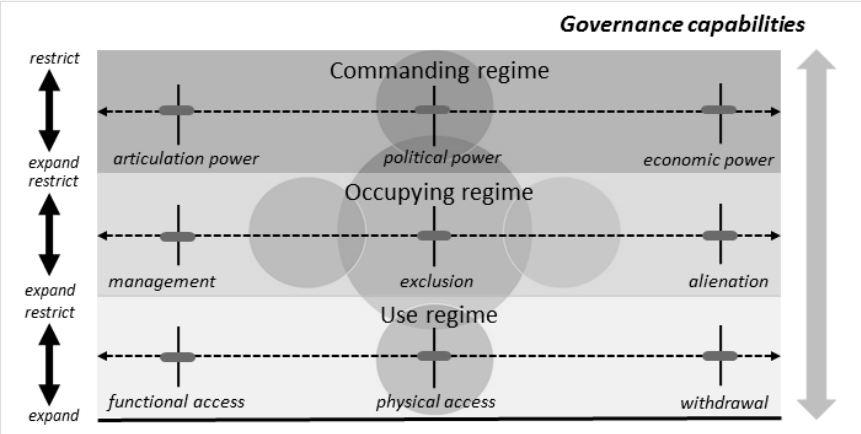
Following the ethical baseline outlined in the previous sub-chapter, the thesis argues that whether a **system of rules** that coordinates actions, both with regard to identified goals and the means with which they are achieved, is to be judged ethically 'right' or 'wrong' depends on the extent to which it contributes to the striving of a good life (enjoy life and help live) of the greatest number based on the right to a defined ecological space and the duty of not constraining that of others. Following the principle of an ecosystem approach, this involves the actions of a **diversity of stakeholders** belonging to different groups, including the private and public sectors as well as communities, society and the environment more broadly, whereby the latter can be represented by those taking on a stewardship role (see Figure 39). Stakeholders are defined as all those parties holding an interest in or being affected by the shaping of an ecological space.

Figure 39: Governance capabilities and involved stakeholder groups

Note: The figure refers to four main stakeholder groups, with regard to those that might hold interest or affect the shaping of ecological space. It needs to be noted that this is a very simplified representation as various actors might belong to different groups or not easily be associated with one. However, it helps reflecting some of the potential polarities of interests and impacts.

In addition, rather than looking into more general discussions on governance related to urban development and planning (e.g. participative and communication processes) and given their substantial impact on land use dynamics, the thesis is specifically interested in the **key institution of property rights**, what entitlements they confer, and how different governance systems provide for those (e.g. market mechanism, legislative requirements). They are considered important aspects of empowerment for an integral democracy, understood as a process of self-management and balances of powers, which is supported by knowledge of basic needs and legitimate aspirations and takes into account the abilities of members of a stakeholder group (see chapter C 1.2.1.1). By considering property rights as social means to an end, they can be broken down into different, more specific entitlements, as has happened with regard to the property rights bundle described in Figure 40.

Figure 40: Governance capabilities, related regimes and entitlements (own development building on Hayward 2013:5-9, Colding and Barthel 2013:159 and Schlager and Ostrom 1992:252)



Note: Overall governance capabilities are assumed to be determined by the expansion or restriction of capabilities of different stakeholder groups within three main regimes: use, occupying and commanding. An expansion or restriction of one capability (represented by the blue slide) for one stakeholder group might result into the expansion or restriction of a capability of another stakeholder group. For example, the restriction of withdrawal of water resources for private use might expand the functional access for public use or overall use for the environment. The horizontal arrows underline those interdependencies.

The thesis argues that the two previously introduced categories of use and occupying of ecological space can be linked to those bundles. Additionally, the commanding category has been introduced. Capabilities

within different regimes can be restricted or expanded on a continuum of choices, affecting the overall governance capabilities of different stakeholders in influencing the appearance and disappearance of GI nodes and links specifically, and the fabric and access to ecological space more generally (see Figure 40). It can be called a **master frame** with which to clarify potentially existing unbalances between different stakeholder groups in exercising rights and powers.

The different regimes are defined as follows:

- **Use regime:** The 'use' of ecological space is hereby described to be first determined by rights of physical access and withdrawal. Following definitions provided by Colding and Barthel (2013:159), these refer to the right of entering a defined physical area and enjoy non-subtractive (or non-consumptive) benefits as well as to the right of withdrawing resource units or 'products' of a resource whether for endosomatic or exosomatic use. Furthermore, given the emphasis the ecological space concept puts on 'functionings', the right of functional access is added to the use category (e.g. access to pollination functions provided by wild insects).
- **Occupying regime***:* 'Occupying' ecological space, on the other hand, can mostly be related to management, exclusion and alienation rights. According to Colding and Barthel (2013:159, building on Schlager and Ostrom 1992:252), the first refers to the right of '*regulating internal use patterns and transform the resource by making improvements*'. The second refers to the right of '*determining who will have an access right, and how that right may be transferred*', and the third to selling or leasing either or both of the previously mentioned right bundles. Whereas owners usually cumulatively hold rights of access, withdrawal, management, exclusion and alienation, authorised users might only hold rights of access and withdrawal (see Figure 17). Some rights held by owners might for example be restricted by the provision of management requirements (e.g. cutting of old-growth trees) or be limited regarding exclusions (e.g. right to cross private land). The latter at the same time expand entitlements provided to non-occupiers (e.g. right to collect certain fruits). These examples show how policy interventions can expand and restrict use and occupying entitlements with regard to ecological space, affecting different stakeholder groups.
- **Commanding regime:** The third category of commanding offered by Hayward (2013) cannot be directly related to any of the proposed property rights bundles. The latter primarily allow to address issues of direct access, use and management and excluding or alienating others from doing so particularly with regard to clearly delineable natural resources. However, they fail to address the issue of power in defining those rights. The category of commanding can be seen as an attempt of filling that gap. It represents the category that most closely relates to the power of designing the rules or the ends to be achieved. According to the thesis this can happen by different means, including articulation power, political power or economic power.

A more detailed description of what the different categories of the **commanding regime** might actually encompass is necessary, as it can be considered the least concrete and difficult to grasp. According to the economist Atkinson (2015:123), the success of the model of the perfect competitive market results from the fact that it has '*helped avoiding to think about issues of power*'. It might also be interpreted as a way of avoiding to think about who gains and who loses and what 'compass' might be used to decide what is acceptable and what not and who is involved in the decision-making process. This is what makes the model so attractive regarding its use. It offers simplicity where in reality complex interactions of power take place.

The economist argues that, similar to property rights, income represents a mean to an end and is indicative of the power it may convey regarding decisions to be taken (Atkinson 2015:36-37). Income inequalities may thus result in unbalances of economic powers exercised in three main areas:

1) Labour market, of less concern to the thesis
2) Product market, for example with regard to the supply of real estate
3) Capital market, referring in particular to the costs and availability of financing

Taxes and transfers might be one group of interventions that can be taken to re-distribute income and wealth, and thus **economic power**. However, Atkinson emphasises the importance of focusing on issues of income and wealth before such measures apply, and particularly the role of setting countervailing powers (Atkinson 2015:123).

In this regard, he criticises that many economists working on solutions on reducing excessive levels of vertical dimensions of inequality focus on just one side of the coin (e.g. capital or property taxes), ignoring the role **political power and law** can play. This refers to the power of influencing the development and implementation of policies and legal norms, in a democracy distributed across a range of institutions. Also the economist Kurt Rothschild (2002:433) argues that current mainstream neo-classical theories are ignoring issues of power beyond those considered directly influencing price formation processes such as monopoly or bargaining power. Arguably, one reason of neglecting the aspect relates to its complexity and thus perceived fuzziness compared to other observable and measurable phenomena such as prices and quantities (Rothschild 2002:438). However, he emphasises that power can be used in securing profitable positions in the market, influencing the framework which impacts the working of market mechanism, and represent the main aim of economic activity (Rothschild 2002:433). He describes it as a ring of variables (e.g. legislative instruments, wealth distribution, policy objectives), which surrounds and influences economic processes such as the distribution of resources. Power aspects can have a major impact on those variables, (re-)defining the position of stakeholders regarding their influence on those processes. In the context of green gentrification processes analysed by Gould and Lewis (2016:31-32) in New York (USA), the authors go as far as arguing that wealth, as the concentration of capital, has become a primary component of power in the city, resulting in the greater ability to influence the democratic political system (e.g. financing of campaigns, purchasing media space and time). They also iterate that greater wealth occurs to those with political power, and that economic resources, political connections and professional resources are often concentrated in specific communities, resulting in a spatial distribution of power. It afflicts processes on who has a say about a development, who makes decisions and who participates in rejecting environmental hazards or restoring environmental amenities, and potentially promotes the development of '*environment rich and environment poor communities*' (Gould and Lewis 2016:3-4).

Besides the interrelated and interdependent political and economic powers also **articulation powers** come into play. It picks up the issue of the above mentioned professional resources, and generally refers to all those powers that allow different stakeholders to articulate or explain and demonstrate a defined value. It relates to the model of value articulation process developed by Ernstson (2013) to indicate that actors might be unequally equipped regarding the access to artefacts (e.g. information, knowledge) and access to social arenas (e.g. workshops in participation processes) (see chapter C 1.2.2.2). It also concerns aspects of procedural justice (in German 'Verfahrensgerechtigkeit') as key component of the environmental justice concept. As such it is often associated with aspects of individual resources (e.g. liberties, experience, skills and participatory opportunities) and the design of participatory processes (see chapters C 1.2.1.1 and C

1.2.1.3.). However, articulation powers also refer to issues of recognition (Schlosberg 2013, Walker 2012), which refers to respecting identities and cultural differences regarding claim-making in the planning processes, beyond the more limiting concept of participation (Agyeman and Erickson 2012). The thesis also argues to include the aspect of timing and sequencing, iterating that with regard to articulation powers it is not only important to consider how and who is involved in the process, but also when or at what stage.

Following arguments brought forward by Atkinson, the discussion above and the provided frame does not aim at an ideal, socially just balance of powers, but at finding a pragmatic way of addressing issues of concentration of powers that might contribute to inequalities of concern also to the thesis. It aims at indicating directions to address possible distortions. This for instance can include measures such as the development of organisations that obtain political powers in form of stewardships to manage urban land independently; the expansion of political powers of municipalities at the regional, national or international level; or the development and expansion of rights of civil society committees or the environment more broadly (e.g. environmental trustees). It can also refer to measures expanding the economic power of municipalities by addressing the issue of financial revenues or making the case for public real estate investment and ownership. It can mean restricting economic powers by introducing mechanism of housing rent control or articulation powers by applying strict rules of conflict of interest. A guiding question can be on who reaps the benefits and who bears the costs with regard to ecological space across different stakeholder groups.

C 2.4 Framing a strategic approach to GI operationalisation

Various components of the conceptual and action model have been presented and discussed in the previous sub-chapters. However, the question remains how these different components intertwine and what considerations still need to be taken in order to frame it as strategic approach to GI operationalisation. In chapter C 1.3.3.2, an outline of different understandings linked to strategic planning especially in the context of spatial planning has been provided. This for instance includes elaborations by Albrechts (2006:1155-1162), who proposes five key characteristics such as being selective, relational-annex-inclusive, integrative, visioning and action oriented. How these characteristics might actually apply to the conceptual and action model and the extent to which revised or new characteristics need to be considered will be addressed in the following paragraphs. The overall conclusions of the various chapters have been graphically summarised in Figure 41.

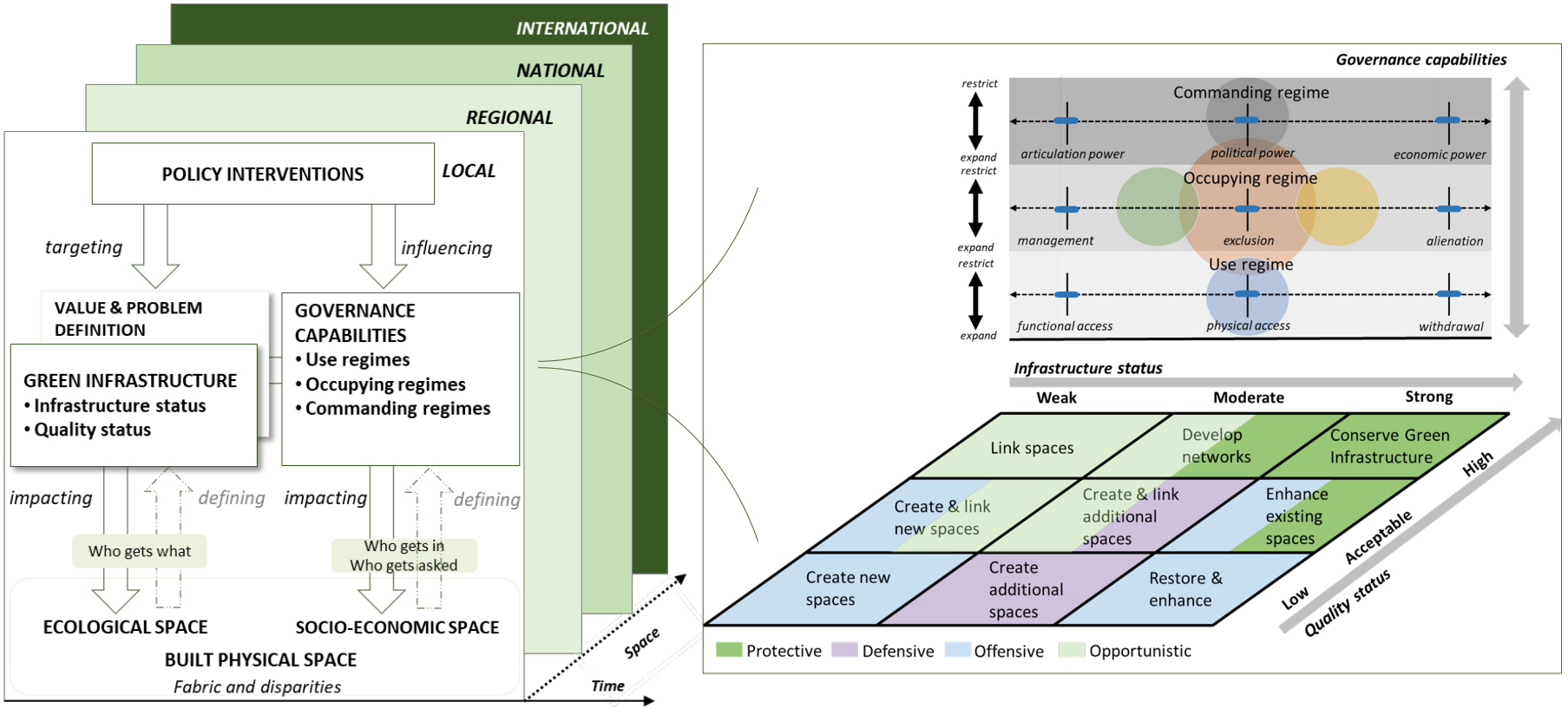
The six key characteristics of strategically planning GI operationalisation:

- Selective, by focusing on entry points and patterns: Albrechts (2006) depicts strategic spatial planning as being focused on a few issues rather than comprehensively trying to integrate a wide range of problems. Based on the conceptual and action model, the thesis somewhat differently argues that it is important to select a problem as an entry-point, although without losing out of sight existing complexities and interrelations across different spatial levels and time. As such GI operationalisation represents one entry point to address disparities with regard to the ecological space, taking into account patterns resulting from disparities in the built-physical as well as socio-economic space. Some decisions and actions might be considered more important than others, for example regarding GI's functional and physical shaping, although by proceeding on a continuum of choices based on existing conditions.
- Relational-annex-inclusive, based on a network approach and considering outcomes: Albrechts (2006) underlines the importance of relations and processes, and being less focused on objects and forms.

The conceptual and action model also emphasises relational aspects, as part of a network approach and taking into consideration preferential linkages. However, this encompasses interactions between both abiotic and biotic factors, of which human beings are one component. At the same time, the model iterates the importance of reflecting on outcomes with regard to GI status and quality, besides relational aspects to be considered as part of the component governance capabilities.

- Integrative, including time: The conceptual and action model takes into account the need of vertical and horizontal integration both of objects and functions (e.g. infrastructure status and quality) as well as governance processes, by embedding the various components of the conceptual and action model in a framework developed by LaFortezza et al (2013:106). Adapted to the findings of the previous chapters, it figures the need of taking into due account different space levels (including local, regional, national and international) as well as the temporal dimension (axis 'time'), given that many impacts, whether improvement or deterioration, will only be visible over a defined period of time.
- Visioning, including visualising values: It relates to the necessity of visualising what a place ought to be, according to Albrechts (2006) based on a solid analysis as well as the creativity of design. It is described normative in nature as well as context and time specific. The thesis argues that hence it becomes important to be aware of one's own values, the ethical system one upholds, and what this encompasses when it comes to defining the 'ought-to-be'. GI operationalisation has been selected as key entry-point of the thesis, framed by the ecological space concept. At the basis lays the assumption that the human society and economy is a subsystem of the natural environment, making it not an afterthought of development but laying at its basis. As ensuring a favourable environment for human survival and well-being represents a priority moral norm, the right to a defined ecological space as well as the duty of not constraining that of others, including other species, represents the ethical baseline for policy interventions. In addition, recognising the need of testing and reviewing related values and moral codes, not only based on scientific findings, but involving actors that are impacted by or impact decisions and actions becomes crucial.
- Performative, rather than only action oriented: Albrechts (2006) also refers to the key aspect of ensuring implementation and the existence of an active force that enables change. Although agreeing on the importance of ensuring actual realisation of interventions, the model implies that it can be necessary not to act and to limit changes (e.g. protection measures). Choosing the term performative, if understood as the fulfilment of a claim, attempts to take due consideration of this aspect.
- Democratic: This newly introduced characteristic implies that the existing options of different stakeholders to raise their voice, defined by articulation, political and economic powers, need to be continuously checked and taken into consideration as part of strategic spatial planning. It includes, where necessary, the introduction of 'brakes' to stop self-reinforcing power loops.

Figure 41: The conceptual and action model and its strategic approach to GI operationalisation (own development building on Hayward 2013:5-9, Colding and Barthel 2013:159 and Schlager and Ostrom 1992:252, Roe and Mell 2012:6, Ahern 2007:271 and LaFortezza et al 2013:106)



Note: The graphic on the left side represents the overall framework of the conceptual and action model. Policy interventions figure at the beginning, given the focus is on opportunities to confront and transform processes that gave rise to a problem. Nevertheless, the 'defining' arrows, pointing from the various space concepts towards the options for interventions, indicate that those depend on the existing conditions and needs particularly with regard to existing disparities. Policy interventions for a strategic operationalisation on the one hand target GI status and quality, building on prior value definition and scrutinising potentials for 'functionings' access. Related decisions impact who gets what with regard to the ecological space. On the other hand, policy interventions can also influence governance capabilities, impacting who gets in (e.g. use and occupying regimes) and who gets asked (e.g. commanding regime) with regard to the existing ecological space fabric. Considerations of what this might imply at multiple scales, from local to international, as well as temporal considerations should be taken into account. The graphic on the right side zooms into the two main components of the strategic approach, underlining the importance of considering the related interlinkages.

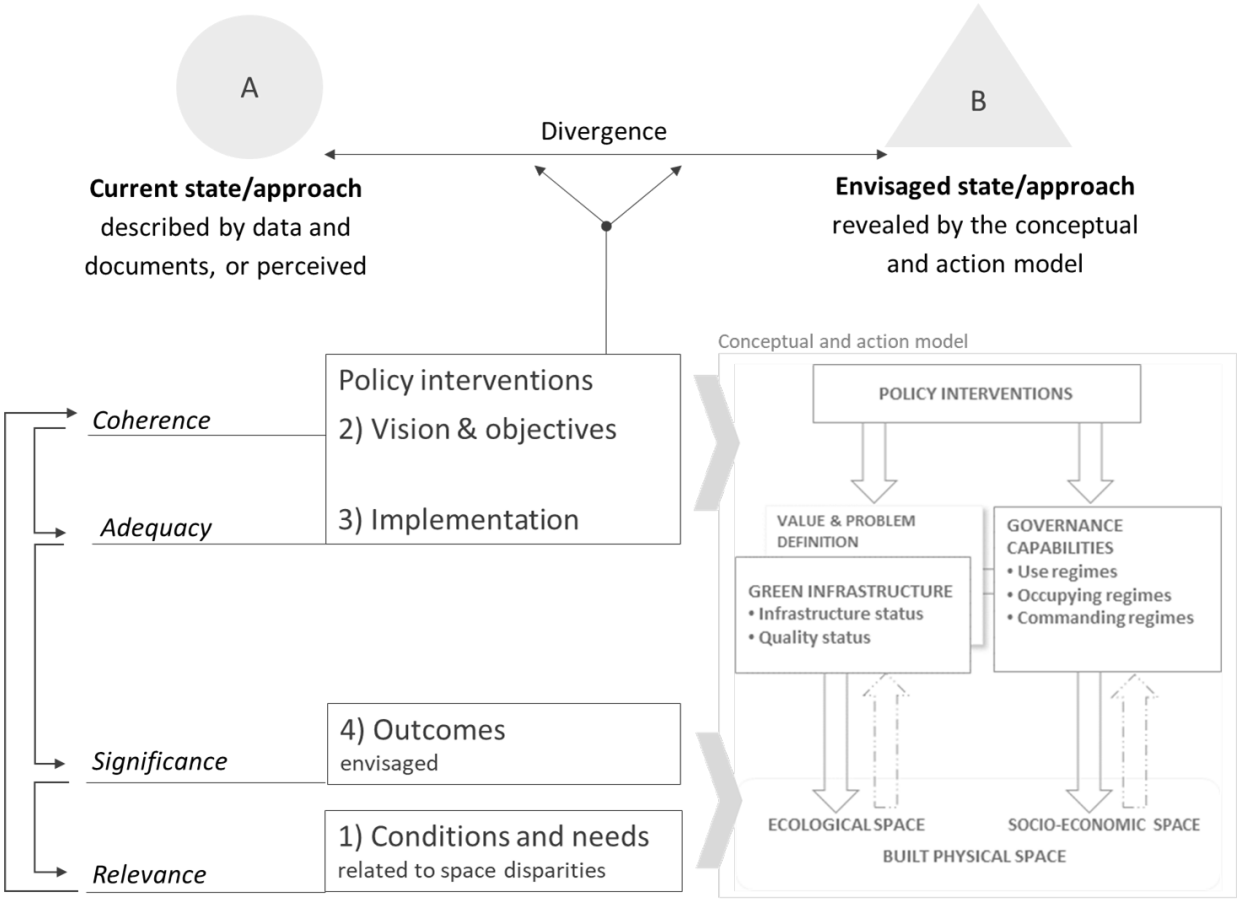
D APPRAISING THE MODEL FOR GI OPERATIONALISATION

D 1 Appraisal methodology

D 1.1 The appraisal framework

Given that spatial planning and urban development are assumed to be strongly linked to policy development, the appraisal framework will build on an approach used to judge the relevance and effectiveness of policy interventions (see chapter C 1.3.2). Similar to what is often the case in ex-ante evaluations at the EU level, **a thought model (logic)** has been developed to appraise the extent to which the conceptual and action model might be meeting defined judgment criteria, in order to draw conclusions on guiding research sub-hypotheses. The logic describes a pathway to compare and evaluate the divergence between a current status or approach, and the underlying assumptions of the conceptual and action model. It builds on a comparison of collected evidence on urban green space planning for a selected case study and the hypothetical framework developed for GI operationalisation. The aim is to evaluate the relevance of conditions and needs, the coherence of policy interventions driven by vision and objectives, the adequacy of policy interventions regarding their implementation and the consistency of envisaged outcomes (see Figure 42).

Figure 42: Conceptual and action model appraisal logic



Note: The logic consists of four appraisal areas referring to four judgments to be made. It starts with the divergence between existing conditions and needs (1), which determines the relevance of issues in relation to spatial fabrics and disparities. The potentially resulting difference between existing and envisaged vision and objectives helps to judge the coherence of policy interventions (2). The subsequent gap between existing and envisaged policy implementation in addressing GI status and quality as well as governance capabilities determines the adequacy (3), and differences in envisaged consequences describe the significance (4).

The judgment criteria are interpreted as follows:

- **Relevance:** The extent to which identified key conditions and needs correspond to assumed conditions and needs across spatial fabrics and disparities.
- **Coherence:** The extent to which policy interventions are informed by diverging visions and objectives with regard to GI planning and design.
- **Adequacy:** The extent to which the existing implementation of policy interventions can be considered enough or acceptable compared to what is revealed by the conceptual and action model.
- **Significance:** The extent to which a similar stand on valued consequences and expected contributions across spatial fabrics and disparities exists.

Conclusions on the judgment criteria will be drawn by seeking answers to a set of questions, guided by the relevant sub-hypothesis and resulting aim of the empirical research. All these components form the appraisal framework presented in Table 11, which lays at the basis of the case study analysis to follow. Guiding sub-questions, which provide further structure to the analysis, are introduced at the beginning of the various dedicated chapters.

Table 11: Appraisal framework

GUIDING SUB-HYPOTHESIS:
As framed by the conceptual and action model, only a strategic planning approach that embeds GI in a **dedicated space concept**, ecological space, and applies a **wider understanding of spatial planning** as a policy intervention and process can support a **variety of actors** in the operationalisation of GI and its **integration** across relevant policy areas and at different scales. Based on the resulting **coherent vision**, it allows the identification of relevant rationales and areas of intervention with regard to **GI status/quality** and **governance capabilities**. These result in the application of **an adequate mix of instruments** to address dynamics of spatial disparities and contribute to an overall **just access to ecological space**.
AIM:
Understanding the current application of GI principles & characteristics, the gap existing between practice, theory and the proposed conceptual and action model, as well as the possible outcomes and constraints, in order to define rationales and areas of intervention.
APPRAISAL AREAS – GUIDING QUESTIONS
Appraisal area 1: Relevance of conditions and transformations as well as needs
(1) What current situation is revealed with regard to *the fabric and possible disparities of the ecological space provided by GI?* (2) What *interlinkages* are identified between the ecological space provided by GI and the *fabric and disparities across other space dimensions*? (3) To conclude, what rationales and areas of intervention and hence *relevance* does the comparison of conditions, transformations and needs reveal?
Appraisal area 2: Coherence of policy interventions ensured by objectives and visions
(4) What *intended policy objectives* are in place for addressing dynamics of spatial disparities and a just access to GI? In what *vision* are they embedded? (5) Which *principles and characteristics* of the GI concept have been addressed in existing green and open space planning processes? (6) To conclude, what rationales and areas of intervention and hence *coherence* does a comparison of objectives and visions disclose?

Appraisal area 3: Adequacy of the implementation of policy interventions
(7) How do *spatial planning interventions* currently target a just access to *GI status and quality*?
(8) Which *additional interventions* might be considered especially for a wider accessibility to GI, and *governance capabilities* in particular?
(9) To conclude, what rationales and areas of intervention and hence *adequacy* does a comparison of implementation strategies disclose?
Appraisal area 4: Significance of envisaged outcomes
(10) Which *envisaged desired/undesired outcomes* are revealed by the interpretation of environmental justice with regard to GI operationalisation for a just access?
(11) Which *envisaged desired/undesired outcomes* are disclosed by economic methods of stated and revealed values of preferences?
(12) To conclude, what *significance* has the comparison revealed in light of previous results, and what *feasibility constraints* affecting the outcome have become visible based on the appraisal analysis?

The appraisal framework might suggest a mainly deductive approach to the empirical research, aiming at testing theories behind the conceptual and action model. However, it also includes inductive and especially abductive components, focused on understanding existing complexities, resulting challenges, theories, concepts and interventions that might evolve from it. In this regard, the appraisal includes both a check whether the hypothetical way forward presented by the conceptual and action model represents the desirable one as well as to what extent existing approaches come close to the proposed framework.

Regarding its limitations and biases, similar concerns as with regard to the assessment of policy interventions can be raised (see chapter C 1.3.2). These refer to the difficulty in determining success and failure, the elusiveness of problems and needs, the ambiguousness in identifying correlations and even more so causal relationships, or the complexity of observing impacts. More concretely, it needs to be noted that the framework bears the risk to suggest a comprehensiveness, which at this point is not yet possible, given the explorative approach in testing the conceptual and action model. In addition, the methods applied for the appraisal are not directly targeting a validation of the model, but aim at appraising some of its underlying assumptions. As such, it risks presupposing correlations or interrelations when it comes to the interpretation of the results, despite the research's inductive component. In addition, although distinct appraisal areas are delineated, not necessarily results might easily fit to the different categories. For example, not necessarily it might always be clear what represents a need and what an objective, or whether an objective already reflects an envisaged outcome. Furthermore, some of the assumptions of the model might still be relevant although the judgment criteria would suggest otherwise. This could for example be the case if the awareness regarding an issue (e.g. economic inequality) is not yet high or has not yet entered the policy agenda, or if there is not yet a sufficient amount of information available that allows a sound judgment. It can only be emphasised that the results represent an approximation of existing realities, and that the framework intends to help properly reflecting on the issues outlined above and as such support the further development or underlining the limitations of the conceptual and action model. All these aspects have also affected the overall design of the empirical research, the applied methods as well as the subsequent analysis, and are described in the following chapters.

D 1.2 The appraisal design

D 1.2.1 The selection of case studies

When outlining research interests and design in chapter B, it was also highlighted how the international doctoral college 'Spatial Research Lab' contributed to 'crystallising' the problems or challenges the thesis would like to focus on. Research laboratories were set up across the various cities of the contributing universities, which besides lectures included assignments to be carried out, taking into account the specific context of a city and input from practising experts as well as public administrations. It included cities such as Vienna (AT), Munich (DE), Zurich (CH), Hamburg (DE), Milan (IT), Karlsruhe (DE), Stuttgart (DE) and Belgrade (RS).

At a very early stage, the process of the urban laboratories was important for providing insights into practical problems, into a diversity of perspectives and a range of tools for seeking solutions, as well as differences and similarities across places and processes. As such, they have influenced the design and hence results of the empirical section of this work. The visited cities represented a first pool for selection, and also the college's guiding theme of 'urban landscape transformation' helped framing the further research. The research laboratories were also important in determining some key aspects of the case study selection, especially regarding the following criteria:

- Overall spatial scope
- Socio-economic baseline
- Housing policy and other policy interventions
- Urban green space planning
- Capacities

As for the **overall spatial scope** to be addressed by a case study, it needs to be noted that the thesis focuses on the operationalisation of the GI concept mainly at the urban scale, given urban ecosystems represent interesting models to research the relationship between biophysical processes and society. A case is thus framed by the understanding of what 'urban' or 'city' actually means in the context of the empirical research. In this regard, the key focus has been put on cities with core population sizes above one million inhabitants. Of the pool of cities that have been visited, this includes for example the city of Vienna, Munich, Hamburg, Milan and Belgrade. However, as highlighted in chapter C 1.3.1, a city does not represent an isolated system, but is related to neighbouring areas and biogeographical regions, forming up metropolitan areas, poly-centric city regions or delineated macro-regions. Especially a biogeographical macro-region and the GI elements it presents can be an important aspect if the hierarchy theory of infrastructures is taken into account.

For the actual selection it was important that several of the visited cities are closely situated to the **Alpine area**. Albeit it is characterised by a high diversity of demographic, linguistic, cultural and socio-economic backgrounds, it also constitutes a biogeographically defined area with a high level of biodiversity. In 2013, the European Council invited the European Commission to develop a Macro-regional strategy for the Alpine region (EUSALP) in close collaboration with Member States, resulting in a Communication and Action Plan (EC 2015). Rationales for action included the common challenges and opportunities the region faces and the resulting necessity for transnational collaboration. With regard to the policy area environment and energy, the strategy emphasises the importance of the region as a biodiversity reservoir as well as water

tower, and calls for the promotion of corridors and GI also outside protected areas. According to the strategy, this is not limited to mountainous areas but should take into due consideration dynamics with regard to the Alpine foreland and especially a range of large agglomerations, including Vienna, Munich and Milan. This makes them particularly interesting for further research from a biogeographical perspective.

In addition to the overall spatial scope, the socio-economic baseline of urban transformation processes, referring to the (re-)development of urban spaces, was an important factor for the selection of a case study. Of particular interest was the extent to which a city, agglomeration or metropolitan area is confronted with growing population dynamics, due to its impact on the ecological space fabric in relation to the built-up physical and socio-economic space. As such, it largely affects the application and hence evaluation of the conceptual and action model, given a different pattern with regard to the continuum of choices presented by the model might be selected. Though the focus of the empirical research lies on cities with a growing population, any differences that become visible and might potentially be important to consider with regard to cities facing shrinking dynamics will be briefly highlighted, where possible.

An important aspect with regard to a growing urban population represents the question on how to ensure a fair distribution as well as access to urban green/nature, in particular in light of a hot real estate market driving land use competition, and of potential socio-economic disparities regarding the available income and capital, influencing access to ecological space. Compared to cities in the United States, levels of urban socio-economic segregation have been relatively modest in European cities so far, as indicated in a report by the European Commission (EC 2011b) and research by Tammaru et al (2015). However, signs of polarisations are increasing, linked especially to aspects of socio-economic inequality, but also due to trends in retreating from or the ineffectiveness of welfare policies (Cucca and Ranci 2016). With regard to the city of Vienna, Tammaru et al (2015:80-109) conclude that despite an equity oriented approach to planning, socio-economic features, such as a disproportional growth of the service sector, increasingly contribute to socio-economic segregation. This is reflected in people with lower income being increasingly constricted to neighbourhoods with a high share of public housing, and the amplification of a historic sectoral pattern that confines the upper-class to the western inner-city districts up to the western outskirts (Tammaru et al 2015:107). Also Munich presents an interesting example to study. It has been argued that the city was less affected by the aftermaths of the 2008 financial crisis due to its diversified, multi-sectoral economic base, defined as the 'Munich Mix' (Thierstein et al 2016:218). However, Munich also experiences an increased concentration of highly-qualified jobs, with rising demands on housing meeting higher scarcity of land, with significant impacts on housing costs also driven by augmenting interest of real estate investors in providing high-end apartments to well-paid knowledge workers (Franz and Torri 2016:71-73, Thierstein et al 2016:208-209). In Germany, Munich is not the only place, which has experienced a swift rise in housing prices over the last two centuries. Also Hamburg and Stuttgart, out of the pool of cities that were visited, are affected by substantial increases.

These developments and considerations of the socio-economic baseline are especially important when it comes to the evaluation of policy interventions impacting governance capabilities, such as occupying and commanding regimes, brought forward by the conceptual and action model. The design of urban housing policies are hereby deemed of particular interest, due to their impact on the distribution of the urban population in relation to the various GI elements and as such wider questions of accessibility. Cucca and Ranci (2016:9) argue that the housing policy pursued by a city has an important and often undervalued role to play regarding the development of socio-economic spatial disparities. This in particular relates to aspects

such as the retreat from public and affordable housing solutions often as part of a general cutback of welfare policies. According to Cucca and Ranci (2016:10), the remaining different options often have side-effects that bear the risk of undermining pursued objectives. These include for example:

- *Proportion of housing going to low-income residents:* share often too low for providing affordable housing beyond immediate necessities, and contributing to stigmatisation and segregation
- *Public subsidies to social housing associations and non-profit organisations*: often coming along with reduced transparency and greater freedom to discriminate
- *Rent control/ support to avoid major displacements*: limited impact due to public funding restraints
- *Support for homeownership*: major negative impacts on those unable to afford expenditures

The 'laboratories' of the doctoral college present different approaches with regard to their housing policy. In Munich, the safeguard of a social spatial mix lies at the forefront of its action programme 'Living in Munich', to be ensured by local housing programmes that mainly consist of providing housing subsidies for example for rental housing or cooperatives. In addition, it includes the contractual instrument of socially equitable land use ("Sozialgerechte Bodennutzung" – SoBoN), which requires parties profiting from land use changes to bear some of the costs of development for example with regard to road infrastructure, affordable housing or green spaces (Stadt München/Referat für Stadtplanung und Bauordnung 2009). The city of Milan historically pursued urban development largely driven by private property ownership. Following the 2008 financial crisis and the decline of remaining public and social housing, it increasingly focused on a strong regulation of the rental sector and monetary transfers to poor households (Franz and Torri 2016:196-200). Since 2011, the city tries to promote a wider urban development strategy that aims at the provision of common goods and affordable housing by agreed rent contracts between owners and tenants. With regard to its housing policy, Vienna represents a particularly interesting example due to its long history of public and social housing efforts. It offers one of the largest shares of still publicly owned housing in Europe (STATISTIK AUSTRIA 2016a). In addition, regulations of private rental contracts have been deemed important in providing affordable housing not only to low-income groups, but across different income strata, and thus contributing to a social mix across different districts of the city (Gutheil-Knopp-Kirchwald and Kadi 2017-forthcoming). Also efforts targeting a soft urban renewal of sub-standard dwellings, in order to avoid displacement of long-term residents, the so-called Vienna model, have been deemed important in counteracting gentrification processes. This especially refers to the activities of the Vienna urban renewal offices ('Wiener Gebietsbetreuungen') (Lange 2015). In the framework of urban renewal objectives, they also support the design of new urban green spaces. Nevertheless, as previously briefly outlined, also Vienna faces challenges regarding socio-economic polarisations across the city. This makes it an interesting example for the evaluation of the conceptual and action model, especially in relation to governance capabilities.

Essential characteristics for the selection of a case study also relate to the planning system that has been adopted with regard urban green areas, in particular the extent to which some of the principles and characteristics of the GI concept might be applied or a more comprehensive programme on urban green space planning has been developed. An interesting example presented in the context of the laboratories includes the city of Hamburg. The landscape programme supplementing the land use plan of the city envisages the development and maintenance of connected landscape axes, which radiate from the city centre to urban suburbs, crossing two main belts and forming a green web ('Grünes Netz Hamburg'). The main objective is the provision of physical connectivity for recreational purposes, though nature conservation aspects and ecological connectivity also form part of the overall objectives. Recent efforts have also especially concentrated on the development of strategies for increased quality in a densified city and on the related co-

production of open spaces (Stadt Hamburg/Behörde für Umwelt und Energie 2013). In 2008, the city of Milan commissioned a project to integrate the **concept of green rays** ('raggi verdi') into the municipality's strategic development, consisting of greening pedestrian and cycling ways that connect city centre and existing green belts to suburbs (Associazione Interessi Metropolitani n.d.). The stated main aim of the green rays is to connect neglected and isolated green areas across the city. In this regard, it takes a predominantly recreational stance on the functions to be delivered, quite different to the Regional Ecological Network of the surrounding Lombardy region ('rete ecologica regionale della regione Lombardia'). Launched by the regional government in 2008, it focuses on ecological connectivity as a key feature. Also the law on an **added value levy** (Mehrwertabgabe) currently developed by the canton Zurich represents an interesting approach, from the perspective of providing wider access to urban green of a defined quality. The aim is to capture monetary benefits occurring mainly due to a public planning intervention, such as rezoning agricultural land into building land. Although similar to the SoBoN in Munich, it will be mainly legally rather than contractually enforced, based on revisions of the Swiss national spatial planning law in 2014, which requires compensations for costs and benefits resulting from land use changes (Art. 5 RPG). As such, it is mainly conceived as a market instrument, aiming at an optimised distribution of land for construction. The levy is envisaged to feed into a Cantonal fund, which can for example be used for affordable housing but also landscape conservation measures as well as increases of recreational qualities in more densely populated areas (Kanton Zürich/Baudirektion 2016). Of particular interest to the thesis, however, became the approach by the city of Vienna, which in 2015 launched its comprehensive green and open space programme as part of its urban development strategy 'Stadtentwicklungsplan 2025' (Stadt Wien/MA18 2015a). Besides providing a clear typology of elements and the functions to be provided by a connected network of green and open spaces, it has also introduced the declared aim of '**green area justice**', making it to one of the favoured case studies to focus on in the evaluation phase.

In addition to the categories outlined so far, other aspects relating to issues of governance (e.g. multi-level governance compared to regional/urban autonomy) were also important with regard to the case study selection, as well as were issues of **capacities** of the author. This in particular refers to personal capacities, such as limited budget and time for instance in translating documents from more than one language into English or travelling across different case study areas. Due to the reasons indicated above, the following case studies were identified as particularly interesting for further research, and were selected according to the described priority:

- Main case study: **Vienna** (AT)
- Cross-check case study: **Munich** (DE)

The priority status of a case study determined the case study approach and the range of methods applied for collecting data and knowledge. These are further explained in chapters D 1.2.2 and D 1.2.3.

This description of the selection process aims at providing insights into to the variety of variables and experiences that came into play with regard to the case study evaluation process. Albeit key categories and criteria have been listed and described, not necessarily this allows a clear distinction of the decisive aspects that led to the final selection, due to the multitude of aspects that in the end have explicitly or implicitly played a role. It was also thought that the selection of case studies following more clearly delineated criteria (e.g. level of socio-economic segregation, biodiversity status and trends, fulfilment of legal requirements regarding environmental impact assessments) could have proved too strong of a bias regarding the evaluation of the conceptual and action model.

D 1.2.2 The approach to the case studies

The overall approach of the case study design relies on the methodology of **social area analysis** suggested by Riege and Schubert (2005), although subject to changes according to the needs of the empirical research. Social area analysis builds on the development of the social space concept driven by disciplines such as human ecology and social urban geography (see chapter C 1.3.1). As such, two main approaches regarding the emphasis of the analysis can be distinguished:

1. *Texture of social areas*, revealed by variables and patterns, resulting from studying socio-economic indicators used to characterise an area
2. *Use patterns of social areas*, revealed by behaviours and actions, resulting from studying individual activities or living environments

According to Riege and Schubert (2005:43-45), empirical research related to social area analysis only rarely integrates both approaches, due to preferences given to a defined option by a discipline. Hence, the two authors provide a methodology that takes into consideration linkages between the two approaches and highlight their complementarity. Their proposed methodology refers to two basic types:

I. *City-wide type*, which aims at comparing clearly delineated urban administrative units
II. *City-area differentiated type*, which aims at an in-depth analysis of a specific area

Table 12 briefly summarises the main differences between type I and II.

Table 12: The basic types of social area analysis

Type	Approach	Result	Methods
I	Distinction and identification of administratively delineated units at a city-wide level	Comparison of texture and qualities across the entire city	Analysis of aggregated data/indicators based on the classical human ecology model
II	Inward differentiation of a selected area	In-depth description of inner texture and qualities of a specific city area	Analysis of quantitative and qualitative data/monitoring using a mix of methods

Source: Translated from and based on Riege and Schubert (2005:44)

Type I heavily relies on data and indicators provided by municipal statistics, in order to carry out quantitative analyses. These refer to variables on population structure (e.g. gender, age and nationality), education (e.g. degrees), socio-economic situation (e.g. employment status and unemployment support) or living conditions (e.g. rent or ownership structure of housing and housing typologies). When applying type I, the overall aim usually consists of identifying areas where interventions across a city might be needed. Type II uses both quantitative and qualitative information, in order to gain in-depth knowledge on the living environment in a distinct area. At different steps, for example when delineating an area or exploring its status quo, a mix of methods can be applied to analyse an area's textures as well as 'behaviours' (Riege and Schubert 2005:45-49). These can include the collection of information and knowledge through interviews with inhabitants; the use of aggregated, quantitative data based on existing administrative units; the study of individual and a group's 'living environments' or by identifying 'symbols' that explain relations between physical structures, social uses, living cultures and mentalities. According to Riege and Schubert (2005:49), the proposed methodology should support an analysis beyond the study of indicators, as they represent

only a small layer of the complexity involved. At the same time, it combines in-depth qualitative studies of specific areas with analysis at a wider urban and even regional level, in order to allow keeping some distance with regard to the findings, and promoting an in-depth understanding of the bigger picture involved.

Both type I and II have been applied to the empirical research of the thesis, though more weight might have been given to type I due to the overall strategic approach of the conceptual and action model and the wider application of the ecological space concept. Nevertheless, a more in depth investigation of defined areas of a case study, so called **study areas**, was thought necessary given the in-depth insights into different layers of urban spaces it can provide, and hence the increased level of reflection it allows. To shift the focus from pure analysis to an exploring work, empirical research related to the study areas focused on:

- *Understanding the status quo*, related to conditions and needs, objectives and policy interventions
- *Exploring living environments*, based on insights provided by inhabitants and on-site observations

Accordingly a mix of methods has been applied to gain the relevant data and knowledge. An overview and more detailed description of those methods is provided in chapter D 1.2.3.

The **selection of in-depth study areas** was mainly influenced by the following criteria:

- *Case study area*: Given the amount of time required for a more in-depth study, empirical research was limited to examples in Vienna, whereas a cross-check with Munich took mainly place at a city-wide level.
- *Target areas of the Vienna urban development plan, including urban planning projects*: Like in its previous plan, Vienna's urban development plan for 2025 identifies target areas of urban development. They indicate areas of high development potential and/or facing specific challenges, characterised by a high complexity regarding the coordination of different actors (Stadt Wien/MA18 2014:28). As such they constitute interesting urban transformation areas for further study. After a first evaluation in 2014, ten target areas remained, from larger ones such as U2/Donaustadt (Danube city) to corridors such as the Donaukanal (Danube channel). Urban planning projects refer to smaller entities within and outside those target areas (e.g. Aspern lake city representing a distinct urban planning project of U2/Donaustadt)
- *Typology of GI elements:* Of particular interest were the main GI types currently subject to transformation within an urban planning project and/or target area. These not necessarily corresponded to those provided by the Vienna open and green space planning concept, but were rather based on a broader typology referring to potential elements (see chapter C 1.1.2.1.)
- *Existing conflicts and/or civil society initiative*: Often a distinct line of conflict was highlighted for example by a civil society initiative, media or experts related to occurring transformations. These initially most evident examples influenced the selection of a study area, though different layers of conflicts were later on explored. Civil society initiatives were identified by using existing platforms, which group or inform about different initiatives, e.g. bürgerPROtest or Aktion 21.

Table 13 presents a range of study areas, which have been subject to scrutiny.

Table 13: Study area selection

Study areas	Target area	GI typology	Conflicts/Cicil society initatives (CI)
Aspern	U2/Donaustadt	Agricultural land	Agricultural fringes – Growing city *CI: Several, e.g. Hirschstetten retten, esp. related to road development*
Aspanggründe	Erdberger Mais - Aspang-gründe - St. Marx	Vacant land, former railway	Informal recreational space – Densification *CI: Lebensraum Landstraßer Gürtel, esp. related to road development*
Nordbahnhof	Donauraum Leopoldstadt Prater	Vacant land and biotope, former railway	Informal recreational space – Densification *CI: Lebenswerter Nordbahnhof*
Heeresspital	Floridsdorf-Achse Brünner Straße	Extensive agricultural land/ species habitat	Nature conservation – Densification *CI: Initiative Marchfeld*
Donaufeld	Donaufeld	Urban agricultural land	Open agricultural land – Densification *CI: Initiative Donaufeld*
Hörndlwald	No	Urban forest	Nature protection – Building construction *CI: Rettet den Hörndlwald*

The study areas highlighted in **bold** were selected for a more in-depth exploration. Besides representing transformation areas with some distinct characteristics (e.g. Nordbahnhof being situated in a more centrally, densely built neighbourhood), important differences in GI typology (e.g. the urban agricultural land offered by the Donaufeld) and lines of conflict (e.g. nature conservation and building construction) have been decisive regarding their selection.

D 1.2.3 Data and knowledge collection

Linked to the case study design and the decision to dive into different layers of analysis, the empirical research required to take into consideration a **range of methods** to collect relevant data at the case study level and carrying out an appropriate exploration of the identified study areas. Decisions on what methods to apply were also influenced by the willingness of different actors in participating in the various processes. The following methods were applied with regard to the two selected case studies and the study areas. The main phase of data and knowledge collection lasted from June 2016 to December 2016.

Table 14: Case studies, study areas and main methods of data collection

Case study/ study area	Methods
VIENNA	Desk study
	Survey: general public and public administration
	Interviews: experts & practitioners, public administration
Donaufeld	Desk study
	Site visits: interviews with civil society representatives, questionnaire, pictures
Heeresspital	Desk study
	Site visits: interviews with civil society representatives, questionnaire, pictures
Nordbahnhof	Desk study
	Site visits: interviews with civil society representatives and general public, pictures
MUNICH	Desk study
	Survey: public administration
	Interviews: experts

In addition, independent from the case studies and study areas, additional data and knowledge on defined themes were collected via interviews with selected experts. This especially included, though was not limited to the following issues:

- Environmental justice
- Green Infrastructure
- Housing policy and related instruments

The main aim was to collect important insights into theoretical and cross-cutting issues laying at the basis or informing the development of the conceptual and action model.

It needs to be noted that although it might seem like the mix of methods was rather randomly applied, the purpose of the approach was to allow and foster a process of reflection, which promotes continuous questioning, critical thinking and hence in-depth judgment. The reflection process should allow the build-in of constant feedback loops, based on experiential learning as summarised by Kolb (2005). The generation of knowledge is thereby based on a constructivist theory, which assumes that knowledge is created by active experience of the learner following different interactions including with the environment. It consists of validating concepts based on experiences, including the examination and testing of ideas and values. It all forms part of the learning and as such of the evaluation and judgment process. This was considered particularly important not only due to the normative character of many of the concepts forming part of the research. As indicated by Tschirk (in IDK 2016:18-27) enabling learning and setting up transformation processes were core endeavours with regard to the organisation and culture of the International Doctoral College. As such the approach of questioning, reflection and observation was also key part of the empirical research, both design and analysis, and resulting processes of change involved both the researcher as well as all those participating in the research. The following chapters summarise individual processes and considerations regarding the various methods.

D 1.2.3.1 Interviews

First screening

During a preliminary phase of the empirical research, which largely took place from October to December 2015, roughly 4 informal interviews were carried out, with 2 experts from academia as well as 2 representatives of the public administration of the main case study area Vienna. The aim was to further refine the research questions as well as to define methods and approaches to be applied (e.g. testing questions for semi-structured interviews). The informal interviews thus largely addressed more general issues, related to GI operationalisation, inequality and justice or understanding of spatial planning and design processes. Interview partners were either identified during the literature review process applied with regard to work on conceptual foundations, based on suggestions by participants to the doctoral college, or during conferences on subjects relevant to the thesis. Being more informal in nature only written notes were taken.

Targeted interviews

During the main phase of the empirical research, from June 2016 to December 2016, a range of more targeted interviews were carried out. How those were designed largely depended on the target group, both regarding selection and interview approach.

Experts & practitioners: Interviews with experts and practitioners involved both representatives of academia as well as planning and architecture professionals. Not necessarily the line can be drawn neatly. The selection was based on suggestions provided by colleagues and others involved in the doctoral college, and was strongly influenced by participants' willingness and availability to participate. The interviews followed mainly a semi-structured approach, which means that they were guided by questions predefined as relevant for getting answers to the research questions and sent upfront to the interviewee. It mostly included open-ended questions, with a defined focus on a certain theme, though including the occasional closed question. The interview design allowed deviations from the guiding questions, to facilitate reflections on existing experiences on both sides. Especially interviews with practitioners were carried out using a more lightly structured approach, in order to get a more in-depth understanding of processes and settings. In addition to the 6 in-depth interviews, additional 3 more informal interviews were carried out to get targeted information or feedback on a certain topic especially from experts.

Representative civil society initiatives: Representatives of civil society initiatives were selected according to the identified key study areas. It proofed to be difficult to gain additional insights from other civil society initiatives, hesitant to reply to invitations or participate in the process. The interviews consisted of a semi-structured to lightly structured approach, whereby more weight was put on the latter to get in-depth insights into existing experiences. A lightly structured approach includes less and more general interventions from the interviewer and puts more emphasis on listening to the stories told. The initial 2 interviews also evolved into guided site visits (see separate point), and also resulted in completions of an online questionnaire, to test the surveys to be carried out at a later stage. Only notes and no audio-recording were taken, due to the felt risk that interviewees might respond differently and that more controversial parts of the story might be left out. It its thought that this was partly compensated by the guided site visits, where observational notes as well as pictures helped documenting the process.

General public: With regard to the selection of individuals from the general public, the interviewer decided to seek out specific GI elements/ urban green areas. These included for example the shore of the newly developed lake at Aspern Seestadt, the Bednar-Park and informal green of the urban planning project Nordbahnhof, or the Leon-Zelmann Park/ Bittman-Promenade at the Aspanggründe. Potential interviewees were to some extent targeted according to variables such as age and gender, although it much depended on how forthcoming they were in carrying out an interview influenced by language constraints, time availability, interests in and confidence about the subject. Overall aim of the general public interviews was to get a story told in relation to the research interest. Closed questions developed for the online survey (see separate point) were used to create an atmosphere where people felt comfortable to tell their story, thus resulting in a lightly structured narrative interview. The results of the interviews with the general public were also used to improve the online survey, though it was especially seen as a method to get more in-depth insights especially from population groups, which might not necessarily participate in the online survey. In addition, suggestions on interesting sites to visit were also provided.

Public administration: Besides the initial informal interviews with representatives of the public administration of Vienna, two additional interviews were carried out with the same representatives. These were mainly used to test the questionnaire for the online survey to the public administration, though it also resulted in some additional, more specific insights, which were collected accordingly.

Table 15 provides an overview of the number of interviews carried out, the approaches used, the resulting documentation and the coding developed for the analysis and outline of results.

Table 15: Overview interview groups, design and documentation

Target Group	Numbers	Approach	Language	Documentation	Coding
Expert & practitioners	6 (+3)	Semi- to lightly structured interview	German	• Transcription of interviews (I), p.95 Working Document 2 (=WD2) • Interview notes (I), p. 9, WD2	• I-EX-1 to I-EX-3 • I-EXP-1 to I-EXP-3 • I-EXP-light
Civil society initiatives	3	Semi- to lightly structured interviews + observations	German	• Interview notes (I), p.16, WD2 • 2 completed questionnaires • Pictures of study area (P)	• I-CSI-1 to I-CSI-3 • P-SA-I-n to P-SA-III-n
General public	8	Closed questions leading to narrative interviews + observations	German	• Interview notes (I), p.15, WD2, including written observations • Pictures of study area and videos (V)	• I-Inh-1 to I-Inh-7 • P-SA-x to P-SA-y • V-SA-y
Public administration	2	Questionnaire	German	• Interview notes (I), p.7, WD2	• I-PA-1 to I-PA-2
Overall	**22**				

D 1.2.3.2 Surveys

As a counterweight to the qualitative interviews, standardised quantitative surveys were undertaken. Such surveys were developed for the following groups:

- Public administration – Munich (PA-Munich)
- Public administration – Vienna (PA-Vienna)
- Individuals of the general public – Vienna (GP-Vienna)

The surveys had as main objective to address a wider spectrum of actors, both with regard to the public administration as well as the general public, and to offer an additional level of comparability.

Format

The survey was carried out online for all three groups, rather than by phone, mail or personal meeting. This was partly due to financial, capacity and time constraints, though other reasons were important as well. For example, personal meetings were used for interviews rather than filling out a questionnaire, in order to use the time to get more in-depth information on an interviewee's experiences. The surveys mainly relied on the online survey tool 'Survey Monkey'. However, a switch to 'SoSci Survey' had to occur for part of the general public survey, linked to technical and time limitations of the former. Besides influencing the running of the survey it also affected the outline of the questionnaire to the general public, and as such had impacts on the analysis of results. Those are described in more detail in the next chapter on approaches regarding the case study analysis.

Development of the questionnaire

The difficulty of online surveys results from the fact that only a limited amount of follow-up can take place or that no additional clarifications can be provided, making the quality of the questionnaire decisive in engaging participants. This refers to the overall structure, format and number of questions. The structure of the topics to be addressed did not follow the evaluation framework, but evolved around the issues covered by the conceptual and action model. The following table provides an overview of the key topics. Im-

portant differences between the questionnaire to the public administration and to individuals of the general public are highlighted in **bold**. Versions of the questionnaire to the public administration and the general public are included in the Annex.

Table 16: Structure and key topics covered by the questionnaires and main differences

INDIVIDUALS GENERAL PUBLIC	PUBLIC ADMINISTRATION
INTRODUCTION to the research, questionnaire and interviewer	INTRODUCTION to the research, questionnaire and interviewer
A FEW QUESTIONS REGARDING THE DISTRIBUTION AND ACCESS TO NATURE IN THE CITY • Distribution of quantity and quality • Characteristics and needs with regard to urban green, from public to private • Strategies of urban policy and administration with regard to urban green/nature	A FEW QUESTIONS REGARDING THE DISTRIBUTION AND ACCESS TO NATURE IN THE CITY • **Economic inequality** • Distribution of quantity and quality, and **measurement instruments** • **Describing the quality of urban green** • Strategies of urban policy and administration with regard to urban green/nature • **Planning instruments of relevance to the distribution of urban green/ nature**
A FEW QUESTIONS REGARDING GOVERNANCE AND DESIGN OPPORTUNITIES • Barriers and facilitating elements • The various actors, and reasons for taking (no)action • Use and governance opportunities • Environmental justice	A FEW QUESTIONS REGARDING GOVERNANCE AND DESIGN OPPORTUNITIES • Barriers and facilitating elements • **Urban development and planning process** • The various actors, and **their future role** • Use and governance opportunities • Environmental justice • **Right to ecological space** • **Familiarity with key concepts**
A FEW QUESTIONS REGARDING LIVING ENVIRONMENT AND PERSON • Housing and ownership • Surroundings and urban green, special places • Gender, age, income, education, district	DEPARTMENT
FINISH The city in 100 years	FINISH The city in 100 years

Different questionnaires were developed because the focus was less on overall comparability across the two different target groups, but on getting **meaningful, specific insights** with regard to the different topics. The two questionnaires addressing the public administration of Vienna and Munich were adapted to the extent to which important differences regarding terminologies existed or different organisational structures had to be considered.

As indicated previously, the empirical research is only partly based on a deductive approach, and includes many inductive/abductive elements. Hence, at this stage it was thought that the usefulness of a **statistically relevant analysis** is limited given the **scoping and systemic nature of the sub-hypothesis**. This also impacted the overall structure of the questionnaire and the key topics addressed. Some questions were added to the general public survey, which would have made a statistically relevant analysis possible, for example when looking for correlations between living environment, socio-economic status and perceptions on environmental justice. However, it was decided to opt for a **lengthier questionnaire**, to allow a more in depth scrutiny, bearing the risk of a lower amount of respondents and hence a too small sample to provide statistically relevant insights.

In addition, a range of questions were used which had been already applied and tested in the framework of similar studies, for example looking into the development of urban green/nature or GI, as well as studying living conditions. The aim was to allow some comparability with the findings of those studies, though questions were slightly adapted to the needs of the thesis. Nevertheless, it also had as objective to support the future standardised use of some items. These referred to:

- Development of quantity and quality of urban green: Davies et al 2015, Böhm et al 2015
- Strategies of urban planning and policies: Böhm et al 2015
- Barriers & facilitating elements: Böhm et al 2015
- Actors involved: Davies et al 2015
- Living conditions and quality: Schubert and Bottarin 2013, EU-SILC indicators

It also needs to be considered that the main language of the questionnaire was German. This has impacts on the analysis, presentation and interpretation of the results, since meanings are affected by the translation. Particular attention was paid to the wording used in the questionnaire to reflect cultural particularities, and the same attention was paid to the translation of key terms when analysing and presenting the findings.

Testing and launching

The surveys were each subject to a testing phase. It started with the questionnaire developed for the general public, subject to a detailed scrutiny by acquaintances living in Vienna, with different educational backgrounds. In addition, several of the questions were tested during initial interviews with inhabitants to check any comprehension and language issues. With regard to the public administration of Vienna, the testing consisted of two detailed interviews with known representatives, who agreed to help checking on aspects such as general comprehension, language use, key terms and definitions, questionnaire and question structures as well as length. A follow-up test with known public administration officials from the city of Munich was carried out, to investigate on a few municipality specific aspects.

Careful consideration also needed to be given on how to engage respondents to the online survey. With regard to the public administrations, personalised invitations were sent to representatives already involved in the laboratories, asking them to further spread information about the survey. Personalised invitations were also sent to researched contacts across several departments. Getting a sufficient amount of responses from individuals of the general public proved to be a challenge, given the author mostly worked remotely from the study site, and also likely due to the indicated length of the survey. E-Mails were sent to existing acquaintances, inviting them to specifically share information about the survey on social media. It proved to be the most successful strategy, according to information provided by using different collector links. In addition, invitations were sent to civil society groups, Vienna district services and a range of media providing local coverage. Small flyers including link and QR-code were developed and distributed.

The running of the online surveys

The online surveys started with the questionnaire addressing individuals from the general public at the beginning of September 2016, linked to an initial round of interview sessions and site visits carried out in Vienna in August 2016. Additional opening times as well as other key aspects regarding the running of the surveys are summarised in Table 17.

Table 17: The online surveys: Opening time and overall number of completed responses

Target Group	Opening time	Completed responses (+max)	Key characteristic of respondents
General public - Vienna	a) 05/09/2016 – 17/10/2016 b) 17/11/2016 – 26/01/2017	a) n=12 (different channels) b) n=16 (different channels) (max n=20)	*See chapter D 2.1.2.1*
Public administration - Vienna	20/10/2016 – 18/11/2016	n=7 (28 invitations)	*See chapter D 2.1.2.2*
Public administration - Munich	19/10/2016 – 17/11/2016	n=14 (18 invitations)	*See chapter D 2.1.2.2*
Overall		**n=49 (max=53)**	

Some technical errors linked to the general public survey still occurred after the opening, despite several previous testing phases. These were documented in detail in a related working document (WD1). The tool 'Survey Monkey' proofed to be especially inflexible in addressing such errors, with potentially detrimental impacts on the results. Given also due to other constraints (e.g. limited number of separate surveys), it was decided to switch to 'SoScie Survey'. The resulting improvements regarding the handling of the questionnaire were thought to justify the additional efforts required for a robust analysis and the potential limitations particularly regarding the number of responses that can be used.

Albeit it could have been higher, the overall number of responses was considered sufficient, due to the mix of methods used to getting insights for the evaluation of the conceptual and action model, and their scoping character. More responses especially to the questionnaire addressing the public administration in Vienna would have been desirable, but could not be achieved despite several follow-up measures. Response statistics provided by 'SoScie Survey' for example indicates a dropout rate of roughly 13 per cent after the completion of the first page of questions and limited dropouts at later stages, suggesting that at least respondents that had already started the survey were not discouraged by the length of the questionnaire. The number of responses to individual questions used in the analysis will be constantly indicated with n=x, to emphasise differences to the overall number of replies.

Only partially a certain diversity of respondents for example in relation to aspects such as age, gender and level education of the general public could be achieved. This shortcoming to some extent has partly been addressed by a higher diversity of insights provided in the interviews. Future research should look more thoroughly into any statistically relevant correlations between socio-economic or demographic aspects and the replies provided, especially with regard to questions on the perceived justice in the distribution of urban green/nature. With regard to the public administration, responses were obtained across different departments and not only by those directly involved in the planning or management of urban green areas/nature. However, as expected, representatives of departments who likely considered themselves not being directly involved and/or having limited responsibilities with regard to the subject were more reluctant in responding to the survey. This was also indicated by a few respondents replying to the invitation to contribute. Although a range could be persuaded by e-mail follow-ups, the engagement of additional departments, such as for example business development, would have been desirable.

D 1.2.3.3 Site visits

Initial site visits mainly consisted of guided tours through the Vienna study areas by representatives of civil society initiatives, especially Donaufeld and Heeresspital, from August 2016 onwards. Besides collecting interviewees' narratives, photos were taken to document the visits. Building on those tours as well as on

suggestions provided during interviews, further study areas (e.g. Nordbahnhof) and specific sites (e.g. urban gardening initiative Längenfeldgasse) were subject to visits and documentation. They evolved into a 'strolling' approach, which resulted in additional spontaneous interviews, photos, audio and filming material, representing data to be used to check consistency of narratives. The most important areas that were visited are highlighted in the map in Figure 43.

Figure 43: Overview of visited sites

Source: based on Google Earth 7.3.2.5776. Vienna, 48°11'51.08 N, 16°26'36.51 O. Imagery 10/11/2018, Elevation 161 m, Eye altitude 15.4 km: http://www.google.com/earth/index.html (accessed 2019/03/30)

D 1.2.3.4 Desk research

The desk research mainly consisted of collecting and screening different documents to additionally inform the analysis of the different valuation areas and help checking the consistency of the narratives. These range from scientific literature to technical and media reports and maps, for example revealed to be important during interviews or in the questionnaire. It refers to topics such as conditions regarding economic inequality or the distribution of urban green/nature, spatial planning approaches and urban green planning more specifically, as well as the application of other policy instruments more widely. It will be especially important in determining potential consequences of interventions, for example by providing initial insights into preferences and values attributed to (urban) nature and how this might impact the land and housing market, also by studying proposed development projects. Rather than representing first-hand empirical research, it refers to the collection and synthesis of second-hand data, following a defined analysis structure, described in more detail in the following chapter.

D 1.2.4 Data and knowledge analysis

As previously iterated, the use of a mix of methods in collecting data and knowledge aimed at allowing and fostering a process of reflection, which promotes continuous questioning, critical thinking and hence in-

depth judgment, in light of the complexity and normative character of the subjects laying at the basis of the thesis. The **'triangulation' of methods,** or the converging of operations, can be an important way forward in overcoming biases linked to different methods, especially if single observers are involved as is the case for the thesis. According to Yeasmin and Rahman (2012:156), 'triangulation' '*refers to the combination of two or more theories, data sources, methods or investigators in one study of a single phenomenon to converge on a single construct, and can be employed in both quantitative (validation) and qualitative (inquiry) studies*'. Metaphorically building on the use of reference points to calculate the position of an object, the approach is assumed to provide greater accuracy especially in social sciences. The thesis also argues that it can help the researcher to continuously question one's own perspective, also with regard to the values involved. At the same time, Yeasmin and Rahman (2012:159) emphasise the importance of the research being conceptually anchored, for a meaningful outcome when applying a triangulation of methods. Its effective use can also be hampered by time and cost constraints. With regard to the former, the thesis used as a basis the conceptual and action model. Regarding the second concern, which can be considered especially important as the research was carried out by one person, the thesis aimed at limiting potential risks by clearly delimiting the scope of the methods. Other important issues, which are raised to ensure the effectiveness of the approach, refer to the '*creativity from its user*', with regard to the *'ingenuity in collecting data',* but also with regard to the *'insightful interpretation of data*' (Yeasmin and Rahman 2012:160).

With regard to the interpretation of the data, it is important to note that the multi-method approach resulted in gathering different kind of information (quantitative and qualitative), from different sources (e.g. interviews, online survey or document analysis), different scales (e.g. development project, data at district and municipal level) and different locations (Vienna and Munich). Hence, the analysis required a framework with which to decompose the different results, reduce the amount of data and reassemble key components according to a defined structure. At the beginning, this was based on the development of an **appraisal grid**, which consisted of breaking down the guiding questions of the different appraisal areas into more narrow sub-questions and subsequently into defined categories (see Figure 44). It allowed a first check of which results from which method inform particularly which appraisal question, sub-question and category. The quantitative data provided by the online survey hereby formed the backbone of the appraisal grid.

The approach proved to be useful in gaining a first structure, according to which the analysis could be carried out. The categories developed in the first round of scrutiny were successively checked and if necessary overhauled. Although the appraisal framework is building on a guiding sub-hypothesis informed by the theories laying at the basis of the conceptual and action model, this does not necessarily mean that a mainly deductive approach to the empirical research is applied. As already emphasised previously, it also includes a strong inductive component, and this required a continuous revision of the identified categories. In this regard, the research follows processes suggested by Mayring (2014) with regard to **qualitative content analysis** of written interview records and key documents and their combination with results from quantitative methods. Given the explorative nature of the appraisal questions, however not a comprehensive coding, referring to the detailed development of codes and sub-codes, was undertaken when analysing the qualitative information. Although a first attempt was made, it proved to be too restrictive and dissected, especially as the analysis did not aim at a quantification of qualitative results (e.g. frequency of statements) and at a distinct cross-comparison of the case studies. The analysis was carried out using broader categories, focused on material relevant with regard to the research questions and not undertaking the step of paraphrasing the content. A word processing program was used for the scrutiny of clean-read transcripts and selective protocols of the interviews, findings of open end questions of the online survey and key documents.

Figure 44: Extract appraisal analysis grid

AA-1	Condition and needs		
	Appraisal questions	Input area 3: Questionnaires	
		Source: Representatives public administration	Source: Individuals general public
AQ-1	**What is the current situation with regard to the fabric and possible disparities of the ecological space provided by Green Infrastructure? What conditions, including transformations and needs, are revealed?**		
1.1	*Conditions and transformations*	Q4-Perceived **development** of urban green/nature **quantity:** urban green/nature in private hands rather decreasing though many don't know, in public hands clearly increasing, and of high diversity rather no change assumed Q5-Perceived **development** of urban green/nature **quality:** quality green/nature in public hands assumed to be improving, whereas for others rather no change assumed	Q1-Perceived development of urban green/nature **quantity-different forms:** urban green/nature in private hands no change to rather increasing, differently to PAs; similarly for in public hands; more pessimistic than PA-Vienna, and definitely far more pessimistic regarding development of urban green of high diversity; mostly positive about quantity development of green/nature in public hands Q2-Perceived development of urban green/nature **quality-different forms:** quality of green/nature in private hands improving, even more so for in public hands; clearly deteriorating for green/nature with high diversity
		Q7-**Perceived justice:** more optimistic than GP-Vienna and PA-Munich; green/nature in private hands more or less unjust, more or less just to just with regard to green/nature in public hands; amore or less just regarding green/nature with high biodiversity Q8-Reasons for existing perceptions on **just/unjust distribution:** no reasons stated	Q4-**Perceived justice:** green/nature in private hands unjust to more or less unjust, more or less just with regard to green/nature in public hands; again more unjust regarding green/nature with high biodiversity Q8-Reasons for existing perceptions on **just/unjust distribution**: strongly linked to historic developments, natural features; access provided by public transport
1.3	*Quality characteristics and needs*	Q3-**Quality characteristics:** Strong focus on natural water bodies as a key quality characteristics, influenced by Vienna's closeness to important water bodies such as the Danube? Similar interest by the general public. Strong focus on charcteristics identified in green management as important characteristics such as lawns and seating opportunities. But second come connected areas, by far less important to GP	Q3-**Quality characteristics:** Highest importance given to size of an area and lack of road noise, the latter by far less considered by PAs. Third follows diversity of animal and plant species. Less importance given to urban gardening, though this likely linked to the background of respondents, who might not necessarily feel the need. Q7-**Needs:** living conditions and quality in near neighbourhood figures most prominently, indicating that highest interest might be to secure own favourable environment. Although this is followed by securing favourable urban climate and the conservation of animal and plant species and natural areas.
1.4	*Available indicators & monitoring*	Q7-**Monitoring instruments**: green area land register and green space information system considered most important instruments, the latter linked to the Vienna comprehensive Grünraummonitoring. User surveys also play a key role for guaranteeing a just access to urban green/nature. Less important green roof register or vacant land register, with high insecurity whether they have been adopted.	

Note: This is only an excerpt of the appraisal analysis grid used to structure the analysis and outline of findings. It shows work undertaken for the first appraisal area on the relevance of conditions and needs, based on results of the online questionnaire.

The selected approach with regard to the appraisal design and analysis poses some questions on the **reliability and validity** of the results. The thesis opted for the triangulation of methods, in order to overcome methodical biases and approach a complex problem from different angles. However, this also implied time and cost constraints, to carry out an in-depth scrutiny of more than one to two case studies, and hence did not allow a more comprehensive cross-case analysis. To ensure the quality of the work, the thesis put emphasis on important aspects also highlighted by Mayring (2014:109). These refer to a clear documentation of methods, including making explicit any shortcomings. In addition, interpretation safeguards consisted of triggering a reflection process, by continuously questioning and if necessary revising assumed patterns, influenced by the researcher's perspective on incoming information, and creating knowledge. Furthermore, given the value-laden nature of the research, it included a reflection of one's own values, which were especially tested in the communication with those subject to the research. Further implications regarding the interpretation of results are also highlighted in the respective chapters as well as in the final discussion of the findings.

D 2 Appraisal findings

D 2.1 An introduction to the case studies

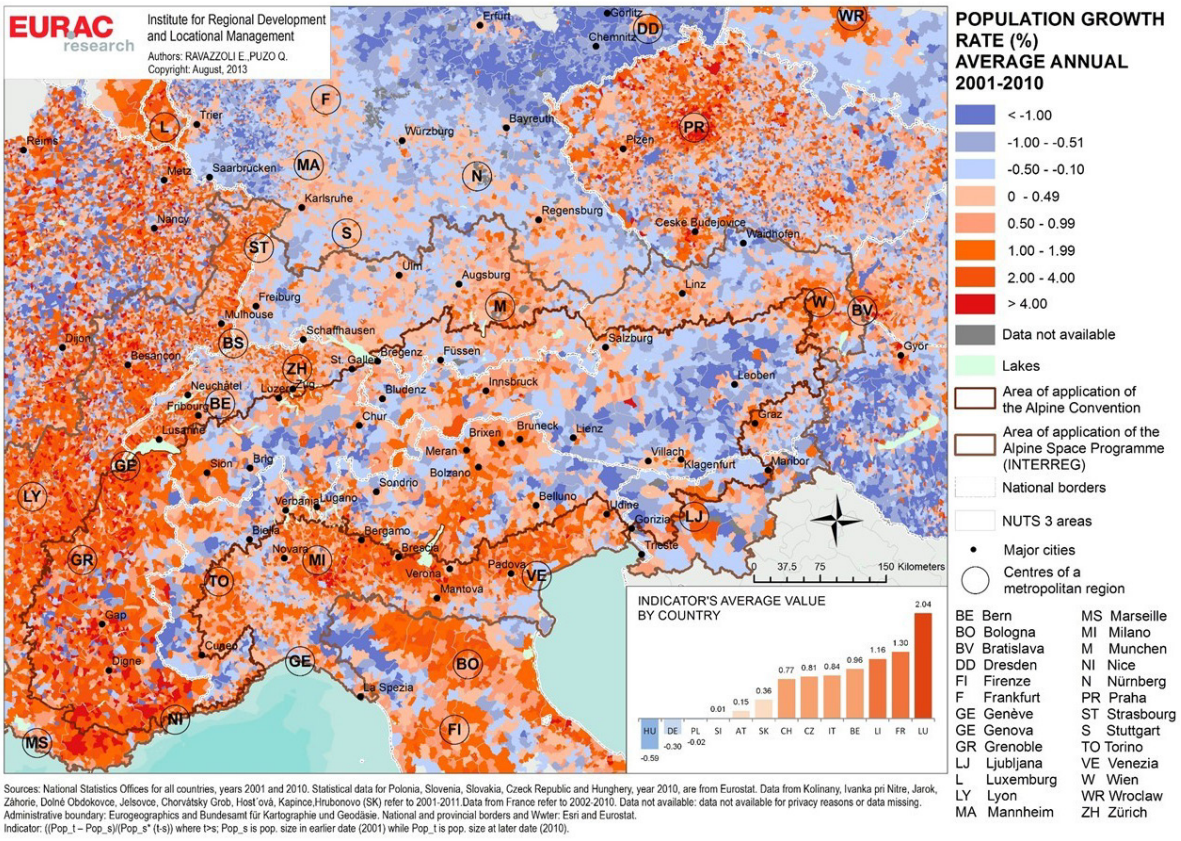
The first section of the chapter provides an overview of basic parameters that describe the two case study areas of the city of Vienna and Munich. It starts with a brief description of the relevant historical and natural baseline, as assumed to still strongly influencing fabric and potential disparities regarding the ecological, socio-economic and built-up space. It then looks into important governance aspects and provides an overview of identified policy interventions related to urban green planning and affecting GI operationalisation. With regard to the city of Vienna, it also introduces the three key study areas: Nordbahnhof, Donaufeld and Heeresspital, which will be used for in-depth insights regarding the analysis. What follows is then a description of key characteristics describing survey respondents from the Vienna general public and the public administrations of Vienna and Munich. Overall aim is to outline the contextual framework within which the findings of the analysis can be embedded and have to be interpreted, including with regard to national and regional aspects of relevance to the analysis.

D 2.1.1 A first description of important baselines

In several chapters, it has been emphasised that cities do not represent isolated systems, but are embedded in a certain context, including neighbouring areas and biographical regions as well as the national framework. With regard to the selection of case studies, it was argued that the city of Munich and Vienna represent interesting examples to study, as being situated close to the Alpine area, a biogeographically macro-region constituiting an important biodiversity reservoir and water tower, also impacting and being impacted by neighbouring large agglomerations (see chapter D 1.2.1).

To exemplarily show how the city of Vienna (W) and Munich (M) and its neighbouring area perform in this overall context, Figure 45 displays **average annual population growth rates** between 2001 and 2010 within the perimeters of the Alpine area, as defined by the international Alpine Convention (inner delineation) and the Alpine Space Programme (outer delineation). It indicates the extent to which the two cities and the affected neighbouring region represent hubs of significant population increases, particularly in light of national decreasing (Germany) or lightly increasing (Austria) population growth rates. These growing population dynamics have been an important factor for selecting the two cities, as being an important aspect of the socio-economic baseline affecting urban transformation processes.

Figure 45: Average annual population growth rate 2001-2010, Alpine area and foreland (Ravazzoli et al 2013)



The following table summarises some additional basic parameters, describing the overall context of the two case studies. Especially interesting are differences regarding city size and of related macroregions, inhabitant densities and green/open spaces per inhabitant. The different parameters will be discussed in more detail, where relevant to the appraisal analysis. Other important aspects as well as key historical developments have been further summarised below.

Table 18: Overview of basic parameters

	CITY OF VIENNA	CITY OF MUNICH
Area characteristics		
City size (km²) [related macroregions]	415 (2016) [8,819 Metropolitan Region Vienna MRV, Eurostat]	310 (2016) [5,500 Metropolitan Region Munich MRM, Eurostat]
Key land use types, city	45.1% green area 4.7 % water bodies 35.8 % built-up area 14.4 % transport area	36.5% open and green space (incl. waterbodies) [or 21.4 % without agriculture] 44.8% built-up area, incl. related open space & un-built industrial area 17.4% transport area 1.4 % other land use
Green area and open space types, city	30.5% (57 km²) agriculture 9.1% (17 km²) urban parks 4.3% (8 km²) sports & recreational area 43.3 (81 km²) forests 12.3% (23 km²) meadows	41.4% (47 km²) agriculture 42.5% (48 km²) recreational area (incl. sport area) 11.9% (13 km²) forests 4.2% (5 km²) water bodies

Sources: Stadt Wien/MA23 (2016); Stadt München/Kommunalreferat (2016); Eurostat (2017a)

Population and living conditions		
Inhabitants [related macroregion]	1.84 million (2016) [2.72 million (2015) MRV]	1.54 million (2016) [2.85 million (2015) MRM]
Inhabitants/ km²	4,434	4,897
[related macroregion]	[308 MRV]	[518 MRM]
Green or open space per inhabitant, city	102 m²*	74 m²*
Tenure/ownership status of dwellings, city	889,700 total number main residence dwellings (2015) *Tenants* 18% ownership (5.6 % house, 12.4% apartment) 24.6% council housing tenants 20.5% limited profit housing 32.9% tenants with private landlords 3% other tenure of dwellings	753,040 total number dwellings (2011) 23.8% owned by tenant 73.7% rented *Ownership status* 39.1% collective ownership 29.1% private person 11.5% housing company 7.9% municipal housing 4.1% cooperative 3.3% other company 2.3% Bund or Land 2.6% non-profit organisation

Sources: Stadt Wien/MA23 (2016); Stadt München/Statistisches Amt (2016); Destatis 2011; Eurostat (2017a); *own calculation

Socio-economic aspects		
Unemployment rate	13.5% (2015)	4.3% (2016)
Annual net income per capita	€ 21,143 (2014)	€ 26,500 (2012)
At risk of poverty	21.6% (2014)	11.7% (2012)
GINI-coefficient national level	*AT* 0.279 (2013, LIS); 0.272 (2016, Eurostat)*	*DE* 0.291 (2013, LIS) 0.295 (2016, Eurostat)*

Sources: Stadt Wien/MA23 (2016); Stadt München/Statistisches Amt (2016); Eurostat (2017a+b); LIS (2017); * changed scale, applying 0 to 1

D 2.1.1.1 Vienna

Key historical and natural developments

The historical development of Vienna is strongly connected to two of its most important natural features. On the one hand, this refers to the **Danube river and wetland**, remnants of retreating oceans, which formed the basin in which the city of Vienna lies, and led to the development of its characteristic terrace landscape. It provided for favourable climate and soil conditions as well as important transport ways. On the other hand, large **forest ecosystems**, extending from the slopes of the adjacent alpine mountains, provided for a diversity of resources as well as construction materials (Berger and Ehrendorfer 2011:211; Stadt Wien/MA18 2001). This original natural baseline slowly retreated to the hills of the Wienerwald in the west, and the Danube crossing the city from the north to southeast. Today, both are defined as two important landscape cornerstones of green and open space planning in Vienna. The Wienerwald is assumed to still hold 50% of natural to semi-natural forest ecosystems (Berger and Ehrendorfer 2011:252), and is protected as a UNESCO biosphere park. Of the diversity of natural landscapes offered by the Danube river floodplain, roughly 19% of wetland forests and 16% of the river system still exist today, and are partly protected as national park in the southeast of the city.

Other landscape mosaics originally existing outside the walls of the city were subject to major clearing for **agri- and vinicultural use**, resulting in a diversity of extensively used, especially vinicultural landscapes. Up to the 18th century, the development of a Glacis, green open land located in front of the city's walls for

military protection, contributed to the dense development of the inner district, whereas outside small villages slowly transformed into suburbs circulated by agricultural land (Berger and Ehrendorfer 2011:212). In the 19th century, the city experienced **large population growths** and an increased construction boom, especially occurring westwards, with the slow incorporation of the suburbs, disappearance of the city walls and Glacis, replaced by the Ringstraße as a boulevard delineating the 1st district (see transport infrastructure in Figure 46).

Following trends of developing green belts to limit city growth (see chapter C 1.1.1.2), in 1905 the city released an act to establish and protect the **forest and meadow green belt** of Vienna (Stadt Wien n.d./a). It initially did not include the northeast of the city across the Danube, as further population growth was expected, and reached 2 million inhabitants in 1910 (Stadt Wien n.d./b). The forest and meadow green belt was finalised in 1995, by releasing a package of measures to incorporate additional areas in different parts of the city and in particular northeast, and by establishing a dedicated land use category in the Vienna building code. It also envisaged the acquisition of land by the public administration, although this was successful only to a limited extent (Stadt Wien/MA18 2015:21). Today, the forest and meadow belt encompasses the five landscape cornerstones of Vienna: the Wienerwald in the north-west, the Danube floodplain in the south-east, the Bisamberg in the north-east, the Marchfeld in the east and the terrace landscapes especially in the south of the city. Its various elements are often protected by different protection categories and laws (see chapter D 2.2.3). In Figure 46, it is visible that the compactness of the green belt varies, with major gaps especially in the south and northeast of the city. Especially the vini- and agriculturally extensively used landscapes of those areas were subject to major transformation processes, replaced by extended residential areas, transport infrastructure as well as industrial and commercial area. Of the originally 52% of vini- to agricultural landscapes surrounding Vienna, only 5% of vini- and 11% of other agricultural land use remain (Berger and Ehrendorfer 2011:252).

Figure 46: The city of Vienna – its districts, built-up land, transport infrastructure, urban green and waterbodies (translated based on Stadt Wien/MA23 2016:14)

Note: Number I to XXIII refer to the municipal districts of Vienna.

Major structural, socio-economic transformations influenced the development of Vienna in the 19th and 20th century. This first of all refers to the rise of industrial production, which attracted an increasing number of people, transforming especially the municipality of Florisdorf from an area dominated by agricultural production into a district inhabited by the working class. It led to its incorporation as the 21st district in 1904. Until the end of the 19th century, **housing** was mainly provided by private landlords, hence also called the 'founders' building period. It resulted in a range of low quality apartments built for the working class, especially in the then existing suburbs, referring to the later on included districts 3 to 8 (Tammaru et al 2015:81). After World War 1st, the focus shifted to the provision of public housing to improve living conditions, and after World War 2nd to the reconstruction of the city. It led to the development of some of the characteristic municipal housing buildings distributed across the entire city, including the development of big green inner courtyards. Still today, Vienna has one of Europe's largest public housing stock, related to the social housing, equity and social mix policy pursued by the Social Democratic Party especially until the 70s and 80s of the 20th century, as already outlined previously.

In the 1970s to 1980s one of Vienna's most important recreational areas, the Donauinsel, slowly made its appearance. Initially crafted as an artificial island resulting from the excavation of the Danube for flood protection reasons, the 21 km long and 200 m width island between the new lake-like channel and the controlled river was soon subject to a range of landscape design efforts (Stadt Wien 2001:27-35). These were followed by an extensive, cooperative planning process, called the **Vienna Model**, which had as main focus the recreational use of the island and its accessibility to the urban population. Based on the model and subsequent evaluation processes, the city of Vienna has developed the approach of a cooperative planning procedure, which is adopted for defined urban development projects. Rather than focusing on competition and the development of a rather static masterplan, it envisages a larger cooperation process, involving different stakeholders for a step-wise development of a project (Stadt Wien/MA21 2015a).

As indicated previously, the closing of remaining gaps of the Vienna forest and meadow belt in the north-east of the city, as well as the introduction of green wedges connecting to the Danube island, was envisaged to be achieved by the acquisition of land as part of the urban development plan in 1994 (Stadt Wien 2001:47). However, the **deregulation and privatisation trend** of the 1990s limited the use of such an instrument. It also affected the social housing policy of the city, for example by shifting the focus from municipal housing to limited-profit associations (Gutheil-Knopp-Kirchwald and Kadi 2017-forthcoming). With regard to socio-economic aspects, from 2001 onwards the structural shift from manufacturing to business-related services has also gained momentum, and is assumed of not yet being concluded. As analysed by Tammaru et al (2015:83-84), it has led to some changes in the occupational structure of the work force towards professionals (from 11.8% of the labour force in 2001 to 22.2% in 2011) as well as service and sales workers (from 13.9% in 2001 to 19.3% in 2011) and away from elementary occupations (from 14.6% in 2001 to 8.9% in 2011). It has also contributed to an increase of the percentage of the work force graduated from university (from 13.5% in 2001 to 21 % in 2011), and still a large percentage of the work force has at least a degree from secondary school (Tammaru et al 2015:85). At the same time, the city's population is fast increasing, from a decrease down to 1.5 million in the 1980s up to 1.8 million inhabitants in 2016 and expected 2 million in 2030 (Stadt Wien/MA23 2016:60; Stadt Wien/MA18 2014:15).

Governance aspects and policy interventions

Following Cucca and Ranci (2016:251-252), the shaping of urban policy in European cities can be affected by two important dimensions:

1. *Political and legal vertical regulation*, indicating the extent to which urban policy is influenced by central regulation, including laws as well as direct political decisions
2. *Financial dependence on the state*, referring to the nature, amounts and limits of funding provided at national level

The two dimension define the degree of centralisation/decentralisation, or the regulative and financial responsibility of cities in defining their own policy. Depending on how distinct parameters come into play, they define different **multi-level governance settings**, according to the authors.

With regard to Vienna, it needs to be noted that it not only represents the capital of the federal republic of Austria, but at the same time is also one of its nine states ('Bundesländer'). It is hence entitled to respective **competencies**, including legislative as well as financial, and the councillors of the city of Vienna are part of the regional government. Spatial planning subjects are more or less exclusive competence of the Länder, and the same applies to issues of nature conservation. Hence, with regard to the related multi-level governance setting, it can be said that a relatively strong concentration of regulative and financial power takes place in Vienna. At the same time, it needs to be considered that the collection of public revenues is mainly regulated at the federal level, which for example in the case of income taxes are then re-distributed to the Länder and municipalities according to a defined key, including urban population size. A general housing tax is also levied on wages. At the same time, a range of welfare policies and the respective funding, including for example unemployment benefits, are still mostly centrally provided.

The following table provides an overview of **policy interventions affecting green and open space planning** in Vienna, and thus GI operationalisation. They have been grouped according to the extent to which they provide for a regulatory framework or operationalisation, represent conceptual and preparatory instruments, or have a financial, market-based, cooperative and contractual focus. In addition, it indicates to what extent the different urban policy interventions are embedded in rules and regulations or are influenced by instruments at the regional and national level.

Table 19: Policy interventions affecting green and open space planning in Vienna

National framework	Regional framework	Urban and local instruments
REGULATORY FRAMEWORK AND OPERATIONALISATION		
Building code and land use		
	• **Vienna building code, incl. land use plans** [BO für Wien]	
Environment and nature conservation		
	• Vienna Nature Conservation Law [Wiener Naturschutzgesetz] • Vienna National Park Law [Wiener Nationalparkgesetz] • Vienna Biosphere Reserve Law [Wiener Biosphärenparkgesetz] *and several legal acts related to area and object protection*	
• Environmental Impact Assessment [UVP-G 2000]		
Specific urban land use elements		
	• Allotment garden law [Wiener Kleingartengesetz 1996] • Tree protection law [Wiener Baumschutzgesetz]	

CONCEPTUAL AND PREPARATORY INSTRUMENTS	
• Austrian Spatial Development Concept	• STEP2025 Urban development strategy • **STEP2025 Green and open space concept**
Specific green and open space elements	
	• Programme Network Nature [Netzwerknatur] • Concept Structural Development Plan Agriculture- AgStep • Guidelines Urban Park Design [Parkleitbild] • Guidelines Public Space [Leitbild öffentlicher Raum] • Guidelines Sustainable Urban Squares [Urbaner Platz] • Guidelines Streets and Green [Straßengrün Leitbild] • Study Early Green – prioritised and temporary Green
(*legally required by the federal forest law* [Bundesforstgesetz])	• Forest Development Plan (Strategy)
Processes	
	• Guidelines on secure planning [Planen aber sicher] • Guidelines on the application of social area and functional analysis [Raum erfassen] • Handbook Participation • Masterplan Participation (Strategy)
FINANCIAL, MARKET-BASED, COOPERATIVE AND CONTRACTUAL INSTRUMENTS	
	• Cooperative planning procedure [Kooperatives Planungsverfahren]
	Legally framed by the Vienna building code law: • Urban development contests [Städtebaulicher Wettbewerb] • Urban contractual agreements / Public Private Partnerships [Städtebauliche Verträge / PPP]
Austria conference on spatial planning *(national, regional and local spatial planning coordination platform)*	

Interventions highlighted in **bold** represent the entry-point for the study of relevant documents in the appraisal process. Different instruments will be introduced in more detail in the subsequent appraisal chapters, where this is thought necessary. Additional information on governance aspects is provided in chapter D 2.1.2.2, when introducing key characteristics of survey respondents from the public administrations.

Outline of the study areas

What follows is a brief introduction of the study areas, which were selected for a more in-depth exploration to get additional insights on some aspects of the appraisal analysis with regard to the case study of Vienna.

Nordbahnhof: The transformation area represents a part of the urban development target area Donauraum/Leopoldstadt/Prater, and is located in 2/Leopoldstadt. After World War II, the area was mainly used for freight transport by the Austrian railway company OEBB, in combination with the Nordwestbahnhof located in the neighbouring district 20/Brigittenau. Over the last decade, step-by-step the railway company has transferred related activities to the south, opening up the two areas of roughly 130 ha for development. In 1994, a first development concept was released for the originally 85 ha large Nordbahnhof area (Stadt Wien/MA18 n.d./a). It led to a first development phase which affected more than half of it. This included amongst other the creation of the Rudolf-Bednar-Park in 2008, the construction of a first school campus and the creation of about 2,400 dwellings by a range of developers, ranging from housing associations (e.g. Gesiba) to those operating on the free market (e.g. STRABAG real estate) (Stadt Wien/MA21

2014c). In the south the Signa Holding GmbH is currently developing the Austria Campus, a business centre for up to 8,000 people to be completed by 2018. It is envisaged that the two other remaining development projects, a 2nd school campus and the 'open centre' project, shall be finalised by 2025. The latter represents one of the largest patches, consisting of 34 ha, and is expected to provide another 4,000 dwellings. It lays at the centre of the analysis and is introduced in more detail later on. Overall, it is expected that the Nordbahnhof area will provide roughly 10,000 dwellings by the end of 2025, and in combination with the development area Nordwestbahnhof offer housing for roughly 32,000 inhabitants.

Figure 47: Development area Nordbahnhof, Vienna – Transformations 2003, 2009, 2017

Source: based on Google Earth 7.1.8.3036. Vienna, 48°13'32.59 N, 16°24'55.14 O. Imagery 2003/2009/2017-03-31, Elevation 162m, Eye altitude 2.72 km: http://www.google.com/earth/index.html (accessed 2017/07/15)

Donaufeld: The study area Donaufeld is located in district 21/Florisdorf, between two main district hubs, Florisdorf and Kagran, and north of the 'Old Danube'. The roughly 60 ha large parcel represents one of the oldest but newly revived target areas of Vienna's urban development plan. It consists of small-parcelled agricultural land and individual, detached housing as well as some informal green on vacant land. A new development concept was released in 2010 (Stadt Wien/MA18 n.d./b), which was not subject to any larger participatory process. It was however accompanied by information campaigns and dialogue opportunities, for example at the information centre close to the site. The development is expected to occur in two phases. The first affects the east of the area, and will result into 2,000 dwellings until 2020, consisting of some subsidised housing. The second phase will follow later on, resulting into 4,000 dwellings. The two areas will be crossed from north to south by a green corridor of roughly 11 ha, to be designed 'naturally and landscape-like'. Central to the green corridor is a larger urban park of 0.8 ha, complemented by smaller parks and open spaces of overall 1.7 ha. Elements of ecological connectivity of roughly 0.6 ha will be added. Higher densities in relation to building types and gross floor area are expected for an 'event tape', crossing the area from west to east, and probably mainly consisting of commercial and retail area.

Figure 48: Target area Donaufeld, Vienna – Transformations 2004, 2011, 2017

Source: based on Google Earth 7.1.8.3036. Vienna, 48°15'03.38 N, 16°23'25.66 O. Imagery 2004/2011/2017-03-31, Elevation 161m, Eye altitude 2.47 km: http://www.google.com/earth/index.html (accessed 2017/07/15)

Heeresspital: The development project Heeresspital is situated in district 21/Florisdorf, close to Stammersdorf in the northern part of the urban development target area of 'Florisdorf/Achse Brünner Straße', which expands from the New Danube to the northern administrative border of Vienna (Stadt Wien/MA18 n.d./c). It has been targeted as an important development area for additional densification, linked to the existence of a historic town centre, the former railway station, which offers opportunities for expanding public transport, and the availability of important natural features for recreation such as the Marchfeldkanal and Bisamberg. The 20 ha large area of the Van-Swieten-Kaserne-Heeresspital is still used for military and medical purposes by the Austrian military. Already in 2009, a first development phase led to the construction of housing close to the Brünner Straße, north to the Heeresspital. In a subsequent step, the construction of additional housing between the Brünner Straße and the Marchfeldkanal on an area of 7 ha was envisaged, which temporarily was put to hold for nature conservation reasons. The main developers are the 'Kabelwerk Bauträger GmbH' and the 'Donau City Wohnbau AG', whereby the area has been sub-divided into different construction lots. The stated aim is nevertheless to deliver complementary projects, also in relation to the planned open and green spaces (Kabelwerk Bauträger GmbH n.d.).

Figure 49: Development project Heerespital, Vienna – Transformations 2003, 2009, 2017

Source: based on Google Earth 7.1.8.3036. Vienna, 48°17'37.01 N, 16°25'22.80 O. Imagery 2004/2011/2017-03-31, Elevation 164m, Eye altitude 1.26 km: http://www.google.com/earth/index.html (accessed 2017/07/15)

D 2.1.1.2 Munich

Key historical and natural developments

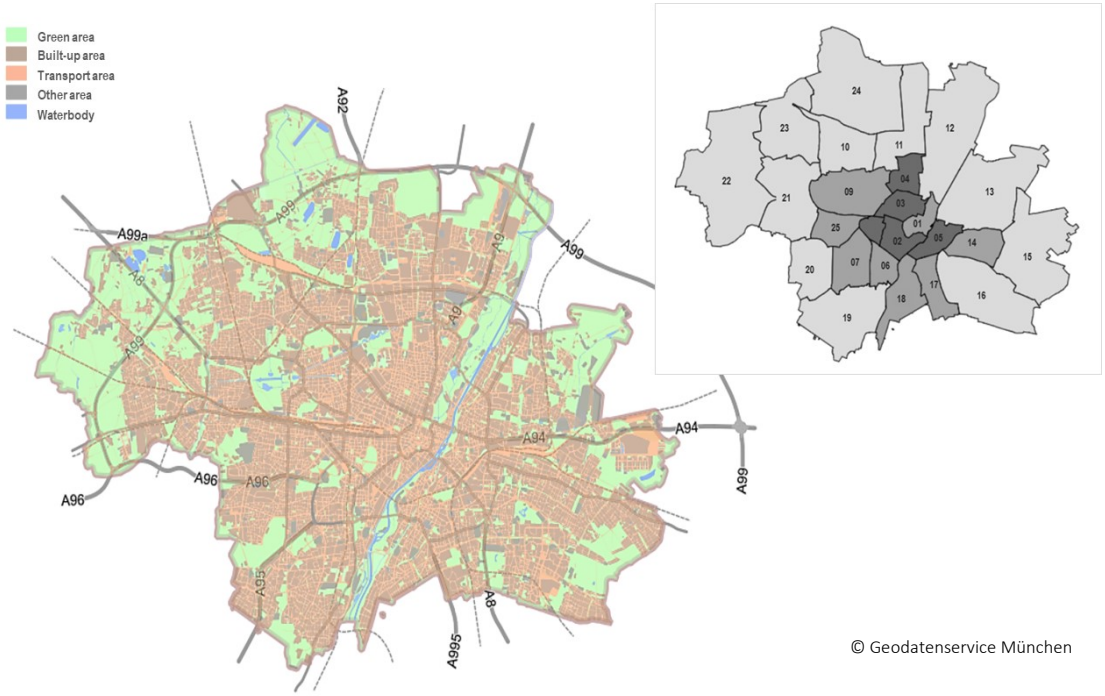
Munich is situated on a slightly elevated, pre-alpine plain of limestone gravel of glacial origin (Stadt München/Referat für Stadtplanung und Bauordnung 2014). The **Isar and Würm** river floodplains, limestone gravel terraces, and larger fen areas in the north of the city for many decades represented key constraining natural features and had major influence on Munich's development (Pauleit and Oppermann 2001, Pauleit 2016). However, in comparison to Vienna most of the original landscapes are lost or heavily fragmented, due to urban development, strong water regulation but also increasingly intensive farming and forestry. Remaining patches include natural to semi-natural areas of **fenlands** remaining in the north-east (e.g. Eschenrieder Moos), **heathlands** in the north (e.g. Fröttmaninger Haide) or restored fenlands in the east (e.g. Hüllgraben) (Stadt München/Referat für Stadtplanung und Bauordnung 2014; LÖK et al 1990 in Pauleit 2016).

Although located close to important trade routes, the city itself was relatively small until the 19th century, developing into densely constructed inner districts, complemented by royal residences (e.g. Nymphenburg, Residenz) and larger boulevards (e.g. Ludwigsstraße) when it became capital of the Kingdom of Bavaria. It led to the development of **several royal parks**, which today constitute important recreational areas, including the Nymphenburg and Schleißheim parks (Stadt München 2005). At the end of the 18th century, the opening of the Hofgarten, adjacent to the central Residenz, to the general public resulted in the subsequent

development of the publicly accessible **English Garden**. Based on the English landscape garden concept (see chapter C 1.1.1.2), it today represents one of the largest existing urban landscape parks worldwide.

Despite substantial economic and population growth, at the beginning of the 20th century the city of Munich still constituted a relatively small city, including roughly 500,000 inhabitants compared to the 2 million of the city of Vienna at the time (Stadt München/Referat für Stadtplanung und Bauordnung 2005). Increasing concerns regarding air pollution and health resulted in the promotion of **green front yard gardens**, as well as linear corridors and avenues connecting the different parks. The period between the two World Wars was also characterised by the development of **cooperative housing**, which included the expansion of tenant gardens. After World War II and especially in the 1960's, Munich's population significantly increased. The reconstruction efforts after the war, sought car-conformity and the expansion of the city all led to an increased disappearance of urban green. Only in the 1970s these developments were slowly accompanied by the creation of a range of **additional larger recreational areas**, including the Olympiapark and the Westpark. The most recent, larger addition is the landscape park of Riem in the east of Munich, finalised in 2005. The re-development of the former airport area to a new urban neighbourhood, consisting of residential, commercial and exhibition area, was accompanied by several biodiversity offset and compensation measures. These measures were used to create a landscape park that combines intensively used recreational area and restored ecosystems such as dry grasslands. Also important to mention is the restoration of the river Isar linked to flood management measures in the south of the city, finalised in 2011 and resulting in the creation of an important recreational hub.

Figure 50: The city of Munich – built-up land, transport infrastructure, urban green and waterbodies (translated & modified based on Stadt München 2011a and Stadt München 2011b)



Note: Larger map: Indicated numbers refer to key motorways.
Smaller map: Registered inhabitants per km² according to district 1 to 25. Dark grey = 10,899-15,706, middle grey=6,091-10,898, light grey=1,282-6,090

Some of the main socio-economic aspects defining the city of Munich today have already been indicated when describing the reasoning behind selecting the city as a case study for further cross-checks. To begin

with, this refers to the **multi-sectoral economic base** the city has been able to provide over the last decades, and defined as the 'Munich Mix' (Thierstein et al 2016:218). However, increasingly the focus is put on high-qualified jobs, especially with regard to sectors such as information and communication as well as innovation, research and development. Since the beginning of the 1990s, the share of those employed in the service rather than production sector has been steadily increasing (from 65.7% in 1990 to 83.8% in 2015) (Stadt München/Referat für Arbeit und Wirtschaft 2016:26). From 2011 to 2016, these increases especially impacted the financial service and assurance sectors (+55%), information technology (+40%) as well as architecture and engineering offices (+48%) (Stadt München/Referat für Arbeit und Wirtschaft 2017:7). Also Munich has experienced **growing population dynamics**. Subject to a slight stagnation until the end of the 1990s, the city's population increased from 1.25 million in 2000 to 1.54 million in 2016 (Stadt München/Statistisches Amt 2016), and is expected to increase up to 1.8 million until 2030 (Stadt München/Referat für Stadtplanung und Bauordnung 2017b:59).

Governance aspects and policy interventions

As outlined in chapter C 1.3.3.4 and highlighted in Figure 27, the German national spatial planning system in a more narrow sense consists of dedicated legal and formal instruments of an overarching and integrative nature. It involves framework legislation at the national level, broken down into regional spatial law, programmes and plans, and resulting in land-use and building plans at local level. If interpreted in a wider sense, these are complemented by respective sectoral laws, programmes and plans, for example with regard to issues of biodiversity and nature conservation. As such, the German spatial planning systems can be described as being embedded in a strong national framework, which aims at ensuring coherence (e.g. federal building code), followed by the operationalisation taking place at the Länder (e.g. Länder development programme) and local level (e.g. building plans), with strong intertwinements and reciprocal influence (Schmidt and Buehler 2007).

In this regard, it can be argued that the city of Munich is embedded in a much **more distinct multi-level governance system** than this is the case for the city of Vienna. This is also visualised in Table 20, which provides an overview of policy interventions potentially affecting green and open space planning in Munich, grouped according to the type of intervention (e.g. regulatory or conceptual) and level of integration (e.g. regional and national level). It shows that competences with regard to spatial planning as well as nature conservation are distributed across different levels. It however needs to be noted that the degree to which the city is able to rather autonomously intervene is strongly influenced by the policy area involved. According to Cucca and Ranci (2016:255), the multi-level institutional governance of the city of Munich is characterised by an **active subsidiarity setting**. It means that programmes set at the local level financially largely profit from federal financing, without substantial constraints and a certain level of flexibility. At the same time, it can also profit from strong regulatory power at the regional level, particularly where the regional government leaves municipalities a defined scope for manoeuvring regarding implementation measures. This much depends on the emphasis set in the respective Land development programme. It can be argued that especially economic growth strategies and programmes have profited individual municipalities, including those in the wider city-region of Munich. However, higher autonomy also bears risks regarding policy areas where rather than competition a high level of coordination is needed across multiple scales.

Table 20: Policy interventions affecting green and open space planning in Munich

National framework	Regional framework	Urban and local instruments
Regulatory framework and operationalisation		
Building code and land use		
• Federal Building Code [Baugesetzbuch BauGB]		• Building plan and integrated green space plan (legally binding)
• Federal Spatial Planning Act [Raumordnungsgesetz ROG]	• Bavarian Planning Act [Bayerisches Landesplanungsgesetz BayLplG]	*Based on regional plans:* • **Land use plans** (legally not binding)
Environment and nature conservation		
• German Nature Conservation Law [Bundesnaturschutzgesetz – BnatSchG]	• Bavarian Nature Conservation Law [Bayerisches Naturschutzgesetz – BayNatSchG]	*Based on landscape framework plans:* • Landscape plans (integrated in land use plans) • Green space plans (see above)
• Environmental Impact Assessment [Gesetz über die Umweltverträglich-keitsprüfung UVPG]		
Specific urban land use elements		
		Complementing building plan: • Tree protection ordinance • Open space design ordinance
Conceptual and preparatory instruments		
	Legally anchored in respective planning act and nature conservation law: • Land development programme and resulting regional plans • Landscape framework programme and landscape framework plan	• **Perspektive München** - Strategic urban development concept • Long-term settlement development (conceptual evaluation) • **Open space 2030** (conceptual evaluation) • Green space planning Munich 2005
Specific green and open space elements		
(legally anchored in nature conservation law and building code)		• Biodiversity offsetting concept (based on impact regulation)
		• Species and habitat protection programme • Biotope network concept
Processes		
		(addressed by 'Perspektive München')
Financial, market-based, cooperative and contractual instruments		
(legally anchored in federal building code)		• Urban contractual agreements and socially equitable land use [Städtebauliche Verträge & Sozialgerechte Bodennutzung]

Again, those interventions highlighted in **bold** represent the entry-point for the study of relevant documents in the appraisal process. Individual instruments will be introduced in more detail in the subsequent chapters, where this is thought necessary. Additional information on governance aspects is provided in chapter D 2.1.2.2, when introducing key characteristics of survey respondents from the public administrations.

D 2.1.2 Key characteristics of survey respondents

Although in the end the thesis did not undertake a statistically relevant analysis, especially in looking for correlations between variables describing respondents and their living environment and the provided responses, some key aspects need to be outlined, to be taken into consideration with regard to the interpretation of the results. The following analysis of key characteristics of survey respondents is also expected to provide inspiration for the development of more specific hypotheses to be in future statistical analysis and research.

As indicated when outlining format and running of the surveys (see D 1.2.3.2), responses have been collected by using two distinguished online tools. Constant information on the number of overall responses n=x shall help in clearly identifying diverging samples, and guide the understanding of the results.

D 2.1.2.1 Individuals of the Vienna general public

The following section provides an overview of the main characteristics describing individual representatives of the general public who have replied to the survey undertaken as part of the appraisal process. These refer to the following two main areas:

1. Socio-demographic variables
2. Variables describing living conditions

It needs to be noted that out of the maximum of overall 32 responses, which have been considered for the analysis, 25% did not provide any information on the above variables. Albeit a small sample, the outline of the variables will be used to introduce comparable, relevant existing statistical data, indicating the extent to which respondents can actually be considered representative or not of the Vienna population.

Socio-demographic variables

With regard to **gender**, a majority (75% out of n=24) was male. Table 21 shows that a more diversified representation of **age** structures was achieved, although especially those under 18 and those over 65 years old were under-represented.

Table 21: Socio-demographic variables describing participants of the Vienna general public (GP) survey

Age (n=25)		**Employment status** (n=25)		**Net income** (n=25)		**Education** (n=25)	
<18	0%	Full-time regularly employed	76%	< 1.000	0%	Compulsory general education	0%
18-29	4%	Part-time regularly employed	16%	< 1.800	36%	Vocational training/school	4%
30-39	36%	Occasionally/irregularly employed	4%	< 2.500	28%	General secondary school (AHS),	
40-49	40%	Marginally employed	0%	< 4.000	24%	vocational secondary school (BHS),	
50-65	20%	Not working	4%	> 4.000	8%	college	20%
> 65	0%			not specified	4%	University, university of applied	
						sciences, academies	76%
						Other educational qualifications	0%

Note: The table includes percentages, calculated based on n number of responses given to a selected variable by the Vienna general public (GP)

As regards the **employment status**, most people indicated to be regularly, full-time employed and only a small part to be either not working or to be only marginally employed, referring to employment of very short duration and a defined income cap, e.g. mini-jobs. This is also reflected in data provided on **net income**, referring to wages and salaries, pensions as well as social benefits in cash after deducing taxes. A

large majority specified a net income above €1,000, with more than 1/3 earning between €1,000 and €1,800 and 1/4 having a net income between €2,500 and €4,000, suggesting that especially groups with what might be defined as a decent income replied to the survey. In addition, a vast majority of respondents (76%) had a university degree with regard to the highest level of **education** achieved.

Further aspects of the survey to characterise survey respondents refer to the **size of households**, which most often included 2 or 4 persons (mean=2.6; n=25), and either none or 1 child (mean=0.71; n=21). In addition, survey respondents seem to be distributed over most of the 23 **municipal districts** of the city of Vienna (n=25). This especially includes 2/Leopoldstadt (8%), 9/Alsergrund (12%), 19/Döbling (12%), 22/Donaustadt (12%) as well as those living outside of Vienna, but working in the city (16%). Most of the listed districts, with the exception of Donaustadt, offer a large density of 19th century buildings or low density, semi-detached housing, which used to be belong to bourgeois residents or the upper-class (Tammaru et al 2015:89). Today, they represent districts assumed to be slightly dominated by middle-income to high-income classes with annual average net income employment ranging between roughly €26,000 (19/Döbling) to €23,000 (9-Alsergrund) and €20,000 (2/Leopoldstadt) (Stadt Wien/MA23 2016:151). Municipal districts traditionally described as working-class districts, and also today considered to include higher shares of population groups with lower incomes and higher unemployment rates, are only minimally represented, referring particularly to 10/Favoriten, 20/Brigittenau as well as 15/Rudolhsheim-Fünfhaus.

As a summary, a vast part of respondents can be characterised as male, aged between 30 and 49 years, in the prime time of employment, with a decent income and usually well-educated. As this became already visible during the running of the survey, it was decided that spontaneous interviews during site visits will particularly target groups that might correspond less to these characteristics (e.g. female, below 18 or older than 65, unemployed, low income), to the extent this was achievable.

Variables describing living conditions

Besides variables describing socio-economic and demographic characteristics of the respondents, a range of questions aimed at getting information on living conditions, due to their potential important impact on some of the responses, for example with regard to needs attributed to urban green space/nature. To begin with, they include some basic parameters characterising housing, such as net dwelling area in square metres, age of building, housing typology and ownership status. Additional information was collected on aspects such as housing conditions, access to private or semi-public and public urban green/nature or open space, as well as features describing the immediate neighbourhood.

With regard to the **net dwelling area** (m^2), respondents (n=24) distribute across different ranges, from below 50 m^2 (13%), to above 110 m^2 (29%). Higher square metre ranges are especially well represented, with many respondents indicating a net dwelling area between 90 to 110 m^2 (25%) and the most frequently indicated net dwelling area amounting to 100 m^2. According to census data, the city of Vienna accounts an overall average net dwelling area of 72 m^2, with particularly high average square metres in 1/Innere Stadt (104 m^2) and 13/Hietzing (88 m^2), and the lowest numbers to be found in 20/Brigittenau and 15/Rudolfsheim-Fünfhaus (61 m^2) (Stadt Wien/MA23 2016:33). With regard to **ownership status**, roughly 50 % (n=24) are tenants, 33% own their dwelling and 17% have another ownership status due to usufruct rights or membership in a building cooperative. Compared to census data on tenure status of dwellings (main residences) presented in Table 18, dwelling ownership is to some extent overrepresented in the survey compared to average distributions in the city. In Vienna, higher percentages of ownership are considered

to particularly affect newly constructed buildings, as indicated by Knopp-Kirchwald and Kadi (2017forthcoming). It can be argued that this is supported by information provided by the respondents (n=24) on the **age of buildings** in which they reside, with 42% of respondents' housing having been constructed in 2001 or after, although followed by a large share residing in older, 19th century buildings (25%).

The question on **housing types** revealed that 53% of respondents (n=24) live in buildings holding between 3 to 10 dwellings and up to 3-5 floors, followed by buildings with more than 10 dwellings but below more than 9 floors (21%) and the same share living in a detached house. The latter might have been likely influenced by a distinct percentage of respondents living outside the city, if one assumes that this comes along with a higher probability of owning a detached house. According to census data (see Figure 51), in 2011 up to 72% of the urban population in Vienna lived in buildings including more than 11 dwellings. This indicates that those living in smaller entities are slightly overrepresented in the survey.

Figure 51: Buildings according to dwellings (based on 2011 Statistic Austria census and translated from Stadt Wien/MA 23 2015:13)

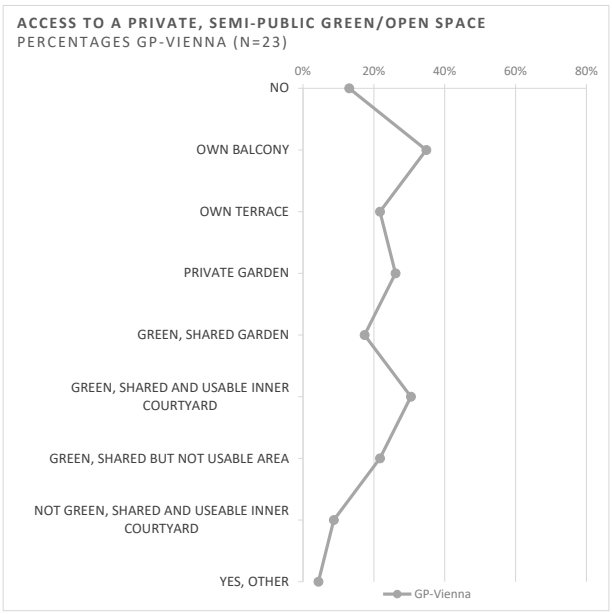
Dwellings in buildings	buildings	in %	population	in %
VIENNA	164,746	100	1,714,227	100
1 dwelling	86,415	52.5	156,436	9.1
2 dwellings	6,520	4.0	22,333	1.3
3 to 5 dwellings	7,843	4.8	56,928	3.3
6 to 10 dwellings	16,844	10.2	236.757	13.8
11 to 20 dwellings	24,966	15.2	636,124	37.1
21 and more dwellings	11,249	6.8	596,929	34.8
No dwelling	10,909	6.6	8,720	0.5

Asked to what extent certain **housing conditions** apply to the respondent's dwelling, the average respondent (n=24) stated that not necessarily exterior facades or community areas are in need of renovation (respectively 71% and 67% replying with no). Even less are there signs of vandalism or of mold affecting the dwelling (respectively 88% responding with no), indicating a generally good housing quality. Exceptions are higher percentages of references to problems of high-noise permeability (22% saying yes). A generally good housing quality of participants can also be assumed if comparing responses to statistical data on housing problems by inhabitants of the city of Vienna. In 2015, for example roughly 26% felt bothered by noise from neighbours and from the street, nearly 18% indicated to have problems with mold and up to 27% stated to face acts of vandalism, based on a representative sample size survey in the framework of EU-SILC, Eurostat's Statistics on Income and Living Conditions (STATISTIK AUSTRIA 2016b:58).

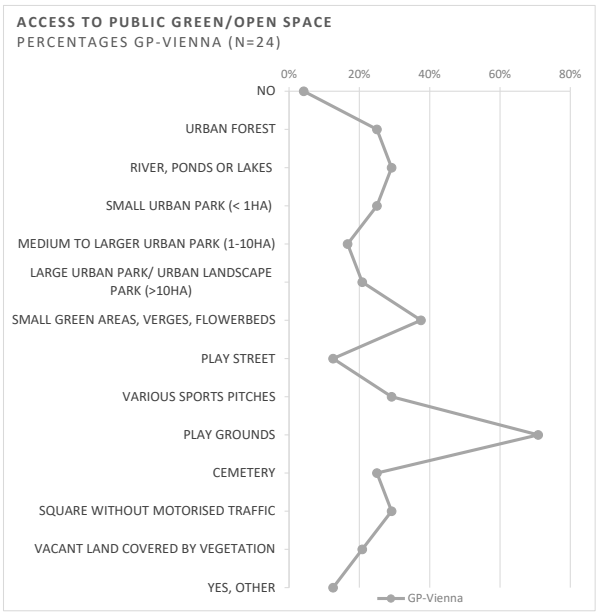
Asked about their **access to private or semi-private green/open space**, a large percentage of survey participants replied to have access to an own balcony (35%), followed by those with a green, shared and usable inner courtyard (30%) and those with access to a green, shared garden or private garden (each 22%) (see Figure 52a). According to STATISTIK AUSTRIA (2016b:28), 47.1% of all those with main residence in Vienna have access to a balcony, terrace or similar features, and 4.8% have access to a private garden. With regard to **access to public green/open space** (see Figure 52b), a very high percentage of 71% states to have play grounds situated in the immediate neighbourhood, defined as within approximately 150 metres or 5 minutes of walking distance. This is followed by the accessibility to small patches of green space, verges and flowerbeds (38%), and subsequently squares without motorised traffic, various sports pitches as well as river, ponds or lakes (29% respectively). Other publicly accessible spaces mentioned my respondents include vacant, former railway land; vineyards and mixes of forest and agricultural land.

Figure 52: a) Do you have access to a private or semi-public green or open space? b) Is there a public or publicly accessible green and open space in the immediate neighbourhood of your dwelling?

a)



b)



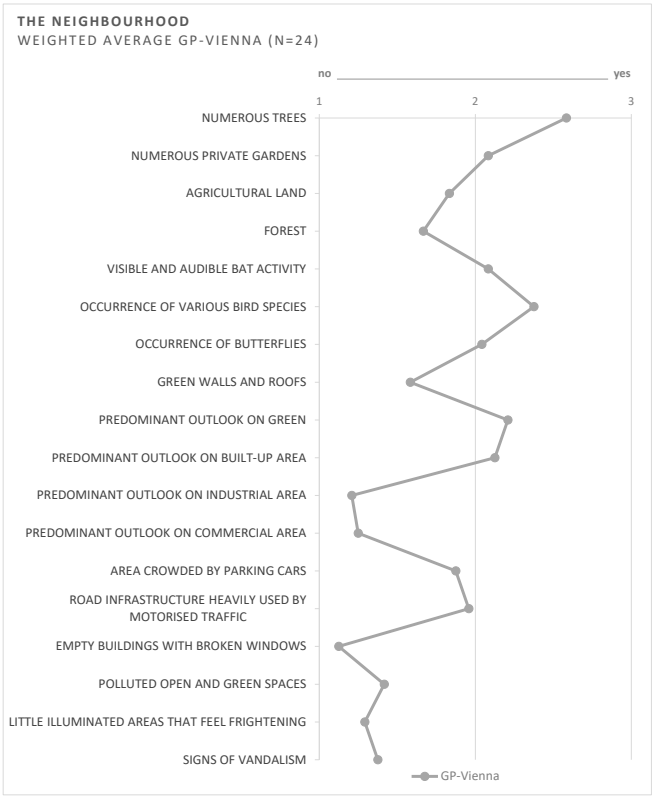
Note: Figures refer to percentages calculated based on n number of responses given to a selected variable by individuals of the Vienna general public (GP). Participants were able to provide more than one response. Examples of size comparisons were provided related to question b) (e.g. Wiener Prater 600 ha, Burggarten 4 ha). The immediate neighbourhood was defined as within approximately 150 metres or 5 minutes walking distance.

Survey participants were also asked to provide information on what selected features apply to the immediate neighbourhood of the area surrounding their dwelling (see Figure 53). The provided list of features was developed based on work undertaken by Dunstan et al (2005) with regard to the development of an observation tool to assist with the assessment of urban residential environments. The tool consists of 28 items referring to physical incivilities (e.g. broken windows, vandalism), territorial functioning (e.g. poor garden maintenance), defensible space (e.g. dense properties), natural environment (e.g. predominant outlook not green) and miscellaneous (e.g. industrial outlook) (Dunstan et al 2005:298). For the questionnaire, different items were pooled (e.g. empty buildings with broken windows) and partly more neutrally reframed (e.g. predominant outlook green) due to the initial items' focus on deprivations. A range of features were also added to include not only visible but also audible, ecological features (e.g. bird and bat activities, occurrence of butterflies).

The results indicate a stronger exposure of respondents to features such as numerous trees and the occurrence of various bird species, and show lighter tendencies towards a predominant view of green, including numerous private gardens as well as visible and audible bat activities and occurrence of butterflies (see Figure 53). This is closely followed by the feature of a predominant view on built-up area, partly characterised by road infrastructure heavily used by motorised traffic and area crowded by parking cars. Predominant outlooks on industrial and commercial area, empty buildings with broken windows, polluted open /green spaces, weakly illuminated areas that feel frightening as well as signs of vandalism seem to be rarely the case. Also green roofs and walls, and forests seem to be less often visibly characterising the neighbourhood of the respondents.

An interesting aspect noted during the development of the questionnaire is the existing lack of overarching statistical indicators addressing the subject of living conditions with regard to urban green beyond variables such as size (e.g. m^2 per capita) and physical closeness to public green (e.g. in m). Although for example the EU-SILC database collects interesting information linked to living and housing conditions and environmental burdens (e.g. noise and air pollution) based on standardised representative surveys, information addressing for example private green and open spaces or environmental features of the neighbourhood is only available to the extent it focuses on distinct deprivations (e.g. vandalism). This will be further discussed when looking at conditions and needs characterising the case studies and the availability of relevant indicators (see chapter D 2.2.1).

Figure 53: To what extent does the following apply to the immediate neighbourhood of your dwelling?



Note: The figure includes weighted averages, calculated based on n number of responses provided to no (1), partly (2) and yes (3) for the listed variables. The immediate neighbourhood is defined as within approximately 150 metres or 5 minutes walking distance.

To summarise, the living conditions of the average respondent, referring to housing conditions, access to the green/open spaces and features of the immediate neighbourhood, can be described of generally good quality, although including some perceived, problematic aspects. This for instance refers to noise permeability with regard to housing conditions, and partly exposure to road infrastructure heavily used by motorised traffic and area crowded by parking cars affecting the immediate neighbourhood. The average respondent has at least access to a private balcony or a shared, green and usable inner courtyard. He or she has also very likely an outlook on numerous trees, with a predominant view of green, and is aware of the occurrence of various bird species. This is followed by those respondents who have a predominant outlook on built-up area, containing small green patches with likely accessibility to playgrounds. It will be important to keep this image of the average respondent in mind when looking at the further results of the survey.

D 2.1.2.2 The public administrations of Vienna and Munich

Variables to describe key characteristics of respondents from the public administrations of Vienna and Munich were limited to information on the administrative groups or departments. The online survey aimed at gaining insights from a range of municipal representatives, and not only from those belonging to specific groups or departments such as urban planning or environment.

Table 22 shows that this was only partly achieved for the public administration of Vienna. The small group of respondents mainly belongs to the administrative group of 'Urban Development, Transport, Climate Protection, Energy and Public Participation' (n=4) and 'Environment and Vienna Public Services' (n=2).

The various institutions of the public administration of the city of Vienna, which compose the 'Magistrat', are organised according to administrative groups ('Geschäftsgruppen'). They are the responsibility of a constituted councillor, which is elected by the municipal council ('Gemeinderat'). Municipal council representatives are members of the urban senate ('Stadtsenat'), but do not necessarily have to lead one of the administrative groups. Since 2015, the political parties of the Social Democratic Party of Austria (SPÖ) and the Green Party (Die Grünen) form a coalition that holds the majority of seats of the municipal council and regional government (54 out of 100) (Stadt Wien/MA23 2017). The administrative groups consist of distinct departments called 'Magistratsabteilungen' (MA). The administrative group of Urban Development for example is currently headed by Maria Vassilakou of the Green Party, and includes MAs such as MA18 Urban Development and Planning, MA19 Architecture and Urban Design, or MA21 Urban District Planning and Land Use. The councillor Sima Ulli, also of the Green Party, is responsible for the administrative group of Environment and Vienna Public Services. MA22 Environmental Protection (including nature conservation), MA42 Urban Park Management, MA45 Vienna Water or MA49 Forestry and Agriculture Services all form part of the administrative group. Issues related to Housing, Residential Construction and Urban Renewal are addressed by MAs such as MA69 Real Estate Management, MA25 Urban Renewal and the Vienna Fund, and are directed by Michael Ludwig of the SPÖ. The administration group of Health Affairs, Social and Generations for example include MA24 Health and Social Planning as well as MA40 Social Affairs, Social and Health Law, and is headed by Sandra Frauenberger (SPÖ).

Table 22: Respondents according to public administration groups and departments

Vienna public administrative groups (n=7)		Munich public administration departments (n=11)	
Urban Development, Transport, Climate Protection, Energy and Public Participation	57%	Department for Health and Environment	37%
		Department for Municipal Affairs	27%
Environment and Vienna Public Services	29%	Department for Planning and Building Regulation	18%
Health, Social Affairs and Generations	14%	Department for Construction	9%
Women, Education, Integration, Youth and Personnel	0%	Department for Social Services	9%
Finance, Business and International Affairs	0%	Department for District Administration	0%
Culture, Science and Sports	0%	Department for Culture	0%
Housing, Residential Construction and Urban Renewal	0%	Department for Organisation and Personnel	0%
		Department for Labour and Economic Affairs	0%
		Department for Education and Sports	0%
		Department for Financial Services	0%

A more diversified group of representatives of the public administration of Munich participated in the online survey (see Table 22). More than 1/3 of survey respondents are from the Department for Health and Environment (n=4), followed by the Department for Municipal Affairs (n=3) and the Department for Planning and Building Regulation (n=2). Three out of the overall 14 survey participants did not provide any information on their affiliation.

The public administration of Munich consists of 11 departments, the so called 'Referate'. They are led by head of divisions, which are usually full-time public administration officers ('Dezernent/in'), periodically nominated by the council consisting of elected, voluntary councillors. The departments can also be headed by elected councillors. This is for example the case for the Department for Labour and Economic Affairs, which is directed by the 2nd mayor of the city of Munich. Since 2014, the political parties of the German Social Democrats (SPD) and the Bavarian Christian Democrats (CSU) form a coalition that holds the majority of council seats (48 out of 80) (Stadt München 2017a). Different to the city of Vienna, the council does not

have any legislative power, and can only release executive rules according to existing regional (in this case the state of Bavaria) and national law. The Department for Health and Environment is mainly responsible for issues such as sustainable development, air emissions, noise, water and soil, climate as well as nature conservation. The Department for Municipal Affairs includes urban forest management, real estate management, agricultural estates or land valuation. The Department for Planning and Building Regulation is the main unit responsible for urban development and planning, including housing, transport planning, urban renewal as well as green and open space planning. The Department for Construction is usually responsible for the actual development, including with regard to urban green such as the development of parks, as well as other infrastructure projects.

It is important to take this particularities into account when looking at the survey results. This especially relates to issues of governance capabilities, as the scope of action by the public administration of Vienna can be deemed by far larger due to its legislative competencies. This also constitutes an interesting variable to consider in the appraisal analysis, especially in light of calls for increasing financial and political capacities to be attributed to cities.

D 2.2 Lessons learnt from Vienna, including a cross-check with Munich

The chapter is structured according to the four identified appraisal areas, concluding on lessons to be learnt by applying the individual appraisal questions to the case study of Vienna and Munich for cross-verification. At the basis of the analysis lays the first sub-chapter on the relevance of identified conditions and needs, and each of the following sub-chapters partly builds on the previous one, ending with conclusions on the overall consistency of the envisaged outcomes. The individual sub-chapters include an outline of the findings with regard to the distinct appraisal questions (AQ), and end with a synthesis of the judgment and conclusions on rationales and areas of intervention. The different sections are usually structured similarly. At the very beginning, they introduce questions and sub-questions guiding the analysis, and briefly summarise what is assumed by the conceptual and action model. It continues with findings of the document analysis mostly for the city of Vienna, but continuously taking a glance at Munich in separate boxes. As mentioned previously, key conceptual and preparatory policy interventions related to green and open space planning have been identified are used as an entry-point to the document analysis. Where available, further insights from the online survey addressing the public administrations of Vienna and Munich and individuals of the Vienna general public are provided. This is complemented by in-depth information from interviews and on-site visits, which especially occurred in Vienna. Deviations from this structure are likely where thought necessary to navigate through the reasoning behind the appraisal.

With regard to the **terminology**, it is important to add the following. '**Urban green/nature**' has often been used to describe the ecological space provided by GI, especially in the framework of the online survey and in relation to conditions and needs (sub-chapter D 2.2.1). It proved to be the most inclusive and familiar definition for representatives of the general public during the testing of the initial questionnaire. When asked what features the term would include, different elements from urban parks (mostly associated with green) to water elements as well as natural areas (mostly associated with nature) were mentioned by different interview partners. It was hence applied throughout the questionnaires to refer to a range of GI elements.

The term **policy objectives** is often used to describe distinct, envisaged and to be reached achievements in defined thematic policy areas. In the framework of new public management, it is often argued that policy objectives should be SMART (Specific/ Measurable/ Accepted/ Realistic/ Timebound). However, the question remains to what extent such a rational and efficient approach captures the reality of a less rationalist policy world dealing with complex social, ecological and economic processes (see chapter C 1.3.2). Although underlining the importance of such objectives to support evaluation and monitoring, in the framework of the thesis, and especially in sub-chapter D 2.2.2, the understanding of policy objectives is broadened, and interpreted as representing stones in a mosaic of what is the image of the 'ought-to-be', in short components of the pursued vision.

In the previous chapters, **policy instruments** were introduced as means to achieve certain policy objectives, including spatial planning instruments. Subsequently the focus shifted from policy instruments to policy interventions. Given the interest of the thesis in all activities that have a spatial impact, ranging from designations to institutional alignments, the term **policy interventions** was applied, in particular in sub-chapters D 2.2.2 and D 2.2.3. They refer to means that impact fabric and disparities of the ecological, built-up physical and socio-economic space more broadly, including visions, objectives, governance processes and instruments. Of specific interest are those that affect GI quality and status as well as governance capabilities. In addition, the use of the term policy interventions also aims to signal that not necessarily the focus is put

on individual instruments and their individual repercussions, but on the different processes involved. This also affects the understanding of **outcome**, as it does not necessarily refer to direct and indirect impacts individually arising from policy interventions. It rather addresses the envisaged nature of the urban environment produced, as suggested by UN Habitat (2009:70). **Rationales and areas of intervention**, which conclude the individual chapters refer to deduced reasons or explanations for action in a certain field or considerations to be taken into account regarding the further development of the conceptual and action model.

Finally, it needs to be considered that not necessarily those terms newly introduced by the thesis (e.g. ecological space, GI) were used in the online survey and interviews, but rather the most commonly known terminology (e.g. environment, urban green and open spaces). This resulted in some of the terms being used interchangeably in the following sub-chapters, but additional clarifications are provided wherever this is important.

D 2.2.1 The relevance of conditions and needs

The following chapter focuses on the relevance of issues laying at the basis of the conceptual and action model. It starts by looking into issues which describe the fabric of the ecological space provided by GI (e.g. quantity of urban green/nature), potential disparities (e.g. distribution of urban green/nature), important sought-after quality characteristics and related needs as well as the applied monitoring. This is followed by an analysis of how its fabric and disparities are linked to those of the socio-economic space (e.g. segregation) and ecological space more widely (e.g. quality of life) as well as the built-up physical space (e.g. housing conditions). It ends with conclusions on identified rationales and areas of intervention and resulting relevance revealed by the comparison The analysis as well as the **structure of the chapter** is hence guided by the following questions and related sub- questions:

Appraisal guiding questions and sub-questions
(1) What current situation is revealed with regard to the *fabric and possible disparities of the ecological space provided by GI*? – What relevant *conditions and transformations* are stated? – What are existing perceptions on important *quality characteristics and needs*? – Which *monitoring and indicators* have been applied? Which are missing?
(2) What *interlinkages* are identified between the ecological space provided by GI and the *fabric and disparities across other space dimensions*? – What about the *socio-economic space and economic inequalities* in particular? – What about the *ecological space more broadly* and the *built-up physical space*?
(3) To conclude, what rationales and areas of intervention and hence *relevance* does the comparison of conditions, transformations and needs reveal?

The following overview summarises assumed key conditions, transformations and needs targeted by the conceptual and action model. They will guide the comparison to judge the relevance of underlying issues.

Conceptual and action model – Assumed underlying key conditions, transformations and needs
Fabric and disparities of the ecological space provided by GI • Natural and semi-natural land features of high biodiversity value dispersed and isolated elements in a city, concentrated in some areas, lacking in others, and characterised by deteriorating status of high proportion of habitat and species • Continuing disappearance of informal urban green areas, e.g. abandoned railway sites, and land not considered of high (biodiversity) value, e.g. agricultural land • Potentially increasing quantity and quality of private urban green areas, concentrated in distinct areas • Distribution affected by focus on preferences to determine value, rather than 'functionings', related to the fulfilment of basic human physical, psychological and psycho-social needs as well as the realisation of ecological space for species and habitats conservation
Interlinkages between fabric and disparities of different spaces • Above developments contributing to ecological space disparities, referring to the unequal distribution of ecological 'functionings' such as clean air, noise abatement or habitat functions, enjoyed in some part of a city and of limited or enhanced access to certain population groups • Potentially influenced by dynamics of socio-economic space disparities, especially vertical disparities such as income and wealth, and urban land and housing capital in particular, bearing the risk of working as a barrier to the overall access to ecological space, including GI • Linked to built-up, physical space conditions and transformations such as construction and densification efforts due to an envisaged increase of the urban population, which potentially promote dynamics of ecological space disparities (e.g. caused by high-density housing and building typologies)

D 2.2.1.1 Fabric and disparities of the ecological space provided by GI

Relevant conditions and transformations

Some of the most important historical developments and related transformations of the urban landscapes of the city of Vienna and Munich were already introduced when providing a first description of the case studies. They give an indication of the baseline to consider when looking at the fabric and disparities of the ecological space provided by a city's Green Infrastructure. Regarding the city of Vienna, entry-point to the document analysis on relevant conditions and transformations was its g*reen and open space thematic concept* (Stadt Wien/MA18 2015a). It forms part of the current Vienna urban development plan 'Stadtentwicklungsplan 2025' (STEP2025), which guides the city's transformation until 2025, including on renewal processes affecting the densely built inner city, urban growth impacting its fringes and the development of networks to connect different neighbourhoods (Stadt Wien/MA18 2014).

The thematic concept hints at the richness and high-quality of the city's open and green spaces, to which its unique natural features as well as important policy decisions and milestones have contributed. Its natural features are impacted by the diversity of its five cornerstone landscapes: Bisamberg, Marchfeld, Wienerwald, the Danube floodplain and its terrace landscapes. Important policy decisions and milestones include previously mentioned interventions such as the forest and meadow belt finalised in 1995, the national park Danube floodplains enabled in 1996 or the creation of the UNESCO biosphere park Wienerwald in 2005. The thematic concept does not provide any concrete numbers on the quantity of green space and its distribution. However, details are provided by separate information on actual land-use ('Realnutzungskartierung'), showing that up to 45.1% out of the total area can be classified as green (see chapter D 2.1.1 on historical and natural baseline and Table 18). The categories of the actual land use data used to classify urban green, their overall share and their distribution across different municipal districts are presented in Figure 54.

Figure 54: Vienna's urban green spaces according to land use types and districts (translated from Stadt Wien/MA23 2016:15, based on data by MA41)

Municipal district	Total	Green area				
		Agriculture	Urban parks	Forest	Meadows	Sport & recreational area
	ha					
Wien	**18.691,8**	**5.737,6**	**1.737,5**	**8.084,0**	**2.344,9**	**787,9**
1. Innere Stadt	**27,3**	–	27,3	–	–	–
2. Leopoldstadt	**673,8**	14,8	96,6	295,6	72,6	194,3
3. Landstraße	**108,0**	2,3	78,2	4,0	11,3	12,2
4. Wieden	**17,7**	–	12,1	–	–	5,6
5. Margareten	**8,8**	–	8,5	–	–	0,4
6. Mariahilf	**3,0**	–	3,0	–	–	–
7. Neubau	**3,7**	–	3,7	–	–	–
8. Josefstadt	**2,0**	–	2,0	–	–	–
9. Alsergrund	**22,0**	–	20,7	–	–	1,3
10. Favoriten	**1.424,6**	892,2	210,6	113,9	114,6	93,4
11. Simmering	**934,4**	421,7	304,6	103,2	77,8	27,1
12. Meidling	**111,3**	5,6	79,2	1,5	16,9	8,2
13. Hietzing	**2.648,0**	23,1	169,0	2.064,7	372,8	18,3
14. Penzing	**2.025,3**	33,4	84,4	1.674,9	207,0	25,5
15. Rudolfsheim-Fünfhaus	**34,0**	–	23,6	–	–	10,3
16. Ottakring	**263,3**	9,9	28,9	197,9	11,4	15,1
17. Hernals	**602,5**	20,0	26,5	468,9	61,0	26,1
18. Währing	**173,4**	3,8	51,4	91,1	18,6	8,5
19. Döbling	**1.194,2**	353,8	65,4	644,6	106,6	23,8
20. Brigittenau	**51,0**	–	31,3	2,4	7,0	10,3
21. Floridsdorf	**1.808,7**	1.119,8	132,3	261,9	221,0	73,7
22. Donaustadt	**5.569,8**	2.649,0	201,9	1.630,6	894,9	193,5
23. Liesing	**985,2**	188,2	76,4	528,8	151,5	40,2

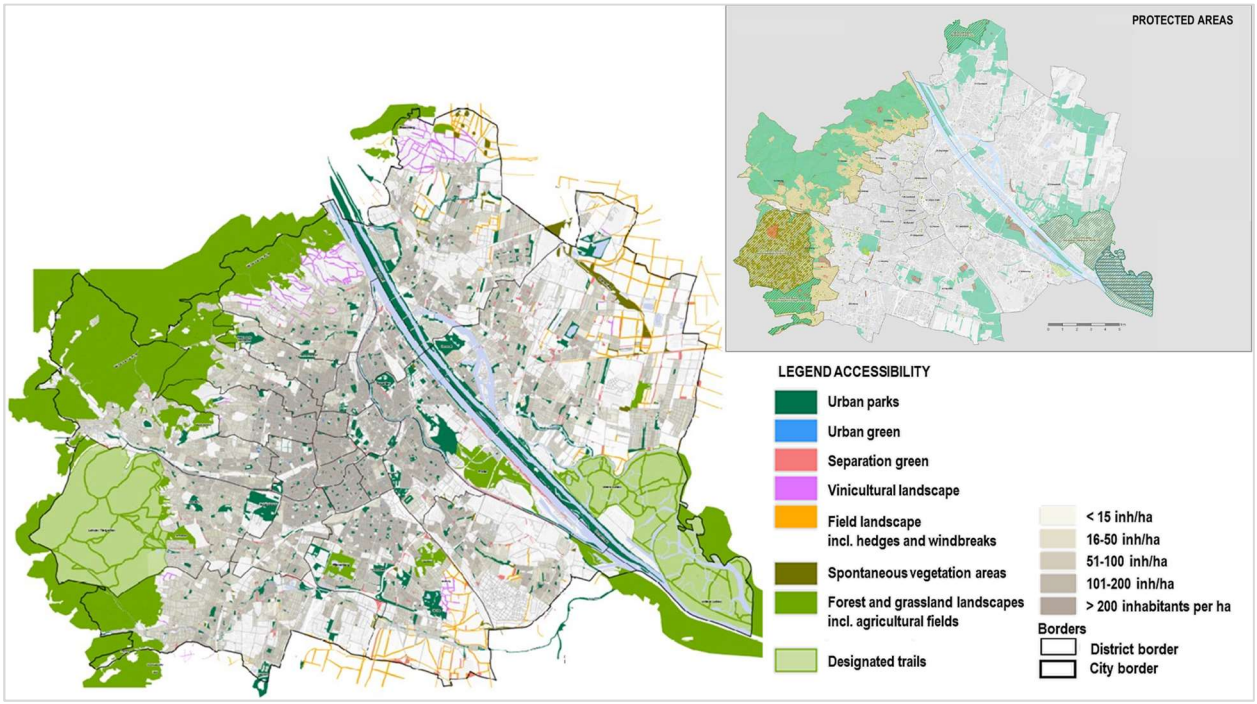
The numbers re-confirm of what was already partly illustrated in Figure 46. Inner, more densely constructed and populated districts, which engulf the first and historically central district 1/Innere Stadt from northwest to southwest have lower shares of green space. This for example includes 4/Wieden, 5/Margareten, 6/Mariahilf, 7/Neubau, 8/Josefstadt 9/Alsergrund and 15/Rudolfsheim. Inner districts in the east are either an exception as presenting larger shares of green linked to historically developed parks (e.g. 2/Leopoldstadt and landscape park Wiener Prater) or as having only a rudimentary amount of green and being dominated by other land use types (e.g. 20/Brigittenau and transport infrastructure). The main difference between outer districts in the north to west (e.g. 19/Döbling or 13/Hietzing) and those situated in the east (e.g. 21/Florisdorf and 22/Donaustadt) also lies in the land use types they provide, mainly made up of urban forests regarding the first and agricultural land use regarding the latter.

This distribution is also made evident in the map on the accessibility of Vienna's urban green spaces in Figure 55. It was produced as part of an analysis on **green space accessibility** carried out to inform the development of the Vienna *green and open space thematic concept.* It includes all green spaces that are free and of common public access, independent of issues of property rights. As such the accessibility can also refer to accessible trails, for example with regard to privately owned vinicultural fields or publicly owned protected areas. In addition, information on the number of inhabitants per ha is included, to make accessibility and population density comparable. The map emphasises the limited accessibility of agri- and vinicultural landscapes especially situated in the east (districts 21 and 22) and south (district 10), the broader accessibility to urban forests delineating the north (e.g. district 19), and the importance of more centrally located recreational, former royal parks (e.g. districts 1, 2 and 3).

It needs to be noted that the map does not consider actual use numbers, which can be influenced by commuters and tourists visiting the city and influence the overall availability of green space. It also does not refer to other privately or community owned green such as private gardens, allotment gardens and also other areas not necessarily accessible for recreational use (e.g. cemeteries). In addition, the map only includes limited information on green vacant land, although some information on accessibility to areas with spontaneous vegetation is provided (e.g. Nordbahnhof in district 2/Leopoldstadt). It also remains unclear to what extent the map will continuously be updated. This also applies to a complementary map which was

developed to inform on the safeguard of minimum distance standards between publicly accessible green area and residential housing, which are provided by the Vienna *green and open space thematic concept* and will be discussed in more detail in sub-chapter D 2.2.2.

Figure 55: Vienna green space accessibility (left) and distribution protected areas (right) (translated & slightly modified based on Stadt Wien/MA22 2015 and Stadt Wien/MA22 2016a:47)

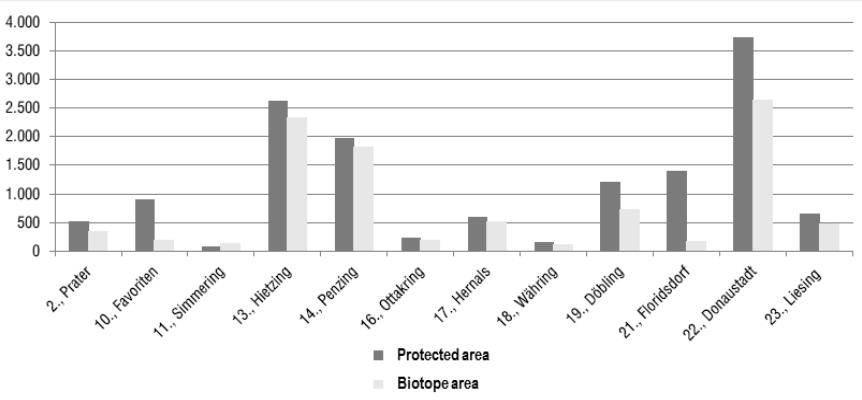


Note: Left, larger map includes information on different types of urban green areas, taking into consideration their general and free public accessibility. This can be limited to defined trails and hence appear linear. This is linked to information on population densities.
Right, smaller map is a snapshot of protected areas in Vienna, including the national park (hatched blue), the biosphere park (hatched brown) and related zones (e.g. development zone in plaid brown), Natura 2000 (hatched green) and landscape protected areas (green).

Figure 55 also includes a smaller map on the distribution of **protected areas** for nature conservation. Besides linking to information on accessibility, it also provides a first indication on whether they are confined to particular areas of the city. It shows that protected areas of a defined size to a large extent can be found at Vienna's outskirts, dominated by the Wienerwald in the west and the Danube floodplains in the south-east (22/Donaustadt). This also includes Natura 2000 sites, protected under the EU Birds and Habitats Directives (see chapter C 1.1.1). Protected landscape features constitute important hubs that can also appear more centrally (e.g. Wiener Prater in district 2/Leopoldstadt).

The overall size of protected areas amounted to 16,806 ha or 40% of Vienna's total area in 2015 (Stadt Wien/MA22 2016a:44). The distribution of smaller **biotopes** more or less corresponds to the indicated distribution of urban green space in the various districts. Besides the biotope-poor, central districts and the obvious peaks linked to the Wienerwald (e.g. 13/Hietzing) and Danube floodplains (e.g. 22/Donaustadt), Figure 56 also indicates little availability of biotopes in the south (e.g. 10/Favoriten and 11/Simmering). Although not lacking protected area, only a small number of biotopes is also available in the eastern district 21/Florisdorf. Despite being situated in the west and closer to the Wienerwald, interestingly also districts 16/Ottakring and 18/Währing lack protected areas and biotopes. Besides quantitative indicators on size and distribution of protected areas and biotopes, however no indicators of the overall conservation status of those areas was publicly available.

Figure 56: Vienna's protected and biotope areas according to district, in ha (translated based on Stadt Wien/MA22 2016a:47)



The figures presented so far are a snapshot of the current situation regarding the distribution of urban green/nature throughout the city and linked to urban population densities. Although some historical developments have been outlined, they do not provide a description of more recent **developments and transformations**. In addition, the figures apply relatively broad land use categories, for example not directly addressing typologies such as front yard gardens, allotments, private garden of residential areas or green roofs. Also they do not consider the extent to which those areas are covered by vegetation or include built-up areas (e.g. cycling paths, gastronomic and agriculture infrastructures). This allows to observe transformations only on a larger scale and as long as affecting land use designation.

For a more in-depth analysis of developments and transformations of urban green spaces, the city of Vienna expanded its initial monitoring programme of individual biotopes in 2000 (report dated 2002) to include all green spaces in 2005 (report dated 2008), based on infrared images. The resulting **green space monitoring programme** aims at capturing in more detail vegetation expansion, structure and related changes, to be carried out and reported roughly every 8 years. At the moment of writing the thesis, unfortunately the most recent results were not yet published. It is assumed that some substantial changes have occurred since the last report, linked to major development projects having taken place to host an increasing number of inhabitants. Nevertheless, some of the latest results are briefly presented below, given of specific interest to a range of appraisal questions and as generally representing one of the most comprehensive monitoring programmes carried out by a European city.

In 2008, the results of Vienna's green space monitoring programme indicated that the non-sealed surface area decreased by 1,185 ha between 2000 and 2005. This can mostly be attributed to the development of railway infrastructures and residential areas in the south (Stadt Wien/MA22 2008:24-26). At the same time, the city's urban green area overall increased by 816 ha. Losses and gains did not evenly impact key urban landscape types that were identified by the programme. This refers to 13 overarching groups consisting of 58 landscape types, which can be described by distinct structural elements of green as well as built-up area (e.g. high-density areas including types such as green yards and green roofs). According to the report, between 2000 and 2005 small but numerous transformations of the type '*detached houses with private garden* and *allotment garden',* and thus mainly private green area, contributed to the loss of vital green space. These losses affected mainly the outer districts of the city, and either included changes of green area size, green inventory or overall type. Whereas in the 1990s such transformations had mostly impacted districts 21/Florisdorf and 22/Donaustadt in the east, it impacted increasingly districts 19/Döbling and 14/Penzing in the north and west at the beginning of 2000 (Stadt Wien/MA22 2008:85). This may have changed again

in light of more recent development projects especially in the east and south, and their higher number of areas identified of having development potential by the urban development programme STEP2025. In addition, already in 2008 the report evidenced that the two eastern districts 21 and 22 as well as the southern district 11/Simmering are the most dynamic ones, referring to increases/decreases of vegetation as well as changes of vegetation structure and overall vegetation type. The most stable proved to be inner districts, although the high-density areas were generally considered more prone to changes due to management measures affecting the vegetation inventory and potentially reducing the amount of green (Stadt Wien/MA22 2008:70+76). Besides private gardens, the structural type most affected by transformations were areas for transport, although leading to higher increase of vital green than decrease (Stadt Wien/MA22 2008:74). This may be linked to the transformation of former railway sites, first from green vacant land to construction area and subsequently to residential area covered by green (e.g. Aspanggründe). Vinicultural areas proved to have the highest increase of vital green between 2000 and 2005, mostly linked to additional vegetation between the grapevines.

Although offering very interesting results on transformation dynamics, the authors of the monitoring report highlight important constraints. The programme offers opportunities of monitoring important changes to the inventory of green space, but it does not allow any detailed assessment of plant (and also animal) species composition (Stadt Wien/MA22 2008:110). In this regard, it does not allow an evaluation of associated qualities, the status of habitats or the potential 'functionings' distinct compositions may support for example in light of the ecological space concept. At this stage, it also remains unclear to what extent new approaches will be applied to monitor for example the distribution of the functions that have been identified in the framework of the *Vienna green and open space thematic concept* (Stadt Wien/MA18 2015a:43). These include the following:

1. *Recreational function*: walking, cycling, social interactions, communication, recreation and sports
2. *Urban structuring function*: providing structure to the city, orientation as well as identification
3. *Urban ecological function*: influencing urban climate, air quality and water provision/ quality
4. *Natural space functions*: habitats for plant and animal species, biotope and ecosystem networks

These functions are applied differently to the 12 open space types which the thematic concept proposes to secure and further develop the green and open space network of the city. For example, the type *lively streets and pedestrian zones* is expected to prioritise recreational and urban structuring functions, but not ecological functions. The different open space types and the related strategies will be introduced in more detail in the subsequent sections. However, at this point it should be noted that so far no detailed information on the distribution of the different types and the functions they provide is publicly available and hence no insights into possible conditions and transformations can be provided.

Box 3 offers a glance at how the city of Munich compares on distinguished conditions and transformations of its urban green/nature. The city is known of having smaller shares of urban green space compared to other major cities in Germany. In relation to the underlying assumptions of the conceptual and action model, conditions and transformations linked to areas of high ecological value are of particular interest. The provided insights also form an important background to the responses provided by the Munich public administration in the framework of the online survey.

Box 3: Munich in comparison – a glance at conditions and transformations of urban green /nature

Which entry-point to select for the document analysis was no easy decision, given the city of Munich offers a patchwork of different evaluation concepts and programmes with regard to urban green space planning (see Table 20). It also was not always clear to what extent individual evaluation concepts still apply or how they interrelate. This likely links to the approach applied by the city of Munich with regard to its urban development strategy, *Perspektive München* (Perspective Munich), within which the various concepts are embedded. It is described as an '*extremely elastic and open form of strategic planning*', consisting of principles and guidelines rather than objectives, and adapting its methodologies and focus according to needs (Petrillo 2016:59). The potential risks are discussed in sub-chapter D 2.2.2.1.

Munich's most recent open space evaluation concept, ***Freiraum2030***, emphasises that the available open space per person is one of the lowest, if compared to other German cities (Stadt München/Referat für Stadtplanung und Bauordnung 2015:18). In 2016, it amounted to 74 m² per inhabitant, compared to 102 m² offered by the city of Vienna (see Table 18). The wider term **open space** is described of being composed of different categories, depending on its application. The largest share is held by recreational and agricultural areas, although the latter is not always included as a category. Only small percentages of urban forests are available. According to the city's data on land use types, high shares of recreational area, forest and waterbodies compared to district size can be found in 11/Milbertshofen - Am Hart (39.9%) and 12/Schwabing Freimann (39.2%) in the north, whereby the latter includes large parts of the English Garden (Stadt München/Kommunalreferat 2016). This is followed by 9/Neuhausen-Nymphenburg (30.7%), which hosts the Nymphenburger Park in the east, and 7/Sendling Westpark (29.3%), which includes the accordingly named park in the west of the city. The available data per district do not consider agricultural areas as well as private green, such as green front yards or private gardens.

Figure 57: Munich's ecologically important areas and green spaces for offsetting (translated & modified based on Stadt München/Referat für Stadtplanung und Bauordnung 2014:Anhang 3)

The evaluation concept *Freiraum2030* provides some additional data on conditions and transformations, mostly to describe some of the challenges the city faces with regard to defined open space types. According to the concept, **protected areas** for example amounted to 5,698 ha or 18% of the city's total area, compared to 40% in Vienna (Stadt München/Referat für Stadtplanung und Bauordnung 2015:24). Different to Vienna, Munich interestingly figures some more centrally located areas protected under the Habitats Directive (e.g. Nymphenburger Park). In addition, the city is confronted with the challenge of looking for suitable sites for the adoption of **ecological compensation measures**, in light of future expected developments. In this regard, the related national legal requirement by the federal building code has likely contributed to a pro-active approach in further identifying and developing adequate areas also in Munich. Figure 57 visualises the related status quo and expected transformations. It includes information on areas considered ecologically valuable, green and open areas more generally, and priority scoping areas for offsetting measures. Priority I offsetting areas can especially be found at the outskirts of Munich, of what is described as part of the green belt in the north, in districts 22, 23 and 24 from north to west, and close to already protected areas of regional importance (Stadt München 2013). Other more linear and central priority areas have been identified with regard to former railway tracks and areas (e.g. Paul-Gerhardt-Allee quarter to the west).

However, overall the available information did not allow to assess in more detail where **transformation processes** may be headed, for example regarding the extent to which offsetting measures have actually contributed to additional green area or whether they have been mainly responsible for changing its inventory. The city lacks an extensive monitoring programme, such as the one offered by the city of Vienna. Certain transformations can only be assumed and partly located, due to the outlined development efforts. It can for example be expected that the pressure to deliver housing to an increasing number of inhabitants will especially impact agricultural area, e.g. in the northeast of the city. In addition, densification efforts are assumed to especially take place for example in residential areas with private green gardens (Stadt München/Referat für Stadtplanung und Bauordnung 2013b:41-45).

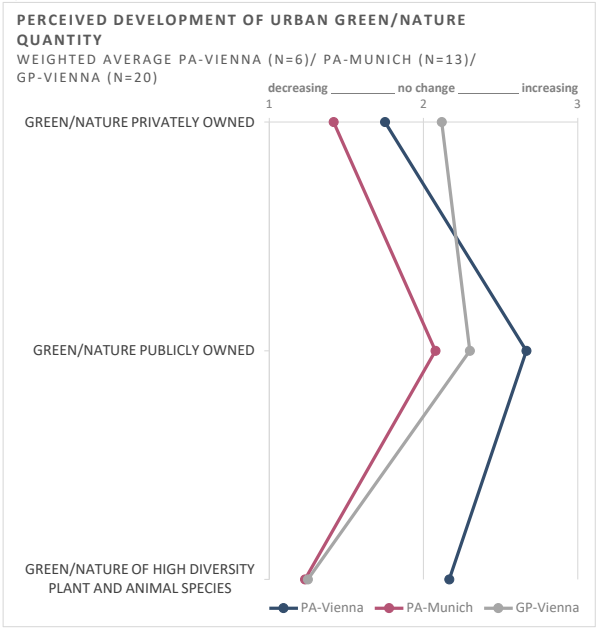
To gain another perspective on relevant conditions and transformations, survey participants of the public administrations of Munich (PA-Munich) and Vienna (PA-Vienna), and individuals from the general public of Vienna (GP-Vienna) were asked about how they think that the quantity as well as the quality of urban green/nature has developed over the last 10 years for proposed types, including urban green/nature of predominantly private or public ownership, as well as of high species diversity. The aim was to get an understanding of the **perceptions** regarding the development of the fabric of ecological space linked to GI quantity and quality, especially in relation to different schemes of property governance and composition.

Figure 58a provides the results on perceptions regarding the **quantitative development of different forms of urban green/nature**. It indicates a perceived decrease of areas of private ownership, mostly expressed by the public administrations. Interestingly, no change or even an increasing development is observed for private urban green by individuals representing the Vienna general public. The more pessimistic view by the public administrations may be linked to their awareness of transformation processes impacting particularly residential areas with private gardens, indicated by Vienna's green space monitoring programme and targeted by the city of Munich in the framework of inner development strategies. The more positive outlook of representatives of the general public regarding private green could be strongly related to the feeling that it is increasingly enjoyed only by a few. This was partly stated in some of the interviews carried out with inhabitants of the city of Vienna (I-Inh-2, para 8; I-Inh-4, para 12), where it was linked to the city-wide disappearance of informal green and the perseverance of private gardens in the north-western districts, e.g. 19/Döbling.

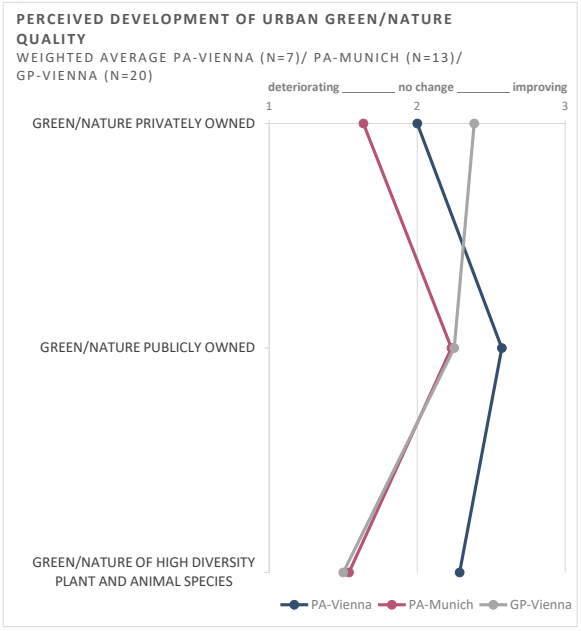
As regards urban green/nature of public ownership, all three groups convey a trend towards an increasing quantity, although PA-Munich representatives seem to be less optimistic on the subject. Interestingly, PA-Munich/GP-Vienna and PA-Vienna have quite diverging views regarding green/nature of high biodiversity. Whereas the first two groups indicate a clear trend towards a decreasing quantity, respondents of PA-Vienna are more confident of no change or even an increasing development.

Figure 58: How do you think has a) the quantity and b) the quality of urban green/nature developed over the last 10 years? What trend do you see for various forms of urban green/nature?

a)



b)



Note: The figure includes weighted averages, calculated based on n number of responses provided to decreasing/deteriorating (1), no change (2) and increasing/improving (3) for the pre-defined variables by the Vienna general public (GP) and the public administrations (PA) of Munich and Vienna. *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for a) quantity, *green/nature of high diversity*: PA-Munich n=3 + GP-Vienna n=4; and b) quality, *green/nature privately owned*: PA-Vienna n=2 + PA-Munich n=2 + GP-Vienna n=7, *green/nature of high diversity*: PA-Munich n=3 + GP-Vienna n=5.

Survey results regarding the **qualitative development of urban green/nature** are similar, especially with regard to areas of high biodiversity. The latter is most clearly expected to have deteriorated and/or to further deteriorate by PA-Munich and GP-Vienna, whereas PA-Vienna assumes a more positive trend (see Figure 58b). All three groups are again most optimistic regarding the quality of green/nature of public ownership, showing a trend towards an assumed improvement. The most diverging views between public administrations and individuals of the general public of Vienna once more relate to the development of the quality of green/nature privately owned, where GP-Vienna respondents see and/or expect an improvement, and PAs no change or deterioration. Generally, the figures indicate a much more pessimistic view regarding trends on quantity and quality expressed by the public administration of Munich. Higher levels of insecurity are revealed by an increased number of '*don't know*' responses regarding the development of the quality of green/nature of private ownership and of high biological diversity across all three groups.

With regard to Vienna, it can be said that the results presented above are also supported by perceptions and insights provided by interviews with practitioners, civil society initiatives and inhabitants. Mostly a positive outlook regarding the quantity of urban green of public ownership was provided, many satisfied with the overall quantitative provision (e.g. I-Inh-2, para 2; I-Inh-4, para 12; I-EXP-1, para 12). Criticism by inhabitants was mainly issued in relation to the quality and design of the public parks, especially their perceived 'naturalness' (e.g. I-Inh-6, para 2; I-Inh-3, para 4), exemplarily described by the following statements:

- '*Green spaces should remain natural, where not every blade of grass is ordered*', unemployed male person, 2/Leopoldstadt, interviewed in the Rudolf-Bednar-Park (I-Inh-2, para 4) (see Figure 59).

- '*Not forced into some form, informal natural space quality with wild growing vegetation, opportunities for free design and no overly designed playgrounds*', young mother, 3/Landstraße, interviewed close to Leon-Zelman-Park and vacant land of the former Aspanggründe (I-Inh-4, para 6).

These comments also reflect concerns of several interviewees regarding the increasing disappearance of informal green mainly on vacant land, due to several major development projects. Although the need to create additional housing was understood, the speed with which this is leading to the transformation of informal, recreational areas seemed to cause distress. Interviewees recognised the strong commitment by the public administration in delivering a sufficient amount of publicly accessible green also in new residential areas. However, it was also argued that the strongly designed parks cannot compensate for the felt loss of 'wilderness' and of species diversity linked to the vanishing of many habitats or 'Gstettn' (Austrian term for vacant land).

Figure 59: Rudolf-Bednar-Park and vacant land in the development area Nordbahnhof, Vienna

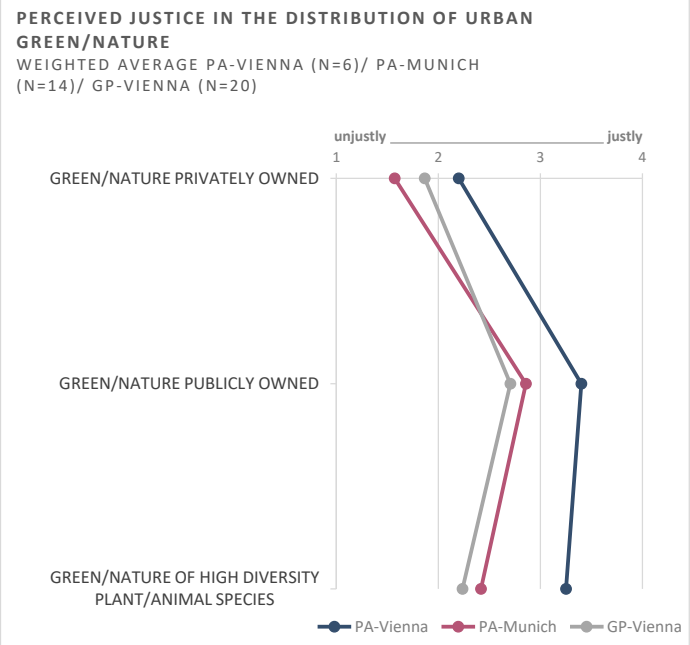
Regarding the distribution of urban green space in Vienna, interviewed inhabitants (e.g. I-Inh-4, para 8), representatives of civil society initiatives (e.g. I-CSI-1, para 40) and public administration (e.g. I-PA-2, para 4) issued the perception that the focus is increasingly put on existing, high-profile urban green areas, both with regard to their recreational value as well as with regard to biological diversity. Regarding recreation, efforts are assumed to concentrate either on maintaining and increasing physical access to existing recreational green hubs (e.g. Donauinsel, Prater) or on the creation of new public parks of a certain size in a defined location of a new residential area (e.g. lake in the Seestadt Aspern). Interviewees emphasised that they feel that this comes along with accepting the disappearance of smaller lots of vacant land and informal vegetation in Vienna, which subsequently leads to the concentration of urban green in defined areas. As regards areas of biodiversity value, a range of representatives seem to agree that activities are focused on the conservation of protected areas of a certain size and including flagship species (e.g. national park Donau floodplains). According to interviewed experts, especially corridors and stepping stones are slowly getting lost and areas of high biodiversity value are increasingly concentrated at the outskirts, although in parallel many species are pressured to migrate into the city, given many habitats on agricultural land are disappearing.

Representatives of the public administrations and individuals of the general public were also asked how just or unjust they think the distribution of various forms of urban green/ nature currently performs over the city and for its inhabitants. Figure 60 shows a tendency towards defining the distribution of urban green/nature of private ownership as unjust by all three groups. Views increasingly diverge with regard to green/nature of public ownership, with PA-Vienna tending towards a more just distribution. This becomes even more evident regarding urban green/nature of high species biodiversity, where PA-Munich and GP-

Vienna tend towards more or less unjust whereas PA-Vienna is more inclined to a more or less just distribution. However, it needs to be noted that a significant number of PA-Vienna representatives indicated *don't know* with regard to the distribution of urban green/nature of high biodiversity. Individuals of the general public show a higher level of insecurity with regard to green/nature privately owned.

In an open question, all three groups were invited to state any **reasons for why the distribution is judged as just or unjust**. A range of replies are provided by the public administration of Munich (n=6) and the general public Vienna (n=5). With regard to PA-Munich, a just distribution is generally felt to be supported by the existing purpose of urban planning and related concepts in ensuring an equivalent distribution of and access to urban green public spaces across the city. Stated reasons for unjust distributions are mostly linked to privately owned green/nature. This is considered an issue first due to increasing land and housing prices influencing access to features such as private gardens ('*affordable to few*'), and second due to for example green inner courtyards becoming increasingly rare with regard to cooperative or affordable housing linked to densification efforts. Urban green/nature of high biodiversity is described to be predominantly situated in high-price neighbourhoods, and influenced by historical prerequisites, such as the existence of only few, larger open space areas (e.g. English garden and river Isar). Individual survey respondents from the Vienna general public underlined the perceived, relatively equivalent distribution of public green/nature across the city, although recognising that central districts may be profiting less than outer districts for historical reasons. The importance of public transport in guaranteeing a just access is emphasised. Private green/nature is described to be mostly owned by a few, although this is to some extent perceived to be counterbalanced by community garden initiatives.

Figure 60: How just or unjust do you think is the current distribution of various forms of urban green/ nature over the city and for its inhabitants?



Note: The figure includes weighted averages, calculated based on n number of responses provided to unjust (1), more or less unjust (2), more or less just (3) and just (4) for the listed variables. *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered *for green/nature privately owned: GP-Vienna n=5.*

An interviewed practitioner in urban planning and design stated that in Vienna '*land prices will increase close to green, and they risk of not being affordable for large parts of the population resulting in an increasingly unjust access*' (I-EXP-1, para 19). According to the practitioner, this is also influenced by '*densification and loss of urban green/nature especially taking place in those neighbourhoods where little resistance can be expected*'. With regard to a just distribution, another practitioner emphasised that it is not sufficient to look at the mere distribution of urban green for a just access, as for example '*municipal housing may offer larger areas of green, but they are often only good to look at and not really accessible due to the many restrictions applying*' (I-EXP-2, para 35).

Solicited quality characteristics and needs

As indicated before, Vienna's *green and open space thematic concept* has introduced four key functions to describe different green and open space types, however without providing detailed **qualitative standards**. The included minimum standards are mainly of quantitative nature. The concept states that '*a qualitative evaluation of individual green and open spaces will be based on the obligatory features they provide*', including '*age-specific playgrounds for both genders, playing fields, open spaces for the youth, seating opportunities, dog running areas and specific landscape ecological features*' (Stadt Wien/MA18 2015a:84).

Interestingly already in 1999, the city of Vienna in collaboration with interdisciplinary representatives of academia developed a tool for the evaluation of areas concerning their 'ecological' quality and relevance (Stadt Wien/MA22 1999). The tool, titled the 'value of nature', provided a range of proxy indicators and defined evaluation criteria, to assess the contribution of an area to ecological functions (e.g. healthy urban climate, conserving old-growth features, local ecological production function), species and habitat protection (e.g. unique landscapes and habitats, conservation of not-fragmented areas) and social space (e.g. preserving recreational use, permeability of built-up area).The identified indicators are similar to those developed by Böhm et al (2015), concerning the nature conservation potential of reserves for dual inner development and introduced in chapter C 1.3.4. However, it remains unclear why the evaluation tool was not adopted in Vienna, at least not on a larger scale. How quality characteristics have been approached by the city of Munich is presented in Box 4.

Box 4: Munich in comparison – a glance at envisaged quality characteristics and needs

Munich's *Freiraum 2030* concept refers only rather generally to available and envisaged quality characteristics of open spaces. The evaluation concept hints at the heterogeneity of use preferences, and hence emphasises the need of elaborating quality characteristics in the framework of negotiation/participation processes.

Some specific types of open spaces have been identified, which describe 'area sceneries' and include guiding urban features. These refer to urban parks and gardens of historical value (e.g. Nymphenburg Park), wild nature and 'nature-staged' places (e.g. Isar), productive cultural landscapes (e.g. Allach/Untermenzing), identity building places (e.g. cemeteries), and 'engrossing' infrastructures (e.g. old railway infrastructure). Also some key characteristics have been identified, including ecologically important areas (see previous section), as well as the role of open spaces in ensuring diminished stress from noise and identifying respective quiet areas throughout the city. In addition, the concept calls for the development of an open space quality offensive, differently targeting distinct urban types such as already dense neighbourhoods or those with low densities. For an increased quality, it especially envisages:

- Augmenting use qualities of already existing green and open spaces
- Improving 'reachability' of green/ open spaces at longer distances by opening routes and connecting areas
- Multi-functional use of non-built up area
  (Stadt München/ Referat für Stadtplanung und Bauordnung 2015:21+26+58+91+94)

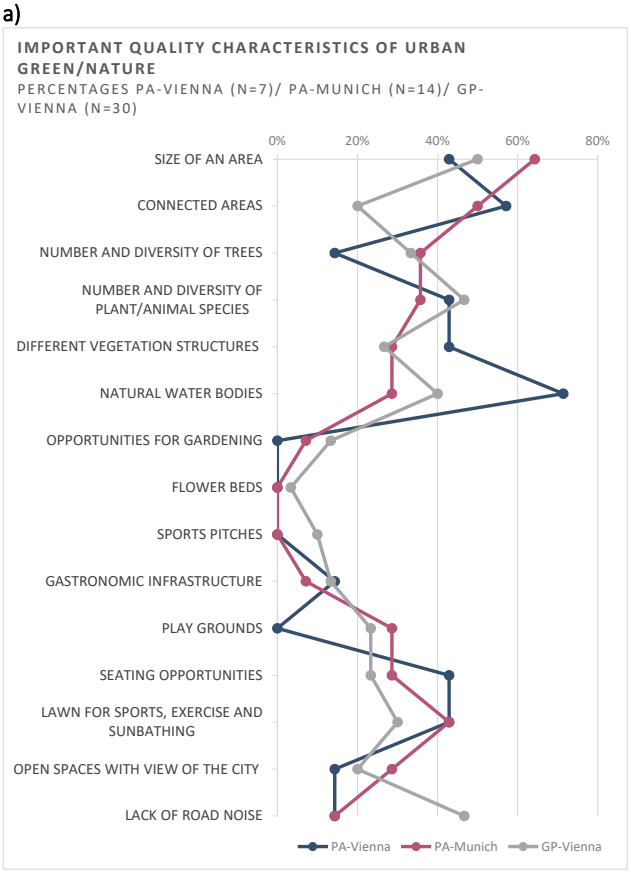
The concept *Freiraum 2030* also states that it aims to uphold quantitative minimum standards developed in the framework of an older evaluation concept on the *provision of open spaces of recreational value in the city* ('Erholungsrelevante Freiflächenversorgung im Stadtgebiet') (Stadt München/ Referat für Stadtplanung und Bauordnung 1995). It refers to guiding standards such as 17 m^2 of public urban green and 20 m^2 of private green per capita, depending on the level of reference. However, distinct qualitative standards which were elaborated by the older concept have not been addressed, and it remains unclear to what extent they are considered. These standards will be introduced in Box 6 on *Munich in comparison-ecological space more widely*, given their interlinkage with the topic.

The provision, securing and designing of urban green areas of distinct quality often takes the centre-stage of discussions, in light of urban transformation processes such as inner development and densification.

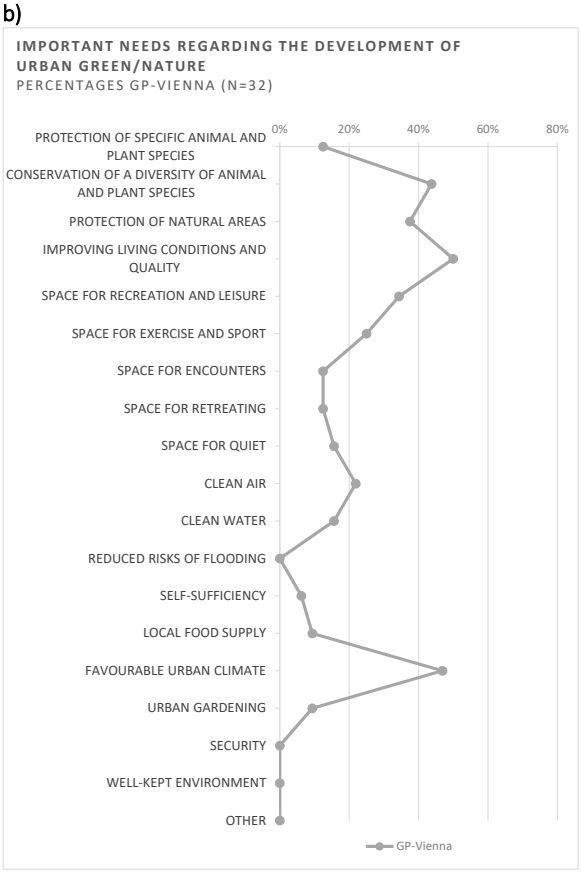
Survey participants of Munich and Vienna public administrations and Vienna general public hence also were asked about what they perceive as important **quality characteristics** related to a list of provided features of urban green/nature. The selected features have either been already in use for example as minimum standards, which define urban green area quality (e.g. area size) or are linked to distinct qualities applied in the framework of urban green/open space planning (e.g. sports pitches, playgrounds, seating opportunities). They also include GI key characteristics (e.g. connected areas) and features that apply to the provision of ecological space more widely (e.g. lack of noise). Although the identified characteristics may also hint at the **potential needs** associated with GI development, individuals of the general public were more directly asked about what they personally feel are important needs regarding urban green/nature. The applied variables are envisaged to reflect 'functionings' that may be provided by urban ecological space, building on concepts such as basic needs and ecosystem services.

Figure 61: a) Which characteristics do you consider particularly important with regard to the quality of urban green/nature? b) What needs are particularly important to you personally with regard to the development of urban green/nature?

a)



b)



Note: The figures include percentages, calculated based on n number of responses given to a maximum number of variables to be selected by a) public administrations (PA) of Munich and Vienna and Vienna general public (GP); and b) Vienna general public (GP). The figures do not include results for *other* and *don't know*, given no responses provided.

With regard to **important quality characteristics of urban green/nature** (see Figure 61a), individuals of the Vienna general public give the highest significance to the *size of an area*, having been selected by half of the respondents. The same applies to the public administration of Munich, with 64% of respondents, whereas it is less of a priority to representatives of the Vienna public administration. The latter places the existence of *natural water bodies* first (71%), followed by the feature of *connected areas* (57%). This comes second also for the public administration of Munich (50%), but very interestingly plays a significantly minor role for individuals of the general public (20%). What follows second for GP-Vienna respondents is actually

the feature of *lack of road noise*, which seems to underline the importance of taking into account features that affect the ecological space more widely. Differently PA-Munich and PA-Vienna give it a substantially lower ranking. The *number and diversity of animal species* was ranked third by respondents of GP-Vienna. Considering the lower number of PA-Vienna participants, which increases the probability of response peaks, it may be said that there is some cross-cutting agreement on the minor importance given to *flowerbeds* and *sports pitches*, and also *urban gardening*. The latter seems surprising, considering it often prominently features in urban development projects and with regard to the provision of high-quality urban green, strongly driven by civil society movements.

Regarding **needs** expressed by GP-Vienna individuals (see Figure 61b), these seem particularly high with regard to *improving living conditions and quality* in the immediate neighbourhood, selected by 50% of survey participants. This is followed by the provision of a *favourable urban climate* (47%) and the *conservation of a diversity of animal and plant species* (44%) as well as the *protection of natural areas* (33%). Interestingly at the same time, the expressed need for *protecting individual plant and animal species* figures less importantly. Similarly this goes for rather specific components such as *clean air*, *clean water*, *space for quiet* or *encounters*. These preferences for selecting more general variables may be interpreted as an indication of the importance attributed to a multitude of factors or 'functionings' rather than individual, specific components. The key interest in a *favourable urban climate* seems to be the exception. In this regard, it is important to remind how the average respondent of the general public can be described and especially related housing and living conditions. Besides very often presenting a university degree and usually a decent income, either he or she has good housing conditions and not necessarily lacks access to green area or he or she is heavily exposed to road noise and hence likely air pollution. This may have had effects on the selection of perceived needs.

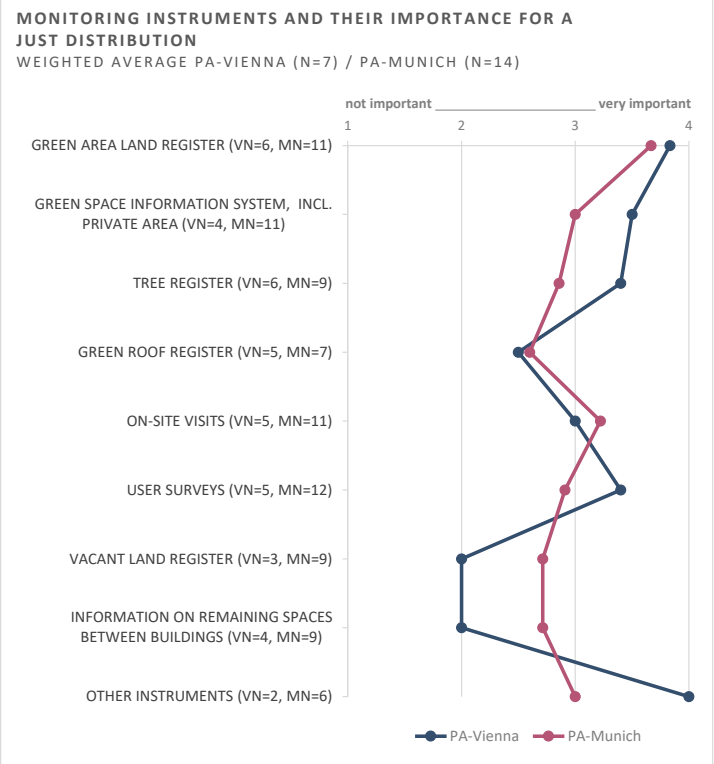
The monitoring and indicators informing on conditions and transformations

When describing conditions and transformations of the quantity and quality of urban green/nature, some information on existing monitoring approaches (e.g. Vienna's green space monitoring programme) and applied indicators (e.g. land use type data, maps on accessibility and distance, amount and distribution of protected areas) was already provided. The first analysis showed that the figures often present only a glimpse of the current distribution of urban green/nature, as applying relatively broad land use categories. In addition, there is a lack information on typologies of urban green not necessarily publicly owned, such as front yard gardens, allotments, private gardens or green roofs. Especially the typology of vacant land is less well represented, including information on the transformation processes by which it is affected. Even the more comprehensive monitoring programme implemented by the city of Vienna includes constraints regarding an assessment of plant and animal species composition, status of habitats and associated qualities.

In the framework of the online survey, the public administrations of Vienna and Munich specifically were asked about which **instruments** are applied in **assessing the quantitative and qualitative distribution** of urban green/nature and how important they consider these instruments for the purpose of a just provision. The related question aimed at getting further insights into monitoring approaches to describe conditions, transformations and needs with regard to urban green/nature. Survey participants were asked to rate only those instruments, which they think are actually used. Figure 62 shows that the instrument of *green area land*

register figures most prominently regarding its importance for both administrations, with a high certainty of application due to the high degree of selection likely linked to the formal requirement of collecting related information. The public administration of Munich ranks *on-site visits* and PA-Vienna the instrument of *green space information system* second. More explicitly, two representatives of PA-Vienna indicate under *other instruments* the importance they regardingly attribute to the existing Vienna green space monitoring programme. PA-Munich respondents additionally emphasise the role of the *biotope register* ('Biotopflächenkataster'), and comment that that *user surveys* are considered less important due to the limited frequency of the surveys and the reduced sample sizes. Diverging views exist with regard to the application of a *tree register*: PA-Munich participants seem to be more insecure about the actual application, whereas PA-Vienna respondents give it higher importance. This is an interesting aspect considering how the quality feature of *number and diversity of trees* is ranked high by Vienna general public survey participants, and significantly lower by PA-Vienna with regard to quality characteristics (see Figure 61a). Highly visible differences in the evaluation of the importance of given instruments between the public administrations also exist with regard to *vacant land register* ('Brachflächenkaster') and *information on remaining spaces/building reserves* ('Baulückenkataster'), although those might also have been largely impacted by the reduced number of PA-Vienna respondents. High insecurities exist regarding the use of a *vacant land use register,* selected by less participants.

Figure 62: In your opinion, how important are the following instruments in assessing the quantitative and qualitative distribution of urban green space and to determine a just distribution?



Note: The figure includes weighted averages, calculated based on n number of responses provided to not important (1), slightly important (2), moderately important (3) and very important (4) for pre-defined variables that have been selected by n number of participants of the public administrations (PA) Vienna (v) and Munich (m). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for *other instruments*: PA-Munich n=3.

A similar question was already used in the framework of the study on urban green for dual inner development by Böhm et al (2015) (see chapter C 1.3.4). Roughly 80 representatives of green planning and management departments of cities with more than 100,000 inhabitants in Germany replied to the respective survey. Key focus of the question used by Böhm et al (2015:97) was on monitoring instrument for dual inner development, also applying a slightly different list of variables. However, interestingly those participating in the survey by Böhm et al (2015:97) also particularly favoured the instrument of *green area land register*, followed by the *tree register*, *biodiversity offset register* and *site-visits*.

In a different part of the online survey, a PA-Munich respondent comments that existing monitoring instruments only allow to take a snapshot of quantitative distributions, especially in relation to distinct land use types. However, they fail when it comes to monitoring a more diverse set of GI elements and particularly

the qualitative distribution of urban green/nature. However, especially the latter was described as key for defining what a just access represents.

D 2.2.1.2 Interlinkages between fabric and disparities of different space dimensions

Socio-economic space fabric and disparities

It is of special interest to the thesis to address how the overall access to GI is potentially influenced by dynamics of socio-economic space disparities, in particular with regard to vertical disparities such as inequalities of income and wealth, e.g. in relation to urban land and housing capital. Making socio-economic fabrics and disparities spatially visible can also be important in describing the 'landscape of power' that characterises a city. The term was introduced by Gould and Lewis (2013:31) to describe the dynamics of increased economic power and, paired with discrimination, its influence on political power and the resulting '*enormous capacity to control* [one's own] *environmental trajectories*'. Central focus of this section is hence the extent to which interlinkages between socio-economic space disparities and the ecological space provided by GI have been considered so far.

In this regard, it is important to point out that the *Vienna green and open space thematic concept* has not given any specific attention to economic inequalities and the resulting spatial disparities as a framework to define the distribution of and access to urban green and open space. Nevertheless, the city provides some data that allows getting first insights into the relevance of such disparities, although not explicitly in connection with a just access to urban green/nature. Additional knowledge on the importance of the subject is also presented based on the results of a range of recently published studies.

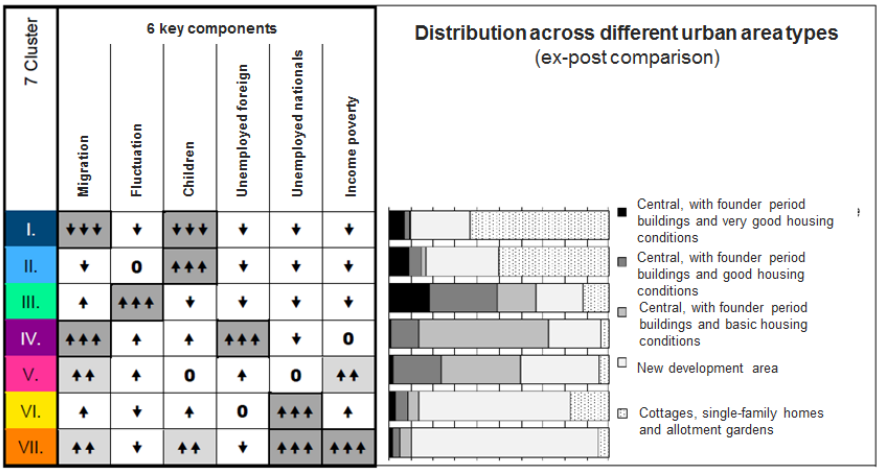
The social area atlas represents one of the relevant analyses, developed by the city in the framework of urban research in 2012. It constitutes a cluster analysis based on 29 indicators, grouped into 6 key components, which include:

1. *Children*, e.g. number of children, number of one-person households
2. *Migration,* e.g. population density, share of older cars, contribution to elections
3. *Fluctuation,* e.g. stable households, influx of people with migration background
4. *Unemployed Austrian nationals,* e.g. youth unemployment, long-term unemployment
5. *Unemployed foreign nationals*, e.g. youth unemployment, long-term unemployment
6. *Income poverty*, e.g. youth or main income holders receiving minimum social benefits.

Building on the performance of the different key components, 7 clusters were developed to describe distinct social areas of the city (see Figure 63). Cluster I is described as more or less lacking major social problems (e.g. linked to income poverty or unemployment). It usually consists of inhabitants without children, who do not experience much fluctuation and rarely have a migration background. Cluster II is similar, but with a higher number of children. An ex-post comparison with different urban area types undertaken as part of the analysis illustrates that cluster I and II are especially located in low-density areas with high amounts of green. It particularly applies to the northwest of the city (e.g. 19/Döbling) as well as to some parts of the east (e.g. 22/Donaustadt).

Cluster III represents the urban middle class. It includes inhabitants who frequently have an EU migration background, can be described as very mobile, have few children and a low level of social problems. They are mostly situated in areas with 'founder-period' buildings of good housing quality, surrounding the first district (e.g. 9/Alsergrund). Cluster IV and V are characterised by inhabitants with an international migration background and having some occurring social problems related to unemployment and also income poverty. They usually occupy founder-period buildings along the major road of the Wiener Gürtel, or live in district 2/Leopoldstadt and 20/Brigittenau. Cluster VI holds population groups with high unemployment rates amongst Austrian nationals, with moderate income poverty. Cluster VII consists increasingly of people with international migration background, low incomes and high number of children. Both clusters are often situated in new development areas, which especially appeared in the 1950s to 1970s, and public housing. They are rather evenly distributed across the outskirts of the city.

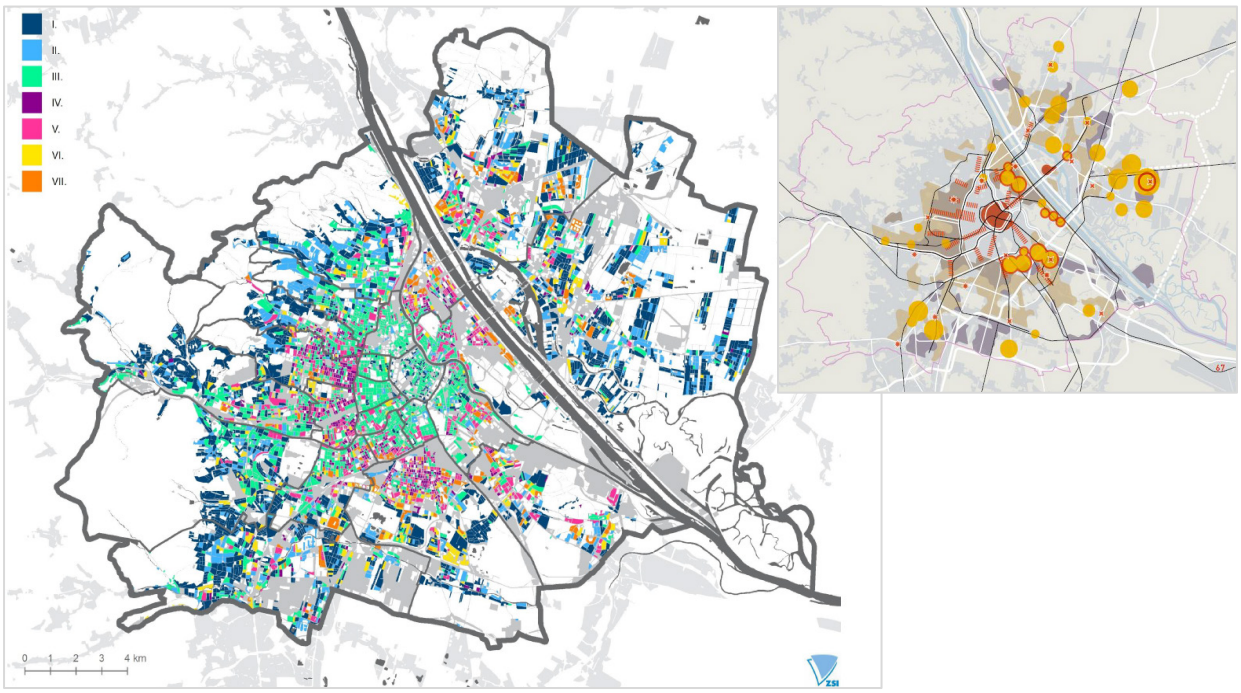
Figure 63: Vienna social area atlas – performance of key components and clusters (Translated & modified from Stadt Wien/MA18 2013)



Note: Strong positively charged=↑↑↑; strong negatively charged=↓↓↓; even= 0

The social area atlas does not indicate a strong polarisation or even segregation of groups regarding the cluster VI and VII. However, some polarisations are visible (Figure 64). These refer to some concentrations of population groups with high unemployment rate and income poverty along main roads and in certain districts. This includes for example 20/Brigittenau, which was previously marked as having the lowest share of green and the highest share of transport area. In addition, the middle class population of cluster III seems to particularly concentrate in areas with good-quality, founder period buildings, which can be assumed to be more largely characterised by green inner courtyards or green roofs. However, the strongest polarisation can be assumed for cluster I. Although also scattered throughout the east of the city, it constitutes a larger block that in particular runs from the north to the west.

Figure 64: Vienna social area atlas, and envisaged development projects (Stadt Wien/MA18 2013 and Stadt Wien/MA18 2014:67)



Note: The smaller map is a snapshot of envisaged development projects in Vienna, represented by orange bubbles. Districts where predominantly buildings from the founder period are located are highlighted in dark brown, those constructed between 1950s and 70s in light brown, and industrial area zones in dark grey. Features marked or encircled in red refer to business structures and centres.

Figure 64 also includes a smaller map, which displays major **urban development projects** envisaged by Vienna's urban development plan *STEP2025*. The aim is to allow a rough comparison of how different clusters may be affected by urban transformation processes. It indicates that especially districts 2/Leopoldstadt and 20/Brigittenau, which are characterised by clusters V to VII, will likely be subject to a range of major developments. The same clusters will or have already experienced some transformation processes also further in the south, in the neighbourhood of the newly developed main railway station. A range of projects are also envisaged for 22/Donaustadt, although impacting more largely clusters I and II. It needs to be seen how this will affect the provision of GI for the different clusters. The new report of the green space monitoring programme may shade some light on the subject. Nevertheless, the relative stability of the northwest can be emphasised, which remains a stronghold for those facing little social problems, no strong transformation dynamics and are well equipped with urban green/nature. It however remains unclear whether the map will be continuously updated in order to be able to observe socio-economic transformations over a longer period of time.

The findings outlined above largely correspond to results on **socio-economic segregation** processes affecting the city of Vienna, provided by Tammaru et al (2015) and briefly introduced in chapter D 1.2.1. The authors analysed changes to the occupational, educational and housing structure of the city between 2001 and 2011, taking into consideration the impact of welfare interventions on housing conditions. They then selected 19 indicators to analyse to what extent those co-variated across the city in the defined period, and to identify homogenous areas. This included indicators for example related to tenant status, employment status, educational attainment, housing age and condition as well as citizen origin (Tammaru et al 2015:98). Although according to the authors Vienna was able to retain a certain social mix due to its long history of social equity policy, the results also indicate some increased polarisations. For example linked to rapidly increasing rents, people with lower income seem to be gradually constricted to neighbourhoods with a high share of public housing, especially in the east and south of Vienna. In addition, the authors argue that

historical sectoral patterns have been amplified, and confirm that the upper-class is increasingly confined to the western outskirts and the green slopes of the Wienerwald (Tammaru et al 2015:107). According to Tammaru et al (2015:106), these developments have likely been influenced by Vienna's housing policy, for example linked to the only recent opening of the council housing sector to certain low-income groups of non-EU countries. Although the analysis does not explicitly consider environmental aspects, it highlights the role housing policy can play in shaping the fabric of a city.

The issue of **housing policy and spatial inequality** in Vienna has also been addressed by Gutheil-Knopp-Kirchwald and Kadi (2017-forthcoming). In a first step, the authors used information on the annual average per-capita income, referring to individual income from current or former employment and including all incomes that accordingly have to be declared in tax reporting (e.g. different pension schemes or support by foundations), to describe socio-economic differences at the district level. The districts for example displaying the highest range of median income (€23,001 to €26,000) include 19/Döbling in the north, 13/Hietzing in the west as well as the first district. Districts with the lowest ranges of income (€17,001-19,000) refer to 20/ Brigittenau or also 15/Rudolfsheim-Fünfhaus. In a second step, they combined the information with data on shares of social housing and Gini-coefficients (see chapter C 1.2.1.2), the latter to describe inner-district inequalities between groups with higher and lower shares of income. The largest amount of social housing resulted for district 11/Simmering in the south, which also presented relatively low inequalities.

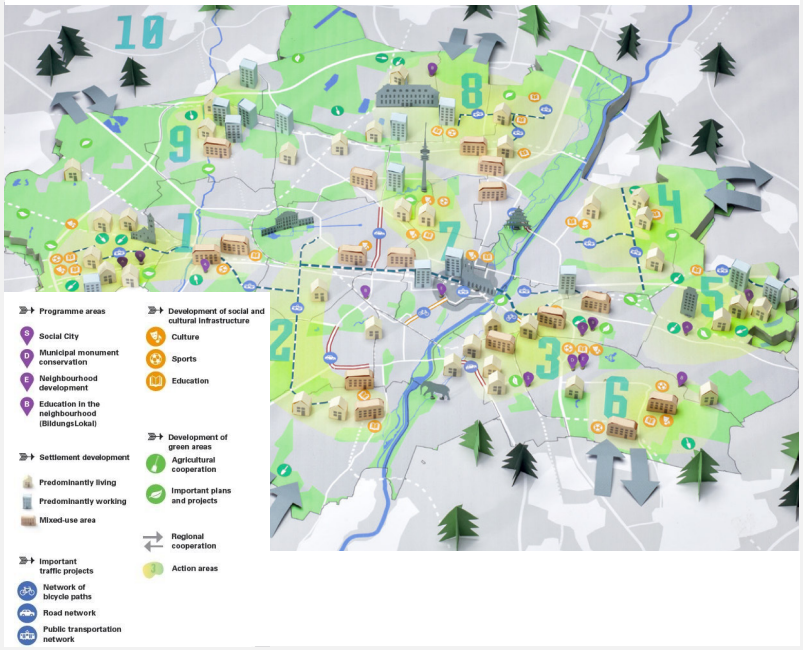
It can be noted that the social area atlas and the two studies reveal similar spatial patterns with regard to socio-economic space disparities, although in many cases using different indicators. Of special interest were the interrelations between socio-economic aspects and housing, whether referring to tenant status (e.g. ownership, tenant council housing or housing association) or housing age and conditions. Only some reference to urban green/nature was available, if suited to describe distinct urban area types hosting defined social groups. Tammaru et al (2015) did not include indicators that take issues of income into account, and also the social area atlas focused on other aspects to reflect income poverty (e.g. minimum social benefits). Gutheil-Knopp-Kirchwald and Kadi (2017-forthcoming) applied related information, although it was limited to income by those employed and did not include the often income-heavy group of the self-employed. Other indicators, which are used for example at the national level, refer to the net equivalent income of households (see Table 18 describing basic parameters). However, these do not necessarily capture income from other sources such as capital. In this regard, already statistics on income taxes, especially on income from agricultural activities, self-employed work, financial capital as well as rent-seeking applying to the city of Vienna, allow some interesting differentiations. In 2013, related data on tax revenues quite differed for some districts, otherwise performing comparably with regard to the previously illustrated results on social group clustering and ranges of income. They were higher for 19/Döbling (€583 million) and 13/Hietzing (€448 million) than for 22/Donaustadt (€351 million) (Stadt Wien/MA23 2016:154). However, also these data not necessarily include all relevant information. The lack of in-depth information, leading to an underestimation of how much particularly goes to those with the highest incomes, has also been highlighted in the most recent national social report, an assessment of the current social situation in Austria (Austrian Ministry for Labour, Social Issues and Consumer Protection 2017:182).

Box 5: Munich in comparison – socio-economic space fabric and disparities

Munich's evaluation concept on open spaces, *Freiraum 2030,* hints at the challenge of an increasing 'differentiation' and heterogeneity of its urban population. This not only refers to the city's internationalisation, but also to the difficulties of some inhabitants in affording recreation due to reduced economic opportunities. It names increasing disparities between poor and rich and social polarisations as one of the future challenges, especially in light of a limited amount of open spaces. However, no

information is included how these disparities and polarisations may be geographically distributed or perform throughout the city, and how this in detail would affect decisions on the distribution of and access to urban green and open space. (Stadt München/ Referat für Stadtplanung und Bauordnung 2015:16+19+21)

Figure 65: Munich's action hot spots and programmes (Stadt München/Referat für Stadtplanung und Bauordnung 2013a:54-55)



As part of its urban development strategy *Perspektive München*, the programme *social city* ('Soziale Stadt') and its identified hot spots of action (see e.g. Nº 3 in Figure 65) may however provide first indications of existing polarisations. The programme is linked to the thematic guideline of *strengthening neighbourhoods by developing districts*, and builds on financial contributions at regional and federal level. It targets districts and neighbourhoods, which present deficits with regard to housing conditions, economic development, social cohesion as well as ecological challenges, including urban green and open space. Previous projects for example included the renewal of urban green in district 11/Milbertshofen-Am Hart (action hot spot Nº 8). Districts 17/Obergiesing, 16/Ramersdorf-Perlach and 14/Berg-am-Laim, identified as social action hot spots Nº 3 and 6 and also subject to urban renewal programmes, are also characterised by a heavy impact of road traffic, influenced by their closeness to the road belt *Mittlerer Ring* and being entry-points to two main, heavy frequented motorways. Not surprisingly, the programme Social City has also been closely linked to issues of health (Stadt München/ Referat für Stadtplanung und Bauordnung 2013a:56-61).

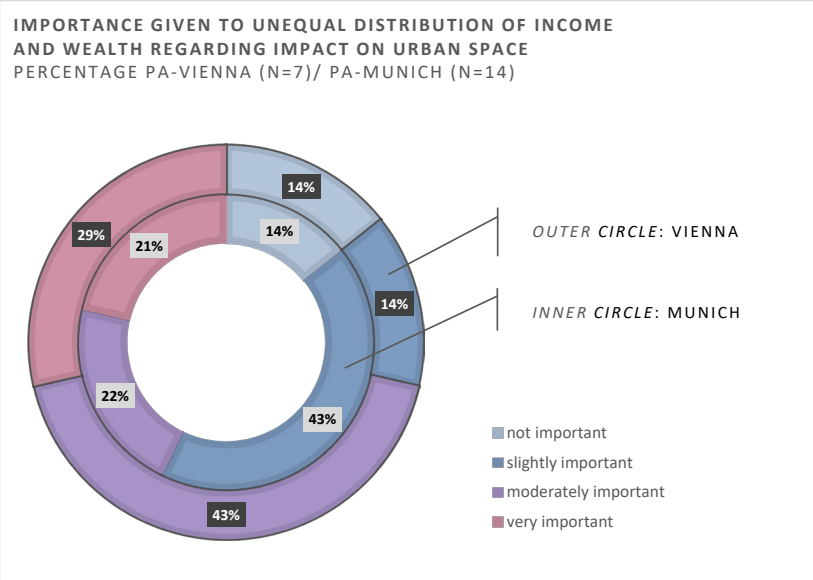
On a yearly basis, the city of Munich also updates an atlas of indicators anchored in spatial maps and focused on a range of issues deemed of central importance (Stadt München 2016). Data are at least available from 2010 to 2015, and address issues such as labour market (e.g. unemployment density, inhabitants receiving minimum social benefits), population (e.g. age groups, migration background), health (e.g. physician density) or child care (e.g. available infrastructures). No specific indicators on the educational structure are currently provided, and especially information on the distribution of income and wealth is missing. A brief screening of indicators, such as on unemployment rate and density of those receiving minimum social benefits, usually shows districts 16/Ramersdorf in the south and 11/Milbertshofen in the north ranking highest, and district 1/Altstadt-Lehel and 3/Maxvorstadt ranking lowest. Munich's last poverty report in 2017 provides some information on the net equivalent income and how different households distribute along the median, with 17.4% (14.7% in 2010) having less than 60% of the median net equivalent income being classified as poor, whereas 8.9% (8% in 2010) receiving 200% and more being defined as rich in 2016 (Stadt München/Sozialreferat 2017a:23, Stadt München/Sozialreferat 2012:30). It concludes that income inequalities have continued to rise between 2010 and 2016, negatively hitting the poorer and profiting the upper middle class. No detailed social area analysis is provided, and inequalities of wealth beyond some scattered indicators are not included. According to the report, this is also related to the scarcity of reliable data with regard to high-income groups (Stadt München/Sozialreferat 2017a:33) In addition, it would be crucial to take into consideration the metropolitan region Munich more widely, given very high-income groups may rather hold main residence in neighbouring municipalities (e.g. Grünwald or Starnberg).

Overall, it can be said that with regard to the description of socio-economic disparities, the focus is still largely put on social problems and poverty rather than inequality more largely, very similar to the city of Vienna.

In the framework of the online survey, first of all representatives of the public administrations of Vienna and Munich were confronted with the **familiarity** of the term economic inequality. Whereas on average Vienna public administration respondents (n=7) state to be only partly familiar with the term, PA-Munich participants (n=10) tend towards a higher familiarity. These results already hint at a certain level of aware-

ness. Survey participants of the administrations were also directly asked about their opinion on the **importance** currently given to the **unequal distribution of income and wealth** and its potential impact on urban development and urban space in their respective departments. The aim was to get an impression of the significance they attribute to socio-economic space disparities, economic inequalities and their impact on the urban space in particular.

Figure 66: In your opinion, what importance is currently given to the unequal distribution of income and wealth and its potential impact on urban development and urban space in your department?



Note: The figure includes percentages, calculated based on the number of responses provided to different levels of importance, from not important (1) to very important (4), by the public administrations (PA) of Vienna (outer circle) and Munich (inner circle).

According to Figure 66, a majority of respondents of the public administration of Vienna believes the issue being moderately to very important. Differently, representatives of the public administration of Munich attribute it no or only a slight importance, suggesting the subject being considered of lower relevance. The question on the importance of the topic was followed by an open enquiry on the extent to which **existing strategies** (e.g. concepts, programmes) explicitly address the issue and what could be reasons for a lack of explicit references. The intention was to get a better understanding of how high the topic is already set on the policy agenda of the case studies Vienna and Munich. Most of the PA-Vienna respondents state that strategies often implicitly but not explicitly address the subject, regarding for example access to public space (e.g. specific public space concept addressing the issue of commodification) as well as affordable and social housing (e.g. studies and monitoring of gentrification processes, stated objective of mixed use in newly developing districts). Others argue that although there may be a lack of strategies that explicitly consider impacts of economic inequalities on urban space, programmes generally addressing social inequalities indirectly relate to those issues. Albeit PA-Munich representatives give less importance to the topic, similar to PA-Vienna participants argued that the topic has been integrated into existing strategies more often indirectly or generally rather than directly or specifically. Important to mention are frequent references to strategies targeting affordable housing and access to public green (e.g. objective of equal living conditions, integration of social housing in different neighbourhoods or the Munich Model, supported by the urban development strategy *Perspektive München*, as well as the *Freiraumkonzept 2030*), and those explicitly focusing on the issue of environmental justice and health (e.g. related projects supported by the national funding programme *Soziale Stadt*, implicitly for example in relation to noise abatement planning). Those emphasising that no proper overall strategy is in place for example argue that the rapid economic development and its repercussions currently dominate the policy agenda. They fear impacts such as an increasing segregation between those that can afford housing prices offered by the market and those that need to be supported by urban programmes. Others attest a generally scarce or not existing awareness regarding the topic.

The extent to which topic-related indicators are applied and monitoring programmes have been developed can also indicate how high on the policy agenda a topic figures. The first is usually the case especially during the problem recognition phase and the development of policy options, whereas monitoring programmes are used for evaluating existing strategies (see discussion on policy cycle in chapter C 1.3.2 and Bassi et al 2011). Accordingly, in an open question both public administrations were asked to what extent currently indicators are applied in their respective areas to monitor the impact of economic inequality. Those of the city of Vienna who replied that indicators were in place make reference to social indicators and monitoring programmes, for example linked to social area analysis efforts and the previously outlined social area atlas. A larger group indicates not to be aware of any specific economic inequality indicators, which might be spatially anchored and applied to topics within their resorts. Representatives of the city of Munich refer to examples linked to reporting on environment and health, where indicators are set in relation to data on social status. In addition, respondents refer to socio-economic indicators that are used with regard to the identification of areas subject to preservation efforts according to articles 172 to 174 of the German national building code, which regulate the renewal of defined areas to counteract displacements caused by high-price renovations (e.g. development permits, pre-emption right by the local government). It remains unclear to what extent issues of private and public green space development are considered in the framework of related programmes.

Ecological space more broadly and the built-up, physical space fabric

The focus of the thesis has been put especially on the interlinkages of the ecological space supported by GI and the socio-economic space and economic inequalities in particular. However, the previous analyses have already hinted at the importance of looking at possible correlations with the ecological space more widely (e.g. lack of noise as important characteristic to describe the quality of urban green/nature) as well as the built-up physical space (e.g. Vienna social area atlas and ex-post comparison on urban area types and housing conditions).

Again the *Vienna green and open space thematic concept* does not provide any indication on the extent to which other environmental qualities or the lack of it as well as characteristics of the built-up physical space such as housing conditions inform the distribution of and access to urban green/nature. However, some related work has been carried out. To begin with, it is worth mentioning that since 1995 the city of Vienna regularly carries out representative surveys involving a significant amount of households in the framework of studies on the quality of life of its inhabitants. It also includes some cross-comparisons with European cities, based on data provided by the Eurobarometer 'Quality of life in European cities' (EC n.d.). The latest report was published in 2014 (Verwiebe et al 2014), and resulted in the development of a range of maps to spatially describe the degree of satisfaction with environmental qualities of the neighbourhood, including for example on air quality and noise emissions (Stadt Wien/MA18 2015c). Not very surprisingly, high levels of satisfaction with regard to air quality were issued by inhabitants of well-off districts, socio-economically as well as with regard to urban green/nature, at the slopes of the Wienerwald and especially 13/Hietzing. A similar perception was iterated by neighbourhoods close to landscape protection areas in districts 21/Florisdorf or 22/Donaustadt. Low levels of satisfaction were indicated by those inhabiting central districts, those living in the south (e.g. 10/Simmering) and those that are particularly affected by some major road infrastructures such as the road belt West (e.g. 15/Rudolfsheim). It often concerns districts that have previously been described as less well-off regarding aspects such as income and education as well as housing conditions. Similar, although less pronounced differences, have become visible with regard to noise emissions. This is also confirmed by a brief spatial analysis of interlinkages between 'environmental

bads' such as noise emissions, and other aspects such as housing conditions, life expectancy and social situation undertaken in the framework of recent research on environmental justice and health by Lange (2015:78).

It needs to be noted that the results of the quality of life surveys are based on perceptions rather than actual outcomes. In addition, not necessarily interlinkages to questions related to other spatial fabrics and disparities such as GI provision, socio-economic inequalities or **housing conditions** are directly taken into account. Also with regard to the social area atlas, a comparison with urban area types was undertaken only in a subsequent step, although the city of Vienna provides for a range of indicators that look into housing conditions based on census data (Stadt Wien/MA23 2015). These especially refer to building characteristics (e.g. number of apartments and floors), building age, share of non-residential buildings, housing area per person, and dwelling category (e.g. category A dwellings including bathroom/toilette and central heating).

In this regard, it is also interesting to look at gathered information on changes to the **building and dwelling stock** over time, to understand how urban transformation processes might have differently impacted individual districts. Figure 67 seems to reconfirm some of the previous conclusions made on the relative stability of certain districts over time, whereas others have been particularly affected by urban development projects and as such likely also by changes to urban green/nature.

Figure 67: Vienna building and dwelling stock between 1981 and 2001 (translated & modified based on Stadt Wien/MA23 2015:9)

Municipal district	Buildings 1981 to 1991 %	Dwellings 1981 to 1991 %	Buildings 1991 to 2001 %	Dwellings 1991 to 2001 %	Buildings 2001 to 2011 %	Dwellings 2001 to 2011 %	Buildings 1981 to 2011 %	Dwellings 1981 to 2011 %
Wien	**22,7**	**15,3**	**9,4**	**6,8**	**-2,0**	**8,0**	**22,7**	**19,8**
1. Innere Stadt	-2,5	-0,4	8,9	2,3	-10,7	2,0	-5,1	1,5
2. Leopoldstadt	15,6	2,6	-1,9	2,2	-7,1	8,5	5,4	11,4
3. Landstraße	2,9	-1,6	3,0	0,0	-5,6	5,8	0,1	4,0
4. Wieden	7,4	-0,3	-0,4	1,0	-6,8	2,8	-0,2	2,5
5. Margareten	2,4	-0,8	4,3	3,2	-3,2	5,1	3,4	4,2
6. Mariahilf	5,9	8,6	5,2	5,4	-9,0	1,9	1,3	10,6
7. Neubau	7,3	6,4	5,9	4,9	-18,7	1,9	-7,6	8,4
8. Josefstadt	0,7	1,5	5,8	2,9	-12,1	0,9	-6,3	2,4
9. Alsergrund	2,8	-1,7	0,5	0,2	-8,3	3,3	-5,3	1,5
10. Favoriten	13,2	10,1	8,5	5,1	-4,0	11,9	17,9	23,2
11. Simmering	21,6	35,7	12,8	21,9	-5,1	14,9	30,1	55,9
12. Meidling	6,3	4,5	8,0	5,8	-4,4	8,2	9,7	13,1
13. Hietzing	7,2	11,9	5,7	3,8	-3,8	3,2	9,0	15,6
14. Penzing	13,0	10,9	3,0	4,7	-3,9	4,9	12,0	16,4
15. Rudolfsheim-Fünfhaus	-1,3	-6,8	27,6	0,2	-19,6	5,7	1,3	-1,5
16. Ottakring	9,1	1,4	1,7	0,4	-2,1	7,4	8,6	8,8
17. Hernals	12,6	4,1	4,0	-0,5	-1,1	7,0	15,8	11,4
18. Währing	4,3	-2,2	1,5	2,2	-2,6	3,6	3,2	1,3
19. Döbling	10,6	11,2	3,4	1,9	-1,6	5,8	12,5	17,7
20. Brigittenau	9,5	8,3	7,3	9,6	-8,2	6,2	7,9	15,0
21. Floridsdorf	23,6	27,9	12,9	13,1	-0,5	10,7	38,9	41,5
22. Donaustadt	29,6	57,2	24,6	31,1	6,7	17,0	72,3	83,9
23. Liesing	19,4	37,3	8,2	14,5	0,8	10,8	30,2	52,1

According to the figure's last two columns, between 1981 and 2011 especially the building and dwelling stock of districts 21/Florisdorf and 22/Donaustadt in the east as well as 10/Favoriten and 11/Simmering in the south and 23/Liesing in the southwest were subject to changes. Whereas the first two are usually associated with a well-standing middle class, its population having a secondary although not necessarily university degree and having often access to private gardens, the two districts especially in the south have higher percentages of inhabitants with lower income and education levels and higher social problems. The most stable were inner districts engulfing district 1, mostly inhabited by well-off EU citizen with a high degree of mobility, with the exception of 2/Leopoldstadt and 3/Landstraße. Also 13/Hietzing and 19/Döbling have been relatively stable. Remarkable is also the significant reduction of the building stock between 2001 and 2011, linked especially to the disappearance of non-residential buildings such as industrial areas or offices (Stadt Wien/MA23 2015:9).

In addition to the outlined indicators, the federal statistics institution (Statistik Austria) collects and analyses data regarding the subject of housing, based on microcensus housing surveys and EU-SILC indicators. The latter have already been introduced when describing key characteristics of survey respondents belonging to the Vienna general public group (see chapter D 2.1.2.1). They are an example of how information on socio-economic space disparities can be combined with information on disparities regarding the built-up physical space as well as the ecological space more widely, for example by looking into:

- Distribution of population by tenure status, type of household and income group
- Average number of rooms per person by type of household and income group
- Overcrowding rate by income quintile - total population

However, as outlined previously, information addressing for example private green and open spaces or environmental features of the neighbourhood is only focusing on distinct deprivations or not collected.

Box 6: Munich in comparison – ecological space more widely

Already the previous comparisons indicated to what extent the open space concept *Freiraum 2030* takes issues concerning the wider ecological space into account. The particular focus on aspects related to environment and health was noted (e.g. role of open spaces in ensuring diminished stress from noise and identifying respective quiet areas across the city), and existing linkages between the social city programme and health were indicated.

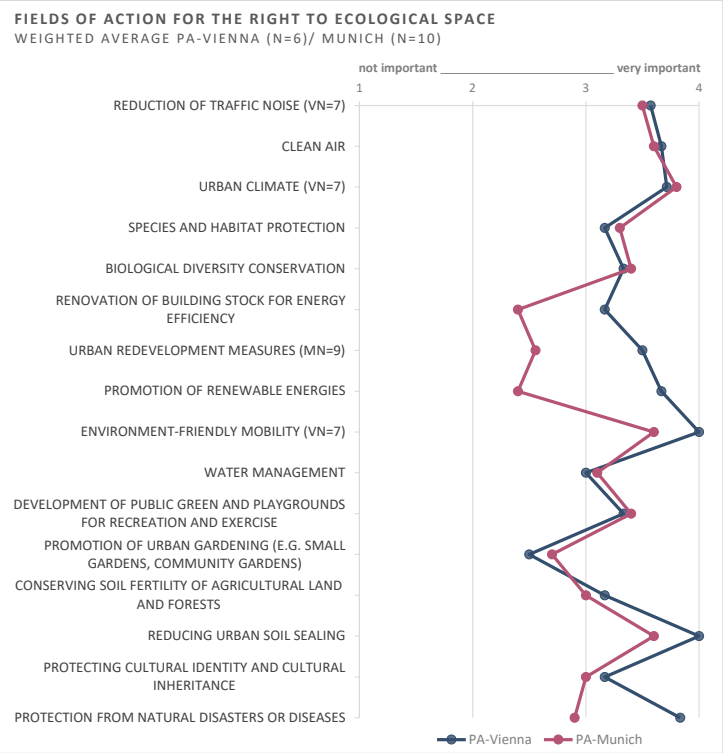
However, it is important to mention that already in 1995 the city of Munich provided for a range of guiding qualitative standards of green and open spaces, which take **characteristics of the wider ecological space** into account. The concept on the *provision of open spaces of recreational value in the city* ('Erholungsrelevante Freiflächenversorgung im Stadtgebiet') aimed at a systematic analysis of the publicly accessible green and open spaces regarding their reachability, required sizes and tasks of provision and 'services' (Stadt München/ Referat für Stadtplanung und Bauordnung 1995). It envisaged the creation of a green web, which also guarantees an equivalent provision of ecological functions at different levels – neighbourhood, district and city-wide (Stadt München/ Referat für Stadtplanung und Bauordnung 1995:12). It carried out analyses of open spaces based on indicators that evaluate their **use potential, experience potential**, and **physiological pressure potential**.

The first group of indicators for example evaluates an open space based on characteristics such as open lawns, playgrounds, tree canopy and connection to other green areas. The second refers to aspects such as biotope areas, waterbodies, historical and natural monuments. Most interestingly, the last group includes NO_2 and SO_2 pollution levels, particulate matters as well as noise emissions. Following the evaluation related to all three groups of indicators, at district and neighbourhood level green and open spaces of beneath average quality were especially located close to the Isar in the Munich east (e.g. 14/Berg-am-Laim, 16/Ramersdorf). They were performing less well particularly regarding their use potential, and due to substantial physiological pressures linked to air pollution. At landscape level, similar conditions applied to areas in the district of 24/Feldmoching-Hasenbergl. Green and open spaces of beyond average quality were situated in the inner districts (e.g. 1/Altstadt and 3/Maxvorstadt) and west (e.g. Nymphenburg), due to a lack of physiological pressures and high use potentials. It needs to be noted that the authors also concluded that not necessarily areas of high quality were strongly concentrated (Stadt München/ Referat für Stadtplanung und Bauordnung 1995:50).

In order to test the understanding of the concept of ecological space and its usefulness in considering potential interactions between different issues and spaces, survey participants of the public administrations of Munich and Vienna were asked about the importance they attribute to defined **areas of action for the right to ecological space**. Figure 68 shows that both public administrations often concur regarding the attributed significance to most of the proposed areas or fields of action. This on the one hand refers to the relatively high importance attributed to issues such as *urban climate*, *clean air*, *traffic noise reduction* and partly *urban soil sealing*. On the other hand, it includes the relatively lower rating of aspects such as *promotion of urban gardening*, *water management* as well as *protection of cultural identity and cultural inheritance*.

The main differences are clearly visible regarding the importance of variables related to energy, such as *renovation of building stock for energy efficiency* and *promotion of renewable energies*, given a substantially lower importance by PA-Munich than by PA-Vienna. It similarly applies to *urban redevelopment measures* as well as *protection from natural disasters or diseases*. A rather surprisingly high congruence occurs with regard to the weight given to environment-friendly mobility. This may be due to the perceived direct linkage to other aspects such as clean air or reduced traffic noise. Compared to other areas of action, *species and habitat protection* and *biological diversity conservation* do not figure very prominently. This may on the one hand result from the interpretation of the term 'ecological', which is often commonly used to refer to a wide spectrum of environmental issues in policy- and decision-making, including energy-relevant aspects. In the context of another question in which ecological space played a role, one of the respondents of the Vienna general public commented '*What is ecological space?* […] *Is it not everywhere/everything?*' It hints at the risk of the concept being inflated with meaning and potentially losing its purpose. On the other hand, the comparably less importance given to biodiversity and species protection with regard to the right to ecological space may also be due to the less relevance those areas still get attributed in pursuing human well-being objectives. This will be an aspect that will be further looked into when evaluating their importance as a policy objective for a just access in the following sub-chapter.

Figure 68: How important do you think are the following fields of action for the right to ecological space in your city?



Note: The figure includes weighted averages, calculated based on n number of responses provided to not important (1), slightly (2), moderately (3) and very important (4) for pre-defined variables by the public administrations (PA) Vienna (V) and Munich (M). *Don't know* responses have not been taken into account when calculating the weighted average. No significant numbers of *don't know* responses have been registered. *Other* not included due to lack of responses.

D 2.2.1.3 Conclusions on rationales for action and overall relevance

1. **Quantitative disparities of the ecological space provided by GI are exposed**

   The study of relevant documents and data revealed existing polarisations regarding the quantitative distribution of urban green space across both analysed cities. This refers to the distribution of different typologies of land use types (e.g. urban forest), concentrated in some neighbourhoods quite lacking in others, and also links to historical developments and natural features. The polarisation however affects especially areas of high biodiversity value or protected areas of a defined size, which are increasingly concentrated at the outskirts or to defined, high-profile protected areas of the two studied cities. It seems to be confirmed that this is likely impacted by the increased disappearance of vacant land and informal green, linked to densification efforts driving development projects not only at the fringes of cities. Such transformation processes affect some districts more than others, especially those characterised by agricultural land but also in relation to private green such as private gardens and allotment

areas, which can significantly contribute to the loss of vital green space and also likely affect the biological diversity across the city. Studied perceptions indicate that the quantitative provision of urban public parks is often thought to be quite secured, especially with regard to larger sites, or even expanded with regard to newly developing neighbourhoods. However, views are bleaker regarding the development of the quantity of urban green/nature with a high diversity of plant and animal species, in line with what the documents and data analysis seem to suggest. It confirms some of the identified problems laying at the basis of the conceptual and action model.

2. Different perceptions on the provision of privately owned GI exist

Quite diverging views on the quantitative and qualitative development of private urban green/nature were issued in the framework of the online survey as well as during interviews. They indicate different interpretations of what is happening to privately owned GI elements. Individuals of the Vienna general public have the impression that they are more highly protected at least with regard to private gardens in distinct districts, whereas public administration representatives are assuming their increased disappearance especially in light of densification processes, referring both to vacant land as well as for example allotment gardens. This indicates the importance to focus on what kind and whose private green/nature is disappearing, increasing or facing no change, in order to gain more in-depth insights on the subject. This can be considered especially important given the distribution of private green/nature is perceived as rather highly unjust, and shows the relevance of the model in addressing the subject. The analysis of existing data and indicators provided only some first insights, to the extent a more comprehensive monitoring programme existed that allows to address different typologies such as front yard gardens, allotments, private gardens or green roofs.

3. Difficulties in assessing GI distribution and transformation become evident

When initially screening documents and data on conditions and transformations especially of Munich's urban green space, it proved to be difficult to decide what land use data to use to present the findings. Depending on what categories were included, the presented conditions could quite vary, given that different land use categories are applied to describe open or green space (e.g. agricultural land). It also showed the limits of any cross-city comparison using related land use data. In addition, since existing monitoring and indicators focus on land uses more broadly, they fail to take a more diverse typology of GI elements into account. Besides types such as private gardens, this could include a category of vacant land or informal green, as a related inventory could prove useful in informing about existing potentials for further developing and making GI accessible. It also needs to be noted that the previously drawn conclusions on the quantitative distribution of GI only represent a rough assessment and a snapshot of the current status, given the difficulty in evaluating transformations beyond changes in distinct land use types and mostly at district level. However, these findings suggest the need for an increased awareness of the role such transformations may play in defining a just access to GI, especially if accounted for a longer period of time. It is an aspect, which with regard to the underlying assumptions of the conceptual and action model, has been underestimated.

4. The need to discuss and monitor important GI qualities is issued

The previous conclusions reconfirm that a clear classification of urban green spaces is often missing, and it may be said that this even more so applies to GI. Interviews also revealed the necessity of leading a discussion on what green space includes and what not (e.g. which kind of agricultural area, degree of

soil sealing allowed). This relates to the need of more clearly defining some of its basic qualities. Especially the latter was described as crucial for defining what a just access represents. Although the studied green and open space concepts address the issue of qualities, either the discussion is rather general and conducted at the level of preferences or minimum standards of quality beyond the size of an area are missing. Ecological compensation requirements seem to more actively drive some considerations. Regarding the inquired quality characteristics, at least for individuals of the general public the size of an area seems to play an important role, whereas the focus of the public administration lies on connectivity issues. Some convergence on the importance of the diversity of plant and animal species occurs, although with more emphasis by the general public. The latter group also considers less important individual and specific features especially with regard to those distinct qualities favoured by the public administrations (e.g. lawns, playgrounds, seating opportunities) and iterates concerns about overly designed urban parks. It also needs to be considered that even if more comprehensive monitoring programmes of urban green space are in place they do so far not necessarily allow a more in-depth assessment of associated qualities. This especially regards the description of the status of habitats beyond protected areas or of potential 'functionings' supported by distinct species compositions. The latter could be especially important in defining what the right to a minimum ecological space implies.

5. First indications on the relevance of socio-economic space disparities are given

Although referring to social polarisations across the city and their potential impact in accessing GI, the analysed urban green and open space concepts do not provide any detailed information on how spatial disparities may perform throughout the city. It is also unclear whether this has affected decisions on the distribution of and access to urban green and open space. Existing data provided by separate indicators and analyses as well as studies indicate polarisations or even segregation of groups with high unemployment rate and income poverty along main roads and in certain districts poorly equipped with green. It also includes districts that are strongholds of those with higher income, little social problems, subject to no strong transformation dynamics and well equipped with urban green/nature. It emphasises the importance of considering disparities in countervailing transformation dynamics in addition to GI distribution.

Of special interest to the analysed studies and data were often the interrelations between socio-economic aspects and housing conditions. However, aspects addressing the living environment more widely and urban green/nature more specifically was only the case if suited to describe distinct urban area types hosting defined social groups. Variables describing living conditions applied in the framework of the survey could be useful in developing related perception indicators for statistical analysis (e.g. selected features applying to a neighbourhood). Although issues of socio-economic disparities entered the urban policy agenda, its potential impact on ecological space disparities in relation to GI seem to be yet of moderate concern, if related perceptions and the availability of strategies and monitoring are taken into account.

6. Need to consider economic inequalities more widely is revealed

The provided descriptions and mapping of socio-economic space fabrics and disparities in Vienna and Munich illustrate the strong focus on indicators that are usually related to issues of social status (e.g. education, employment status) and poverty (e.g. income threshold, child poverty), but less on socio-economic inequality and a description of high income groups in particular. It is assumed that this is linked to the reduced availability or robustness of related data, as very often not sufficiently covered by national tax reporting and likely underreported in household surveys.

Examples of which indicators can be used are provided by the city of London (United Kingdom), having been faced by a longer history of segregation and gentrification. Based on official government data sources, a poverty profile has been developed (e.g. Aldridge et al 2015), which addresses inequality more specifically, including data on:

- *Income inequality*, e.g. 80 to 20 income ratio, pay inequality based on 90 to 10 percentile ratios according to borough
- *Wealth inequality*, e.g. distribution of financial/physical/property and pension wealth by decile, ratio of low and high house prices by borough

Further elaborating on aspects of economic inequality would allow a more fine-grained description of the 'landscape of power' across a city, and would represent an important area on which to act.

7. Necessity of considering disparities across spatial dimensions, especially in relation to GI, is disclosed

The initial rough analysis of some of the dynamics of socio-economic, built-up physical and ecological spaces disparities provides first indications that power linkages could be at work that create 'winner-takes-it-all' hubs, for example with regard to variables such as relative stability of the built-up environment, good housing conditions, and access to high-quality urban green/nature. This could be related to certain urban development following a path of lowest resistance, for instance influenced by economic and political factors as well as articulation capabilities. The conceptual entry-point of the model in this regard proved to be particularly relevant in combining different perspectives, which so far have often been treated separately or only superficially interlinked. Some risks have been revealed by the interpretation of the 'right to ecological space'. Although developed as a framework that addresses the provision of 'functionings' not only for the human but a range of species, biological diversity figured less prominently as a field of action in the enquiry of its interpretation. In addition, risks have been revealed that the term could be inflated with meaning and potentially loose its purpose.

D 2.2.2 The coherence of policy interventions

The following chapter aims at appraising the coherence of the envisaged 'ought-to-be', by first comparing currently stated policy objectives (e.g. overall vision, biodiversity) with those deduced from the conceptual and action model for a just access to urban green/nature. The level of coherence is secondly determined by assessing the extent to which the policy objectives are informed by the identified key GI principles and characteristics (e.g. the term GI, connectivity). In this regard, the analysis and the structure of the chapter are guided by the following questions and related sub-questions:

Appraisal guiding questions and sub-questions
(4) What *intended policy objectives* are in place for addressing dynamics of spatial disparities and a just access to GI? In what *vision* are they embedded? – Which *policy objectives* currently inform the *planning of urban green/nature*? How do they relate to issues of in/equality or in/justice? What *vision* informs the identified objectives? – Which *additional policy objectives* are identified being of relevance to address dynamics of spatial disparities?
(5) Which *principles and characteristics* of the GI concept have been addressed in existing green and open space planning processes?

- To what extent is there are *clear reference* to the concept?
- To what extent have the identified *principles and characteristics* been addressed?

(6) To conclude, what rationales and areas of intervention and hence *coherence* does a comparison of objectives and visions disclose?

The following overview summarises the most important assumptions regarding policy objectives and GI principles laying at the basis of the comparison to judge the coherence of the 'ought-to-be'.

Conceptual and action model – Deduced policy objectives and GI principles and characteristics

Deduced policy objectives & vision

- Central guiding principle is the fulfilment of basic human physical, psychological and psycho-social needs as well as the realisation of ecological space for species and habitats conservation, to thrive in an urban environment
- It leads to a deduced right to ecological space and duty of not constraining that of others, informed by ensuring the provision of ecological 'functionings'
- Biodiversity conservation lays at the basis of pursued objectives, as backbone for many ecological 'functionings' and thus informing issues of health, air and water quality, recreational value etc.
- Guiding vision of a just distribution and access to the ecological space provided by GI includes addressing excessive levels of disparities across different dimensions
- This involves the strengthening of governance capabilities as part of the justice concept

Involved GI principles and characteristics

- Connectivity and questions of accessibility
- Multi-functionality and distributional questions
- Multi-scale and the hierarchy theory of infrastructures
- Integration of a continuum of choices and pre-consideration given to GI
- Multi-stakeholder approach involving questions of procedural justice

D 2.2.2.1 Policy objectives and pursued visions

As indicated previously, in the framework of the thesis the understanding of policy objectives is broadened, going beyond distinct achievements or so called SMART targets. They are more closely linked to the vision of the 'ought-to-be'. Also for this reason, the sub-chapter combines policy objectives and pursued visions or principles, as not always clear distinctions can be made. In this regard, the sub-chapter is closely interlinked with the last appraisal chapter on envisaged outcomes.

Entry-points of the analysis remain existing concepts and strategies with regard to the planning of urban green and open spaces. Of interest are thus especially targets that figure as integral part of those concepts and strategies. It however needs to be considered that they are often informed by objectives set in different policy areas (e.g. nature conservation, environmental protection). These will also be subject to analysis to the extent to which they address key policy objectives more largely (e.g. related to participation).

To begin with, it needs to be noted that the *Vienna green and open space thematic concept* provides for an overall general objective that envisages the current share of 50% of the city's total area consisting of green space to be maintained (Stadt Wien/MA18 2015a:8). Accordingly, the continuing urban growth will need to be accompanied by a quantitative and qualitative growth of the city's green and open spaces. As has been noted previously (see chapter D 2.2.1.1), Vienna has a comprehensive green space monitoring in place, which should at least allow observing to what extent the quantitative target will be met.

The question remains how this growth will occur and with what overall vision in mind. As indicated before, one reason for selecting Vienna as a case study was due to the introduced guiding principle of 'green space justice'. According to the *green and open space thematic concept*, '*a socially just city also builds on the green area justice between its different neighbourhoods*' (Stadt Wien/MA18 2015a:8). A socially just city is also one of the key principles of Vienna's overall urban development strategy STEP2025 (Stadt Wien/MA18 2014:21). The notion of justice regarding urban green and open spaces is mostly associated with ensuring the even ('gleichmäßig') and city-wide ('flächenmäßig') provision of GI. It is also stated that '*all citizens have the equal right to a high-quality provision of green and open spaces*' (Stadt Wien/MA18 2015a:15). Additional references to the subject suggest how this can be further interpreted, including that '*high-quality green space is not limited to exclusive neighbourhoods*' and that it needs to be particularly taken into account '*regarding housing conditions related to affordable housing*' (Stadt Wien/MA18 2015a:8).

One of the interviewed practitioners emphasised the importance of understanding the term as a counterbalance to green and open spaces being mainly interpreted as an amenity, which along with an increased demand and rising house prices can limit accessibility (I-EXP-1, para 19). The references made in the *thematic concept* suggest an approach that puts into focus urban neighbourhoods that may still be lacking or are at risk of lacking an adequate provision, rather than for example increasing physical accessibility in areas where there is a sufficient amount available. It can be interpreted as an approach that puts an understanding of justice at the forefront which envisages bringing up the 'poor' rather than addressing overall questions of redistribution. This is further informed by the minimum standards described by the concept, which aim at ensuring that everyone can easily access green and open space (see Figure 69). These refer to the catchment area in guaranteeing access to green and open spaces, as well as the minimum overall and per capita sizes to be provided, according to reference level.

Figure 69: Vienna green and open space standards (Stadt Wien/MA18 2015a:84)

GREEN AND OPEN SPACES	CATCHMENT AREA (m)	SIZES (hectare)	m² per inhabitant		
Neighbourhood	250	< 1			3.5
Residential area	500	1–3	4.0	8.0	13.0
Urban quarter	1,000	3–10	4.0		
	1,500	10–50			
Region	6,000	> 50		5.0	
+ sports ground					3.5
+ green spaces per working place (catchment area 250 m)					2.0

Minimum accessibility is hence determined by the 'reachability' and size of an area. It may be argued that this vision builds on the ideal of a 'Stadtlandschaft' (city landscape), where the focus lies on providing a critical mass, predominantly related to the urban scale, although mixing urban and wider landscape elements and especially blurring the city-landscape binary (see conceptual foundations in chapter C 1.1.3). More than once, also the thematic concept refers to the term, stating for example that '*main emphasis of the green and open space planning will be the crystallisation and further development of the city landscapes*' (Stadt Wien/MA18 2015a:14). However differently to what is proposed by the idea of the city landscape, the thematic concept introduces distinct green and open space typologies, which will be described in more detail when discussing the application of GI principles and characteristics. Nevertheless, it can be assumed

that the focus on the provision of a critical mass has likely resulted in avoiding to apply a hierarchical approach to the development of different GI elements. This assumption is further explored in sub-chapter D 2.2.3.1.

In the conceptual foundations chapters C 1.2.1.3, it was already outlined how urban planning theorists criticise that questions of spatial disparities are mostly related to the quantity and less to the quality of public urban green areas, also in relation to issues of a just access. In addition, according to Susan Fainstein (2010), quality discussions fail to go beyond arguments of preferences and to provide more 'objective' criteria. Also the *Vienna green and open spaces thematic concept* mostly focuses on what preferences are raised by social groups or individuals, emphasising that it will aim at '*fulfilling the most varied use requests by all population groups*', and referring to '*target group specific need profiles'* (Stadt Wien/MA18 2015a:29+25). At the same time, it lacks specific objectives regarding the quality of urban green areas, besides those related to the previously addressed obligatory requirements regarding features such as playgrounds or seating opportunities (see chapter D 2.2.1.1).

When describing its **overall objectives**, the thematic concept repeatedly emphasises the key aspect of ensuring a high quality of life in the immediate neighbourhood, and puts a strong focus on developing spaces for recreation and leisure. It also iterates to build on targets which in 2010 were agreed upon in the governmental programme of the current council (Stadt Wien/MA18 2015a:12). In this regard, the concept more explicitly refers to issues such as climate change adaptation (e.g. corridors for fresh air provision), health aspects (e.g. combined infrastructure developments related to cycling and walking), urban gardening (e.g. promoting self-governance at semi-public spaces), economic competitiveness (e.g. environmental amenities for real estate development, image-building), and culture and identity (e.g. vinicultural landscapes). However, not necessarily these can be identified as unequivocal objectives, for they are mainly used to describe the value of Vienna's green and open space network and to indicate the vast range of initiatives and projects that are in place.

With regard to **biodiversity**, the thematic concept clearly states that key task of the open and green space planning is to make provisions for the conservation of habitats, plant and animal species. In addition, it argues that green corridors need to be large enough to provide for different uses, including biodiversity supporting features (Stadt Wien/MA18 2015a:26+28). However, biodiversity objectives seem to remain more of a by-product than informing or even building the backbone of urban green and open space planning. Although its role is underlined with regard to the ecological functions to be provided by Vienna's open and green spaces, it is not necessarily related to other identified functions, such as everyday life and recreation or structuring of the urban fabric.

This perspective is also believed to be confirmed by the way objectives are issued in the framework of related regulatory policy interventions. The Vienna building code represents the regulatory framework that addresses different forms of land uses and envisaged developments, except nature conservation areas (see Table 19). Nature conservation objectives are mainly addressed by the Vienna nature conservation law (Wiener Naturschutzgesetz), and no separate urban biodiversity strategy exists, which could outline related objectives. Article 1, paragraph 2 of the Vienna building code (BO für Wien), which sets out a range of land use requirements, is mainly focused on ensuring:

- Provision of green/water areas for recreational purposes, especially related to the forest and meadow belt

- Environmental conditions that support healthy living conditions related to housing, working and leisure, creating preconditions that support a sustainable use of natural resources, land and soil
- Protection of the Wienerwald

In this regard, nature conservation areas do not necessarily represent a development category for which to provide for, but rather a protection category, which mostly has to be dealt with separately. This can have impacts on the perceived role of biodiversity with regard to the development of GI. And it has been of some concern also in the Austrian biodiversity strategy 2020+ (BMLFUW 2014), specifically with regard to target 11 on the integration of biodiversity and ecosystem services into sectors such as spatial planning and transport. It calls for the designation (or at least consideration) of priority areas regarding ecological functions (Green Infrastructure) in local and regional plans.

With regard to the strengthening of **governance capabilities**, the Vienna green and open space concept also builds on another of the key principles of the urban development strategy STEP2025, namely the participatory city. The development strategy aims to fulfil citizens' demands on the 'co-determination' of their living environment, by pursuing a range of initiatives in the context of different institutional settings, such as urban renewal offices or urban development offices (Stadt Wien/MA18 2014:25-26). This not only refers to active participation but also to ensuring transparency of information. All these aspects mainly address the issue of articulation powers, as outlined by the conceptual and action model. However, there is no reference to objectives regarding the strengthening of political processes, and seemingly no awareness regarding possible unbalances of governance capabilities for example in relation to economic powers. The strategy emphasises that by applying this principle it envisages flexible procedures substituting rigid rules and mechanisms (Stadt Wien/MA18 2014:26). Although more informal processes can be crucial for a joint development of the city, it also rises the question whether there is a risk of eroding formal, legally required participation procedures. In addition, it needs to be noted that the participatory objective of the city is not explicitly outlined as a component of its notion of justice.

Box 7: Munich in comparison – a glance at policy objectives and pursued vision

Rather than updating on a regular basis the city's urban development plan, already in 1998 the city of Munich opted for the development of an overarching development framework, called the *Perspektive München,* to combine all spatially relevant policy areas. The stated aim was to shift from comprehensively outlined plans to a '*process-oriented planning*' (Stadt München/ Referat für Stadtplanung und Bauordnung 2013a:26). This requires to take a closer look at some of its content to better understand pursued objectives and visions, given the patchwork of different evaluation concepts and programmes affecting Munich's open and green spaces is strongly embedded within this framework.

Building on **public participation processes** which take place at a regular basis, the development framework *Perspektive München* evolved from initially 7 guidelines and 5 lead projects to a framework that consists of 1 guiding principle, 4 strategic guidelines, 16 thematic guidelines, 10 action areas and 60 lead projects. The guiding principle refers to a 'city in balance', and unites the four strategic guidelines, including 1) open atmosphere and attractive appearance, 2) foresight and cooperative management, 3) caring and committed urban society, and 4) high-quality and characteristic urban space. The accompanying thematic guidelines (G) are defined as specific target statements, which should inform the work of the different municipal departments. This includes the following examples considered of particular relevance:

- G-4: Strengthening neighbourhoods by developing districts (e.g. social city programme)
- G-5: Creating future-oriented residential structures through a high-quality inner-city development - 'compact, urban, green' (e.g. urban green belt)
- G-10.1: Developing ecological standards and safeguarding natural resources (e.g. soil)
- G-10.2: Ecology – climate change and climate protection (e.g. urban green belt)
- G-15: Health – meeting challenges, creating perspectives, promoting quality of life (e.g. environmental justice)

It becomes evident that there is no single thematic guideline that addresses green and open spaces. The issue is tackled in the context of different themes (e.g. qualified inner-city development, climate change). The same goes for aspects related to **social cohesion** (e.g. social harmony safeguarded by local government policies such as housing as well as local security procedures). The latter is defined as representing a responsible and peaceful 'together', allowing social and cultural mobility and including the support of socially disadvantaged population groups. Issues of environmental justice are addressed by G-15 on health, targeting those areas where environmental burdens (e.g. air and noise emissions) are high and thus face increased health risks.

In a subsequent step, these rather general thematic guidelines are then directly spatially anchored, by identifying action areas across the city and translating them into lead projects. This represents a rather steep passage, from a level of principles to the concrete project level. It was argued that this amorphous and diffuse approach should allow to easily and flexibly tackle key themes across administrative boundaries (Thierstein et al 2016:211). This flexibility can however also bear the risk of making it more difficult to grasp and more volatile as well. It is assumed that evaluation concepts (or conceptual evaluations), which are developed for specific themes or challenges by involving a range of stakeholders, aim at filling potentially resulting conceptual gaps. Of relevance to GI are for example conceptual evaluations on the long-term settlement development, open spaces or biodiversity offsetting (see Table 20 for an overview). However, this approach also makes it difficult to pin down the envisaged way forward, as it is not always clear how those different concepts interact, especially regarding their hierarchy or prioritisation.

Similarly to its urban development strategy, Munich's evaluation concept on open spaces (*Freiraum 2030)* proposes planning guidelines and thematic guidelines, but an overall, spatially concretised vision of the development of its green and open spaces is difficult to carve out. Planning guidelines are described as representing distinct strategies with regard to open spaces, including for example the establishment of connectivity (Stadt München/ Referat für Stadtplanung und Bauordnung 2015:36). The latter is argued to contribute to '**open space justice**', although a more detailed outline what this may encompass is not provided. It also does not seem a driving vision of the document, different to Vienna's green and open space concept. Interestingly, however, it interprets connectivity more largely as accessibility, and proposes a range of measures to expand use capabilities of private green, for example by limiting their enclosure. The thematic guidelines of the concept are portrayed as **framework narratives**, which bundle activities but remain flexible. They are described as representing strategies that provide a distinguished profile to the city's open spaces. Building on principles such as deceleration, densification and transformation, they have been translated into 'area sceneries', introduced previously with regard to quality characteristics (see Box 4). Wild nature and 'nature-staged' places, for example, are envisaged to contribute to deceleration by providing 'counterbalancing spaces'. However, an overall commitment with regard to the share of green spaces seems to be lacking. In addition, the concept gives the impression of largely focusing on coping strategies and objectives, in light of expected transformation and densification processes, and being reactive rather than driving a pro-active development.

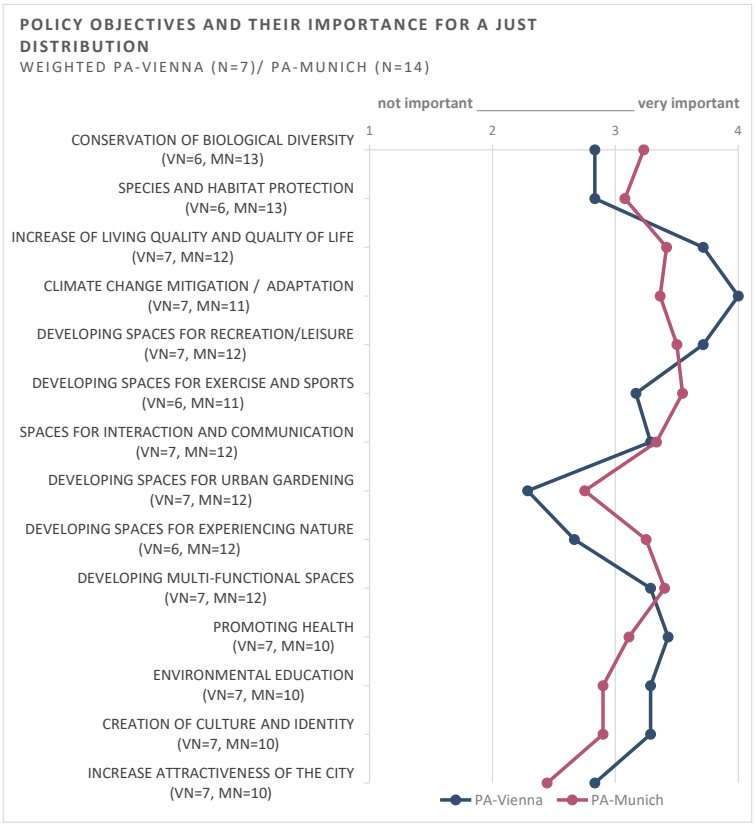
It is also important to highlight how Munich's *Freiraum 2030* connects to **biodiversity policy objectives**. As part of the principle of deceleration, the further development of the biotope network across the city figures as one of the key aspects, also emphasising potential conflicts with recreational functions and land use pressures (Stadt München/ Referat für Stadtplanung und Bauordnung 2015:40). Related targets are part of Munich's species and habitat protection programme, established in 2005 (Stadt München/ Referat für Stadtplanung und Bauordnung 2014:18). According to the concept, however, a sustainable open space strategy needs to go beyond the establishment of protected areas and address biodiversity conservation more widely across the city (Stadt München/Referat für Stadtplanung und Bauordnung 2015:24). In this regard, it refers to the development of an according biodiversity strategy, which integrates the subject more extensively into urban and open space development beyond nature conservation, indicating its sectorial handling so far. Although the respective concept, including a related monitoring programme, was already envisaged for 2014, a preliminary version is now expected for the end of 2017 to be discussed with various stakeholders and likely presented to the council mid-2018 (Stadt München 2017b).

It also needs to be noted that, differently to the Vienna building code, Article 1a of the German federal building code (BauGB), which outlines legal requirements with regard to building and land use plans, directly integrates targets addressed by the German Nature Conservation Law (BNatSchG). It emphasises the importance of avoiding or compensating disturbances to the landscape and the service and operational capability of the natural environment, setting out the according requirement of compensation measures. The latter can either be based on plans and designations or also occur in the framework of urban development contracts, not necessarily at the site of the disturbance. As stated previously, this has likely resulted in a more pro-active approach in further identifying and developing related areas also in Munich. However, interestingly at the same time Article 40 and 41 of the federal building code issue requirements for monetary compensations to be provided to property owners, in case the building plan imposes green areas or water areas, or includes obligations with regard to the type of vegetation (e.g. trees). It is based on the assumption that it potentially leads to an asset value decrease as a result from hindrances to the economic

use of a property, and also applies to other infrastructures such as road or playgrounds. Any resulting compensation payments would need to take into account also value increases to which the development of such features may lead. However, Thiel (2016:694) argues that value increases with regard to urban green are often unappreciated. More often urban green is identified as a **'damage category'**, rather than an active development category with regard to private property. It rises important questions on the equal treatment of urban green/nature as an infrastructure feature.

As a follow-up to the question on sought quality characteristics and needs (see Figure 61a+b), the online survey asked representatives of the public administrations of Munich and Vienna about which **policy objectives** are pursued and how important they think those are **for a just distribution of quantity and quality of urban green/nature**. As Figure 70 illustrates, there is no strong opinion about an objective not being considered important at all. A lower importance is given to the *development of spaces for urban gardening* especially by representatives of the Vienna public administration. The lowest importance given to a target by respondents of the Munich public administration refers to the *increase of attractiveness of a city*, commented by a respondent '*as being the smallest problem the city is facing*', in light of population growth and economic development. PA-Munich respondents generally display no strong positive inclination towards any of the proposed objectives, although *developing spaces for recreation and leisure* as well as *sports and exercise* figuring the strongest support. In a different section of the survey and related to an open question, a PA-Munich participant indicated that he did not expect a clear picture resulting from responses, given many policy objectives are actually overlapping. Another emphasised the need of establishing just distribution as an explicit, cross-cutting target. Representatives of the public administration of Vienna show clearer tendendcy towards defined objectives, with a strong importance attributed to *climate mitigation and adaptation*, followed by an *increase of living conditions and quality* as well as the *development of recreational space*. These objectives largely correspond to important needs identified by individuals of the Vienna general public, and also to previously outlined objectives of the thematic concept.

Figure 70: In your opinion, how important are the following objectives for a just distribution of quantity and quality of urban green/nature?



Note: The figure includes weighted averages, calculated based on n number of responses provided to not important (1), slightly (2), moderately (3) and very important (4) for predefined variables that have been selected by n number of participants of the public administrations (PA) Vienna (v) and Munich (m). *Don't know* responses have not been taken into account when calculating the weighted average. No significant numbers of *don't know* responses have been registered for the listed variables. Results for *other* not included, due to limited responses and risks of distortion.

However, PA-Vienna attributes slightly less significance to objectives such as *conservation of biological diversity* as well as *species and habitat protection*, for a just access to quantity and quality of urban green/nature, and even less to *experiencing of nature*. At least the first item was rather highly valued by individuals of the general public with regard to expressed needs (see Figure 61b). The two public

administration groups seem to mostly agree on the moderate to high importance of *developing multi-functional spaces*. Not very significant but higher insecurities exist on whether targets such as *promotion of health*, *environmental education* and *creation of culture and identity* are pursued, also indicated by a reduced number of responses by PA-Munich. Somehow suprisingly is the lower ranking of the *promotion of health* by PA-Munich respondents, despite representing an important topic with regard to objectives pursued in the framework of its urban development concepts, especially linked to the subject of environmental justice.

Although more explicitly targetting urban green areas for double inner development, a similar question on policy objectives was also included in the survey of Böhm et al (2015:93). Interestingly, partly similar results were retrieved. *Improving living conditions and quality* ranked highest among the roughly 36 respondents of urban green planning and management departments in Germany, followed by *climate mitigation/adaptation*, *development of spaces for recreation*, *exercise and sports*. In additon, the *development of urban gardening space* also figured rather low as objective. *Conservation of biodiversity* in particular as well as *species and habitat protection* were however even far less favoured than by respondents of the public administrations of Munich and Vienna. It can however be asssumed that the relatively lower importance given to the conservation of biological diversity as policy objective for a just access has less to do with a limited awareness regarding the subject. According to one of the survey questions, enquiring on the familiarity of certain terms, biodiversity figures as the most well known by both public administrations of Vienna and Munich. With regard to PA-Vienna, n=6 out of the n=7 respondents expressed to be familiar with the term, whereas it amounts to n=7 out of n=10 participants for PA-Munich.

In this regard, it can be added that rather pessimistic or limited views on the role of biodiversity conservation and nature protection in urban green and open space planning were issued in interviews with practitioners, representatives of civil society initiatives as well as the public administration in Vienna. According to one interviewee, the city lacks an overall concept on biodiversity conservation (I-CSI-3, para 10). Another respondent stated that the city's nature conservation law is mostly reactive and applied too late in the land use planning process, limited to some areas and often to the protection of certain species rather than the design of habitats and ecosystems. It can only raise awareness on possible threats but allows little scope to actually intervene, even more so pro-actively (I-PA-2, para 4). According to a practitioner, nature and biodiversity conservation objectives will probably mainly inform larger GI landscape elements and ecological functionings, and as such will help shaping the edges of the city. If it pro-actively seeks the development of landscape protection areas in places not necessarily offering unique ecological features, it can make an important contribution to environmental justice (I-EXP-1, para 46). However, at the same time its role in establishing a city-wide ecological network is perceived to be limited, which indicates high risks that it will remain secluded to some 'islands' of high biodiversity value.

D 2.2.2.2 Consideration given to GI and its principles & characteristics

According to results of the online survey, regarding its familiarity Green Infrastructure is one of the better known terms to representatives of the public administrations of Munich and Vienna. This applies especially to the Vienna public administration, given 5 out of the n=7 respondents expressed that '*yes, they are familiar with the term*'. It is only slightly less with regard to the public administration of Munich, where it was the case for 6 out of the n=10 respondents. Interestingly, at the same time the ecosystem services concept seems visibly less familiar to both survey groups (n=5 for PA-Vienna and n=7 for PA-Munich).

Interviewed representatives of civil society initiatives in Vienna were mostly not acquainted with the term. One representative issued the fear of another buzz-word appearing, which propagates a '*highly-efficient green*' that only to a limited extent may actually be composed of vegetation (I-CSI 1, para. 20-23). The interviewee underlined that, when finalised, newly designated urban green space to a large extent is fragmented, for example due to the crossing of large and paved walking and cycling routes. Interviewed planning practitioners were all familiar with the term, although with often diverging views regarding its usefulness. One of the practitioners underlined that not necessarily the GI concept offers new principles and characteristics, especially in relation to connectivity, multi-functionality and multi-stakeholder approach, which she or he deemed already largely applied in the 1980s (I-EX-P 1, para 23). However, the practitioner emphasised that it allows to shift the discourse of methods and processes to the discussion of outcome or the 'ought-to-be'. Similar to other infrastructures, this also refers to the provision of functions, and as such claims of justice can be made (I-EX-P 1, para 42). The practitioner also iterates that it allows a new form of dialogue with those responsible for the provision of other infrastructures, whether related to waste, waste water or energy, giving it the same level of importance. Another practitioner issued a similar view, iterating that its principles are not necessarily new, but that it may lead to a different understanding regarding the importance of urban green, and get the respective political support (I-EX-P 3, para 36). An expert working on the issue of environmental justice underlined the term's potential in linking discussion of green and open space planning more closely to social aspects, and integrating it into discussions on the just distribution of environmental resources (I-EX 1, para 53).

However, there were also critical voices. A practitioner associated the term rather with a process that does not value nature for its own sake, but as 'a means to an end' by providing a range of functions for human well-being. He or she feared that this in the long term, and especially with regard to biodiversity, could be counterproductive (I-EX-P 2, para 67). An interviewed representative of the public administration emphasised that only a few urban species will likely profit from the forming of a network according to the GI concept (I-PA 2, para 10). More important would be to improve the quality of nature conservation habitats, but especially to define the quality characteristics of green with regard to the 'functionings' it supports, e.g. soil formation and water cycles. In addition, a large number of the interviewed representatives of the planning community, experts from academia, and individual public administration respondents expressed their worries and scepticism with regard to the ecosystem services concept propounded by some GI definitions (I-PA 2, para 20; I-EX-P 3, para 36; I-EX-P 2, para 67; I-EX 2, para 30). The concept was often linked to issues of commodification and privatisation of urban green and nature. Respondents criticised the resource-oriented and economic approach of the concept, focused on quantifying and monetising the usefulness of urban green/nature. A planning practitioner iterated that:

> *[…] principles and values are more important […]. Otherwise, you support the narrative that only those things are of value which can be monetised'.* (I-EX-P 3, para 40)

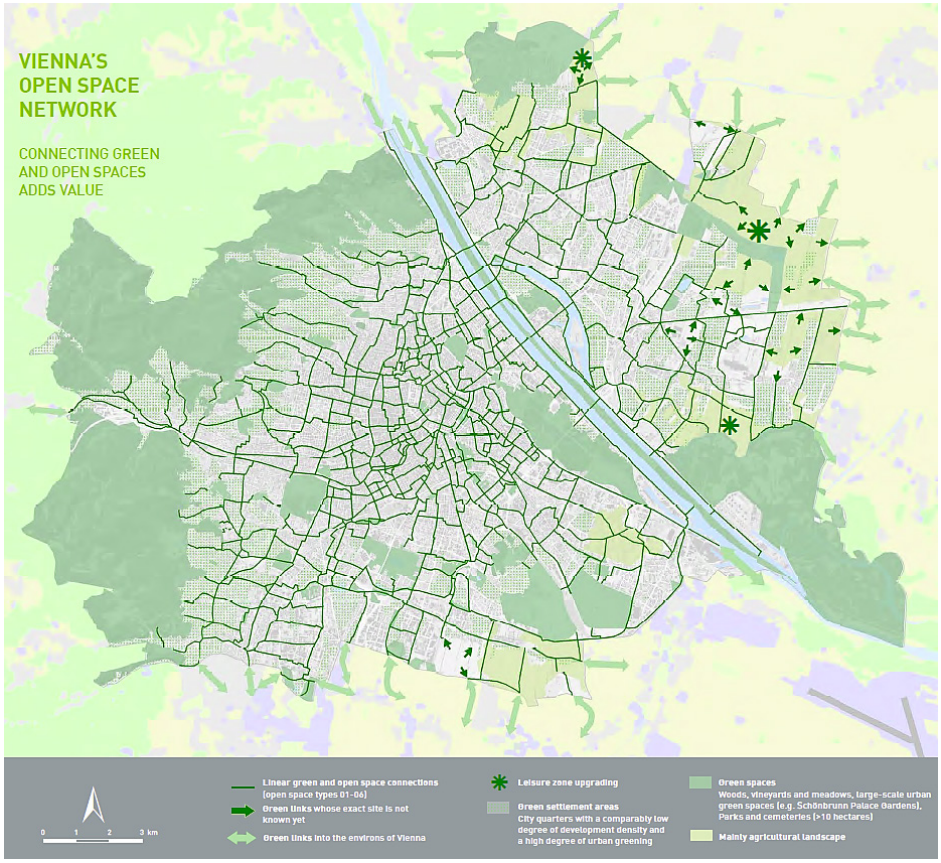
An expert also argued that municipalities currently very often apply terms such as ecosystem services as well as Green Infrastructure to secure additional funding especially at the EU level, although not necessarily new approaches are applied (I-EX 1, para 43).

This leads to the question to what the extent the GI concept, and/or the identified principles and characteristics have actually entered open and green space planning. The related analysis of the *Vienna green and open spaces thematic concept* shows that the term Green Infrastructure, or infrastructure of green and open spaces, figures rather prominently. The importance of green and open spaces as a key infrastructure is emphasised, which provides functions of general public interest and plays a crucial role for the quality of

life of Vienna's inhabitants (Stadt Wien/MA18 2015a:14). In light of envisaged urban population increases, it is underlined that the focus of the city's green and open space planning lies on the further development of the according infrastructure, similar to those related to public transport, roads or its sewage system (Stadt Wien/MA18 2015a:15+24). In this regard, it can be said that the term is used to demonstrate interest in an active development of green spaces, putting emphasis on its necessity.

According to the analysis of the thematic concept, one of the most prominently featuring key principles related to the development of the green and open space infrastructure is to ensure the connectivity of its elements. Most often this refers to the development of a network or web, and consists of connecting linear features that form part of the identified typology of elements, and linking it to public transportation, cycling and walking infrastructure (Stadt Wien/MA18 2015a:14-17, 26+29). The overall aim is to have a dense, fine-mashed network in place, which provides for an even and hence just infrastructure provision (see Figure 71). According to the concept, this becomes especially a priority in densely built-up neighbourhoods (Stadt Wien/MA18 2015a:29). However, it needs to be noted that the *Vienna green and open spaces thematic concept* mainly addresses physical components of connections, whereas functional connectivity plays less a role. The interpretation of connectivity seems to rather build on the concept of greenways than on ecological networks (see chapter C 1.1.2.1). Main focus is the quantitative distribution of urban green spaces.

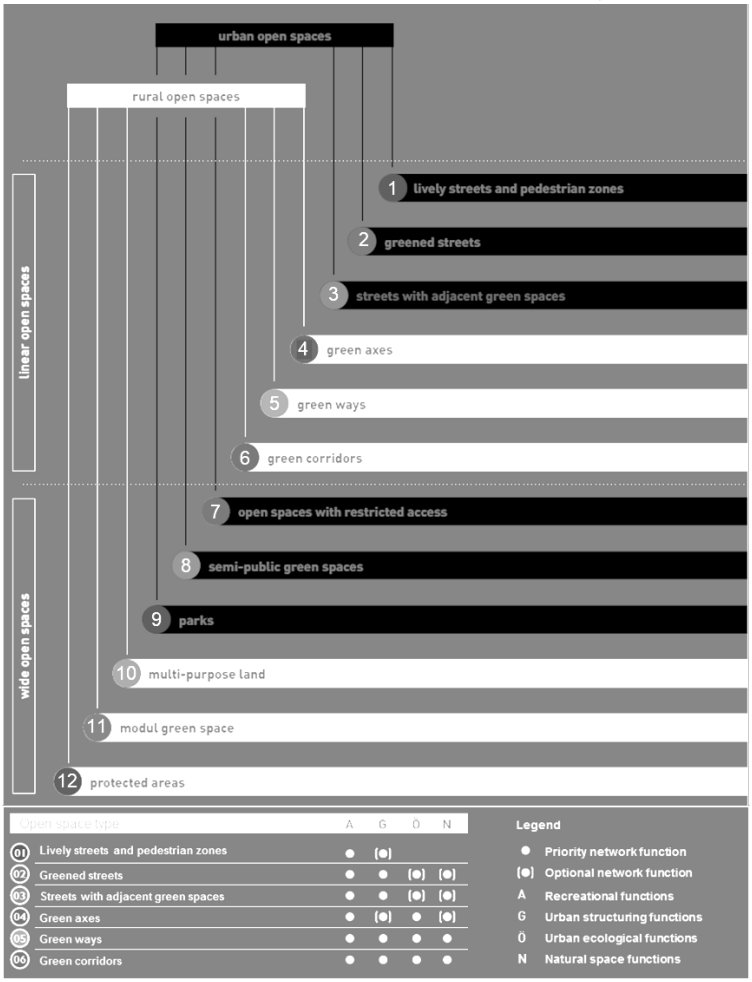
Figure 71: Vienna green and open space infrastructure (Stadt Wien/MA18 2015a:3)



This does not necessarily imply that the concept fails to address the issue of functions or **multi-functionality**, although it rather seems to aim at the development of a critical mass than specifically targeting the provision of functions in relation to existing needs. As indicated when looking into conditions and needs and available monitoring programmes and indicators (see chapter D 2.2.1.1), the *Vienna green and open spaces thematic concept* introduces a range of functions to be secured, including recreational, urban structuring,

urban ecological and natural space functions (Stadt Wien/MA18 2015a:43). It is envisaged that the development of multi-functional green corridors also 'unlocks' newly developed neighbourhoods (Stadt Wien/MA18 2015a:26). As already briefly outlined, the identified functions are applied differently to the 12 open space types that have been proposed to secure and further develop the green and open space network of the city, and are presented in Figure 72.

Figure 72: Vienna's open space types and priority functions (examples) (partly translated and modified from Stadt Wien/MA18 2015a:43+49)



The 12 types are classified according to whether they are linear or wide, and represent urban or rural open spaces. Especially green ways and green corridors are targeted as a priority with regard to the range of different functions to be secured. However, it remains unclear whether certain functions are prioritised for certain parts of the city, due to arising needs or to promote certain qualities. As outlined before, with regard to qualities the concept largely refers to preferences and wishes, and it is assumed that this also applies to its interpretation of multi-functionality. It is also worthwhile noting that the English shorter version of the thematic concept translates *ecological functions* with *ecosystem services*, making reference to the concept, but not explicitly addressing it in the German version. Additionally, it is important to remark that also private green spaces are included in the its typology of elements (e.g. open spaces with restricted access), in particular referring to green residential zones and areas with allotment gardens, as well as semi-public spaces such as inner courtyards. Whereas however protected areas are represented by various land use categories linked to Vienna nature conservation laws, and other wide open spaces are covered by the Vienna building code, no explicit land use categories exist for linear open spaces such as green axes, green ways or green corridors. The Vienna building code (Article 1, paragraph 2 A, BO für Wien) with regard to green land generally distinguishes between rural, recreational and protection areas, which are subject to different rules. According to the code, recreational areas include urban parks, allotment garden areas, sport and playgrounds or public swimming facilities. Protection areas refer to the forest and meadow belt, and park protection areas, including cemeteries and a range of brownfields. These differences need to be taken into account, given the thematic concept per se is not legally binding whereas this is the case with regard to the building code and nature conservation laws and its categories. Linear types such as green corridors could be zoned using related categories, although this might result in a patchwork rather than coherent type also with regard to the rules that apply.

With regard to considerations given to **multiple scales**, it can be noted that the *Vienna green and open spaces thematic concept* underlines the importance of developing and securing larger recreational areas at the fringes of the city, in close cooperation with neighbouring municipalities and the state of Lower Austria ('Niederösterreich') surrounding Vienna (Stadt Wien/MA18 2015a:15). It also indicates that closer collaboration will be sought in applying planning instruments, for example with regard to landscape offsetting measures (Stadt Wien/MA18 2015a:26+89). Although the latter is not legally required by the Vienna building code, biodiversity compensation measures are issued in the framework of environmental impact assessment procedures (UVP-G 2000) (see Table 19). The thematic concept also aims at establishing a platform, which spatially coordinates those measures, to target relevant landscape elements particularly in the south and north of the city. However, it can be noted that multiple scale considerations seem currently to be limited to the immediate landscape neighbourhood of the city. The importance of taking into account connectivity issues at a larger landscape scale, not only physical but especially functional, is reflected in some comments provided by interviewees in the city of Vienna. An elderly inhabitant interviewed in the vicinity of the central cemetery ('Zentralfriedhof'), who emphasised the higher importance of nature and meadows rather than parks, also indicated:

> '*Although I am happy with the urban renewal that is currently taking place, given my experience with sub-standard housing, the young ones do not use the available green. They prefer to leave the city over the weekend.*' (I-Inh-6, para 2)

This is also an important aspect to consider regarding potential streams of visitors and tourists flowing from a range of large agglomerations such as Vienna and Munich into the Alpine foreland and central area, seeking recreational and 'nature' experience. At the same time, a practitioner underlined that especially those with smaller incomes have often few options in evading their situation, for example by leaving the city over the weekend to seek recreational opportunities in a different landscape. They have to rely on the provided options in the close neighbourhood, resulting in high presences in urban parks over the weekend (I-EXP-2, para 13). Besides those larger dynamics, limited consideration is also given to issues of ecological connectivity with regard to biodiversity conservation at a wider landscape level in the thematic concept. This conclusion is also supported by the following findings in relation to the principle of integration.

The *Vienna green and open spaces thematic concept* repeatedly emphasises the importance of integrating green and open space infrastructures with infrastructures for walking, cycling and public transport, to facilitate a new urban mobility and promote health aspects (Stadt Wien/MA18 2015a:6,15,11,28,36). In addition, its importance for an integrative rainwater management system is mentioned (Stadt Wien/MA18 2015a:33). In this regard, the principle of **integration** is addressed following the interpretation of Davies et al (2015:14), since it focuses on the coordination of urban green with other infrastructures both in physical and functional terms. No explicit reference could be found that Green Infrastructure is operated on a continuum of strategic choices of conservation and development. Although for example conservation is addressed, it mainly refers to existing protected areas. A brief reference to the land use category of ecological development area is included (Stadt Wien/MA18 2015a:87). It represents a land use category introduced by the Vienna nature conservation law (Wiener Naturschutzgesetz). It includes the temporary or permanent designation of areas that contribute to the objective of nature and biodiversity conservation, in particular the development and connecting of green features or the implementation of the species and biodiversity protection programme. According to Article 26 paragraph (3), the category can be used for land owned by the city as well as other land, if based on a related contract with the property holder. If the area is identified as particularly valuable, an order can be issued that puts the land under protection independent of the forming of such a contract. However, the category seems to find little application, currently

including only one site, the 'Erdberger Wildnis' in the south of the city. This impression is supported by input from one of the interviewed public administration representatives, who stated that '*it represents a dying category, for its designation often caused the delay of development projects*' (I-PA 2, para 5).

With regard to integration, also no reference could be found that GI should be taken into consideration before development takes place. The thematic concept only argues that green and open spaces can be developed most efficiently if they are optimally integrated in the project development, which is interpreted as vegetation and open space design being optimally represented during various construction phases (Stadt Wien/MA18 2015a:35). The city of Vienna also published a study which addresses the issue of early green. It provides guidance on measures such as temporary green and use, including agricultural use and temporary rewilding, as well as the early valuation of an area by organising horticultural shows (Stadt Wien/MA18 2010). Stated key aims are the avoidance of conflicts (e.g. noise and air emissions), reputation and brand building and securing real estate values. However, securing already existing green does not figure, and it remains unclear to what extent it represents a key principle of the pursued GI concept.

As previously outlined when analysing the coherence of policy objectives, the thematic concept builds on the principle or overall idea of a participatory city, and the respective difference to the overall vision of strengthening governance capabilities was already outlined. Although not integral part of the included notion of green space justice, participatory processes are addressed as an important instrument for implementing Vienna's green and open space infrastructure. It for example emphasises that such processes are not only politically important, but are also key for the success of a project, especially to achieve a high level of quality and identification, by promoting sense of ownership and responsibility (Stadt Wien/MA18 2015a:29). It also highlights the importance of focusing on those groups of citizens that usually are less often heard, indicating an awareness of differences in governance capabilities when it comes to articulation powers. In this regard, it can be stated that the involvement of a multitude of stakeholders, central part of the **ecosystem approach** laying at the basis of a range of GI definitions, represents also a component of Vienna's green and open space planning. According to its masterplan on participation, key aims of the participation processes are an improved communication between the urban population, the public administration, policy-makers and developers in the framework of development projects, and the early and transparent outline of the status of planning (Stadt Wien/MA21 2016:7). At the same time, it is emphasised that the final decision-making lies on the municipal council, and that the participation processes are mainly of consultative character. Overall, the stated objectives leave the impression of participation processes still being at an early stage of evolvement, slowly shifting from information processes to the broader involvement of citizens. Although for example the masterplan on participation describes the different options in applying such processes, a clear commitment to their regularity is missing. This was an aspect criticised by representatives of civil society initiatives, who stated that the participation processes have no legal anchorage (I-CSI 1, para 8) and it is difficult to grasp their intention (I-CSI 3, para 4).

Box 8: Munich in comparison – GI and its principles & characteristics

The introduction to the planning guidelines of Munich's evaluation concept on open spaces, *Freiraum 2030*, makes a direct reference to Green Infrastructure. It is used to highlight the diversity of economic, social and ecological functions to be provided by open spaces, especially with regard to recreation, ecological functions, urban climate, air quality, natural resources as well as biodiversity and nature conservation (Stadt München/Referat für Stadtplanung und Bauordnung 2015:34). Some of GI's principles and characteristics are subsequently picked up in the planning guidelines. This is for example the case with regard to the planning guideline of **connecting** existing spaces and establishing a regional network, seeking **cooperation** and fostering communication and **participation** as part of an ecosystem approach, as well as providing **multi-functionality**.

More largely, the term 'infrastructure' has been applied to refer to 'area sceneries', approaching it from a design perspective with regard to the 'recodification' of certain industrial sites. This for example refers to increasing the 'quality' of former railway sites, water channel systems, energy infrastructure or former landfill sites. In addition, especially opportunities regarding the integration of different infrastructure types, for example with regard to water management or urban climate adaptation, are emphasised, although a lack of public awareness with regard to the approach is highlighted. The interpretation of the **integration** principle hence follows again the definition proposed by Davies et al (2015:14). As part of a strategy for an active open space development and the application of a Munich Code, the evaluation concept proposes the development of an open space check to be applied to new development projects and areas. However, this not necessarily refers to the conservation and integration of already existing urban green/nature beyond areas of high biodiversity level. It seems to largely focus on the identification of compensation areas mostly close to the development site or in the near neighbourhood, assuming the substitutability of urban green/nature, as often the case in off-setting schemes.

Explanatory annotations to Munich's most recent land use plan also refer to a **typology of elements**, based on the concept *Freiraum 2030* and the overall aim of a connected network of open spaces (Stadt München/Referat für Stadtplanung und Bauordnung 2016a:3). According to the explanations, urban neighbourhood parks (e.g. park miles) and related connecting elements (e.g. green ways/open space axes) form the backbone of the open space system of the city. They are enclosed by the city's green belt landscapes, consist of important open space flagships (e.g. English garden), and are additionally structured by river systems and complemented by identity-building sites. Although these elements are outlined in more detail, overall they seem less distinct as those proposed by the Vienna concept, less easy to grasp, which makes them also more difficult to judge. With regard to the operationalisation, the land use plan applies categories such as *general green areas* (mainly recreational purpose), *specific green areas* (specific purpose, e.g. cemeteries or allotment gardens), *ecological priority areas* (landscape and nature conservation purpose), *forests* (multiple purposes) and *agricultural land* (multiple purposes). Ecological priority areas represent a more widely interpreted category, going beyond protected areas, and to be applied especially in light of envisaged compensation measures, although still mainly representing a protection category. The proposed typology of elements not explicitly addresses private green areas. However, it is important to consider that Munich's building plan (see Table 20) has an integrated green space plan, impacting also the design of private property. Such a plan is not the case for the city of Vienna. This will be subject of further scrutiny in the following sub-chapter.

D 2.2.2.3 Conclusions on rationales for action and overall coherence

1. Urban green space not yet broadly envisioned as an active development category

   The GI concept implies a strong interest in an active development of urban green spaces/nature, putting emphasis on the necessity of expansion and improvement. The analysed concepts on green and open space planning of both cities to some degree seek opportunities for further development with regard to defined types of GI elements. However, the legal framework laying at the basis of the operationalisation of those concepts (e.g. land use plans and building codes) still largely visualises identified elements as protection and not active development categories. This occurs to the extent of considering them as 'damage category' especially in relation to private property. It rises important questions on the degree to which GI should and can receive equal treatment as an infrastructure feature. Especially nature conservation areas are far from being handled as a development category, but rather represent a protection category which mostly has to be dealt with separately. This can have impacts on the perceived role of biodiversity with regard to GI development.

2. Biodiversity and quality objectives do not figure prominently in urban green and open space planning

   Even if the GI concept is applied, biodiversity objectives seem to remain more of a by-product than informing or even constituting the backbone of urban green and open space planning and related quality discussions. Objectives related to biodiversity conservation are often limited to nature conservation laws. As of yet the two cities do not provide for an overall strategy, which includes targets that address biodiversity conservation outside protected areas, and provides a related action plan also re-

garding urban planning measures. With regard to nature conservation, in Vienna insights from interviews indicate little political support in going beyond the fulfilment of existing requirements and a reactive approach. The integration of nature conservation objectives and ecological compensation measure requirements into the German federal building code seems to have promoted a slightly more pro-active approach in further identifying and developing related areas in Munich. Finally, the concepts do not provide specific objectives regarding the quality of urban green space, besides for example those related to obligatory urban planning requirements (e.g. seating opportunities). The large focus on preferences rather than basic needs likely increases the difficulty in providing an overall vision regarding the basic quality to be ensured.

3. The notion of GI and related claims of justice can support the development of a spatial vision

Vienna's green and open space concept includes as a driving vision 'green space justice', which is mostly interpreted as ensuring the even and city-wide provision of GI. Although it is strongly focused on the even distribution of urban green space and its different types, it has emboldened the city to provide for a spatially concretised vision of the 'ought-to-be', also to be supported by respective local green plans. Differently it was difficult to carve out the overall spatial vision pursued by the city of Munich given working strongly with general thematic guidelines and 'sceneries', which are translated into projects for defined action areas. Although the approach arguably allows to flexibly tackle key themes across administrative borders, it makes it also more difficult to grasp, and seemingly more volatile. In this regard, it seems that notions of justice can be drivers for a more committed approach in urban green space planning, going also beyond for example the general understanding of social cohesion.

4. Procedural justice not an explicit component of applied notions of justice or social cohesion

The studied concepts on urban green and open space planning both relate to the general principle of applying participatory approaches, although the latter are not explicitly a part of the applied notions of justice or social cohesion. They mostly address informal participation processes, but not the adequacy of formal procedures. There is for instance no reference to the strengthening of political processes, and seemingly no awareness regarding possible unbalances of governance capabilities, for example in relation to economic powers. Although more informal processes can be crucial for a joint development of the city, it also rises the question whether there is a risk of eroding formal, legally required participation procedures in relation to environmental aspects.

5. General usefulness of GI is recognised, although not necessarily addressing all of its key principles

In a range of interviews, the usefulness of the term Green Infrastructure was pointed out, especially in highlighting how essential the provision of urban green spaces can be for the quality of life of a city's population, and hence in getting the necessary political support, as well as in promoting a new form of dialogue with those responsible for the provision of other infrastructures. However, also concerns were raised regarding the application of the term and more explicitly in relation to the often interlinked ecosystem services concept. This relates to its potential interpretation as a rather technocratic, resource-oriented and economic concept that drives the development of a highly-efficient urban green, by focusing on the quantification and monetarisation of functions of general public interest.

In addition, it was also iterated that GI principles and characteristics especially in relation to connectivity and multi-functionality are not necessarily something new. In particular *connectivity* represents a key principle that drives GI interpretation, although the term is also used independently. In practice,

the principle mostly relates to physical connectivity and also the provision of a critical mass, often closely aligned to previous approaches such as the urban landscape concept. Also *multi-functionality* is presented as key component of both analysed green and open space concepts, but also remains elusive regarding its interpretation. The city of Vienna more closely links the principle to defined types of GI elements and its functions, but still strongly interprets the principle as addressing a multitude of preferences rather than a multitude of 'functionings', in particular in relation to the key objective of recreation. The latter remains the most prominent objective across the concepts on urban green and open space planning of both case studies. Although a *typology of GI elements* is offered by the city of Vienna, including on private green, these are not necessarily covered by defined land use categories applied in the city's building code. This is an aspect to be kept in mind with regard to the legally binding character and the expected coherence of operationalised GI elements, for different categories come along with different rules and responsibilities. With regard to *multiple scale considerations*, these currently seem focused on the immediate landscape neighbourhood of the cities, but little attention is given to the impact across a wider ecological or GI network. With regard to *integration*, the characteristic also figures often, though it is mainly interpreted as the coordination of urban green with other infrastructures both in physical and functional terms (e.g. cycling, waste water). However, it rarely envisages to take into due consideration the conservation of already existing elements before development takes place. This is one of the largest divergences in coherence between the conceptual and action model and policy interventions pursued in the two case studies, and represents one of the greatest challenges with regard to the application of GI principles and characteristics.

D 2.2.3 The adequacy of policy interventions

In relation to the identified conditions and needs as well as visions and objectives, the following chapter analyses whether existing approaches can be considered enough or acceptable compared to those the conceptual and action model may reveal as necessary for a just access to Green Infrastructure. These relate to how spatial planning interventions currently target GI status and quality (e.g. specific strategies and spatial planning instruments), as well as any additional interventions that may inform a just access (e.g. mix of instruments, housing policy), especially in relation to governance capabilities (e.g. participation processes and articulation powers). In this regard, the analysis as well as the structure of the chapter is guided by the following questions and related sub-questions:

Appraisal guiding questions and sub-questions
(7) How do *spatial planning interventions* currently target a just access to *GI status and quality*? – Which *specific strategies* and what *development and planning processes* are disclosed? – Which *spatial planning instruments* are considered important and for what reasons? (8) Which *additional interventions* might be considered especially for a wider accessibility to GI, and *governance capabilities* in particular? – What *barriers and opportunities* for a just access are revealed? – What *additional policy interventions* influence accessibility related to urban green/nature? – Which role do *different stakeholders* play regarding governance capabilities to yield for a just access to Green Infrastructure? (9) To conclude, what rationales and areas of intervention and hence *adequacy* does a comparison of implementation strategies disclose?

The following overview summarises the most important assumptions regarding possible policy interventions laying at the basis of the comparison to judge the adequacy of the way forward.

Conceptual and action model – Areas and strategies of policy interventions
Interventions targeting GI status and quality • Proceeding on a continuum of possible choices, between creation and conservation of respective GI elements, between offensive and defensive measures • Favouring a hierarchical approach in physically shaping a network of urban green areas/GI, according to the general assumption that conserving existing places takes precedence over creating new ones • Giving preference to policy interventions which are committed to such a prioritisation, favouring approaches which allow long-term safeguard (e.g. legally binding, democratic planning processes) *Additional interventions influencing governance capabilities* • Considering additional policy interventions to influence governance capabilities which address who gets in and who gets asked with regard to GI status and quality • Targeting in particular housing policy interventions due to their strong impact on the distribution of people and overall accessibility • Proceeding on a continuum of possible choices, determined by the expansion or restriction of capabilities of different stakeholder groups within three main regimes: use, occupying and commanding

D 2.2.3.1 Spatial planning interventions targeting GI status and quality

In chapter D 2.1.1, the introduction to the two case studies of Vienna and Munich provided an overview of policy interventions that are assumed of key influence to GI operationalisation. These policy interventions represent an important starting point of the overall appraisal analysis. Whereas in the previous chapters the cities' urban and open space concepts as well as their interrelation with the legislative framework played a central role, insights into actually pursued strategies and into the applied mix of different policy interventions targeting GI status and quality are of specific interest to this chapter. Research interests into the applied mix especially refer to the question whether preferences exist with regard to the configuration of policy interventions, according to the classification used in Table 19 and Table 20. Policy interventions were clustered based on the extent to which they provide either for a regulatory framework or operationalisation (e.g. building code, nature conservation law), represent non-legally binding conceptual and preparatory instruments (e.g. green and open space concept), or have a financial, market-based, cooperative and contractual focus (e.g. urban contractual agreements). Especially the latter group is assumed to gain increased importance in the framework of this chapter. In addition, the chapter is expected to shade further light on the role of multi-governance systems or on how specific policy interventions are impacted by the way they are embedded in rules and regulations or influenced by instruments at the regional and national scale.

Strategies and processes pursued by urban green space planning

Following the subject of policy objectives, the online survey more specifically looked into the importance of distinct strategies applied to the development of urban green/nature. The strategies proposed by the questionnaire were formulated as sub-strategies or operative strategies, impacting policy interventions and being determined by them, rather than referring to an overarching approach. The selected, exemplary approaches can largely be grouped according to the four sub-strategies proposed by the conceptual and action model with regard to GI status and quality (see Table 23). However, as already previously emphasised, the line cannot always be drawn neatly, for a distinct approach does not necessarily have to belong to a single defined strategy.

Table 23: Green Infrastructure planning strategies – exemplary approaches

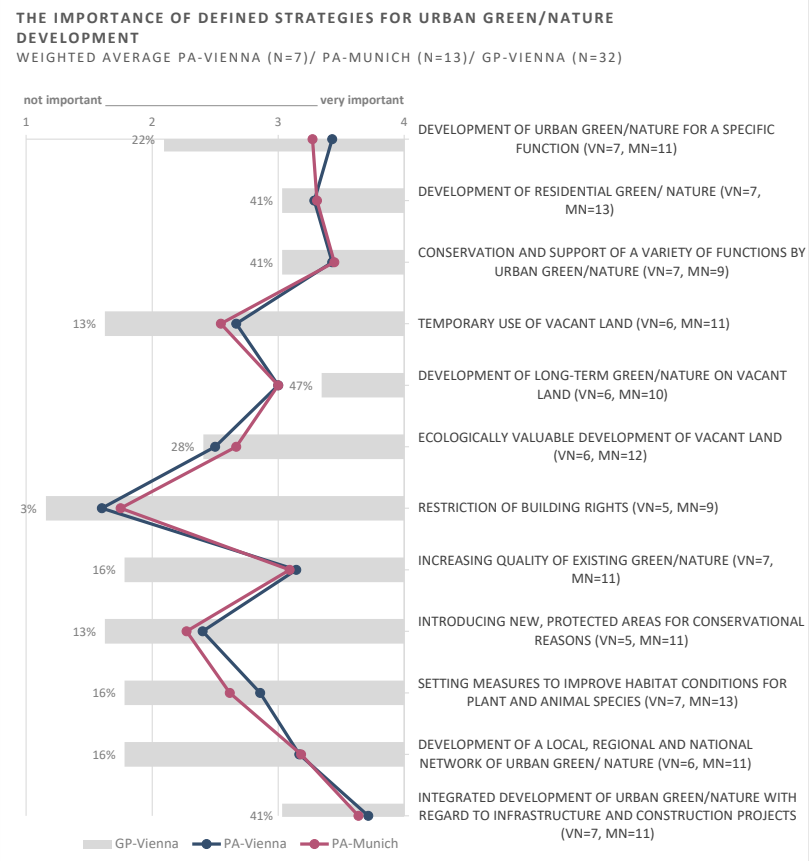
Strategies	Exemplary approaches used in the survey
Protective strategies (preventive actions)	• Conservation and support of a variety of functions to be provided by urban green/nature (e.g. local self-sufficiency, urban climate regulation) • Setting measures to improve habitat conditions for plant and animal species • Integrated development of urban green/nature with regard to infrastructures (e.g. cycling) and construction projects (e.g. consideration prior to project development)
Defensive strategies (safeguarding actions)	• Introducing new, protected areas for conservation reasons • Restriction of building rights (e.g. built-up of vacant lots)
Offensive strategies (remedial or restorative actions)	• Development of a local, regional and national network of urban green/nature • Development of long-term green/nature on vacant land • Ecologically valuable development of vacant land • Increasing quality of existing green/nature (e.g. artistic design, plant diversity)
Opportunistic strategies (targeted actions)	• Development of urban green/nature for a specific function (e.g. recreation) • Development of residential green/ nature (e.g. green roofs) • Temporary use of vacant land

Whereas the public administrations of Munich and Vienna had to select those approaches which they believe are applied to the development of urban green/nature in their city and rate them according to the attributed importance, participants of the general public of Vienna were asked to pick three preferred strategies for the development of urban green/nature. Accordingly, Figure 73 combines weighted averages (PA-Vienna and PA-Munich) that were calculated based on the importance given to an item, and percentages (GP-Vienna) that are based on how often an item was selected as one of the three preferred options. The closeness of the resulting blue and purple lines and of the grey bars determines the level of agreement between respondents of the public administrations and general public. This makes the main divergences immediately visible, although it only allows a rough comparison due to the different methodologies.

The first appearing visible difference regards the strategy of *developing urban green/nature for specific functions*. It is considered by far more important by participants of the public administrations than by individuals of the general public. It can be argued that this largely reflects previous results on important quality characteristics and needs, where respondents of the general public favoured the provision of a range of functions over specific features. The most often selected strategy by GP-Vienna respondents refers to the *development of long-term green/nature on vacant land*, slightly less valued by the public administrations. Strong divergences also exist with regard to the *temporary use of vacant land*, or the *development of a local, regional network of urban green/nature*. They are considered more important by respondents of the public administrations than by individuals of the general public. The small significance given to networks by GP-Vienna respondents seems to be a repeating pattern, if previous results on the lower importance attributed to connected areas with regard to sought-after key quality characteristics are accounted for (see Figure 61a). All three groups seem to agree on the higher significance of the *development of residential green/nature* and the *conservation of a variety of functions*. The *integrated development of urban green/nature with regard to infrastructures and construction projects* is particularly important to public administration participants. Across all three groups, the highest agreement on approaches with lower importance refers to the *restriction of building rights*.

It is also interesting to observe that participants of the two public administrations overall largely agree on the importance of the offered strategies, with only some minor divergences (e.g. setting measures to improve habitat conditions). Regarding their confidence on the extent to which the proposed strategies are applied, the lower number of responses indicates some insecurities with regard to the *development of long-term urban green/nature on vacant land* by PA-Munich participants and with regard to the *introduction of new, protected areas* by PA-Vienna respondents. These insecurities might be explained by previous findings, for example nature conservation objectives not figuring prominently regarding the city of Vienna. Informal and vacant land is also perceived to be a rare case with regard to the city of Munich. Despite the importance given to the development of vacant land, a PA-Munich respondent commented that the *restoration* [of such areas] *will not be affordable due to the requirement of inner development and the resulting built-up of vacant land*. Additional approaches suggested by PA-Munich participants include the *development of provision plans for urban green at district/neighbourhood level*.

Figure 73: Which of the following strategies in urban planning and policy do you consider particularly important with regard to the development of urban green/ nature?



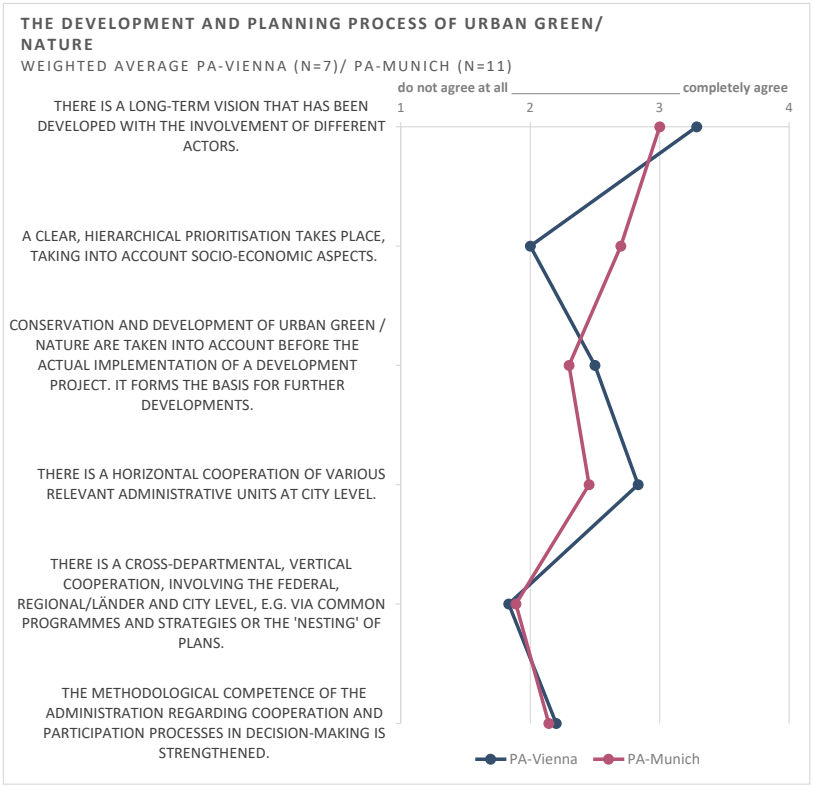
Note: The figure includes a) weighted averages, calculated based on n number of responses provided to not important (1), slightly (2), moderately (3) and very important (4) for variables that have been selected by n number of participants of the public administrations (PA) Vienna (v) and Munich (m). *Don't know* responses have not been taken into account when calculating the weighted average. No significant numbers of *don't know* responses have been registered for the listed variables. Results for *other* not included, due to limited responses and risks of distortion. The figure is combined b) with percentages, calculated based on number of responses given to a defined variable by the general public (GP) of Vienna.

If synthesised, it can be noted that individuals of the Vienna general public seem to attribute a higher importance to offensive strategies such as the development of permanent green, and to favour less opportunistic strategies such as the temporary use of urban green or its development for specific functions. An exception represents residential green, possibly due to the perceived imminent impact on living conditions. These also suggest a tendency towards a stronger interest in the provision of a higher critical mass of a defined type, to be interpreted in light of the previously outlined, perceived disappearance of informal green. The public administrations seem to have a stronger inclination towards some opportunistic strategies such as temporary uses or the improvement of existing qualities, likely linked to the perception that there is not much scope for manoeuvring regarding a quantitative increase, and the resulting focus on qualitative growth.

The study by Böhm et al (2015:92) offers comparable results with regard to a similar question posed to urban green planning and management departments in a range of German cities, although offering a slightly different list of strategies. Amongst a maximum of 36 responses, strategies such as *connecting urban green areas* and the *development of residential green* were attributed the highest importance regarding the development of urban green/nature, comparable to the previous results by the public administrations of Vienna and Munich. Also the *integrated development of urban green* ranked high amongst urban green planning departments, although it needs to be noted that the thesis' questionnaire used a slightly rephrased approach to take into account key characteristics proposed by the GI concept. The strategy of *restricting building rights* however figured similarly low. Differences are visible with regard to the *development of long-term urban green on vacant land*, as it received higher rankings by the public administrations of Vienna and Munich than it did in the study by Böhm et al (2015:92).

Besides enquiring about the application of specific strategies referring to GI operationalisation, the online survey also looked into current **development and planning processes of urban green/nature** more largely. It aimed at gaining insights from public administrations regarding the extent to which existing processes reflect key characteristics that frame a strategic approach, especially in relation to the variables described in chapter C 2.4. This includes for example the selectiveness of processes (e.g. hierarchical prioritisation), their integrative character (e.g. level of cooperation across departments) and the visioning taking place (e.g. long-term vision). According to results presented in Figure 74, survey participants of the public administrations of Vienna and Munich both agree strongest that *a long-term vision has been developed involving different actors* with regard to the development and planning of urban green/nature in their cities. Both groups are by far more sceptical that the related processes involve *cross-departmental, vertical cooperation at local, regional and national level*, including for example the development of common programmes and strategies as well as the 'nesting' of plans. In addition, especially the public administration of Munich would not necessarily support the statement that a *horizontal cooperation across departments at city level* is taking place, leaving the impression that an integrative approach could as yet not have been the case.

Figure 74: How would you rate the following statements with regard to the development and planning process of urban green/nature in your city?



Note: The figure includes a) weighted averages, calculated based on n number of responses provided to *do not agree at all* (1), *agree only partly* (2), *agree to some extent* (3) and *completely agree* (4) for pre-defined variables by the public administrations (PA) of Vienna (v) and Munich (m). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for *methodological competence/cooperation and participation*: PA-Vienna n=2 + PA-Munich n=4. *Other* not figured due to lack of responses.

This is supported by comments of PA-Munich respondents explaining their assessment (n=2). They argue that collaboration is limited, very department-specific perspectives exist, no constraints imposed on other objectives by urban green/nature targets are tolerated, and no mediating institution is in place. It was also suggested that a new cross-cutting department could be helpful in facilitating sustainable planning processes, also with regard to the provision of urban green. The strengthening of *methodological competences regarding cooperation and participation processes* also seems to occur less often, according to perceptions of both public administrations. This may potentially be limiting options of different stakeholders to be heard. With regard to the *conservation and development of urban green/nature being taken into account before the implementation of a project*, both groups seem to be indecisive, although PA-Munich shows a slightly higher tendency towards this currently not being the case. A clear difference between PA-Vienna and PA-Munich respondents can be noted with regard to a *clear, hierarchical prioritisation taking place*, which seems to be perceived more the case for the city of Munich.

These results seem to correspond to previously outlined differences of how green space planning and urban development more broadly is **strategically approached** by the two cities, according to the analysis of documents regarding pursued policy objectives. Munich's urban development framework *Perspektive München* and the embedded open space concept build on the provision of general guidelines, subsequently translated into defined action areas, which prioritise those considered most problematic, taking a clear hierarchical approach (e.g. lack of public green space) (see Box 7). The *green and open space thematic concept* of the city of Vienna, on the other hand, has been described as focused on an even distribution of urban green space, by creating a fine-mashed network of GI elements, not taking clear priorities but targeting a general provision. The way forward by the city of Munich bears the risk of failing to provide an overall, spatially concretised vision, and to address what happens to areas that fall outside those specifically targeted, whereas Vienna's approach risks to miss out on already existing disparities that influence the overall access to urban green space, especially with regard to the provided quality. According to a practitioner, despite Vienna's more comprehensive approach it is currently also 'en vogue' to focus on the continuous delivery of often short-term projects, rather than launching larger schemes (I-EXP-1, para 62). This was also emphasised by Bederke and Schilling (2015:193-194), who analysed issues of good governance with regard to the implementation of the local Agenda 21 in Vienna. According to the authors, there is a preference for projects easy to deliver rather than for undertaking more complex endeavours. It may for example result into 'project islands of public participation' rather than providing a clearly framed anchorage or a respective meta-governance (John 2015:97-80). It overall bears the risk of confounding output with outcome.

The survey findings also suggest that existing approaches seem to fall behind with regard to **cross-departmental and multi-scale cooperation**. In this regard, it needs to be considered that the municipal departments of Munich are rather strongly thematically organised (see chapter D 2.1.2.2) , which can be helpful in progressing distinct activities in one thematic area, but could be a barrier to cross-thematic collaboration. Although also the departments of the city of Vienna are organised into thematic groups, the individual MAs ('Magistratsabteilungen') often represent rather independent entities. This can come along with challenges regarding collaboration within one thematic area. In one of the interviews, a practitioner for example iterated that the independence of Vienna's municipal departments can be helpful in driving forward an idea. However, at the same time a more holistic approach in urban space planning is difficult, given responsibilities of urban green areas (e.g. forests and urban parks) are divided across departments with distinct peculiarities, management cultures and financial budgets (I-EXP-1, para 58-62). This can also affect discussions on which planning categories to apply to a newly created urban green space, as is for example the case

with regard to the study area Nordbahnhof (see Box 13 for more details on the study area). According to a representative of an involved civil society initiative, the 'forest and meadow belt' planning category should be used in order to integrate existing informal green into development plans of the study area, rather than zoning it as an 'urban park' (I-CSI-3, para 13+20). Given the first represents a protection area and the latter a recreational area according to the Vienna building code, they are subject to different rules and responsibility of different departments. According to the interviewee, the MA49 department responsible for the 'forest and meadow belt' category applies a rather extensive approach to the management of the publicly owned silvi-, vini- and agricultural land. It can also rely on a centrally managed budget. The MA42 municipal department responsible for urban parks is deemed to apply a rather strict horticultural and landscape architectural approach, focused on recreational objectives, and has to rely on different district budgets. This makes the first category the preferred option, despite potential limits regarding accessibility, according to the representative.

Next to questions of institutional integration, it can also be noted that in practice the strategy of integrating GI by giving it due consideration prior to project development seems of yet rarely the case, despite the attributed importance. This is again illustrated by the example of the Nordbahnhof development area in Vienna. During a first construction phase, in 2008 the Rudolf-Bednar-Park was created, partly financed by the EU's regional development fund (ERDF). The park was initiated as 'early green', advancing it prior to housing development in order to provide important impulses for the further construction of the surrounding housing stock and as an important tool for marketing the neighbourhood (Stadt Wien/MA18 2010:6). However, efforts to conserve and integrate the existing informal green failed, despite being habitat to a diversity and also some rare, protected species (Schinninger, Maier and Punz 2003). Artificial pond structures were added, and they provide a new habitat for green toad populations (*Bufotes viridis)*, a protected species which still inhabits the area, although whether the population will survive needs to be seen (Wappl 2016). Another example refers to transformations that have taken place at the development area of the Aspanggründe in Vienna. Also a former railway site which is rather centrally located, for many years it mainly consisted of vacant land, partly used by light industry and subject to research regarding its flora and fauna by the University of Vienna. Following an initial masterplan in 2003, in a first construction phase part of the area was developed for housing, including the new development of the first part of the Leon-Zellman-Park up to 2014 (see Figure 75). Also here no integration of the existing GI has taken place.

Figure 75: Leon-Zelman-Park, temporary urban gardening and vacant land in the development area Aspanggründe, Vienna

It is expected that the overall area will provide for 1,600 to 2,000 dwellings (Stadt Wien/MA18 n.d./d). Some of the currently remaining patches of informal green have been put to temporary use for urban gardening, supported by the district's urban renewal office. However, a representative of a civil society initiative underlined that the focus of those offices lies on individual projects that are limited to certain thematic areas and defined stages (I-CSI-1, para 30). According to one of the interviewed inhabitants, who grew up in the district and used the former vacant land as recreational area, it would have been important

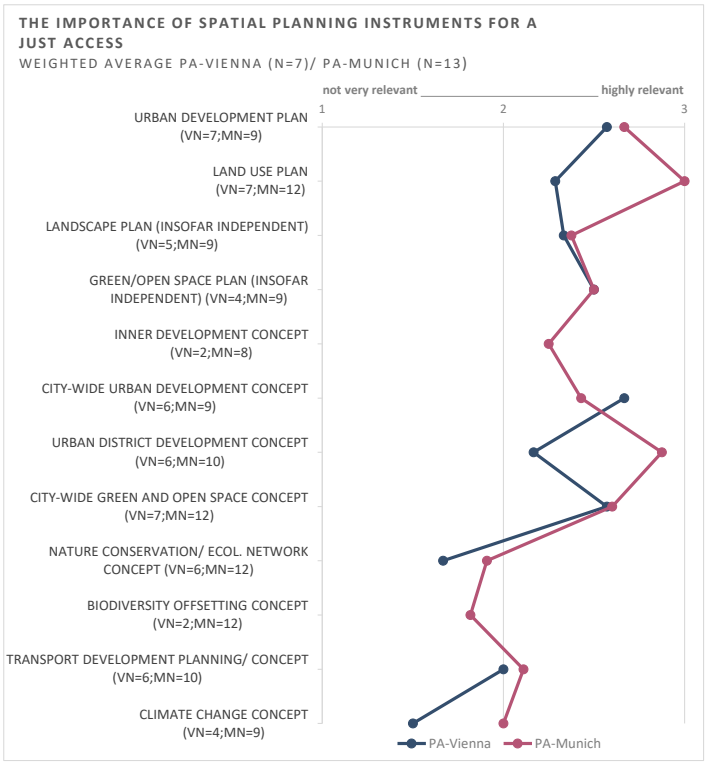
to get involved at an earlier stage, in order to find a compromise between development and the conservation of the diversity of plant and animal species on the vacant lot (I-Inh-4, para 6, 18-20).

Spatial planning instruments

Besides looking into strategies that are applied and considered important in informing policy interventions for the development of urban green/nature, the survey also specifically inquired about the relevance attributed to a range of **formal and informal planning instruments** for just access by respondents of the public administrations of Vienna and Munich. Again respondents were invited to valuate only those instruments that in their opinion are actually applied.

According to the results presented in Figure 76, PA-Vienna respondents accredited the highest relevance to informal instruments such as a *city-wide development concept* ('Gesamtstädtisches Stadtentwicklungskonzept') and a *city-wide green and open space development concept* ('Gesamtstädtisches Grün-/Freiraumentwicklungskonzept') as well as to the more formal but less targeted instrument of *urban development plan* ('Flächenwidmungsplan'), for a just access to urban green/nature. These items also received the highest number of responses, and hence got attributed the highest level of confidence regarding their application. The lowest level of confidence was attached to *green and open space plan*, *climate change concept* and *landscape plan*. This is likely due to the fact that an independent landscape plan ('Landschaftsplan') and green space plan ('Grünordnungsplan') are not applied in Vienna. In addition, the instruments of *inner development concept* and *biodiversity offsetting concept* have not been rated due to the exclusively *don't know* responses, resulting in an interrupted line for PA-Vienna. Less relevance regarding a just access was allocated to a *nature conservation/ecological network concept*, both by the public administration of Vienna as well as Munich. Strong differences regarding the assessment of relevance between the two public administration groups appear with regard to *land use plan* and *urban district concept*, ranked by far more relevant by PA-Munich respondents.

Figure 76: How relevant do you consider the following formal and informal planning instruments for a just access to green/nature?



Note: The figure includes weighted averages, calculated based on n number of responses provided to not relevant (1), partly (2) and highly relevant (3) for variables that have been selected by n number of participants of the public administrations (PA) Vienna (v) and Munich (m). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for *urban development plan*: PA-Munich n=3; *landscape plan*: PA-Vienna n=2; *green/open space plan*: PA-Vienna n=2; *inner development concept*: PA-Vienna n=2 + PA-Munich n=4; *biodiversity offsetting concept*: PA-Vienna n=2. Results for *other* not included, due to limited responses and risks of distortion.

Reasons for the assessment provided by some of the survey participants (PA-Vienna n=3; PA-Munich n=7) might also help to explain some of the results. Besides emphasising the limited role of certain instruments,

a PA-Vienna representative states that all of the mentioned instruments have their value in securing a certain quantity, but fail with regard to the provision of a defined quality of urban green/nature, at least to the level of detail that would be required. According to the respondent, it highly depends on the involved people and their level of awareness. This also links to the statement of another PA-Vienna representative, who emphasises the necessity of a landscape plan that provides clear visions and helps to secure areas and to avoid land use speculations. He/she also iterates that many good concepts are 'torpedoed' by political turn-arounds and questioning, or during their operationalisation at the district level. The latter may explain why urban district development concepts have been considered only partly relevant by PA-Vienna respondents. Also linked to previous insights on cross-departmental collaboration in the city, it should be added that whereas the city-wide conceptual planning is the main activity of the municipal department MA18, the elaboration of development and land use plans at the district level and as such also the operationalisation of the green and open space concept is the responsibility of a separate municipal department, MA21.

Differently, a range of comments provided by PA-Munich survey participants (n=3) indicate that missing *urban district development concepts* are e a point of concern regarding the just access to urban green/nature. The city-wide urban development plan '*Perspektive München*' is described as being too abstract and not sufficiently fine-grained. Concepts at district level may work as intermediate between a larger framework and the detailed land use plans, taking into account specific needs and facilitating participation in the development of a district. At the same time, the importance of legally binding land-use plans in securing urban green/nature for human well-being as well as nature conservation was underlined (n=3), and the need to use them to their full potential emphasised. This especially refers to the identification and classification of a range of areas, both private and public, according to consistent quality standards. The lower ranking of nature conservation/ecological development and biodiversity offsetting concepts regarding a just access to green urban/nature likely results from the limited opportunities they offer with regard to a just distribution. According to a respondent of the PA-Munich, this links to the limited availability of areas of high biodiversity value, and offsetting hence often occurring at the outskirts or in very determined parts of the city.
The survey undertaken by Böhm et al (2015:96-96) analysed the extent to which formal and informal planning instruments address the issue of urban green as part of inner development objectives. When asked for example about how important formal planning instruments are with regard to the development of the urban green in the framework of inner development, the green planning and management departments put landscape plans and green space plans at the forefront. Differently, respondents of PA-Vienna and PA-Munich put a higher focus on land use plans and urban development concepts. Besides the felt need of securing urban green/nature in competition with other land uses for a just access, this can also be explained by another remark made by a respondent. He/she emphasises that opportunities for a just access lie in interlinking and nesting different network structures involving the ecological as well as built-up space (e.g. public transport). Additional comments by survey participants refer to wider policy interventions, focusing especially on financial/market-based instruments for the generation of additional revenues, as well as the acquisition of land by the public administration in order to secure urban green/nature. These are further discussed in one of the following sections.

The results partly indicate a greater confidence in legally binding interventions by the participants of the two public administrations to ensure a just access to Green Infrastructure. This especially regards instruments of a cross-cutting nature (e.g. land use plans). Likely reasons are that related interventions are perceived as a higher safeguard for avoiding GI disappearance or transformation in the long-term, and as a sufficiently high countervailing power to the different demands posed on land use. However, at the same

time public administrations have expressed concern regarding their usefulness in ensuring a defined, basic quality. Repeatedly emphasis is hereby put on the need of a clear vision, and arguably also of commitment to secure apposite areas, which explains the importance attributed to urban development and green space concepts. The issue of urban district development concepts shows the extent to which the usefulness of different instruments also depends on how the operationalisation has been institutionalised, not necessarily only linked to issues of communication. The findings also support previous results on the minor importance attributed to biodiversity conservation, and specifically to related instruments in ensuring a just access to GI, which for different reasons have been attributed a smaller role.

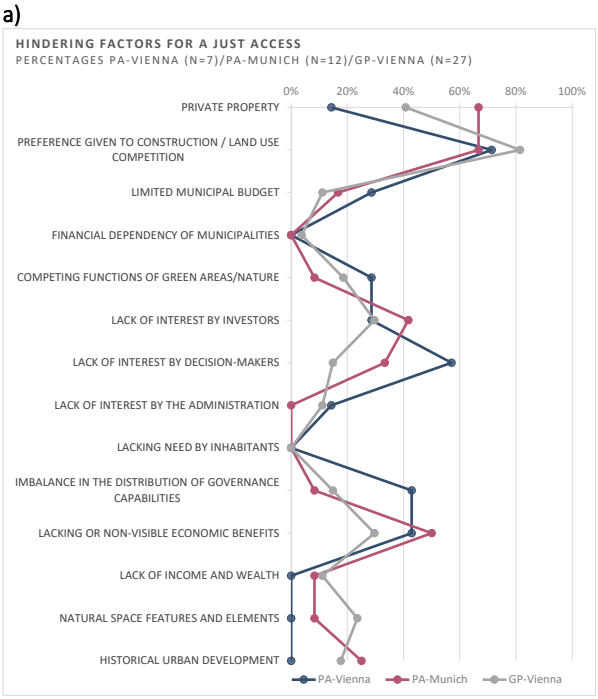
D 2.2.3.2 Additional interventions informing a just access

Factors hindering and facilitating access

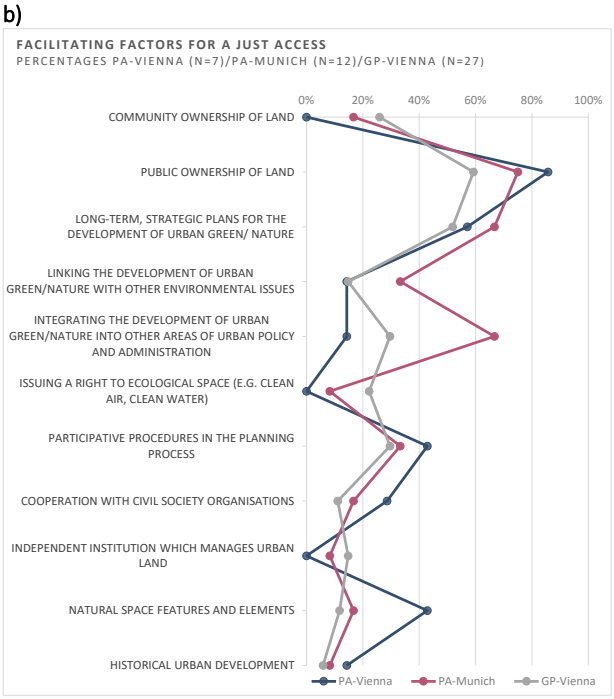
In order to get insights on what aspects might be perceived as influencing a just access to urban green/nature and as such could be **important areas of intervention** beyond economic inequalities of income and wealth, two distinct questions on potential hindering as well as facilitating factors were posed to representatives of the public administrations of Vienna and Munich as well as individuals of the Vienna general public.

Figure 77: a) In your opinion, which factors represent a particular barrier to the access of the population to high-quality, urban green/nature? b) In your opinion, which factors facilitate the access of the population to high-quality, urban green/ nature?

a)



b)



Note: The figures include percentages, calculated based on n number of responses given to a maximum number of variables to be selected by the public administrations (PA) of Munich and Vienna and Vienna general public (GP). The figures do not include results for 'other', due to very limited amount of responses (GP-Vienna n=1 for b).

With regard to factors that could be a **hindrance for a just access**, according to Figure 77a all three groups seem to agree that the issue of *giving preference to construction over other interests and the related land use competition* plays a key role. This is supported by the high preference also given to the factor of *lacking or non-visible economic benefits*, although it is especially of concern to PA-Vienna and PA-Munich and less to GP-Vienna survey participants. With regard to PA-Munich respondents, this may also connect with the higher relevance given to issues of *private property*. PA-Vienna representatives put higher emphasis on

aspects such as *lack of interest by decision-makers* and *lack in the distribution of governance capabilities*, which on the other hand figure less prominently for the other two groups. The *lack of interest by investors* constitutes a factor often selected by all three groups.

Of less concern to public administrations as well as individuals of the general public seems to be the *financial dependency of municipalities,* for instance with regard to private investments or growth demands resulting from needs of generating public revenues. Some of the responses received during the interviews to test the questionnaire indicate that understanding and awareness of possible causes and potential effects related to this aspect may not be very high, potentially resulting in a low preference for the item. Strong agreement on factors considered not really a hindrance across all groups exists with regard to *lacking needs by inhabitants*. Also the *lack of income and wealth* plays only a minor role as a hindering factor for a just access, according to all three groups. Interesting is also the low preference given to *limited municipal budget*, with the slight exception of PA-Vienna respondents, and the relatively higher importance given to *natural features and elements* by individuals of the Vienna general public.

Some of the findings with regard to factors of hindrance for a just access to urban green/nature correspond to those identified in the survey by Böhm et al (2015:104) with regard to the development of urban green in the framework of inner development. The green planning and management departments responding to a similar exercise (maximum n=40) had also nominated most often *land use competition with regard to development projects* as an important hindering factor. This is followed by *limited municipal budget*, *private property* and *limited acceptance by investors*. Comparably low were ranked aspects such as *limited acceptance by the public administration* and *lack of need by inhabitants*.

With regard to factors that may facilitate a just access to urban green/nature, Figure 77b makes visible the high relevance attributed to the *public ownership of land*, especially by public administration respondents but also individuals of the Vienna general public. What follows second for all three groups are *long-term strategic plans for the development of urban green/nature*. Then some major differences start to appear. PA-Munich representatives favour *integrating the development of urban green/nature into other urban policy areas* as next important aspect. It is also the most often selected option by public administration departments participating in the survey of Böhm et al (2015:105). The results can be seen related to the previous, relatively negative perception issued by the public administration of Munich with regard to the horizontal cooperation of administrative units in developing and planning processes of urban green/nature. It was less frequently selected by participants of the Vienna general public and by far less by representative of the city's public administration. GP-Vienna respondents rather put emphasis on the *community ownership of land* as well as *participative procedures in the planning process*. The first has received no reaction from Vienna public administration respondents, although they agree with individuals of the general public on the support of participative planning procedures, and also attribute an important role to *natural features and elements*. *Issuing a right to ecological space*, as could be postulated with regard to the operationalisation of the conceptual and action model, has not gained much support or attention from the public administrations, although to some extent by Vienna general public respondents. Most sceptical were all three groups with regard to the establishment of an *urban institution to independently manage urban land*.

It is considered important to interpret these results on hindering and facilitating factors for a just access in connection to previous findings and especially feedback provided by survey respondents of the two public administrations with regard to the potentials and deficits or obstacles of existing formal and informal spatial

planning instruments. Although long-term strategic plans have been indicated as important facilitating factors, and long-term visions have previously been described to be often in place, public administration participants also noted that existing spatial planning/green and open space concepts may not be sufficient in combining strong as well as concrete visions, to drive the long-term and comprehensive development of urban green/nature. According to provided feedback and in line with previous results, this especially applies to aspects of consistent quality standards, which go beyond traditional indicators such as size of an area and focus on preferences and target groups. Despite being attributed a high importance as a facilitating factor, one of the obstacles mentioned with regard to spatial planning instruments and the operationalisation of urban green/nature refers to the difficulty of acquiring land, especially in a hot real estate market. Previous responses indicating that not necessarily a limited municipal budget constitutes a hindrance factor suggest that this is not associated with an overall lack of financial means but rather depends on the amount allocated to GI implementation. An interviewed representative of the Vienna public administration also pointed out that '*the city is little interested in acquiring land. This is a countertrend, and only small, agricultural areas remain in public ownership*' (I-PA-2, para 4). In this regard, Thiel (2016:693) emphasises that policy-makers and public administrations often disregard that urban public green can be an '*important economic and financial position on the asset side of municipal accounting*', besides representing a good of high public interest.

Finally, it is important to highlight that the *lack of income and wealth* did not prominently figure as an important hindering factor for a just access by all three groups of survey participants. With regard to the Vienna general public, this might correlate with key characteristics of the respondents, who on average are well-off regarding their employment situation, income as well as housing and living conditions. However, the results could also indicate that the factor is perceived as less important as an area to be directly targeted by interventions. Those interventions which aim at ensuring a defined quantity and quality could be perceived as being more crucial in ensuring a just access, especially when considering previous findings, for example on perceived conditions and transformations, sought-after quality characteristics or favoured strategies in developing urban green/nature. This could also be linked to the immediate visibility of results or perceived higher probability of achieving change. Overall it might suggest a higher importance to intervene on the end or in relation to the ought-to-be rather than on the available means, such as property rights or income and wealth.

Additional policy interventions

Besides looking into potential areas of intervention by discussing hindering and facilitating factors, survey participants of the public administrations were also invited to indicate **examples of additional policy instruments**, beyond traditional spatial planning, which in their opinion have a high relevance for a just access to green/nature (PA-Vienna n=6; PA-Munich n=4). Based on the categorisation of policy interventions used in Table 19 and Table 20, a large number of respondents (n=7) highlighted the importance of financing instruments. This includes the development of alternative approaches such as Public Private Partnerships (PPPs), changes to the public budget for securing adequate financing, and public expenditures such as the adoption of tax reliefs. The other most often nominated examples refer to the instrument of contractual agreements ('Städtebauliche Verträge') and of cooperation (n=6), e.g. regarding land use plans. In addition, the importance of an adequate neighbourhood/district management was highlighted (n=2), and examples of information instruments brought forward (e.g. offered consultations regarding urban green and development projects). Some regulatory examples were also provided (n=2), including the introduction of minimum standards regarding urban green/nature in land use plans/green space plans and tree protection regulation.

The proposed additional policy instruments most often target the quantitative securement and provision as well as the management of Green Infrastructure, but not necessarily the overall access with regard to some of the governance capabilities identified by the conceptual and action model. In this regard, the design of urban housing policies has been deemed of particular interest to the thesis, due to their impact on a range of the regimes and capabilities of the model and hence questions of broader accessibility to various GI elements. Also public administration representatives often referred to the implicit impact of housing policy measures on accessibility to urban green/nature, when in the survey asked about assessing the current importance attributed to economic inequalities. The latter was mostly linked to issues of spatial disparities and displacement. It indicates the important role housing policy can play in shaping the fabric of a city, not only with regard to its built-up, physical space but also the socio-economic and ecological dimension. However, in many interviews policy objectives related to affordable housing and the provision of urban green/nature were also often described as conflicting, in light of calls of increased housing supply, densification processes and the disappearance of vacant land. One of the experts interviewed in the framework of the thesis states that '*environmental policy is often blind to social issues, and social policy often blind to environmental issues. In this regard how environmental justice is applied with regard to affordable and social housing represents a very important question to address*' (I-EX-3, para 42). It can be argued that housing policy not necessarily directly targets GI distribution, but it can impact the distribution of different population groups in relation to GI and thus the overall access to it.

As already indicated when introducing Vienna as a case study and explaining the reasoning behind its selection, the city has a long history of public and social housing efforts. According to the previously presented study on housing policy and spatial inequalities by Gutheil-Knopp-Kirchwald and Kadi (2017-forthcoming), in Vienna a mix of interventions has been adopted, which targets not only specific, for example low-income groups, but the urban population more largely. In this regard, it could be argued that this corresponds to the general approach of focusing on an equal distribution, also prioritised with regard to open and green space planning. Vienna's housing policy interventions have however been subject to important changes, especially over the last two decades. According to Gutheil-Knopp-Kirchwald and Kadi (2017-forthcoming:3-4), these have especially affected the programme for the provision of municipal housing, which stopped in 2004 and was only recently relaunched, though it needs to be seen with what kind of impetus. In addition, responsibilities for housing services were incorporated in a publicly owned company, 'Wiener Wohnen', rather than being managed by the related municipal department. Following the stop of municipal housing construction, efforts also shifted to the support of housing associations, including the re-sell of acquired land to those associations. It also includes an increased focus on subsidies, targeting the supply-side (e.g. supporting the development of subsidised dwellings) and demand-side (e.g. supporting households with high cost burdens), and financial incentives for limited-profit housing associations. Also regulations of private rental contracts were subject to several liberalisation steps since the 1980s, including a substantial amendment of the federal rental law in 1994 (MRG). It marked the change from rental caps applying to defined categories based on dwelling standards to an overall benchmark system.

According to Gutheil-Knopp-Kirchwald and Kadi (2017-forthcoming:4), several of the illustrated changes have resulted in a '*partial re-commodification of the housing system,* interpreted as *'non-market allocation and non-market prices having lost its importance*' in Vienna. Some of the potential side-effects from a retreat of public and social housing solutions as part of existing welfare policies have been introduced in chapter D 1.2.1. This includes for example risks of reduced transparency and public control linked to housing associations or the outsourcing of public housing services to publicly owned, but privately managed companies. It also involves jeopardies of stigmatisation and spatial segregation, due to too low shares of

social housing which fail to go beyond immediate necessities. Besides issues of segregation to distinct urban area types characterised by distinct types of urban green, studies such as by Gutheil-Knopp-Kirchwald and Kadi (2017-forthcoming) or also the previously discussed work by Tammaru et al (2015) have not however explicitly addressed how the discussed changes to housing policy interventions may have affected overall access to GI, for example regarding risks of indirect commodification of public urban green areas and the provided 'functionings'. A first scrutiny of some of Vienna's housing policy interventions reveals that **accessibility to defined GI elements** is mostly focused on the quantitative provision of urban green. This includes for example a general commitment to its development and management in the framework of municipal housing (Stadt Wien n.d./c). However, issues of qualities are less discussed, particularly in light of the diverging constructional and architectonical quality of municipal housing developed between the two World Wars and those in the 1950s to 1970s, including with regard to private and public green space (Berger and Ehrendorfer 2011:578). To some extent ecological parameters applied with regard to public procurement (e.g. development contests) and subsidies (e.g. housing associations) include requirements on the provision of both public and private urban green (Berger and Ehrendorfer 2011:585). However, it needs to be noted that in this regard GI represents only one of many criteria, bearing the risk of being underrepresented or undervalued in procurement decisions (Thiel 2016:698). Albeit their usefulness can be disputed, also no standardised factors for the provision of urban green, similar to the biotope area factor in Berlin, are applied. As one of the interviewed experts emphasises, such formal minimum factors addressing for example the degree of soil sealing at a development site can be important, as they are negotiated at a political level and then applied independently of the articulation capabilities of defined groups or individuals (I-EX-3, para 39).

Survey respondents also often suggested additional interventions such as Public Private Partnerships (PPPs) and the instrument of urban contractual agreements, which are also applied in the framework of affordable housing or infrastructure development. They both represent interventions that usually belong to the group of financial, market-based or cooperative and contractual instruments, for at their basis lay usually bilateral negotiation processes which aim at shifting costs for interventions, securing additional financing or transferring risks. **Public Private Partnerships** broadly refer to long-term contractual agreements between a public entity and a private juridical person (e.g. company, consortium) to provide a service in relation to an investment. Arguably the private juridical person takes on some of the risks of the project investment, in exchange for a remuneration scheme (Merk et al 2012:29).The city of Vienna has started to adopt **PPPs** for example with regard to the development and managing of school campuses, though with mixed results so far (Stadt Wien/MA5 2010). PPPs with regard to the creation of urban parks or sharing the costs of their operation have as of yet not been adopted by the city. Their application is thought interesting due to the financing opportunities it may offer to municipalities in light of a limited budget and spending constraints, but it is also quite disputed. As highlighted in the framework of one of the expert interviews (I-EX-4, para 10), this relates to questions on their actual cost-effectiveness for public institutions, on who effectively bears the long-term risks, and issues of commodification of public goods. In the United States, PPPs have been adopted for green space management already since the 1990s, and have faced criticism especially in relation to green gentrification processes (Gould and Lewis 2016). This links to the potential impact the generation of revenues for operating parks (e.g. fees) can have on rising housing prices and the development of luxury apartments (e.g. Prospect Park, New York). Similar consequences are feared regarding the application of tax increment financing (TIF), which consists of designating related development areas, e.g. urban green space, and to earmark increases in property values to finance the investment (Merk et al 2012: 37).

Urban contractual agreements broadly refer to contracts of private nature between a public entity and a private juridical person, usually linked but not dependent upon changes to land use plans (e.g. zoning, re-zoning, up-zoning). It can pursue different aims, but targets the coverage of costs resulting to public institutions due to land use changes. Only more recently, athough with increasing interest, also the city of Vienna has started to apply urban contractual agreements. Introduced by an amendment of Article 1a of the Vienna building code in 2014, besides offering opportunities to require defined shares of affordable housing, they can target the coverage of costs in creating and managing green and open spaces and include some specific requirements regarding their design (e.g. seating opportunities and recreation, green elements and climate cooling). Such contracts can be helpful in securing financing for cost-intensive projects, including for example the restoration of brownfields for housing or the ecological restoration of green space. However, their increased application also comes along with risks, notably due to a possible shift of steering powers, from political processes to bilateral negotiations, and issues of transparency. Additional challenges arise with regard to questions of wider accessibility. Urban contractual agreements usually put emphasis on the quantitative provision of urban green/nature, but do not necessarily consider basic qualities beyond minimum standards, the capabilities of using an area (e.g. barriers such as fences, withdrawal rights) or the distribution of population groups in relation to the distance to an area (e.g. distance of social housing to an environmental amenity). What kind of impacts this might have is shown by the example of the development area Viertel 2 in Vienna, though not directly related to the application of an urban contractual agreement. Located in 2/Leopoldstadt and northeast of the landscape park 'Prater', the development area was initially owned by the city's real estate company Wien Holding. Subsequently sold to a private investor, the privately owned and managed park of the related business centre was created (see Figure 78). Although accessible to the general public, the access is mainly physical and other use capabilities can be deemed limited. Besides the business centre, the development area is expected to host free-market housing only, driven by the environmental amenity of the landscape park, and this will likely impact its accessibility for lower income groups.

Figure 78: Viertel 2 / Business and living close to the Prater, Vienna

Further insights on the use of urban contractual agreements can be gained by looking at the city of Munich, which has a longer history of experience in applying the instrument, linked to its approach of the socially equitable land use (SoBoN) in the framework of its housing policy (see Box 9).

Box 9: Munich in comparison – housing policy interventions and wider GI accessibility

As for the city of Vienna, the main aim of **Munich's housing policy** is the achievement of a social spatial mix. It is however more narrowly targeted, although not necessarily specifically limited to low-income households. Compared to Vienna's housing pol-

icy, it offers a more limited accessibility to social housing linked to the applied eligibility criteria and due to the reduced availability of housing owned by the city, which is mainly provided in the framework of publicly owned housing associations (Whitehead and Scanlon 2007, Gutheil-Knopp-Kirchwald and Kadi 2017-forthcoming). Munich's housing policy includes a wide range of interventions, many adopted in the framework of the action programme 'Living in Munich' ('Wohnen in München'), which is currently in phase VI (2017-2021). First of all, the programme consists of **subsidies** to middle-income households and families, either for home ownership or for rent and cooperatives ('Münchner Model') (Stadt München/Referat für Stadtplanung und Bauordnung 2016b). Secondly, income-oriented support ('Einkommensorientierte Förderung') and the Munich housing element ('Münchner Wohnungsbau'), including loans and grants both on the supply- (e.g. loans for land acquisition) and demand-side (e.g. rent support), specifically target low-income groups. Further interventions refer to the acquisition of occupancy rights, consisting of rent support and bonuses, and the application of reduced market prices to dwellings developed on public land over a defined period of time ('Konzeptioneller Mietwohnungsbau'). The additional programme 'Living for all' ('Wohnen für alle') aims at the development of affordable housing units to be particularly provided by housing associations owned by the city. Increasingly also leasehold estates are applied, which stipulate land to remain in public ownership but building rights to be attributed for example to housing associations.

Beyond interventions targeting the quantitative provision of affordable housing, it is interesting to note that since the 1990s a **catalogue of ecological criteria** is applied to all development permits affecting publicly owned land, and will likely affect all affordable housing in the future, according to the new housing policy programme (Stadt München/Referat für Stadtplanung und Bauordnung 2016b:70). The catalogue, amongst others, includes requirements for on-site species protection measures, for example creating habitats for bird and bat populations. Munich's housing policy also employs interventions aiming at the conservation of the building stock (e.g. socially and ecologically sustainable renewal and renovation), and protective measures. The latter includes the previously mentioned areas subject to preservation efforts, to counteract displacements caused by high-price renovations, and the **rent index**. Applied already for a few decades, the rent index represents a benchmark-system for orientation regarding rent levels for free-market housing. It has gained increased importance with the introduction of the 'rent prices brake' at the federal level (MietNovG). The index is based on a regression analysis of data on rent prices changed or newly issued in a defined period of time, and also uses information on how these are assumed to be impacted by the location of a dwelling, including in relation to the lack or provision of environmental amenities (e.g. main motorways, urban parks) (Stadt München/Sozialreferat 2017b).

Another key component of Munich's housing policy is the **instrument of socially equitable land use** ('Sozialgerechte Bodennutzung' – SoBoN), already briefly introduced in chapter D 1.2.1. Issued for the first time in 1994, the contract applies if a new land use plan is assumed to provide a substantial added value to a developer, independent whether linked to housing or industrial development, and if at the same time this results into burdens and costs for the public administration (Stadt München/Referat für Stadtplanung und Bauordnung 2009). The developer can be asked to step in, either by providing land or financial compensation with regard to road infrastructure, green space or other spaces of high public interest (e.g. elementary school). He is also obliged to provide for ecological compensation areas, measures directly at the site or for identified ecological priority areas (see Box 3). In addition, private developers have to dedicate 30% of the newly created housing area to affordable housing, of which usually 20% to affordable renting and 10% to affordable home ownership. The council is currently discussing whether to increase the share, in light of the hot real estate market (Stadt München/Referat für Stadtplanung und Bauordnung 2016b:45). Overall, the developer is however entitled to retain at least 1/3 of the gross added value arising from the land use change.

In this regard, it is important to note that the **added value** is not calculated based on actual costs and benefits occurring to the public administration and the developer. To begin with, it uses a benchmark-system of land prices ('Bodenrichtwerte'), according to Article 196 of the German federal building code. Benchmark land prices are average local site values in €/m^2, calculated based on a collection of land purchasing prices ('Kaufpreissammlung') using different coefficients and value factors to take site characteristics into account. They are updated every two years by the municipal review panel ('Gutachterauschuss'), and are applied to different development stages and land use categories. Development stages for example run from agricultural land and forest area to settlement area, land to be developed and actual land use. The latter includes categories such as residential area (individual and many-storied housing), industrial area and also recreational and leisure area. The SoBoN profits from increasing benchmark land prices if 'land to develop' ('Bauerwartungsland') is turned into 'land use' ('Bebauung'), which are used to calculate the gross added value. It can differ depending on land use type, for example industrial area for offices and retail being usually higher valued than for production and craft. Lump-sums are used to calculate the costs, for example for the provision of ecological compensation areas or urban green areas. If land is provided, the initial benchmark land price is applied to calculate the covered burden. In addition, foregone opportunity costs with regard to the percentage of affordable housing are also factored. From 1994 to 2016, the SoBoN provided roughly 300 ha of public urban green space and ecological compensation areas, and financing for €130 million of related costs (Stadt München/Kommunalreferat n.d.).

According to the public administration, the use of benchmark values and lump-sums ensures higher reliability and certainty regarding costs and benefits accruing for both public institutions and the developer (Stadt München/Referat für Stadtplanung und Bauordnung 2009:15). However, it also bears some **substantial risks**, given the developer is interested in ensuring that the assumed benefits are at least delivered and thus in generally rising prices. Especially in a hot real estate market, the developer might even attempt at compensating the costs, by focusing on what may achieve higher revenues rather than on what would be needed. In residential areas, it can affect the outfit of dwellings (e.g. luxury apartments) as well as where they are situated in relation to certain amenities, including environmental ones (e.g. reduced distance to the park). Although hence an additional amount of the land use type urban green space is provided, the approach can still negatively affect its overall accessibility to population groups with defined incomes or also seclude biodiversity conservation in defined areas. First counterbalancing measures could consist of including requirements in the contractual agreements, which influence where affordable housing is located in relation to environmental amenities or their lack. However, more substantial changes might be needed in counteracting some of the related dynamics. This can for example include a closer alignment of the instrument with actual existing benefits and costs, adopting a wider perspective by including forgone opportunities and social costs linked to 'functionings' provided by certain land use types, applying purchasing options and the acquisition of land by the public/community to build up the municipal/community housing stock in relation to environmental amenities.

Governance capabilities to yield

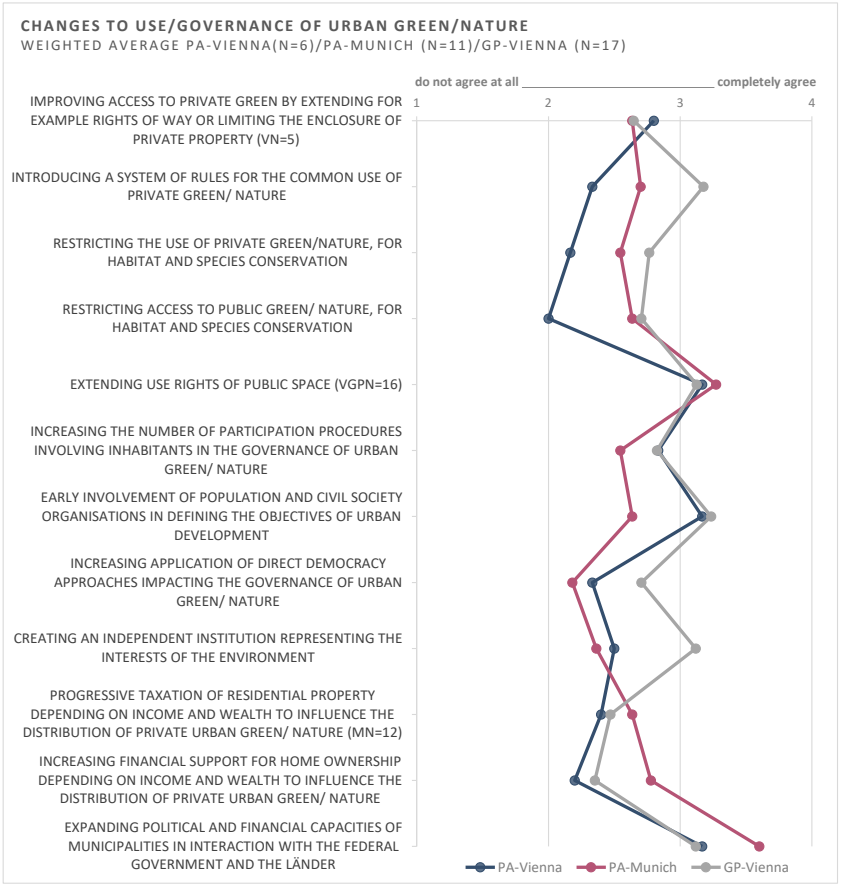
In the framework of additional policy interventions that can come into play in shaping a just access to GI, the conceptual and action model attributes a specific importance to governance capabilities. They address different governance regimes, including on use, occupying and commanding. In the framework of those regimes, capabilities can be expanded or restricted for different stakeholder groups. Such possible **changes to governance capabilities** have been paraphrased into exemplary, more concrete interventions and included in a survey question, to inquire the extent to which representatives of the public administrations and the general public agree to the related changes and as such consider them adequate. Table 24 provides an overview of how the paraphrased governance changes relate to the different regimes of the model.

Table 24: Governance regimes and capabilities – exemplary changes

Regime and capabilities	Exemplary changes used in the survey
Use regime (Functional + physical access, withdrawal)	• Improving access to private green by extending for example rights of way or limiting the enclosure of private property (e.g. regarding restricted use of fences or hedges) • Restricting access to public green/ nature for habitat and species conservation (e.g. prohibiting access to certain areas) • Extending use rights of public space (e.g. urban gardening activities, re-designing street space)
Occupying regime (management, exclusion and alienation)	• Introducing a system of rules for the common use of private green/ nature (e.g. co-operation for the cultivation, harvesting and consumption of urban crops) • Restricting the use of private green/nature for habitat and species conservation (e.g. management requirements)
Commanding regime (articulation, political & economic power)	• Increasing the number of participation procedures involving inhabitants in the governance of urban green/ nature • Early involvement of population and civil society organisations in defining the objectives of urban development • Increasing application of direct democracy approaches impacting the governance of urban green/ nature (e.g. consultative referendum, legally required involvement of civil society initiatives) • Creating an independent institution representing the interests of the environment • Expanding political and financial capacities of municipalities in interaction with the federal government and the Länder • Progressive taxation of residential property depending on income and wealth to influence the distribution of private urban green/ nature • Increasing financial support for home ownership depending on income and wealth to influence the distribution of private urban green/ nature

The list of changes to governance capabilities used for the survey includes a higher number of examples for commanding regimes due to the complexity of the subject and hence the perceived need for more in-depth scrutiny. The exemplary changes have also often been illustrated for a specific stakeholder group (e.g. referring to changes of the political and financial capacities of municipalities), without outlining that this may encompass restrictions for another group (e.g. changes to national or regional governance competencies). The results on the extent to which survey participants agree with those potential changes are presented in Figure 79.

Figure 79: To what extent do you agree with the following possible changes regarding the use and governance of urban green/ nature?



Note: The figure includes weighted averages, calculated based on n number of responses provided to do not agree at all (1), agree only partly (2), agree to some extent (3) and completely agree (4) for variables selected by the public administrations (PA) of Vienna (v) and Munich (m) and the general public (GP) of Vienna (vgp). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for *increasing financial support*: PA-Vienna n=1 + PA-Munich n=2. *Other* not figured due to lack of responses.

The strongest agreement on changes to governance capabilities with regard to urban green/nature relates to the *expansion of use rights of public space*, across all three groups participating in the survey, the public administrations of Munich and Vienna as well as individuals of the Vienna general public. These findings are also supported by the initial group of survey participants of the Vienna general public (n=9), who were asked to select a maximum of three preferred changes, ranking highest the *extending of use rights regarding public space* (n=7). These **expansions of use capabilities** could for example include new opportunities for urban gardening in public parks or re-designing road to street space. Some concurrence seems also to occur in relation to changes to **political and economic power** by developing *political and financial capacities of municipalities*, although figures suggest a stronger need by PA-Munich than by PA-Vienna and GP-Vienna respondents. In this regard, it needs to be considered that the city of Vienna not only constitutes Austria's main capital, but also one of the nine states ('Bundesländer') of the federal republic and as such is entitled to respective competencies (see introduction of chapter D 2.1).

Vienna public administration and general public participants seem also both to subscribe to the rise of **articulation powers** such as the *early involvement of the population and civil society organisations in defining the objectives of urban development*. All three groups of participants do so more strongly than is the case for *increases in the number of participation procedures* as part of expanding articulation powers. At least

some agreement seems also to concur with regard to use capabilities such as *improving access to private green*, for example by extending rights of way, or the restriction of economic power by introducing *progressive taxation of residential property depending on income and wealth* across all three groups. Main differences are most apparent with regard to expanding political power for a defined stakeholder group by *creating an independent institution representing the interests of the environment*, mostly favoured by individuals of the Vienna general public but visibly less by representatives of the public administrations.

A similar distribution of support is visible with regard to expanding occupying capabilities by *introducing a system of rules for the common use of private green*, including for example co-operation for the cultivation, harvesting and consumption of urban crops. Such forms of governance are receiving increased attention, including for example several initiatives which were launched in Vienna to propose new management approaches to urban agriculture. This includes initiatives where farmers take care of preparatory work and sowing, whereas tenants are responsible for fostering activities and harvesting (so called 'Selbsterntegärten'). Compared to the other two groups, PA-Munich representatives also noticeably more strongly support the increase of economic power in securing access to urban green/nature via the *financial support for home ownership*. This might not be a surprise considering Munich's housing policy offers a strong focus on subsidies, including homeownership, albeit with diminishing focus in its most recent programme (see Box 9). Interesting are also diverging views on changes to *restricting access to public green for nature conservation purposes* as part of restricting use capabilities of one stakeholder group (e.g. general public) by expanding those of another group (e.g. species and the environment). Participants of the Vienna public administration seem much more reluctant to do so than is the case for those of the public administration of Munich and individuals of the Vienna general public. However, this seems to be in line with some of the previous responses and findings on the current importance attributed to nature conservation. Noteworthy is also the rather small support of changes regarding the use of *direct democracy instruments* to achieve an increase in articulation powers, especially by public administration participants.

It can be concluded that generally, for all those participating in the survey, the extension of economic powers for a higher access to GI, represented by interventions such as progressive taxation of residential property or financial support for home ownership, seems to be considered less important compared to the expansion of other governance capabilities. This may also be due to the difficulty of linking questions of accessibility to urban green/nature to those interventions. The special importance attributed to the expansion of rights in using public space, for example in relation to road infrastructure, also seemingly emphasises a general preference for approaches that favour large parts of the population rather than those targeting specific groups (e.g. home ownership subsidies). Especially individuals of the general public appear to increasingly favour the extension of use capabilities the more it supports forms of cooperation (e.g. common use of private green) rather than affecting individual rights. With regard to articulation powers, the results seem to indicate that especially individuals of the general public attribute a higher importance to the sequencing of participation of individual citizens as well as civil society initiatives (e.g. early involvement in defining overall objectives of urban development) rather than to an increasing number of opportunities in participating individually. In combination with the frequent selection of the option of an independent institution representing the environment (e.g. land trust) and in light of previous results on hindrance and facilitating factors (e.g. preference given to construction interest, public ownership of land), this seems to suggest that there is a desire for changes towards the evolvement of countervailing powers. To what these may exactly refer to will be explored in more detail in the next section when looking at the involvement of different stakeholder groups.

To further inquire about opportunities of expanding governance capabilities, especially regarding private GI, participants of the public administrations of Munich and Vienna were also invited to judge the degree to which their department can **directly influence the design of private green/nature**, ranging from no (=1) to strong influence (=4). Although average results display the perception of a rather low level of influence by both public administrations (n=17), it was slightly higher for PA-Vienna (mean of 2) than for PA-Munich representatives (mean of 1.7). With regard to the question on what instruments may allow public administrations to more directly influence the design of areas or space of private ownership, a majority indicates that not really such instruments exist. Some emphasise that this would be possible by the use of legally binding requirements only, for example with regard to nature conservation. A PA-Vienna respondent names cooperative planning processes more specifically, whereas more than one PA-Munich representative refers to the application of the contractual agreement of socially equitable land use (SoBoN). It is the perception of the author that generally the degree of influence by the city of Munich can be described higher than that of the city of Vienna with regard to private GI. First of all, different to Vienna, Munich is able to apply a legally binding green space plan integrated in the building plan. In addition, some interviewed representatives of civil society organisations in Vienna iterate that public institutions are mainly supposed to become active by the means of acquiring or managing publicly owned land, and as such only provide guidance on the management of privately owned land (I-CVI-1, para 23+25; I-CVI-2, para 16+20). Box 10 offers additional insights on existing frameworks applied in Germany, and activities envisaged by the city of Munich regarding possible enlargement of governance capabilities.

Box 10: Munich in comparison – social responsibility linked to property and access to private GI

According to Article 14, para 2 of the Basic Law of the Federal Republic of Germany, '*Property entails obligations. Its use shall also serve the public good*' (Basic Law for the Federal Republic of Germany). It could be argued that this also entails to ensure the right to ecological space, to be supported by those holding property, independent whether publicly or in privately owned.

Although not explicitly making reference to the article, Munich's open space evaluation concept *Freiraum 2030* specifically targets **open spaces of public and private property**, which so far might not have been accessible. This is described as important especially in light of its area scenery or overall objective of further densification (Stadt München/ Referat für Stadtplanung und Bauordnung 2015:59-67). It first of all includes promoting the increasing use of roads and squares, by implementing measures such as new traffic management, removal of parking space, speed reduction or forming of recreational 'islands', emphasising at the same time that this may come along with some conflicts. The 'unsealing' of land is mentioned as a further option, especially for the provision of functions such as climate cooling and water management, although this seems to be aiming mainly at micro-level interventions. Also the increased use of green and open spaces owned by public institutions, from school yards to office buildings, is envisaged. The development of partnerships are described as important measure with regard to private GI, for example in the framework of contests and programmes that activate the population in co-designing inner courtyards or green walls, or promote community use though not necessarily broader public access. In addition, the concept takes into consideration activating public access to green roofs, to the extent of developing high-rise parks in particularly dense neighbourhoods. At the same time, it needs to be emphasised that, following the conceptual and action model, such initiatives should not to be considered as a substitute of unsealed land, given their limited soil functionings can be assumed to also impact other functionings if the ecological space concept is applied.

The evaluation concept also highlights difficulties in operationalising some of the envisaged measures, such as the establishment of park miles which connect existing urban parks, mostly linked to barriers in acquiring private land due to the unwillingness of selling or high-price expectations. Similar challenges can be assumed to be encountered with regard to the provision of municipal housing. Although Article 14, para 2 of the German Basic Law is often applied to argue for interference in private property (e.g. tenant protection laws or agricultural land management) and also regulates expropriation for the public good (para 3), Article 15 is rarely mentioned as an option. It states that '*land, natural resources and means of production may for the purpose of socialisation be transferred to public ownership or other forms of public enterprise by a law that determines the nature and extent of compensation*'. It can be seen as an opportunity to keep the options open regarding the pursued economic system, and the Basic Law as being neutral in this regard (Schmidt 2013:144). The Article does not necessarily imply that related

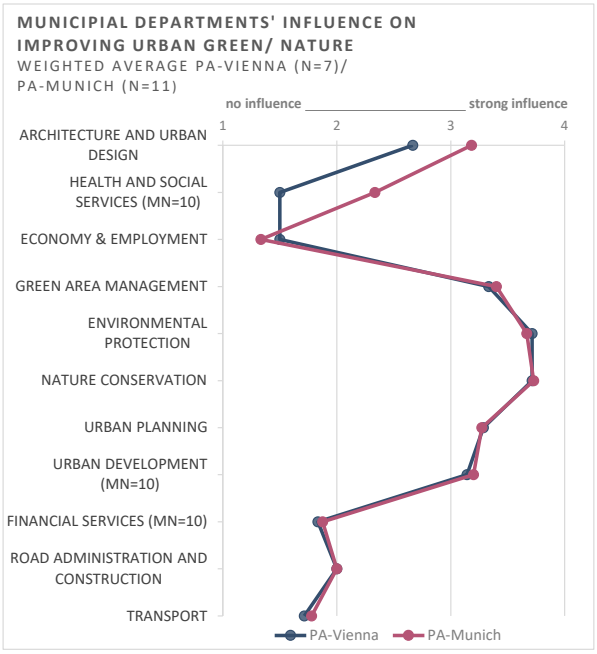
goods are to be transferred to existing public institutions, such as the German federation, the Länder or municipalities, but could also include other forms of community ownership (e.g. land trust, municipal housing institution, cooperatives). It depends on how the German term 'Vergesellschaftung' is interpreted, which has been translated into socialisation. The German version also refers to 'Gemeineigentum' or community ownership rather than public ownership as in the English version. However, there are no legal in-depth interpretations available, given the article has not been applied so far. It can be assumed that there is reluctance in trying to apply it, for example with regard to the management of urban land and housing, in order not to open Pandora's box.

The governance capabilities of different stakeholders

Following the GI principle of an ecosystem approach, its operationalisation should take into consideration the interests of a diversity of stakeholders belonging to different groups, and the impacts they might be subject to, including the private and public sector as well as communities. It is hence important to understand the current role different actors and their interests play in shaping urban space and GI, especially with regard to the governance capabilities they may yield and potential imbalances. At the same time, it again needs to be noted that not necessarily the line can always be drawn neatly between different groups of actors.

To begin with, public administrations were posed the question on how they see the **current influence of selected municipal departments** on improving urban green/nature. Interestingly, according to the presented results in Figure 80, the two public administrations of Munich and Vienna to a large extent are very much in line regarding their assessment, although units are organised diffferently across the two administrations (see D 2.1.2). A particularly strong influence is attributed to the administrative units of *environmental protection* and *nature conservation*, followed by *green area management* and *urban planning*. Little influence is allocated to *economy and employment* as well as *financial services*. Results obtained for a similar question posed to urban green planning departments in the survey by Böhm et al (2015:100) showed a comparable assessment regarding *urban planning* and *financial services*, although a slightly higher relevance was attached to *green area management*, likely due to survey participants mainly belonging to related departments. A more mixed group of municipial departments participated in the thesis' survey, however departments linked to urban development and planning as well as environmental protection are still over-represented (see D 2.1.2).

Figure 80: How strongly do you think are the following municipal administrative units involved in the improvement of urban green/nature?

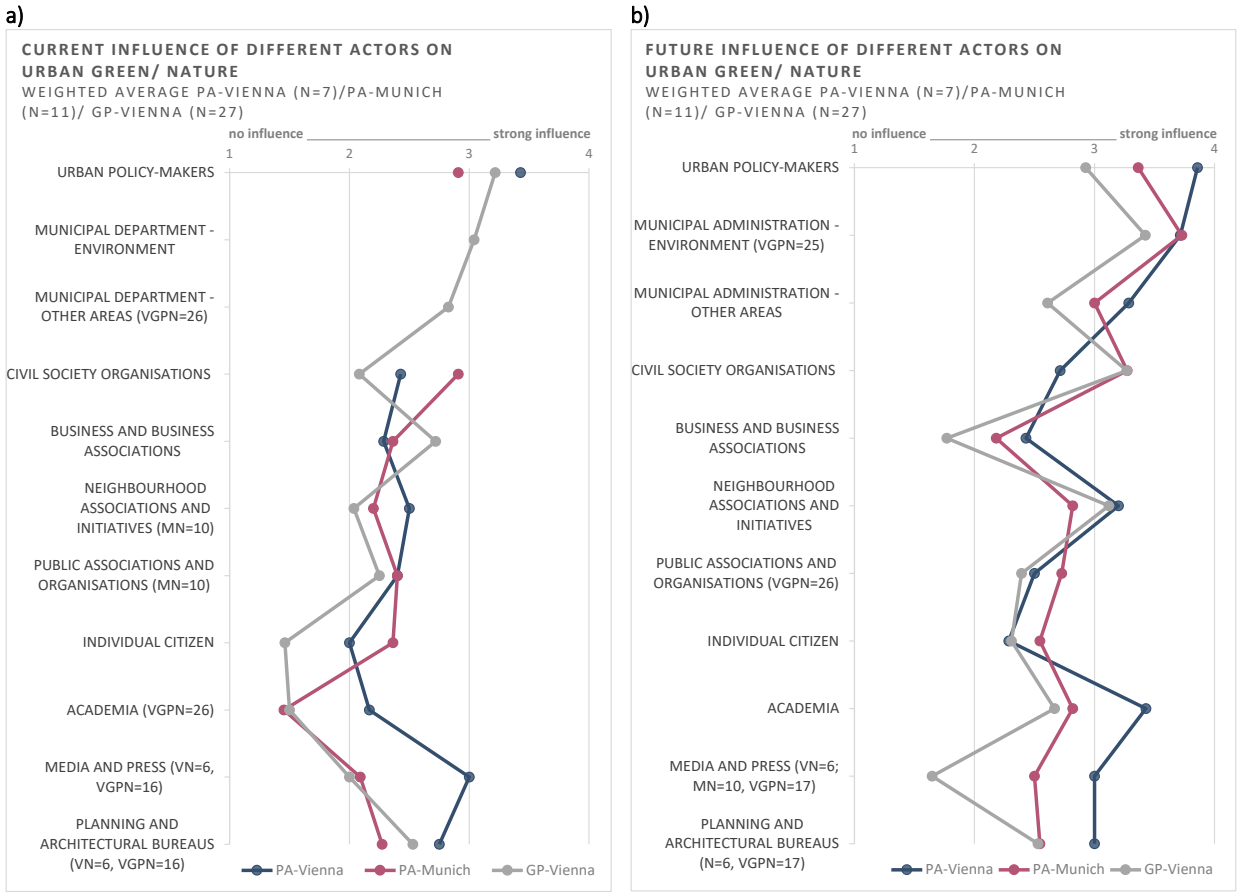


Note: The figure includes weighted averages, calculated based on n number of responses provided to no influence (1), little (2), some (3) and strong influence (4) for pre-defined variables by the public administrations (PA) of Vienna (v) and Munich (m). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for *economy & employment*: PA-Vienna n=3; *other*: PA-Vienna n=2. *Other* not figured due to overall lack of responses.

With regard to the current influence of a range of actors beyond municipal departments, no strong agreement on the importance of a specific collection of actors is visible across all three groups of survey participants (see Figure 81a). *Municipal department/Environment* could be an exception, given also the Vienna general public rates it as having a rather strong influence, similar to the results of the public administrations

in Figure 80. Both PA-Vienna and GP-Vienna survey participants attribute the strongest influence to *urban policy-makers*, whereas PA-Munich representatives emphasise the current role of *civil society organisations*. This difference may not be a surprise, if it is considered that councillors of the city of Vienna are also members of the regional government and hold legislative powers (see chapter D 2.1.2.2). *Civil society organisations*, however, are judged having minor influence especially by individuals of the Vienna general public, which may also correlate with the little influence attributed to the *individual citizen*.

Figure 81: a) How strongly do you think the following actors are currently influencing the design of the urban space, including urban green/ nature? b) How strongly should the following actors prospectively influence the design of the urban space, including urban green/ nature?



Note: The figures include weighted averages, calculated based on n number of responses provided to no influence (1), little (2), some (3) and strong influence (4) for pre-defined variables by the public administrations (PA) of Vienna (v) and Munich (m) and Vienna general public (vgp). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for a) *urban policy-makers*: GP-Vienna n=4; *public associations/organisations*: PA-Vienna n=2; *planning and architectural bureaus*: PA-Vienna n=2; and for b) *neighbourhood associations/initiatives*: PA-Vienna n=2; *public associations/organisations*: PA-Vienna n=3. *Other* not figured due to lack of responses. Variables of m*unicipal departments* missing for the public administration, as addressed in a separate question.

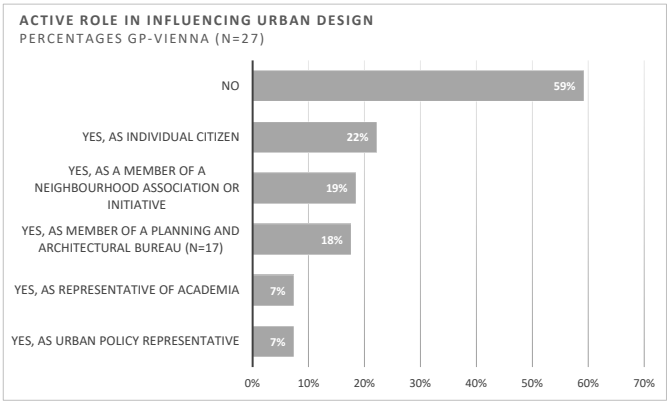
If these findings are compared to those of what future influence a range of actors should have according to survey participants, several aspects can be observed (see Figure 81b). Whereas both public administrations would increase the level of influence by *urban policy-makers*, it would be diminished by individuals of the Vienna general public. At the same time, the latter group envisages an increase of the role of the *municipal department - environment*. Having had a quite pessimistic view regarding the present impact of *civil society organisations* as well as *individual citizens*, GP-Vienna respondents seem to be interested in a rather strong future influence of the first, though only little to some regarding the second. Similar changes to those groups' influence are proposed by the public administrations. All three survey groups wish neighbourhood associations/organisations to take up a more important role, especially in Vienna. The same goes

for academia, which takes one of the highest leaps forward regarding the assumed future level of influence. A significant reverse trend of influence is perceived necessary for *business and business associations* especially by individuals of the Vienna general public. A certain leap backwards seems also desirable when it comes to *media and press*, mainly by GP-Vienna respondents.

A similar enquiry into the current and future involvement of different stakeholders in urban green space planning as part of the GREEN SURGE project (Davies et al 2015:52-53) introduced in chapter C 1.3.4, shows slightly different findings. The degree of involvement of neighbourhood associations, NGOs and community groups is perceived as already high by the chief planners mainly participating in the survey across several EU urban case studies (n=20). Hence also no major changes were envisaged for the future. However, they express the desire for an increased involvement of the business community, contrary to the of survey results of the thesis. This likely depends on what actors are associated with the stakeholder group by survey participants, although it may also indicate a certain scepticism towards the role of business and business associations with regard to urban space design, and a perceived unbalance of powers. Doubts regarding the degree of involvement of individual citizens seems to be a cross-cutting theme for both surveys. This at least refers to their involvement more largely, but not necessarily in the context of neighbourhood initiatives and with regard to the representative role of civil society organisations.

In this regard, it is interesting to look at the findings of a question specifically posed to individuals of the Vienna general public, regarding the extent to which they think they have actually influenced the shaping of the urban environment and in particular urban green/nature **as an actor belonging to one or more of the previously listed groups**. According to Figure 82, roughly 60% state that they so far have not played any active role, with largely minor percentages having contributed as an *individual citizen* (22%), followed by as *a member of a neighbourhood organisation* (19%). Asked in a subsequent question to describe any **reasons for engaging or not-engaging**, participants provide a lower amount of responses to the first (n=6) than to the second (n=15). With regard to important reasons for engaging, survey participants most often refer to the *importance of urban green* (n=5), whether in the direct neighbourhood in order to increase living conditions, or for the *conservation of biological diversity*. The most prominent cross-cutting themes for not-engaging relate to the *feeling of having limited influence* (n=5) (e.g. related to lack of property ownership, preference given to construction interests and investors, or an inflexible and blocking public administration), *lack of time* (n=4) (e.g. related to the length of participation processes) as well as *lack of need or opportunity* (n=5) (e.g. development project stopped before engaging). Other issues addressed by the participants refer to perceptions that civil society initiatives are driven by individual interests, as well as to the fact that some respondents mainly work but do not live in Vienna anymore. The perceived limited influence is also supported by answers (n=26) provided to the question on how survey participants evaluate their **capability of influencing** the design of urban green/ nature. No influence (1) was selected by 35% of respondents, followed by little influence (2) preferred by 50% of survey participants. A

Figure 82: Have you influenced urban design, including urban green/ nature as an actor?



Note: The figure includes percentages, calculated based on n number of responses given to one or more variables by the Vienna general public (GP). Variables with lack of responses are not figured.

small amount of 12% opted for some influence, and the option of a strong influence (4) was not selected once.

The issue of public participation has already been addressed throughout the previous appraisal chapters, in relation to various interventions and documents such as on urban green planning concepts, given it represents an important component of the conceptual and action model. With regard to policy objectives and the coherence of policy interventions, for example the extent to which procedural justice forms an inherent component of the justice approach was discussed, and whether not only participation processes but also formal and legally required participation procedures are addressed. The analysis revealed that this was not necessarily the case, although public participation processes are largely addressed by urban development concepts of the two case studies. With regard to development and planning processes of urban green/nature, it was however also noted that the strengthening of methodological competences regarding cooperation and participation processes has not been more widely addressed. In addition, it was emphasised how a project-driven approach can result into the creation of 'project islands of public participation' and that this suggests the need of a more institutionalised framework or meta-governance that guides such processes over a longer period of time.

With regard to the city of Vienna, it should additionally be noted that the city also published a detailed handbook on public participation processes (see Table 19). Furthermore, outlines regarding the application of the so called cooperative planning procedure are provided. The procedure envisages the step-wise involvement of a range of stakeholders, who cooperate on the development of a defined development area, based on the already previously mentioned Vienna model (see chapter D 2.1.1.1). Related interventions have not been subject to a more detailed scrutiny, given it would encompass a substantial amount of further research to judge their effectiveness. In addition, a large amount of literature is already available that addresses the design of such processes, also in relation to environmental justice and the issue of recognition (see chapter C 2.3). However, public participation processes were frequently subject of discussion in the different interviews with representatives of civil society initiatives, practitioners or inhabitants of the city of Vienna. A few of the most interesting insights are synthesised below, to the extent they are thought important with regard to further defining the concept of governance capabilities:

- A more formal framework is needed: It was often iterated that in Vienna participation processes usually go beyond the basic level of information provision. Co-determination or first steps of co-decision are however as of yet not considered taking place. In addition, although participation processes were described of being applied frequently, they were often considered not sufficiently formally anchored in relation to development projects, and their application much depending on the existing commitment and the available budget of public authorities. Especially the need for controlling the quality of those processes and for an evaluation of their effectiveness was strongly emphasised (e.g. I-EXP-2, para 57-59+61; I-CSI-1, para 8).
- Sequencing matters: Similar to previous responses with regard to development and planning processes, the importance of being involved at early, more strategic stages was highlighted by those interviewed in Vienna. Also the importance of follow-up activities was underlined, given many processes are perceived as suddenly stopping, especially if they are project based. These arguments were also used to stress for example the limits of the urban renewal offices of the city. In addition, the perception of whether participation procedures are viewed as just is also strongly influenced by what aspects are handled at what (critical) moment behind closed doors, or discussed mainly over the media or in court. It is also affected by the extent to which formal planning procedures

and their requirement of informing the general public and involving civil society organisations are respected (e.g. I-Inh-4, para 6+18-20; I-CSI-3, para 4+16+20; I-EXP-2, para 59).

- Different articulation powers need to be considered: The different capabilities of stakeholders in articulating their values and needs in participation processes was also highlighted by different interviewees. Inhabitants and representatives of Vienna's civil society organisations especially denoted the lack of time as an important factor, also in comparison to other stakeholders who in this regard are attributed by far larger means. Other aspects refer to challenges such as feeling exposed or to perceptions of not being educated enough to make a significant contribution. In this regard, the need of low-threshold approaches was emphasised, for example by actively approaching different groups in interviews and discussions at key places rather than organising workshops. In addition, it was also noted that unbalances exist linked to the larger articulation powers existing in some well-off neighbourhoods, for example regarding the design of initiatives and conceptual means available, as well as the influence of political and economic power for example in engaging lawyers (I-Inh-2, para 20; I-Inh-3, para 20; I-CSI-3, para 20; I-CSI-2, para 20; I-EXP-1, para 27+29).

To conclude, it could be argued that there is '*lots of dynamics, not much change*' with regard to a shift from government to governance in relation to the shaping of urban development in Vienna, using words by Arts and Leroy (2006:267) when discussing new environmental policy arrangements. The previous study of governance capabilities and especially commanding capabilities have been guided by the four strongly interlinked dimensions proposed by Arts and Leroy (2006) to contemplate institutional dynamics and stability especially from a perspective of 'power' relations. This to begin with includes available *stakeholder resources*, for example with regard to previously outlined elements such as time, financial means and skillsets. It is followed by an analysis of *stakeholder discourses*, which takes into account ideas, narratives or perceptions dominating with regard to a defined group or domain. It was for example interesting to note that in Vienna interviewed inhabitants or representatives of civil society initiatives frequently emphasised that planning practitioners, public administration representatives and developers often confront them with the narrative of them opposing development per se or pursuing individual interests rather than being largely concerned with environmental problems. Effectively, it proved to be an argument often brought forward in the interviews with related representatives. The third dimension refers to s*takeholder rules of the game,* for example connecting to discussed issues on who defines the rules that are applied to public participation processes ('sequencing matters'), or how the previously indicated, shared responsibilities and application of different rules across municipal departments can impact the shaping of urban green/nature. The last dimension considers s*takeholder coalitions,* such as those frequently phrased by interviewees with regard to the close alignment of the governing political party and housing associations or the close alignment of civil society initiatives and well-off citizens.

A systematic and comprehensive study of those dimensions has not taken place and would require a more in-depth observation of the involved processes and actors. However, it can be argued that the frequent hints at related subjects provided by those interviewed suggests a vibrant political rather than only technical discussion on the rendering of GI in Vienna. The study area Heeresspital, which is introduced in Box 11, offers an interesting final example to illustrate some important dynamics evolving in this context and the driving stakeholder discourses, although constituting only a smaller development project.

Box 11: Vienna – Study area Heeresspital: The role of nature conservation

In the study area Heeresspital, central to and existing dispute are occurrences of European ground squirrel populations (*Spermophilus citellus*) in its northern part, located on former extensively managed agricultural land, which is to be subject to development for housing (see Figure 83). The species is included in Annex II of the EU Habitats Directive, requiring the designation of a protected area due to its overall vulnerable status. According to monitoring undertaken by the city of Vienna between 2014 and 2015, the overall conservation status of populations can be classified '*for all intents and purposes favourable*' (Stadt Wien/MA22 2016b). These results have been put into question by opponents of the development project, suggesting an overestimation linked to the selected method. What seems to be confirmed is a relatively high presence in the north of the city, especially on vinicultural land at the slope of the Bisamberg.

The conflict itself has been evolving already for a couple of years and at quite some length, and only some central aspects of particular relevance to the thesis are outlined. An important milestone represents the development of some initial housing between 2007 and 2010, and the subsequent acquisition of land by developers in a neighbourhood likely prone to substantial transformations in the coming years (see introduction in D 2.1.1.1). What followed was a rezoning by the city of Vienna in 2010, from agricultural to construction land. The report outlining the decision concluded that the planning area '*does not offer any structuring green elements as part of a biotope network or a diversified landscape scenery*' (Stadt Wien/MA21 2010). In addition, a first screening of environmental impacts determined that no substantial disturbances are to be expected, also with regard to biological diversity. At the same time, it emphasised the high recreational value of the Marchfeldkanal (water channel), quite used by the population due to the otherwise lacking availability of recreational area in the neighbourhood. Also the developers recognise the potential of the Marchfeldkanal as an environmental amenity, advertising it as '*pure nature on the doorstep'* (Kabelwerk Bauträger GmbH et al n.d.). At least half of the initially planned more than 900 dwellings have been designated for home ownership, partly subsidised and partly free-market.

Figure 83: Study area Heerespital: Project proposal – Living at the Marchfeldkanal (left, Idealice 2013) **+ Marchfeldkanal/adjacent development area** (right)

Already early in the process, the civil society initiative IGL Marchfeld got engaged on the subject, initially more generally focused on living conditions in the district (IGL Marchfeldkanal n.d.). It argued that the presence of the species had already been well known before the rezoning, and that an EIA would have been necessary with regard to the development project. The initiative originally foremost consisted of inhabitants of the neighbourhood, although also attracting citizens beyond the district of 21/Florisdorf (I-CSI-2, para 6). Over the years, also due to the increased media coverage, it generated support from representatives of various political parties at district level mostly in opposition to the currently two governing parties, as well as civil society organisations located in Vienna (e.g. VIRUS). Also the European Commission was called upon at some point, in order to verify to what extent an infringement of required procedures had occurred. After several more or less successful activities targeting the migration of the species to identified compensation areas, construction works have slowly started though limited to defined periods of the year. The city and the developers continue to emphasise that the development will occur in due respect of habitats and species, and that it will become a best practice example of how nature conservation objectives and housing development can be successfully combined. At the same time, the developers have put on the table a likely increase of housing prices linked to the costs of the lengthy process. The initiative's main requests continue to be an overhaul of the plans, to guarantee a future favourable conservation status of the species, and it keeps being sceptical about the proposed measures.

Those urban planning and design practitioners who addressed the case in the interviews mostly agreed that the situation had been handled badly, although in the end a good compromise was reached (e.g. I-EXP-3, para 28). At the same time, their discourse was often dominated by the view that such civil society initiatives are mainly constituted by inhabitants who fear the disappearance of their pleasant outlook, decreasing property values or transformations more generally, rather than being interested in nature conservation (e.g. I-EXP-1, para 19). Especially fears of transformation were often a re-occurring theme. Interviewed representatives of civil society initiatives were well aware of and also frustrated about these arguments. They agreed that there are likely individuals, who mainly pursue their own interests, but that the majority engages and spends a substantial amount of their free time on such initiatives due to their imminent interest in the overall sustainable development

of the city (e.g. I-CSI-1, para 9). They also iterated that these discourses are often actively fuelled to discredit an initiative and their objectives, playing selfish interests off against the social goal of affordable housing (e.g. I-CSI-2, para 26). The dominating discourse often presented by civil society initiatives and also inhabitants refers to the profit- and power-seeking developers/ housing associations, which are closely aligned with the dominating political party or of which the company managing the city's municipal housing holds own interests, and that such connections are not necessarily transparently communicated. It reflects a certain level of mistrust regarding the zoning processes undertaken by the city and on the extent to which they pursue objectives of overall public interest.

The question remains to what extent the escalation of the conflict could have been avoided if a strategic approach to biodiversity conservation, allowing early identification of priority areas (e.g. inventory) and targeted actions (e.g. acquisition of land) had been in place. This has to be interpreted also in the light of findings of the EU Environmental Implementation Review. With regard to Austria's report and factsheet, it denoted that nature conservation, particularly with regard to the implementation of the Birds and Habitats Directives, represents one of the most important fields for future action given the increasing unfavourable conservation status of many habitats (EC 2017:4). According to the report, one main reason represents the fact that many agricultural and forestry activities, irrespective whether rural or urban, are not affected by protection requirements. However, most importantly the absence of a federal legislation framing the implementation of the nature Directives is used to explain the high number of nature-related complaints and infringement cases Austria is facing in this regard (EC 2017:10). Another stated reason is the insufficient access to justice for citizens and NGOs, as '*no legal redress is available apart from EIA* [Environmental Impact Assessment] *and IPPC procedures* [Industrial emissions]' (EC 2017:23).

D 2.2.3.3 Conclusions on rationales for action and overall adequacy

1. In practice, the strategic prioritisation of conserving GI elements is less an option

   On the continuum of choices which the conceptual and action model offers in shaping GI status and quality for a just access, the analysis revealed a strong tendency towards what can be defined opportunistic strategies (e.g. temporary uses of urban green/nature or the improvement of existing qualities) pursued by the public administrations of the two case studies. It can be assumed that this is influenced by the perceived limited scope for manoeuvring regarding the protection of individual elements (e.g. informal green) or even an overall quantitative increase of urban green space, linked to existing guidelines on densification and housing development. If the creation of new spaces is envisaged, it mostly occurs in defined development areas and often targets specific functions, especially recreation. The strategy of integrating GI by giving it due consideration and conserving defined elements prior to project development seems yet rarely the case beyond areas of high biodiversity value, despite the attributed importance with regard to a just access. Using the words of a participant, the currently applied strategies are best described as 'secondary greening', arguably occurring both in relation to the development of new parks or ecological compensation measures. Different to the public administrations, the individuals of the general public involved in the survey were keener to pursue offensive strategies, especially with regard to the development of permanent green on vacant land for a just access. Initial results also suggest that they especially value the provision of a higher critical mass for the support of a variety of functions, rather than a connected GI network.

2. GI's strategic operationalisation should envisage both a general provision and the targeting of needs

   The two case studies present two distinct overall strategic approaches to shaping GI. The city of Munich seems to favour the provision of general guidelines, subsequently transposed into defined action areas and projects. In this regard, it adopts a hierarchical prioritisation that focuses on those spaces considered most lacking or most suitable, also in relation to socio-economic variables. However, there is no overall, spatially concretised vision, which allows to deduce what happens to areas that fall outside those specifically targeted. The green and open space concept of the city of Vienna is dedicated to

creating a fine-mashed network of GI elements, which ensures an even distribution and general provision of urban green space. However, by not taking into due consideration different needs in defined areas, the approach risks to disregard already existing disparities that influence the overall access to urban green space especially with regard to the provided quality. The outlined challenges of both approaches would suggest an operationalisation that oscillates between the two.

3. Binding interventions and strong commitment to clear visions might be needed for a just access to GI

Results indicate the importance the public administrations of Vienna and Munich attribute to legally binding spatial planning interventions to ensure a just access to GI, especially with regard to instruments that address different land use demands (e.g. land use plans). These are likely perceived as higher safeguards for avoiding disappearance or transformation of GI elements in the long-term, and ensure a defined quantitative provision. However, there are concerns regarding their usefulness in ensuring a defined, basic quality. In this regard, repeating emphasis is put on the need of a clear and concrete vision and larger schemes at different scales, which go beyond the delivery of projects or general guidelines. This could be accompanied by a new interpretation and revive of existing land use planning categories for GI operationalisation (e.g. forest and meadow belt or ecological development area in Vienna), as well as on developing consistent quality standards. These aspects can also be important in light of difficulties regarding the strategic integration of GI operationalisation, referring to the extent to which cross-departmental and multi-scale cooperation currently takes place in both cities.

4. Current focus lies on securing GI rather than targeting economic inequalities for a just access

The previous point already hinted at the felt need of a strong commitment to secure apposite areas for GI development. This is also supported by findings on suggested hindering and facilitating factors for a just access. Land use competition, lack of interest by decision-makers and investors figured often as hindering factors in both case studies. Public ownership of land and long-term strategic plans for the development of urban green/nature being frequently favoured as facilitating elements underline the importance attributed to ensuring the provision of GI elements. Issues of income and wealth have been rated less important as an area to be directly targeted by interventions for a just access, whether with regard to their interpretation as hindering factors as well as in relation to the change of governance capabilities. This could be correlated to the socio-economic status of many respondents, usually well-off regarding their income, education and housing situation, but this would need further enquiry. The results can also suggest a higher importance attributed to interventions directly affecting the 'end' or the 'ought-to-be', such as ensuring a defined GI quantity and quality, rather than on the available means for access, such as income and wealth.

5. Governance capabilities approach can widen perspective and frame interventions targeting GI access

The introduced and applied framework of governance capabilities was helpful in framing already existing interventions on the offered continuum of choices, and also made areas visible which so far might have been of less concern in ensuring access to GI. The city of Munich for example is further exploring the expansion of use capabilities in relation to private urban green, whereas the city of Vienna offers initiatives that expand management capabilities in the framework of urban agriculture. Some results also suggest that clearly distinct roles attributed to defined stakeholders (e.g. public authorities) in the application of property entitlements (e.g. management of publicly owned green area) may increase the difficulty of a more comprehensive approach to GI operationalisation (e.g. public authorities targeting both public and private GI). The exemplary application of governance capabilities as part of the survey

also indicates a special importance attributed to the expansion of use rights in relation to public space (e.g. road infrastructure). It suggests a certain preference for the extension of capabilities that favour larger parts of the population (e.g. expansion community management) rather than targeting defined groups for a just access (e.g. financial support for home ownership and private green). It made visible challenges of individually addressing entitlements such as exclusion and alienation as part of occupying capabilities. With regard to questions of articulation and political power, the importance of the sequence of involvement in public participation processes was further emphasised, as well as taking into consideration the range of capabilities of different stakeholders in articulating their values and in shaping GI. The support for expanding political and financial capacities of municipalities across the two case studies as well as the weight given to formal participation procedures can also be interpreted as a desire of increasing countervailing powers likely to economic powers currently perceived as strongly impacting urban living conditions.

6. Questions of wider GI accessibility put housing policy interventions into focus

Despite the important role which is attributed to housing policy in shaping the fabric of a city, it more often figures as an area of conflict rather than an important area of intervention related to questions of broader accessibility to various GI elements. It can be argued that housing policy not necessarily directly targets the distribution of GI, but besides affecting property entitlements it can also impact the dispersal of different population groups in relation to urban green/nature, and thus the overall access. With regard to GI development, in both case studies existing housing policy interventions mostly target its overall quantitative provision (e.g. share to be provided) and its general management (e.g. maintenance costs), but only to some extent address basic quality aspects or potential impacts affecting overall access (e.g. use rights, distance to GI). First steps could for example include requirements which impact the location of affordable housing in relation to environmental amenities such as GI in urban contractual agreements. More largely approaches could target the acquisition of land for community/public ownership to build up the municipal/community housing stock in relation to GI access. Combined solutions can be driven by housing policy widening its focus from affordable housing to a support of affordable living conditions, and the contribution GI in particular can make.

7. The adequacy of the policy intervention mix is determined by how it influences governance capabilities

The model's introduction of governance capabilities, especially its focus on questions of overall accessibility, has widened the pool of policy interventions for a just access to GI, but has also risen questions on what interventions could be adequate, especially if commanding capabilities are taken into account. Although it is generally important to consider a broader mix of interventions, the means applied can make an important difference regarding perceptions on a just access to GI. This goes beyond the promotion of participation processes. For example, the analysis made evident that increasingly policy interventions out of the group of financial, market-based or cooperative and contractual instruments are evoked for the securement and management of GI, but also in relation to affordable housing. This particularly occurs in light of perceived budget constraints, and for example includes the application of urban contractual agreements as well as considerations regarding the use of public-private partnerships. However, their increased use bears risks regarding a potential shift from long-term steering powers based on political processes and including regulative interventions and formal procedures, to short-term approaches, which seek the latest consensus amongst targeted key stakeholders based on projects or bilateral negotiations processes under private law.

8. There is further need to observe power-relations regarding the operationalisation of GI for a just access

   Dimensions such as resources available to stakeholders, discourses driven by a defined group, influence of stakeholders on formal and informal rules as well as stakeholder coalitions were applied to some extent to study aspects of the commanding capabilities proposed by the conceptual and action model for a just access to GI. Albeit no systematic and comprehensive observation of the involved processes and actors has taken place, the few examples have shown that these dimensions can be important lenses as well as frames in making power-relations visible and more concrete, including in the framework of operationalising urban GI. Respective comparisons may give indications on perceived unbalances regarding governance capabilities, though not necessarily the line can always be drawn neatly between different groups of actors as well as the powers they yield. The initial analysis has also shown that the interpretation and adoption of the commanding capabilities approach remains one of the biggest challenges regarding the application of the conceptual and action model. Many references made to related debates have however emphasised the importance of not only approaching the operationalisation of GI from a technical rendering perspective, but of recognising the political processes it involves and making them visible for discussion.

D 2.2.4 The significance of outcomes

The focus of the chapter lies on judging the significance of envisaged outcomes with regard to GI operationalisation for a just access, based on an appraisal of the extent to which a similar stand on desired and undesired consequences of policy interventions across the ecological, built-up and socio-economic space is visible. This is deduced by looking at interpretations of environmental justice and by insights on stated or revealed values of preferences with regard to environmental amenities. The chapter then compares it to previous results to draw **overall conclusions** on the significance, and to summarise **feasibility constraints** that emerge regarding GI operationalisation. The analysis as well as the **structure of the chapter** is hence guided by the following questions and related sub- questions:

Appraisal guiding questions and sub-questions
(10) Which *envisaged desired/undesired outcomes* are revealed by the interpretation of environmental justice with regard to GI operationalisation for a just access?
(11) Which *envisaged desired/undesired outcomes* are disclosed by economic methods of stated and revealed values of preferences?
(12) To conclude, what *significance* has the comparison revealed in light of previous results, and what *feasibility constraints* affecting the outcome have become visible based on the appraisal analysis?

The following overview summarises the most important assumptions regarding envisaged outcomes laying at the basis of the comparison.

Conceptual and action model – envisaged outcomes
• Rather than focusing on its equal distribution the shaping of GI results from the application of the principle of a just access, achieved by addressing needs stemming from spatial disparities across the various dimensions
• Not preferences but basic needs inform claims of the right to ecological space, and determine the development of a ‘safety net’ of ecological functionings to be ensured for a just outcome

- Biodiversity conservation represents an inherent component of the 'safety net' to be provided, and as such natural and semi-natural land features of high biodiversity value do not represent isolated elements in a city, but form part of a functional and physical web
- A just access is determined by the striking of checks and balances regarding governance capabilities, including power-relations and their impact on the shaping of the ecological space

D 2.2.4.1 The 'ought-to-be' revealed by the interpretation of environmental justice

The concept of environmental justice has gained some momentum as a vision that can drive urban planning with regard to the distribution of environmental qualities and addressing related disparities. It is determined by environmental burdens as well as by environmental resources, such as those envisaged to be provided by GI operationalisation. Especially in Germany, it has entered discussions in academia, which also increasingly collaborates with municipalities in researching how it could be operationalised at the urban level (see chapter C 1.2.1.3). Asked about their **familiarity** with a range of terms in their area of activity, 5 out of n=10 of the responding representatives of the public administration of Munich state to be at least partly and 4 to be familiar with the term environmental justice. Respondents of the public administration of Vienna (n=7) show to be less acquainted with environmental justice, given n=3 state not to be and another n=3 to be only partly familiar with the concept.

In this regard, it needs to be reiterated that the term so far has not necessarily been linked to the GI concept, given GI is often rather connected to social cohesion as desirable outcome or policy objective. However, environmental justice proved to be a more interesting concept to explore, for example due to its overlap with the ecological space concept and already existing models regarding its implementation. Although increasingly also in Europe discussions are taking place about what environmental justice may encompass with regard to urban green/nature, little is known of how the term is understood and interpreted outside academia. One of the interviewed experts noted on the subject that it is crucial to go beyond academic discussions of the term and to ask the urban population and people of a defined neighbourhood about their understanding of environmental justice (I-EXP-1, para 14+16).

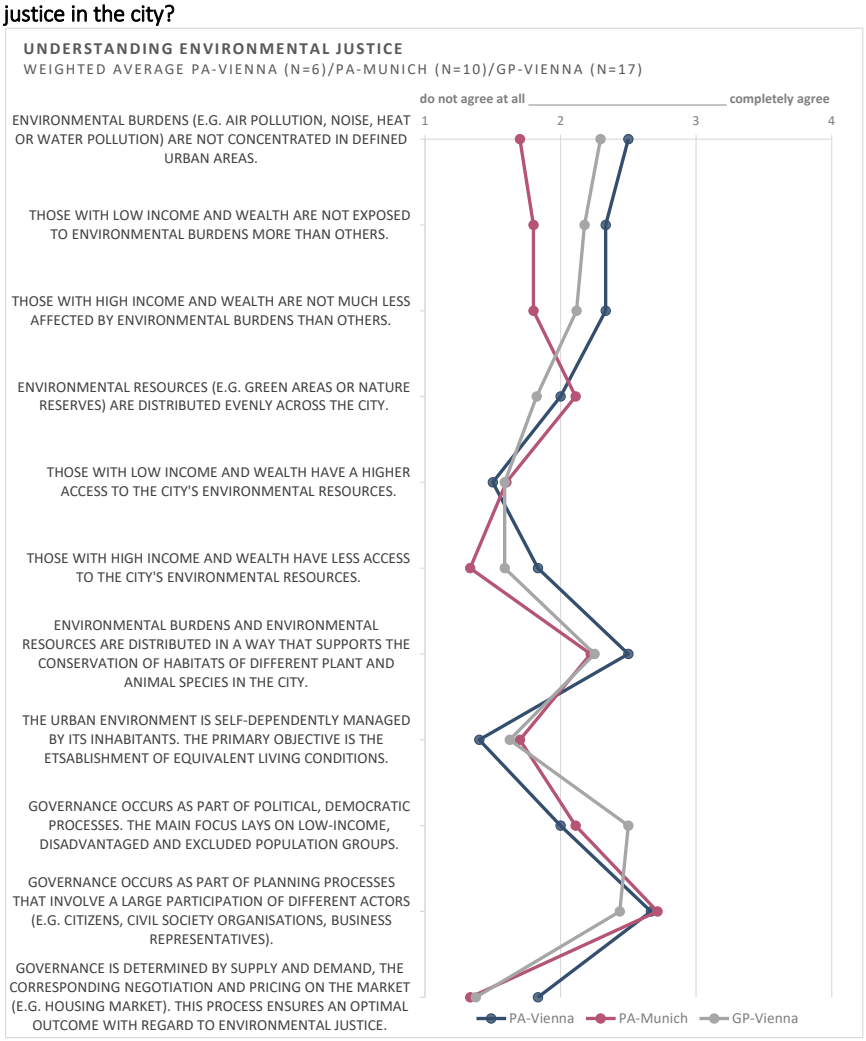
Accordingly, the survey included a related question to gain first insights into the understanding of environmental justice. Several options were proposed, which include **desirable outcomes and governance processes with regard to environmental justice.** These were based on the understanding that the concept especially refers to the '[…..] r*eduction of socio*-[economic] *spatially concentrated,* [….] *environmental burdens, as well as the* [socio-economic] *just access to environmental resources*' (Böhme et al 2015:28). The deduced options refer to different aspects of distributional and procedural justice as well as equal access (see chapter C 1.2.1.3). Particular emphasis was put on economic inequalities and how they inform perceptions of desirable outcomes regarding the distribution of environmental burdens and access to environmental resources. Options on governance processes and as such procedural justice are closely related to the concept of governance capabilities introduced by the conceptual and action model.

The results presented in Figure 84 follow a more or less similar pattern regarding the level of agreement of all three survey groups. Generally, it can be said that participants of the Munich public administration display a low level of agreement across all choices, without any strong preference for one of the statements describing environmental justice. An exception is one of the options relating to **processes informing environmental justice**, namely *governance occurring as part of planning processes that involve the large participation of different actors*, receiving also a strong support by the respondents of the Vienna public administration and general public. However, GP-Vienna participants slightly more agree with the process option

of *governance occurring as part of political, democratic processes, with a main focus on low-income, disadvantaged and excluded population groups*. This may suggest a higher interest in certain objectives rather than participation per se. *The self-dependent management of the urban environment* is one of the least supported descriptions regarding issues of procedural justice. *Governance determined by supply and demand, the corresponding negotiation and pricing on the market, ensures an optimal outcome* also does not figure high support.

With regard to **desirable outcomes**, a strong coherence of agreement can be found regarding the distribution of *environmental burdens and resources in such a way to support the conservation of habitats and species*. This could link to an understanding provoked by the German version of the term environmental justice, 'Umweltgerechtigkeit', which can also be interpreted as justice towards the environment, and resulted in the use of the term 'umweltbezogene Gerechtigkeit' (justice in relation to environmental issues) in academia and by municipalities in Germany. However, PA-Munich respondents suggest to have a certain awareness regarding the concept (see previous outline on familiarity), and nevertheless strongly agree with the statement. This may be due to several reasons, from the desire of a more holistic approach, which takes biodiversity objectives into account, to the hesitance in taking a clearer stance with regard to other provided options of outcome.

Figure 84: To what extent do you agree with the following statements on environmental justice in the city?



Note: The figure includes weighted averages, calculated based on n number of responses provided to do not agree at all (1), only partly (2), to some extent (3) and completely agree (4) for pre-defined variables by the public administrations (PA) of Vienna (v) and Munich (m) and the general public (GP) of Vienna (vgp). *Don't know* responses have not been taken into account when calculating the weighted average. More significant numbers of *don't know* responses have been registered for *governance/planning processes*: PA-Munich n=3. *Other* not figured due to lack of responses.

Another of the statements on which especially PA-Munich representatives mostly agree refers to *environmental resources being distributed evenly across the city*, for example in relation to green space and nature conservation areas. More important for individuals of the Vienna general public and its public administration seems to be the understanding that environmental justice addresses *environmental burdens (e.g. air pollution and noise) not being concentrated in defined parts of the city*. The desirable outcome statements

which more directly link environmental justice to inequalities of income and wealth are also especially supported when addressing the issue of environmental burdens. This is in particular the case for the option that *those with low income and wealth are not exposed to environmental burdens more than others*. Lower levels of agreement can be found with regard to the distribution of environmental resources according to income and wealth. The initial group of Vienna general public participants (n=12) were asked to select a preferred statement. The findings support the preference given to environmental burdens not being concentrated in defined parts of the city, selected by n=3 out of n=9 respondents and the rest of choices being rather evenly distributed across some of the proposed statements.

In order to gain **further insights on the understanding of environmental justice** by individuals of the Vienna general public beyond predefined statements, a related open question was included in the survey. It asks to describe an incident or provide an outline on the personal understanding of the concept. Several of the provided n=6 responses address the issue of access to urban green, defined by short distances, accessibility by different population groups (e.g. age, income, education) and to a diverse quality. Others refer to the necessity of taking into due consideration nature with regard to urban planning (urban space and housing), and of focusing more on species diversity than profit. One respondent emphasises that environmental justice represents a 'scientific pseudo-term', as already environment is difficult to define and even more so justice. As such he/she deems that the concept cannot be answered by non-experts.

However, in this regard it is important to refer to some experiences with the term when carrying out selected interviews with individuals of the Vienna general public. As already indicated, the average survey respondent is in the prime time of employment, with a decent income and usually well-educated, resulting in relatively good housing conditions and access to urban green. Hence targeted interviews with the general public focused on individuals that may not correspond to these characteristics. At the beginning, it was generally feared that discussing the term could be difficult, for being viewed as a complex issue where people would be hesitant in taking a stance. However, selected individuals who had as educational background a compulsory general education or education up to a secondary level often proved to be less hesitant in providing their view on the subject. Statements for example include:

- '*A good environmental quality belongs to everyone, independent of income. Everyone should have the equal right to shape it*' (I-Inh-2, para 24),
- '*Environmental pollution should not be concentrated in poorer neighbourhoods*', and
- '*Clean air, clean water, natural/spontaneous green should be accessible independent of population group or income*' (I-Inh-4, para 28)

These statements also make evident that environmental burdens and resources often were mentioned simultaneously, both representing key components of environmental quality. Nevertheless, when it comes to defining environmental justice a tendency towards relating it to environmental burdens can be identified, especially the felt injustice that people with less income or belonging to a defined ethnic group might be subject to higher pressures. In this regard, it is more clearly linked to increasing the quality for population groups which may issue respective needs. With regard to environmental resources, the survey suggests that people are more inclined to an even distribution rather than welcoming a redistribution which could for example imply that higher income groups have less access to environmental resources in the city. It can be argued that with regard to environmental resources, including urban green space, people favour those options that in the end benefit everyone, including themselves. This would be supported by previous findings of the survey, which put for example living conditions and quality at the forefront of targets to pursue with regard to the development of urban green/nature. On the other hand, survey participants expressed

a certain mistrust that market mechanisms of supply and demand actually lead to an optimal outcome with regard to environmental justice. What outcome is suggested by stated/revealed values provided by economic methods is elaborated in the next section of this chapter.

D 2.2.4.2 The 'ought-to-be' according to stated and revealed values of preferences

As outlined in chapter C 1.2.2.2 on conceptual linkages between GI principles and issues of inequality and justice, values attributed to ecosystems can be made visible by using **monetary approaches** such as revealed preference and stated preference methods. They either study proxy markets, which reveal values that are otherwise not reflected in market prices (e.g. market distortions, public goods), or create hypothetical markets and ask research participants to state their respective values. Hedonic pricing constitutes a revealed preference method, which considers values revealed by real estate prices for example with regard to environmental amenities. In the framework of valuation work attempting to capture the socio-economic benefits provided by ecosystem services, it is assumed that such methods can be used to derive positive statements on the value arising from natural capital. These statements can for example highlight which opportunities natural capital offers regarding the development of property values, especially in cities facing otherwise shrinking dynamics and where a stabilisation of the real estate market could be important (e.g. Haase et al 2014). It is also discussed how they can inform considerations and policy interventions by public authorities in capturing the increase of property values occurring to developers and property owners from the (re-)zoning of land or the creation of a new urban public park (e.g. Thiel 2016:691-692).

Only slowly risks linked to the creation of environmental amenities and its impact on property prices in situations of already high demands and scarce supply are considered more profoundly (see chapter C 1.2.1.2). In the framework of their study of green gentrification processes, Gould and Lewis (2016) for example argue that the creation and restoration of environmental amenities increasingly mainly target the generation of taxes, revenues and profit, and the provision of a defined quality of life for new inhabitants with adequate resources, but consequently resulting into the displacement of people of lower income. In addition, as outlined previously, a range of experts and practitioners interviewed in the context of the thesis express concerns regarding risks of commodification processes linked to the concept of ecosystem services, and the monetarisation of the resulting benefits in particular (see D 2.2.2.2).

It can be argued that it largely depends on how the results are interpreted whether hedonic pricing and other valuation approaches can still be an interesting **vehicle which informs the shaping of a just access to GI**. They can provide important insights into values attributed to urban green/nature more generally, how changes in conditions can affect demand and supply, and provide indications and arguments but also raise alarm on potential impacts of certain policy interventions. The findings on revealed values for example by Votsis (2017) or Brander and Koetse (2011) (see Table 25) could be interpreted as an indication for the need to pay particular attention to the development of housing prices close to new urban parks, especially in areas scarce of open spaces and high population densities. Instead of considering the application of market-based or financial policy interventions such as taxes to capture added values linked for example to zoning, it could rather imply an intervention that timely locks public land for the development of social housing in short distances to the new urban park.

Table 25: Examples of studies revealing GI values

Location	GI element	Revealed value	Source
Salo and Halikko, Finland	Urban forest	Using data from the sales of terraced houses, it was estimated that an increase of 1 kilometre in **distance** to urban forests leads to the market price of a dwelling decreasing by an average of 5.9 %. Those dwellings with **view on the forests** were 4.9% more expensive than other dwellings with otherwise similar characteristics.	Tyrväinen and Miettinen (2000)
Helsinki, Finland	Urban parks, forests and fields	Looking into a sample of apartment transactions, the study concludes that a decreased distance to all three types of GI (urban parks, forests and fields) impacts positively housing prices, though only when at the **correct location**. They are also differently affected by **spillover effects** from amenities provided by neighbouring property. With regard to urban fields this relates to the **urban fringes**, with no spillover effect to be expected. Urban parks capitalise exclusively close to the **city centre** and particularly profit from spillover effects. Housing transactions profit directly from urban forests at the fringes, and indirectly from spillover effects in the city centre.	Votsis (2017)
Meta-analysis of mainly US studies	Mostly urban parks, additionally forests, greenbelts, natural areas, agricultural land	According to the meta-analysis of 12 hedonic pricing studies, the value of different open spaces increases with **population crowdedness** and **scarcity of open spaces** and is heavily influenced by distances. In addition, urban parks seem to be more favoured than other green types though there appear to be significant regional differences.	Brander and Koetse (2011)
Dakota County, suburban to Metropolitan region of Minnesota and St. Pauls, USA	Outdoor recreation areas such as parks, trails, lake and streams, tree coverage	Based on the Metropolitan Twin Cities Parcel Dataset (spatially-referenced sale, tax, and structural data), the results show positive impact on housing prices linked to **outlook** on an increased area, view of **water and lawns**, **decreasing distance** and **improved access** to recreational areas, as well as **high tree coverage**.	Sander an Haight (2012)

These examples show that the usefulness of valuation studies for a just access clearly depends on the end in mind or the policy question issued when applying those methods (e.g. revenue and profit generation or areas of policy interventions for a just access) and on unmistakably outlining their shortcomings and limits. In this regard, one of the interviewed experts underlined that land and housing prices are influenced by a range of amenity factors, and the exact influence of GI as an environmental amenity is difficult to assess, likely underestimating related contributions and posing limits to such interventions (I-Ex-4, para 8). Additional risks of economic valuation especially link to the focus on preferences (e.g. defined environmental amenity) and economic values (e.g. property values), with regard to which urban GI likely will always be interpreted as less profitable than other land uses despite valuation efforts. It may result in losing out on a discussion that bases policy interventions on a broader value basis and helps deducing relevant quality categories.

The fiscal impact analysis applied to one of the study areas in Vienna and outlined in Box 12 is used as an interesting example to briefly illustrate how the use of information from economic valuations could have resulted in different policy recommendations. At the same time, it also hints at its limits, especially in relation to remarks made by one of the interviewed experts. He/she emphasised that economic valuations only

rarely occur with regard to development projects in Vienna, and it is questionable whether such comprehensive studies are necessary, first due to the involved complexity and second because other means might just also do the job and even more successfully (I-Ex-4, para 18+19).

Box 12: Vienna – Study area Donaufeld: The example of the fiscal impact analysis

In light of budgetary constraints and developments such as new public management (see chapter C 1.3.4), increasingly policy-makers and public administrations are interested in more clearly delineating the fiscal impact of development projects. A respective fiscal impact analysis was carried out for a development project in the study area Donaufeld in Vienna (also see introduction in D 2.1.1.1). Accordingly, Bröthaler et al (2013) analyse different costs and income structures expected to arise with regard to the project, and calculate respective Net Present Values. The latter is set equal to the present cash flow occurring to the municipality, considering all project-related expenditures and revenues and applying a rate to discount future or alternative flows for the considered period of time. This occurs up to an extended analysis which also takes indirect project-induced expenditures linked to demographic changes (e.g. health care costs) and person-based tax shares of the fiscal equalisation scheme into account (see chapter D 2.1.1.1 for related information). The authors apply an analysis model which figures urban green space purely as expenditure, in relation to the creation and maintenance of urban public parks, street vegetation and open space to form largely part of a green corridor (see Figure 85, left). Based on the original scenario, which envisages that 25% of the 54 ha large area will be dedicated as urban green space, the authors calculate that its development and management would amount to 5% of the total initial investment costs of €134.8 million, and 1% of the total recurring costs of €31.6 million in 2027 (Bröthaler et al 2013:9). They do not assume that the green space generates any direct revenues or tax revenues provided by new residents and employees. This is not the case for other infrastructures such as water and wastewater management as well as social infrastructures such as schools. In this regard revenues for example from user fees or federal subsidies are expected to occur over a period of time of 50 years. In a subsequent step, the authors calculate the potential fiscal impacts based on alternative scenarios, including a scenario of densification which envisages the reduction of public green space from 25% to 16% accompanied by an equivalent increase of construction area. They argue that it would lead to 'economies of densities', consisting of lowered infrastructure costs and higher tax revenues per capita, making it a favourable scenario for policy recommendation.

Figure 85: Study area Donaufeld: Development concept (left, Stadt Wien/MA18 n.d./b) **+ Agricultural land at current site location** (right)

Note: The development area is marked in white, envisaged green spaces and existing waterbodies are highlighted in green and blue, an 'event tape' is marked red, indicating more lively neighbourhoods.

The recommendation could look quite differently if the analysis were enlarged by considerations and calculations related to the economic value of urban green space. If the same line of pure fiscal argument is used, it could be argued that higher densification could result in decreased attractiveness of the area, especially to higher income groups, potentially leading to an increase in social welfare costs in the area. In addition, if it is assumed that urban green space positively impacts health costs, they could be rising with increased population densities, lower availability of urban green space per capita and potentially higher pollution levels from increased road traffic also linked to the reduced attractiveness in walking or cycling. It could also impact the costs of water management, due to the reduced capability of the remaining GI in contributing to the service.

In the end, the fiscal impact analysis by Bröthaler et al (2013) seems not to have affected the overall decision. According to latest information on the development of land use and building plans for the first phase of the Donaufeld project, there still seems to be a strong commitment to 25% of the study area being composed of green space. It was a key request by inhabitants and civil society initiatives involved in the initial participation process that large parts of the currently agricultural land area are conserved (see Figure 85, right) or that a substantial amount is dedicated as urban green space, though initially 1/3 had been envisaged (I-CSI-1, para 11). One of the remaining criticisms refers to the extent to which the envisaged green corridors actually

consist of un-sealed soil covered by vegetation. Paved squares, cycling and public transport infrastructures are perceived to reduce substantially the actually available share of urban green space (I-CSI-1, para 11).

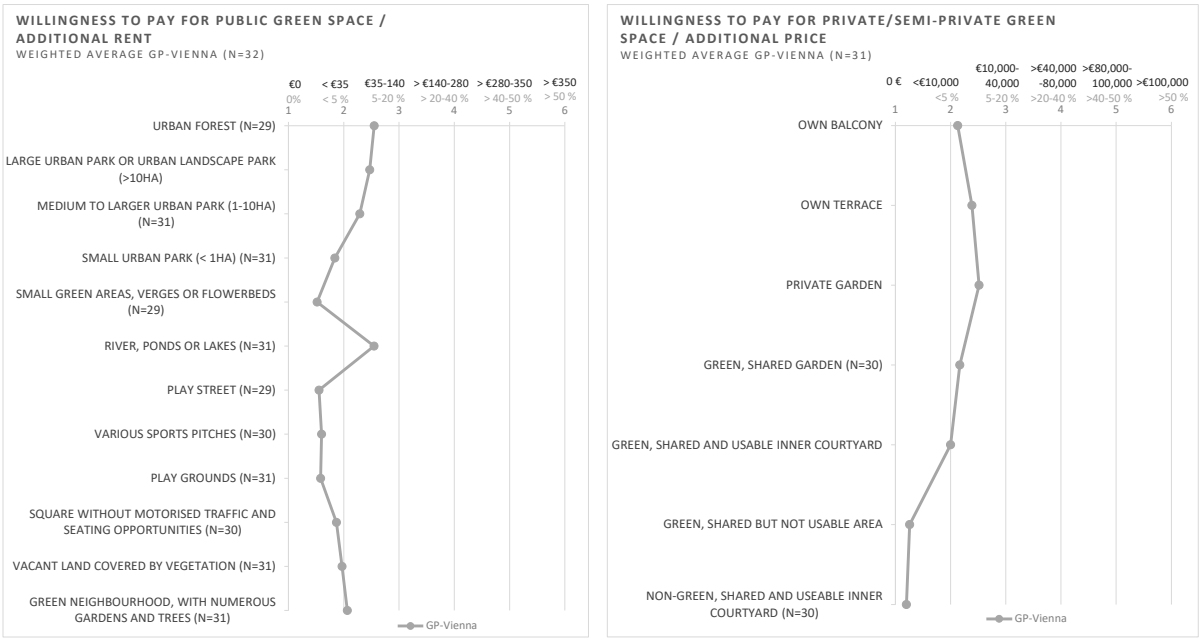
Despite all the risks, limits and shortcomings regarding economic methods, the online survey also included questions that aimed at collecting insights into the desirable 'ought-to-be' based on stated values of preferences in order to allow a rough comparison with the valued outcome following the principle of environmental justice. It followed the approach of asking participants about their willingness to pay for certain amenities in a hypothetical market. The latter was described using various components that reflect the existing real estate market of residential housing in Vienna at the time of the analysis.

The first question refers to the **willingness to pay an additional monthly rent** for a 50 m^2 apartment, depending on environmental amenities such as public or publicly accessible green and open spaces in the immediate neighbourhood and assuming a net income of €2,000 per month. The responses presented in Figure 86a reveal a comparably higher willingness to pay especially for the presence of an *urban forest*, followed closely by a *large urban park/landscape park* and *river, ponds and lakes*, all on average amounting to an additional rent between 5% and 20%. For features such as *urban forests* and *river, ponds and lakes* some respondents would even pay an additional rent of 20% to 40%. These amenities are closely followed by a not necessarily directly accessible *green neighbourhood, with numerous gardens and trees*, a *medium to larger urban park* as well as *vacant land covered by vegetation*.

Figure 86: Values revealed by willingness to pay

a) Suppose you had a net income of €2,000 a month. Your monthly rent would amount to €700 (including €100 running costs) for a 50m² apartment in a 19th century building. How much additional monthly rent would you be willing to pay if you had a public green space in the immediate neighbourhood?

b) Suppose you had €200,000 of savings and could obtain a loan of over €100,000. A prospective newly built apartment of 50m² would cost you €200,000. How much would you be willing to pay in addition if you had your own private or semi-private green or open space?



Note: The figures include weighted averages, calculated based on n number of responses provided to a) €0 (1), < €35 (2), €35-140 (3), > €140-280 (4), > €280-350 (5) and > €350 (6); and b) €0 (1), < €10,000 € (2), €10,000-40,000 (3), > €40,000-80,000 (4), > €80,000-100,000 (5) and > €100,000 (6) regarding the pre-defined variables by individuals of the Vienna general public (GP).

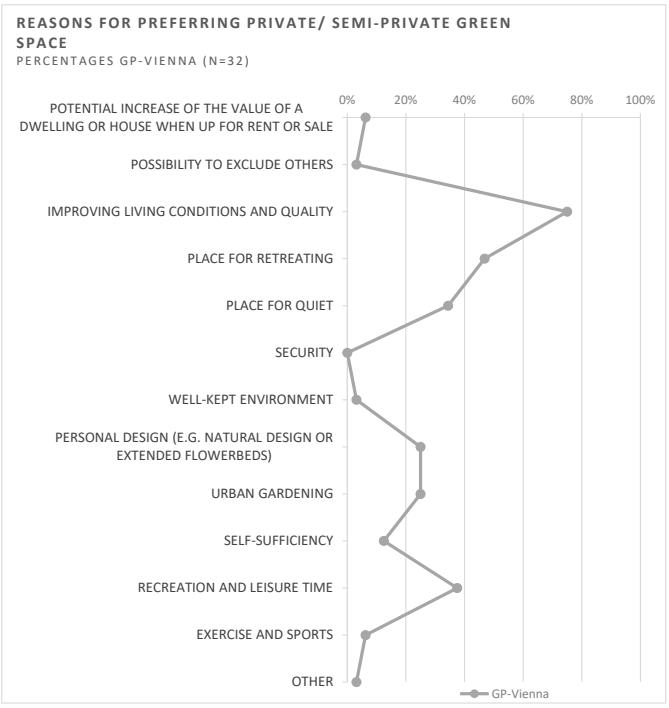
The findings fit with some of the key characteristics associated with the quality of urban green/nature by individuals of the Vienna general public in Figure 61a. This relates to the importance given to the size of an

area, natural water bodies, or the number and diversity of tree species. Similarly to results which were revealed by studies presented in Table 25, urban forests seem to play an important role, though likely depending on their location (e.g. distance to city centre). Although not representing a clearly delineated area, a generally green neighbourhood is also quite highly favoured, which may indicate the importance of considering critical masses.

The second question of the online survey looks into stated values regarding the **willingness to pay an additional price** for a 50 m^2 newly built apartment of defined costs. It assumes that the respondent can partly rely on savings and partly would need to take up a credit, which could be used to finance amenities such as private or semi-private green or open space. Not surprisingly, Figure 86b shows that the highest willingness to pay results for the feature of a *private garden*, on average up to an additional price of 5% to 20%, closely to averages of additional rent to be paid for an urban forest in the immediate neighbourhood. This is closely followed by the feature of an *own terrace* (e.g. roof terrace) and subsequently an *own balcony*. The willingness to spend an additional 20% to 40% only arose a few times for features such as a *private garden* and an *own terrace*.

Although the created hypothetical markets for public and private urban green space are quite different regarding some of the assumptions they make, and this limits the overall comparability, the stated values seem to suggest that private urban green/nature is not necessarily valued higher per se, but largely depends on the features the participants would like to secure in the immediate neighbourhood. To better understand what could be related motives, survey participants of the Vienna general public were asked to state the most important **reasons for why they would prefer a private or semi-private green space**. According to Figure 87, the most important reason selected by 75% of respondents is the *improvement of living conditions and quality* in the immediate neighbourhood. This is followed by the lookout for a *place for retreating*, still selected by 47% of participants, *recreation and leisure time* (38%) and *place for quiet* (34%). *Urban gardening* and applying a *personal design* are still selected by 25% of survey respondents. With regard to *other*, the importance of private green as playing ground for children was mentioned.

Figure 87: For what reasons would you prefer a private or semi-private green space?



Note: The figure includes percentages, calculated based on n number of responses given to a maximum number of variables to be selected by individuals of the Vienna general public (GP).

Securing certain living conditions in the immediate neighbourhood hence seems to be again at the core of reasoning behind values associated to urban green/nature, albeit representing a rather fuzzy term. One interpretation could be that not necessarily specific functions are of interest (e.g. urban gardening), but likely a multitude of aspects as well as 'functionings' come into play, particularly those with a perceived direct impact on the immediate living environment. This may also explain the importance given to recreation and leisure time as a stated reason for preferring private green. In addition, private property of green

space seems to be mostly understood as the power to secure certain living conditions or enlarge individual uses (e.g. personal design) rather than as mean to uphold ownership rights such as excluding others or being able to sell with an added value.

It needs to be noted that the applied approach of stated values has its limitations. They usually analyse the stated behaviour of individuals with regard to a hypothetical market and hence the responses can be heavily biased as no actual consequences arise from them (Gantioler and D'Amato 2013:210). In this regard, methods that reflect actual behaviour or preferences such as the previously outlined hedonic pricing are often the favoured option. However, also they can be influenced by **adaptive preferences**, referring to the issue that defined prescriptions (e.g. income) lead to a different **valuation of ends** to be achieved (see chapter C 1.2.1.3). For example asked about the importance he/she attributes to private urban green space, in Vienna an interviewed inhabitant replied that a balcony ranks highest, given he/she perceives an own private garden in the city to be too utopian in relation to his/her income (I-Inh-2, para 16). Another interviewee replied that she/he is happy with the amount of public green provided, since she/he has the option to reach her/his favourite site by public transport. Her/his family has not a sufficient amount of income to secure access to urban green and also an environment free from heavy road traffic more close to the dwelling (I-Inh-1, para 22+26). The replies make evident how careful questions on preferences with regard to urban green space need to be interpreted, also in the context of this thesis. This can also be illustrated by looking at the results of a study on individual preferences raised by those seeking new housing, ownership and renting, in the hot real estate market of the city of Munich. Based on a survey of 1,800 inhabitants that were able to find a new dwelling between 2009 and 2012, the study of Thierstein et al. (2013) revealed that for example single persons give lower preference to green space than to accessibility of public transport, and concluded that it could be an option to build smaller apartments more central and with less green to meet their preferences. However, no consideration was given to the possibility that the population group could have shifted the valued end to an alternative option. A lower disposable income might have led to the overall conclusion that urban green space of a certain quality is not an achievable end in a densely populated city, where such spaces are rare. As an alternative end, public transport accessibility offers increased opportunities to reach desired destinations, also with regard to GI.

Despite these shortcomings, the role of stated and revealed preferences regarding **environmental amenities** in shaping outcomes regarding a just access to GI should not be underestimated. This is especially important in relation to how different variables such as distances to urban green space or certain types of GI (e.g. waterfronts) are assumed to help rising property values in a defined context, and as such to what extent they may influence the design of development concepts and projects as well as land use and building plans with regard to the presented 'ought-to-be'. Already in the context of the Vienna study area Heeresspital (see Box 11), the role of the Marchfeldkanal as an environmental amenity was indicated, both by the developer as well as by the public administration in identifying the development target area. The closeness of the identified environmental amenity of the Prater Park in Vienna can also be seen decisive in driving free-market, high-rise real estate development in the project area Viertel 2 (see Figure 78). And the rent index by the city of Munich clearly considers environmental amenities as one of the driving location factors of renting prices, whether regarding their lack in relation to housing burdened by road infrastructure, or constituted by short distances to larger areas of urban green especially in central areas. The study area Nordbahnhof provides some further, interesting insights on how considerations of environmental amenities in relation to other assumed amenities (e.g. lower population density) can influence proposed project developments and considerations of policy interventions, and is presented in more detail in Box 13.

To summarise, these examples to begin with emphasise what already became evident in the previous appraisal chapters: the importance of policy interventions which not only consider the distribution of a sufficient amount of quantity and quality, but also take questions of wider accessibility in relation to socio-economic aspects, the built-up physical spaces and ecological space more broadly into account. They also re-iterate the significance of more closely linking the operationalisation of GI to housing policy in particular, with the overall aim of targeting affordable living conditions and the right to ecological space. Revealed values arising from hedonic pricing analysis can be interpreted as a window on economic behaviour and an important means for disclosing areas of intervention for securing a just access, especially in light of the 'scarcity' of defined GI elements and/or in a hot real estate market.

Box 13: Vienna – Study area Nordbahnhof: Access to environmental amenities of the 'open centre'

In 2014, a new development concept for the 34 ha large northwest of the development area Nordbahnhof (see introduction in D 2.1.1.1) was created, arguably due to changing prerequisites affecting the area (Stadt Wien/MA21 2014a). The concept was the result of an urban development contest taking place in 2012 and a follow-up participation process carried out between 2013 and 2014. The architecture and planning bureaus, which originally won the contest, and the MA21 municipal department for urban neighbourhood development and land use were mainly responsible for guiding the process, which consisted of several larger and smaller workshops and expert consultations. Besides neighbouring inhabitants, who contributed either in larger groups or by selecting representatives at defined stages, the process involved a range of other stakeholders, including policy-makers, selected experts, representatives of the urban renewal offices and neighbourhood councils as well as representatives of the original owner of the area, a subsidiary of the Austrian railway company OEBB. Results were expected to inform the subsequent land use and building plans.

One major point of focus of the resulting development concept is the creation of high-quality urban green space, partly integrating already existing features of the site (Stadt Wien/MA21 2014b). Especially the former railway tracks and a larger area of informal green are envisaged to transform into an urban park of natural characteristics and a dedicated 'wilderness area', and to represent centrepieces of the development project, the so called 'open centre' (see Figure 88, right). Rather than distributing buildings for housing and mixed uses (including offices and retail) over the entire area, they concentrate at the fringes of the open space, although envisaged heights and densities (determined by the net floor area) vary depending on the location (see Figure 88, left). The lowest densities can be found south and north of the 'wilderness' area. A range of higher buildings and also the highest densities are expected in the west, opposed to the still operating railway track system and running in parallel to the major road of the Nordbahnstraße. This is the case also for the 'gate' of the development area in the south, consisting of two major buildings constituting the 'entrance' to the southern part of the green open space. At least two tunnels for pedestrians and cyclists are expected to connect the area close to the Nordbahnstraße with the 'open centre'.

Figure 88: Study area Nordbahnhof: Development concept (left, Stadt Wien/MA21 2015b) **+ Railway tracks at the present site** (right)

Note: The envisaged urban green space is highlighted in light red, including the 'open centre' composed of the former railway tracks and wilderness area close to the Inn- and Vorgartenstraße in the north

The development concept envisages a diversity of building and housing types, including affordable housing as well as housing addressing the 'upper segment' of the real estate market (Stadt Wien/MA21 2014b:50). The latter is put in relation to amenities such as the open view as well as location relative to the 'open centre'. Hence, it can be assumed that the lower densities areas close to the wilderness area and urban park will likely target higher income groups, whereas it needs to be seen to what extent it will provide for social housing or affordable housing. This has raised some concerns by citizens participating in the process, and in this regard the handbook accompanying the concept included a recommendation that '*top locations should still be affordable to low income groups*' (Stadt Wien/MA21 2014a:30). According to the representative of a related civil society initiative

interviewed in the framework of the thesis, it is envisaged that 1/3 of the housing will be put on the free market, 1/3 will be subsidised and another 1/3 will fall in the category of affordable. She/he however also states that likely '*you will have to be able to afford short distances to the 'open centre*'' (I-CSI-3, para 20).

In the meantime, the entire project has been put on hold, linked to the issue that the overall development area Nordbahnhof was not subject to an environmental impact assessment (EIA). In addition, the former owner sold the area in the northwest to different developers. The question remains to what extent the original development concept will be applied, but the aim is to secure the 'open centre'. One key problem constitutes its financing, and the potentially arising environmental amenity values are used as an argument to attract investors, including considerations on the development of a public-private partnership (PPP) (I-CSI-3, para 20). However, as already indicated in chapter D 2.2.3.2 on additional policy interventions, it needs to be noted that the approach bears the risk of further affecting its accessibility, if it is assumed that the costs of investing and maintaining the park are expected to be more than covered by rising housing prices. Previously suggested, alternative policy interventions could be the development of urban contracts, which not only set aside a defined share of urban green space or social housing, but also include requirements where social housing is to be located in relation to certain amenities.

D 2.2.4.3 Conclusions on overall significance and constraints

1. Policy interventions are favoured which benefit everyone with regard to a just access to GI

Findings of the survey suggest that to a large extent respondents are more interested in an even distribution of urban environmental resources such as GI rather than a redistribution of access according to defined criteria, with regard to outcomes they envisage in relation to the interpretation of environmental justice. People seem to favour those options that in the end benefit everyone more broadly, including themselves as well as habitats and species. This is supported by previous findings, for example in relation to expressed needs and solicited quality characteristics. In this regard, variables such as ensuring defined living conditions in the neighbourhood were favoured, and a higher importance was attributed to the provision of a multitude of factors or 'functionings' rather than individual, specific components regarding the quality of urban green space. Participants were also more strongly interested in the conservation of a variety of habitats and species rather than in the protection of specific ones. The conclusion is also supported by the higher preferences given to offensive strategies regarding GI operationalisation by individuals of the Vienna general public, indicating the importance of the provision of a critical mass. Differently, the studied policy interventions, whether in relation to policy objectives or spatial planning strategies and instruments, seem to oscillate between 1) delivery of narrowly focused, often very specific functions and the broad targeting of different preferences of target groups; and 2) a general, quantitative provision and opportunistic strategies focused on the most immediate needs, most lacking or most suitable areas. And biodiversity concerns or wider GI conservation interventions do not figure prominently. In this regard, the significance of the conceptual and action model lies in the opportunity it offers in framing GI operationalisation for the provision of a 'safety net' of 'functionings', or for guaranteeing a basic income of 'functionings' for human well-being as well as biodiversity protection, and in requiring a related discussion on the quality of urban green space.

2. The importance of considering environmental quality more widely for a just outcome is underlined

The results of survey and interviews also indicate how closely the interpretation of environmental justice is related to the unjust distribution of environmental burdens, especially the perceived injustice that people with less income or belonging to a defined ethnic group could be subject to higher pressures such as air and noise emissions. In this regard, the awareness of the impacts of economic inequality seems to be stronger than has been the case when discussing GI status and quality or its overall accessibility, for example in relation to hindering factors for a just access. Not surprisingly, with regard to environmental burdens people have largely favoured options that increase the quality of distinct

population groups or specific areas of the city. Policy interventions which safeguard the persistence of a defined quantity and quality have been deemed more important for a just access to GI. At the same time, it also became evident how addressing environmental burdens and resources are perceived as immanently forming part of the same coin or the same set of interventions, that of securing a defined environmental quality. The concept of ecological space and the provision of 'functionings' forming part of the model can guide attention to policy areas where additional interventions could be needed, as targeting GI status and quality alone is revealed as not sufficient for addressing existing disparities.

3. A just outcome implies strong focus on diversified political processes countervailing bilateral bargaining

Imminent part of the environmental justice concept is the component of procedural justice, which takes into due account that involved processes are as important as questions of distribution in defining a just outcome. Regarding interpretations of the term, governance that forms inherent part of planning processes and envisages an extended participation of different actors has received strong support by respondents especially of the Vienna general public. The results also suggest a tendency towards political processes requiring a more widely distribution of powers in shaping the urban environment across stakeholders, favoured over bilateral negotiations involving targeted stakeholders under private law also in relation to market processes. This assumption is also supported by previous findings, for example on suggested changes to governance capabilities or the analysis of risks in relation to instruments such as urban contractual agreements. In addition, the surprisingly frequent selection of governance preferably occurring as part of political, democratic processes, which especially target low-income groups, also indicates that the responding individuals of the general public not necessarily pursues a large participation of the population or individual citizens. In combination with previous insights on the role of different stakeholders, it suggests that especially the setting of countervailing powers is a reoccurring theme, especially in light of the perceived, different demands posed on land use and as 'brakes' to 'winner-takes-it-all' hubs. It brings into focus regulatory policy interventions and clear long-term commitments with regard to defining an adequate mix for the operationalisation of GI for a just access.

4. The usefulness of economic valuations in informing just outcomes depends on the purpose

Deducing policy interventions from the 'ought-to-be' disclosed by stated or revealed values in economic valuations carries substantial risks. This is linked to their focus on preferences and environmental amenities or on what is valued instead of why something is valued or basic needs. It may result in losing out on a discussion that bases interventions on a broader value basis and helps deducing relevant quality categories. This is important if it is considered that economic values of GI for example in relation to property values likely will always be interpreted as less profitable than other land uses despite valuation efforts. Although their application can be important in securing GI provision, for example by forming the basis of financial instruments, their use can substantially affect the overall accessibility, mainly leaving GI shaping to considerations of revenue and profit generation. However, if the purpose of their application is framed by just access deliberations, they can provide important insights on pursued values and on where countervailing interventions could be needed, for example in relation to affordable housing close to a defined environmental amenity in a hot real estate market.

Results also suggest that private ownership of urban green is likely interpreted as means to secure certain living conditions rather than seeking defined entitlements (e.g. excluding others) by inhabitants of Vienna participating in the survey. The previously, with regard to conditions and needs perceived

high injustice regarding the distribution of private urban green/nature could hence be a result of perceptions regarding diverging capabilities in securing access to what are feared otherwise increasingly disappearing features of the city, referring to urban green space of a defined quality and partly including biodiversity features. This is supportive of the focus of the conceptual and action model on governance capabilities in relation to property rights as social means to an end, and consisting of specific entitlements. However, taking into account previous results, the model likely underestimated the role of commanding capabilities.

5. Conceptual constraints of the model – a range of new buzzwords?

In the framework of the various interviews and the survey, terms such as ecological space, Green Infrastructure, ecosystem services and environmental justice were repeatedly tested and also brought up for discussions by various participants. The concept of ecological space was generally less controversially discussed, also likely because representing a relative newly introduced term. Nevertheless, some concerns were raised and risks became visible. These mostly link to the 'ecological' component of the term, which in practice often addresses a wide spectrum of environmental issues and may contribute to the concept being inflated with meaning and potentially losing its purpose. This especially refers to biodiversity objectives, risking to be pushed at the side-lines if the term is not clearly linked to the quality of provided ecosystem 'functionings' for both humans and other species. In addition, it can be noted that the interpretation of 'function' in relation to the ecosystem services concept was often criticised by participants, perceived as too strongly focused on purposes and the usefulness of ecosystems rather than on the persistence of its overall functioning. Especially the economic approach of the concept was heavily put into question. Although the environmental justice concept was not explicitly used to frame the application of the model, it was an important component of testing assumptions especially regarding outcomes. In this regard, it can be observed that the resource orientation of the term with regard to urban green space as well as the current focus on its physical expansion proved to be limiting factors regarding its application. In addition, some participants feared its complexity whereas for others it constituted a new buzzword to 'preach' for policy interventions in areas which lack support by decision-makers due to the little weight given to values of environmental quality compared to other objectives. Also the term Green Infrastructure was often interpreted as a 'vehicle' to emphasise the importance of urban green spaces for the quality of life of a city's population as well as for a thriving economy in light of competitions with other land uses. It was emphasised that it brings the outcome again into focus, different to what are perceived as more ambiguous words such as 'landscape' (I-EX-P 1, para 42). At the same time, it has been associated with the delivery of a high-efficiency 'green', and potentially losing out of sight the difference between the technical rendering of built-up infrastructure, and the complexity of ecological processes sustained by living beings as well as the achievement of conditions that are necessary for living a good life.

6. Action constraints of the model – limitations caused by current practices?

The suggested way forward on policy interventions targeting GI status and quality as well as considering governance capabilities can be substantially constrained by the political support they receive as well as existing awareness of problems and interlinkages. In this regard, the appraisal revealed that although issues of socio-economic disparities entered the urban policy agenda, its potential impact on ecological space disparities in relation to GI seems to be yet of moderate concern or not perceived as a necessary area of intervention. Where this is the case, it is often inclined towards issues of social status and poverty, and not necessarily focused on high-income groups, only partly reflecting the 'landscape of power'

shaping a city. In this regard, the future political support of improving the information base in particular at the high-end of capital income will have a strong impact on the adequacy of policy interventions for a just access to GI. In addition, a continuing shift from regulatory interventions and financing provided by municipal budgets to bilateral negotiations and private financing agreements was noted. This suggests limited political support for some of the identified interventions, including:

- Acquisition of land by public/community institutions in relation to GI and municipal housing;
- New introduction, interpretation or revive of land use categories for GI operationalisation;
- Changes to the legislative framework to institute GI as an active development category to be considered before development takes place; and
- Increasingly pro-active nature conservation law applied early in the land use planning process, and an urban biodiversity policy framing the shaping of habitats and ecosystems.

These build on first insights into conditions, transformation and needs provided by the thesis, which evoke the necessity in tuning brakes that sufficiently countervail developing dynamics of spatial disparities. Also legal aspects would have to be tested with regard to interventions on expanding and restricting entitlements of property rights held by the public and private hands and addressed by the governance capabilities concept. Especially occupying capabilities such as exclusion or alienation will likely be difficult to concretise separately outside cumulatively held bundles. Issues of power related to commanding capabilities also can prove to be difficult to grasp and translate into concrete actions, although they can be important lenses to make visible potentially detrimental unbalances regarding the capabilities different stakeholders yield in shaping the urban environment.

E DISCUSSION

E 1 Operationalising GI for a just access to ecological space

At EU level, Green Infrastructure was introduced as policy concept to address biodiversity conservation beyond 'islands' of high biodiversity value. Referring to the conservation and restoration of a network of natural and semi-natural areas, environmental features and open spaces, it can be argued that it aims at the provision of a critical mass, especially in an urban context. The study of practice examples for example regarding the planning of urban green and open spaces in Vienna and Munich confirmed that existing strategies largely focus on the quantitative provision of distinct features, still mostly for recreational purposes and the fulfilment of defined preferences. Biodiversity objectives often remain at the sidelines, although the available documentation and expressed perceptions suggest slightly different weight attributed to the subject across the two case studies. Generally, areas of high biodiversity value or protected areas of a defined size seem increasingly concentrated at the outskirts or limited to defined 'flag-ship' areas. Besides assumed to be influenced by historical developments and natural features, the increasing disappearance of vacant land and informal green but also of private gardens and allotment gardens, especially linked to densification efforts driving development projects not only at the fringes of the two growing cities, are revealed to be important factors. Although set in the UK, this is supported by recent findings by Dennis et al (2017) on the stronger declines of the relative abundance of butterflies in urban settings, and emphasising the role of the reduction of garden sizes and the development on brownfield land as important pressures affecting urban biodiversity.

Findings of the thesis also indicate that such transformation processes have not affected districts and land use types equally, some districts representing 'strongholds', not subject to major transformation processes and often well equipped with urban green/nature of a distinct type (e.g. urban forest, larger landscape park). Others face major changes to the GI inventory, for example in relation to the development of housing and distinct urban parks on vacant land of former railway sites or agricultural land, but also privately owned GI such as private gardens and allotment areas in defined districts. However, no definite conclusions on the transformation processes can be drawn, as the monitoring of GI inventory especially in relation to biological diversity is often limited, and frequently focused on changes in distinct land use types and mostly at district level.

At the same time, first indications on correlations with socio-economic space disparities are given. Existing data indicate polarisations or even segregation of groups with high unemployment rate and income poverty along main roads and in certain districts poorly equipped with urban green in Vienna as well as in Munich. It in particular also includes districts that can be defined as 'winner-takes-it-all' hubs, regarding variables such as relative stability of the built-up environment, good housing conditions, and access to high-quality urban green/nature. Important driver of these polarisations seems to be development following a path of the lowest resistance, whether in relation to land and housing prices or governance capabilities in countervailing defined developments. The creation of environmental amenities with a pursued impact on property prices in situations of already high demands and scarce supply constitutes an additional risk regarding a just access to a city's urban green space.

In this regard, the results have confirmed some of the identified problems leading to the development of the conceptual and action model in the framework of this research. The model also proved to be useful in combining different perspectives across the socio-economic, built-up and the newly introduced ecological

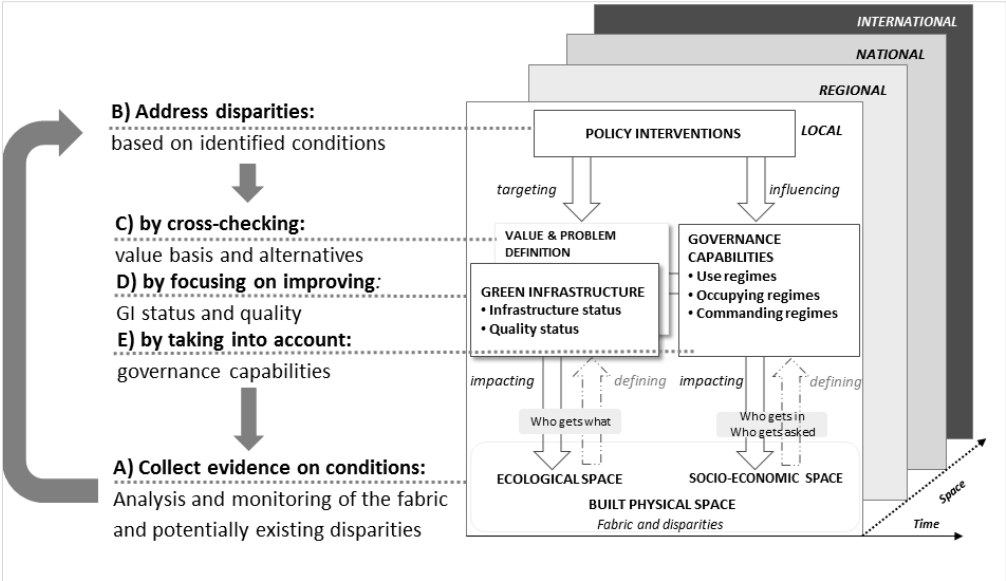
space, which so far are often treated separately or are only superficially interlinked. However, it can also be concluded that the impact of dynamics of transformation processes on spatial disparities and their persistence over longer periods of time have been underestimated. It emphasises the importance of taking into due account historic developments and decisions, and the **component of time** with regard to areas of interventions for a just access. Another important aspect, but to some extent underrated with regard to assumptions on the conditions and needs framing policy interventions, refers to how strongly environmental burdens such as air and noise emissions and the quantitative and qualitative provision of GI are perceived as immanently forming part of the same coin, which consists of securing a defined environmental quality. Although the **concept of ecological space** at the basis of the model adopts this perspective, the main entry-point of the thesis were interventions that target the operationalisation of Green Infrastructure, also in light of addressing the provision of ecological 'functionings' not only for the human but a range of species. However, it became visible that existing environmental burdens can play an important role in defining important quality characteristics associated with defined GI elements. This was not only solicited by survey respondents of the general public of Vienna with regard to the impact of noise from road traffic, but for example also used to form an inherent part of guiding qualitative standards of green and open spaces applied by the city of Munich in the 1990s.

In this regard, also the use of the component 'green' of the GI concept bears the risk of being too narrowly interpreted, as a way of compensating environmental burdens by conserving and expanding mainly vegetation or a 'sea of green lawns', as an interviewee stretches it. However, the model aims at countervailing this interpretation by embedding it in the ecological space concept and related 'functionings', emphasising that though GI refers to the biotic, living components of an ecosystem it also considers their interactions both aquatic and on land as well as with their abiotic environment. As such it aims at addressing genuine basic needs linked to defined **ecological 'functionings**'. Based on Böhm et al (2015: 195+205-207), these can for instance refer to the following conditions, identified as important in an urban context and in relation to environmental burdens, and described by some exemplary variables:

- Soil functionings, e.g. sealing degree, yield capacity, anthropogenic emissions of heavy metals
- Water functionings, e.g. water quality in relation to nitrates, vegetation characteristics
- Air functionings, e.g. anthropogenic impact (e.g. particulate matters), vegetation characteristics
- Climate functionings, e.g. anthropogenic impact (e.g. GHG emissions), climate active elements
- Habitat functionings, e.g. area size and shape, vegetation age and succession, occurrences of target or endangered species
- Recreation and health functionings, e.g. natural and cultural-historic importance, social importance, orientation

Similar to the appraisal logic applied to the empirical part of the research, describing the status quo of the ecological space and to what extent disparities exist also in relation to other space dimensions can form the starting point regarding considerations of policy interventions. The various elements of the logic have been transposed into **recommended steps** on the way forward, and are presented in Figure 89 in relation to the conceptual and action model.

Figure 89: Recommended steps in approaching the conceptual and action model



With regard to the first step A of Figure 89, the following guiding question and sub-questions are proposed as an initial navigator, taking into consideration the potential impact of interventions on the fabric of 'functionings' of the ecological space, potential disparities and how those link to concentrations in the built-physical and socio-economic space at different scales:

How does an intervention impact the fabric of functionings at different scales?

- How do the different variables describing ecological functionings perform?
- How may the intervention impact on individual and combined functionings?
- Is there a concentration of variables? How have they evolved over time?
- Is this concentration of variables linked to concentrations of variables in the built-physical (e.g. housing conditions) or socio-economic space (e.g. wealth)?

What follows would be a cross-check of the value basis in step B and C, which can affect eligibility criteria regarding interventions to be considered to address existing disparities. They represent the 'glasses' with which interventions are approached. As indicated previously, they can affect how for example a site is actually valued and hence considered part of GI or to what extent alternative means targeting the access to the 'functionings' are contemplated. These could be revealed by existing policy strategies and objectives, e.g. 'inner before outer development' and its impact on valuing what can be considered a 'reserve' for development, or processes involving different stakeholder groups. Only subsequently, interventions are considered, which either target GI status and qualities in step D or take into account how governance capabilities are affected in step E. The guiding principle of the first consists of a just access being achieved by addressing needs stemming from spatial disparities across the various dimensions and by proceeding on a continuum of possible choices, from conserving GI to enhancing existing spaces and creating and link additional and new spaces. It postulates a certain hierarchy in physically shaping a GI network, according to the general assumption that conserving existing places takes precedence over creating new ones.

The findings indicate that the public administrations of the two studied cities were partly aware of the previously outlined polarisations and existing disparities. Issues of socio-economic inequalities entered the urban policy agenda, though mostly in relation to issues of social status and poverty and addressing less

socio-economic inequality more widely and in relation to high income groups in particular. Also their potential impact on ecological space disparities in relation to GI seems to be yet of moderate concern, though perceptions differ across the cities of Munich and Vienna, and likely have also influenced the different strategies adopted regarding green and open space planning. Referring to aspects such as high-quality green areas not being limited to exclusive neighbourhoods or the importance of taking into due account urban green with regard to housing conditions and affordable housing, Vienna's green and open space concept includes as a driving vision 'green space justice'. It shall be ensured by an even distribution and general provision of urban green space, to be achieved by the development of a fine-mashed GI network. The city of Munich, on the other hand, favours the provision of general guidelines, then transposed into defined action areas and projects. In this regard, it adopts a strong hierarchical prioritisation that focuses on those spaces considered most lacking or most suitable, also in relation to socio-economic variables. Whereas Vienna's approach poses challenges by not taking into due consideration different needs in defined areas, and risks to disregard disparities linked to the provided quality, Munich's approach does not allow to deduce what happens to areas that fall outside those specifically targeted by reacting only to immediate risks. Perceptions issued by individuals of the general public of Vienna indicate the felt need of a strong commitment to secure apposite areas for GI development and a stronger inclination towards an even distribution, favouring those options that in the end benefit everyone. It recommends a **strategic approach** that oscillates between the two, including a concrete vision and larger schemes at different scales, going beyond the delivery of projects. In this regard, the opportunity of the conceptual and action model lies in framing an operationalisation of Green Infrastructure that contributes in establishing a 'safety net' of 'functionings' or guaranteeing a 'basic income' of 'functionings', not only for human well-being. At minimum, it can help driving a discussion on the basic qualities to be provided by urban green space.

With regard to Vienna's strategy on open and green space planning, the application of the GI principle of connectivity of its various elements, including of private ownership, plays a key role in guaranteeing overall accessibility, and it is also widely referred to by the city of Munich though not directly adopting the GI concept. Connectivity is mostly interpreted as physical connectivity and the provision of a critical mass, often closely aligned to the urban landscape concept. In this regard, the approach is one of spatial design, which looks at the potential, physical spatial patterns to be adopted and their performance regarding defined criteria (e.g. minimum distances). 'Connectivity' was a key quality characteristic solicited by respondents from the public administrations, although it was by far less important to the surveyed individuals of the general public, who attributed a by far higher importance to the size of an area, lack of road noise and the number and diversity of plant and animal species. In combination with other results, it emphasises the need of more clearly defining which features GI includes and which not, and its **basic qualities**. This is perceived more crucial than the quantitative distribution in defining what a just access represents. The current discussion on qualities is described as either rather general or conducted at the level of preferences. The latter also affects the application of another GI principle, multi-functionality, which is presented as a key component of both analysed green and open space concepts. However, it remains more elusive regarding its interpretation, though it is linked to defined types of GI elements and its functions for example by the city of Vienna. However, it is still mostly focused on addressing a multitude of preferences of defined target groups in particular in relation to the key objective of recreation, rather than a multitude of 'functionings'.

In this regard, it was also revealed that one of the other main GI principles, the **integration of conservation considerations** beyond nature conservation sites especially as an integrative part of interventions prior to project developments, is still largely not applied even if the term Green Infrastructure is used. Examples exist, such as the development project of the 'Paul-Gerhardt-Allee' quarter in Munich, mostly driven by the

formal requirement of seeking ecological compensation measures. However, they are few and usually occur on a smaller scale especially if more centrally located. The securement of additional urban green space mainly occurs in defined development areas, often targeting specific functions such as recreation, and have been described as 'secondary greening' efforts.

It shows that in practice not necessarily the envisaged principles are applied to the full extent, or especially with regard to connectivity have not been described as a new approach. Practitioners and public administration representatives nonetheless generally underlined the usefulness of the GI concept, for example given combining different principles that might have been used separately. Also its utility in emphasising the importance of urban green space for the quality of life of the city's population, in getting renewed political support, and allowing a new form of dialogue with those responsible for the provision of other infrastructures were highlighted. The GI concept also suggests a strong interest in an **active development**, accentuating the necessity of its expansion and improvement also for a just provision. However, it needs to be noted that although the studied concepts on urban green and open space planning seek opportunities for additional development regarding defined types of GI elements, the legal framework laying at the basis of the operationalisation of those concepts still largely considers them as protection and not active development categories. In this regard, the analysis suggest an overhaul of the framework as well as newly introducing, interpreting or reviving land use categories for GI operationalisation.

At the same time, other research participants criticised the concept as representing a too technocratic, resource-oriented and economic concept that drives the development of a 'highly-efficient' urban green, which offers no scope for informal green on vacant land. This criticism resonates with Ian Thompson's critical analysis of the design theory of landscape urbanism presented in chapter C 1.1.2.2 as part of the conceptual foundations. He questions the hybridity between engineered and natural systems, which puts the engineers and experts on the forefront and fails of valuing the past. All these aspects can put into question the degree to which Green Infrastructure can and should receive equal treatment as an **infrastructure feature**.

The model presupposes that targeting the provision of a defined GI status and quality is not sufficient for securing just access to ecological space, but that defined **governance capabilities** play a crucial role in defining additional areas and policy interventions. Given their substantial impact on land use dynamics, the key institution of property rights is of particular interest to the model – what entitlements they confer according to what governance system and how they in particular define 'who gets in'. The according regimes of use (e.g. functional and physical access) and occupying capabilities (e.g. management and exclusion) describe conditions that impact an individual or group of stakeholders, or influence their opportunities to act. Furthermore, the category of commanding regime was added. Different to the other two categories, its entitlements are not necessarily clearly delineable to a defined site or function. They rather relate to the power of designing the rules or the ends to be achieved. According to the thesis, this can involve the yielding of articulation, political or economic power. In this regard, the model aims at indicating directions to address possible distortions on 'who gets asked'. The guiding principle with regard to governance capabilities consists of a just access being determined by the striking of **checks and balances** regarding governance capabilities, including power-relations and their impact on shaping the access to ecological space.

The empirical research proved the usefulness of the framework of governance capabilities in framing already existing interventions according to the offered continuum of choices, and also to make visible areas that so far were of less concern in ensuring access to GI. It showed that in the context of the studied urban

green and open space planning concepts of Munich and Vienna initial considerations are especially given to the expansion of **use rights**, e.g. increasing access to private green roofs or public school yards. In the framework of the online survey, it also helped identifying the special importance attributed to the expansion of use rights in relation to public space, such as road infrastructure, for an increased access to urban green/nature. It also indicated a certain inclination towards the extension of capabilities that favour larger parts of the population or the environment more generally rather than targeting defined groups for a just access. This was different with regard to a just distribution of environmental burdens, where the focus was laid on lower income groups and their respective exposure in the context of interpretations of environmental justice. The strong support attributed to expanding political and financial capacities of municipalities, the weight given to formal participation procedures and the high relevance attributed to the public ownership of land by survey respondents especially from the general public can all be interpreted as signs for the desire of increasing **countervailing powers** for a just access. These most likely aim to counterbalance those factors that were perceived as strongest hindrance for a just access to urban green space, namely the high preference given to construction over other interests, and urban green space losing out due to the lack of or non-visible economic benefits. In combination with other findings, it has also shown the significance given to the securement of GI over addressing economic inequalities for a just access. This assumption is also supported by the importance allocated to binding spatial planning interventions, especially to instruments that address different land use demands (e.g. land use plans). They are likely perceived as higher safeguards for avoiding disappearance or transformation of GI elements in the long-term, and ensuring a defined quantitative provision. Additional findings also indicate that the perceptions on just access, and in the end the **adequate mix of interventions** for operationalising GI can strongly depend on how means influence governance capabilities, commanding in particular. Participation processes are in this regard only one and not necessarily the most important component of procedural justice. It refers to risks of targeted, more informal processes eroding formal, legally required participation procedures in relation to environmental aspects. An increased interest in financial, market-based or cooperative and contractual instruments also bears risks regarding a potential shift from political processes requiring a wider distribution of powers in shaping the urban environment across stakeholders to bilateral negotiations seeking the latest consensus amongst targeted key stakeholders under private law.

Especially occupying capabilities such as exclusion or alienation proved to be difficult to transpose into exemplary actions of expanding or restricting related rights for a just access in the framework of the thesis, and might be best addressed with regard to cumulatively held bundles of ownership. Not only due to this reason, the design of urban housing policies was deemed one area of particular interest to the research on additional interventions. Different examples have been outlined that show the importance of housing policy in shaping the fabric of a city, especially with regard to socio-economic polarisation and segregation. Not necessarily it has been identified as an important area of intervention related to questions of broader accessibility to GI by the city of Vienna and Munich. Nevertheless, although housing policy may not directly target its distribution, it can influence the **dispersal of different population groups in relation to GI** and as such the overall access. It is an aspect that can be especially important in light of the 'scarcity' of defined GI elements and/or in a hot real estate market.

Regarding their **housing policy**, the city of Vienna mainly differs from the city of Munich due to its widespread programme for the provision of municipal housing and still-existing regulations of rent-control. Similar to its approach to urban green and open space planning, it aims at an equal distribution of affordable housing throughout the city targeting not only low-income groups. However, in recent decades the attention has also been increasingly shifting towards the provision of subsidised housing and requirements to

provide defined shares of affordable housing, as well as green space, in urban contractual agreements. Also in Munich, the safeguard of a social spatial mix lies at the forefront of its action programme on housing, although already for a longer period of time mainly consists of providing housing subsidies for example for rental housing or cooperatives. In addition, it has a longer experience of applying contractual instruments, such as regarding socially equitable land use (Sozialgerechte Bodennutzung – SoBoN). The latter requires parties profiting from land use changes to bear some of the costs of development, for example with regard to affordable housing or green spaces. However, the application of such instruments can have side-effects that bear the risk of undermining pursued objectives. Especially in a hot real estate market, the developer will likely look into offsetting costs by aiming not necessarily at what is needed but at higher revenues, either with regard to the outfit of dwellings (e.g. luxury apartments) or their location in relation to certain amenities, including on the environment (e.g. reduced distance to a park). Hence, although an additional amount of urban green space is provided, the approach can still negatively affect its overall accessibility to population groups with defined incomes. An initial step could include the addition of requirements on the setting of affordable housing in relation to environmental amenities, or their lack, in urban contractual agreements. More largely impacting approaches could target the acquisition of land for community/public ownership to build up the municipal/community housing stock in relation to GI access.

The implementation of the suggested approaches as well as of other interventions on GI status and quality as well as governance capabilities will largely depend on the political support they receive. This is first influenced by existing awareness and visibility of problems or of the complexity of their interrelations. According to Gould and Lewis (2016:4+153), it can also be affected by the existence of '*severed feedback loops*', referring to the extent to which decision-makers are '*separated from the consequences of their decisions*', as enjoying environmental rich neighbourhoods, both with regard to the small burdens they have to suffer and the environmental amenities they experience. In addition, the field of action to address a just access is by far larger than has been suggested in the framework of the appraisal analysis, due to the complexity of the underlying problems especially linked to economic inequalities and housing capital.

The United Nations, for instance, increasingly emphasises the role of the globally occurring, so-called '**financialisation of housing**'. At the beginning of 2017, the UN Special Rapporteur on adequate housing (as a component of the right to an adequate standard of living, and on the right to non-discrimination in this context) submitted a report, which warns about the impacts of structural changes to the housing and financial markets on human rights in developed, developing and emerging economies, '*whereby housing is treated as a commodity, a means of accumulating wealth and often as security for financial instruments that are traded and sold on global markets*' (UN 2017:3). The report also refers to processes of appropriation of public value for private wealth, for example by developing luxury housing close to public parks, resulting in the displacement of longer term residents (UN 2017:12). It emphasises the necessity of '*reclaiming housing as a social good*' and to '*redefine relationships with private investors and financial institutions* (UN 2017:1). It relates to the debate of income from housing capital impacting economic and in the end social disparities, outlined in the introduction of the thesis. An example brought forward by Atkinson (2015:163) shows the complexity this involves. According to the author, the cut-back of state pensions for example in the UK has driven individuals, in search of alternatives, to increasingly discover the buy-to-let option, supported by low interest rates on credits and changes in laws favouring landlords. In addition, financial institutions, including pension funds, also got increasingly interested in the credit-market for mortgages, representing an attractive option as being secured by physical property. The expected rents, higher for bigger than smaller estates, contribute to increasing prices, which not necessarily have to represent a sign of a lack of housing supply for the urban population. It indicates the necessity of also intervening on

the demand rather than just the supply side (e.g. construction of new homes). However, the first represents a by far more complicated option than the latter, especially since it likely involves means which cannot easily be adopted at the local level.

In addition, discussions on increasing socio-economic inequality and its spatial impacts are also closely linked to questions of salary income and structural transformations of the urban labour market. This regards for instance the shift to a service-based economy, with high-skilled, well-paid workers in the information and communication technology sector on the one hand and badly-paid, low-skilled workers for example in the retail sector on the other hand (Cucca and Ranci 2016:22-23). It also relates to the competitiveness and growth race of cities in attracting especially the first, diverging public funds accordingly. Albeit questions have been risen regarding the role of urban public funds in supporting private investments to the detriment of collective goals (Fainstein 2010, Cucca and Ranci 2016), less often a closer look has been taken at the extent land use management and zoning policies in particular directly or indirectly contribute to driving related transformations processes. In her research, Maantay (2001:1037) highlights that in the US the historic purpose of zoning was often to protect values of commercial and residential properties of certain landowners by creating exclusive zones free of industry. Interesting is hereby the example of Brooklyn brought forward by Gould and Lewis (2016:138-140), as it demonstrates how closely these aspects can be interlinked to questions of a just access to GI. Part of the still existing light industry-rich waterfronts of Brooklyn has been threatened by potential rezoning for high-end commercial and luxury residential property, driven by what are considered high environmental amenities. According to the authors, real estate actors consider the existing blue-collar manufacturing as incompatible with the provided amenities, although being keen in attracting 'creative-class entrepreneurs'. Those however present substantially lower employment opportunities, and the attracted service-sector also usually offers lower salaries for low-skilled workers, which will contribute to the displacement of low-income groups to defined parts of a city or further out.

These examples suggests that multiple interventions in different areas would be needed in order to set brakes that sufficiently countervail appearing dynamics of spatial disparities and also ensure an overall just access to Green Infrastructure. It likely cannot be counteracted by any strategic planning of GI status and quality or by individual entitlements linked to property rights alone. They also underline the importance of looking more closely into aspects of power-relations as part of commanding capabilities, which as such likely have been underestimated compared to other entitlements in the framework of the model. These capabilities can prove to be difficult to grasp and translate into concrete actions, but can represent essential lenses to make visible potentially detrimental unbalances regarding the capabilities different stakeholders yield in shaping the urban environment. They also highlight the significance of not only approaching the operationalisation of Green Infrastructure for a just access to ecological space from a technical rendering perspective, but of recognising the political processes it involves and making them visible for discussion and in shaping future interventions.

E 2 Outlook

As indicated at the very beginning of this work, the research interests inherent to the thesis included addressing one of the most strongly debated fronts of research on inequality, namely seeking solutions to a multi-dimensional and complex problem. Also the focus on justice as one of the key notions implied not only the interest in analysing and providing evidence on existing urban conditions and transformations, but also in providing insights on envisaged and desirable outcomes (or the 'ought-to-be') and related policy interventions. At the same time, especially the appraisal work disclosed the importance of thoroughly testing underlying assumptions when addressing complex problems, in line with arguments of the necessity of an extended phase focused on identifying and outlining problems in spatial planning. As such the appraisal of the conceptual and action model regarding GI operationalisation for a just access to ecological space was largely of scoping character and was not only approached deductively but also inductively. It hence resulted into a range of open questions to be pursued in future research as well as in practice across different disciplines. Those areas of particular interest and importance are summarised below.

Broadening set of indicators on living conditions to address basic needs regarding ecological space: Although databases containing information on living and housing conditions based on standardised, representative surveys exist at the EU level, environmental quality conditions are mostly collected in relation to how environmental burdens (e.g. noise and air pollution) affect the immediate housing situation. No overarching statistical indicators addressing the subject of living conditions with regard to urban green or Green Infrastructure beyond variables such as size (e.g. m^2 per capita) and physical closeness to public green (e.g. in m) appear to be available. The thesis' survey question on '*selected features that apply to the immediate neighbourhood*' could form an interesting starting point for further discussions on the development of such indicators, based on additional research and testing of variables. This in particular relates to further work on what may constitute genuine basic needs, rather than focusing on services and preferences, to be especially pursued in biology. Such indicators could provide interesting information on perceptions regarding the provision of 'functionings' and availability of distinct features (e.g. occurrences of various bird species or butterflies), and would allow further research on how different living conditions or for example the 'luxury effect' of urban biological diversity may impact the support of related policy interventions.

Socio-economic space disparities informed by more widespread economic inequality data: When looking into conditions and needs and potential disparities across the socio-economic space of a city, the need of elaborating on aspects of economic inequality not only in relation to income but especially on issues of wealth was emphasised. This in particular refers to the development of according indicators, in order to provide a more fine-grained description of the 'landscape of power' across a city. It represents an important area to act on, also to gain further insights on how this 'landscape' impacts transformation processes regarding the inventory of different GI typologies. This would however also require an improvement of the information base in particular at the high-end of capital income.

Comprehensive monitoring programmes for the identification of spatial disparities: The city of Vienna is one of the few major cities in Europe that adopts a more comprehensive urban green space monitoring programme, based on infrared aerial photography to capture roughly every eight years changes to its inventory. Some challenges linked to aspects of quality and the diversity of habitats and species have been highlighted. Linked to the continuous development and improvement of satellite images, for example provided by the European Space Agency (ESA) and its Earth Observation Programme, more extended analysis and research especially of the urban landscape could be considered. This not only links to the provision of more

detailed information on the urban green inventory, to allow a detailed assessment to the extent it is subject to transformation, but also to set in relation to the built-up area, including for example building typologies and densification processes.

Correlation of perceived and existing inequalities, supported policy interventions and desirable outcomes: Given the scoping and systemic character of the sub-hypothesis of the empirical part of the thesis, no statistically relevant analysis was carried out. Future research should look more thoroughly into any statistically relevant correlations between socio-economic or demographic aspects and the replies provided especially with regard to questions on the perceived justice or injustice in GI distribution and potential correlations with living conditions and socio-economic status, economic inequalities in particular. It would be interesting to further explore whether perceptions of the envisaged outcome and hence favoured interventions would be different depending on which income group respondents perceive to belong or actually belong to, as well as on perceived and existing living conditions. This could be similar to a study carried out by the World Bank in Indonesia, which assessed perceived economic inequalities and their evolvement, and compared them to actual ones (World Bank 2015). Subsequently, it was analysed how different perceptions impact on the support of defined policy options. Results suggested that lower income groups often overestimate their actual status, whereas higher income groups underestimate it. Interestingly, findings revealed that widely targeted policies such as social protection programmes, creation of more jobs, eradication of corruption and free education were favoured by the vast majority. However, redistributive measures were particularly supported by those who perceived to belong to lower income groups and measures which contribute to economic growth and job creation by those who think to be part of higher income groups. It indicates that perceptions on economic inequalities can be especially important with regard to the support of distinguished interventions.

Evaluation of individual policy interventions for a just access to GI: With regard to policy interventions affecting GI operationalisation and a just access, of particular interest to the thesis were those that provided an overall strategic framework, or interesting, individual components for analysis. Generally less emphasis was put on a comprehensive study of individual instruments and processes. Of central focus was rather the interplay of different policy interventions, ranging from policy objectives to spatial planning instruments. For future research it is thought important to evaluate some of them individually regarding their role in ensuring a just access to Green Infrastructure. It includes both ex-ante as well as ex-post evaluations. For instance, it could be interesting to follow-up on the hypothesis by Maantay (2001) that zoning is less means for implementing comprehensive plans but follows preferences of the real estate market, by studying in more detail the application of the instrument over a longer period of time also in relation to urban green. It would also be crucial to get some further insights on the application of urban contractual agreements and their overall effectiveness with regard to a just access to GI but also in relation to affordable housing. This especially refers to the instrument of SoBoN applied by the city of Munich, given the comparably long-term experience with its application. In this regard, it could also be interesting to explore the extent to which a wider perspective on forgone opportunity costs and social costs linked to 'functionings' provided by certain land use types could be integrated in such instruments. Furthermore, a legal scrutiny of the expansion or restriction of property rights entitlements could also drive the discussion on governance capabilities, as could an inquiry into risks and opportunities of applying for example Article 15 of the German Basic Law with regard to GI and affordable housing.

The role of power-relations in urban development and planning: In the framework of the thesis, urban development and spatial planning processes were not subject to a systematic and comprehensive observation

of power-related dimensions such as resources available to stakeholders, discourses driven by a defined group, influence of stakeholders on formal and informal rules driving the processes or analysis of existing stakeholder coalitions. When developing the governance capabilities concept of the model, it was argued that issues of power are often neglected or have been ignored in discussions on economic inequality, and the same can be said about urban development and distinct spatial planning processes. It would be interesting to apply such a scrutiny in a case study setting, in particular to (informal) spatial planning processes such as urban development contests, cooperative planning procedures, test planning or public participation processes. It would allow further important insights on the distribution of governance capabilities and to study the extent to which defined governance structures are actually part hindrance to the provision of a just access to GI.

The different areas of future research and practical implementation make evident the transdisciplinary knowledge required in addressing the complexity related to the operationalisation of Green Infrastructure, especially in light of dynamics of socio-ecological and economic inequalities. More specifically, they show the importance of addressing the subject of economic inequalities from different perspectives and not only through the discipline of economics and with focus on characterising and measuring its dimensions. At the same time, it emphasises the need to take the economic system into due consideration also with regard to questions of environmental justice and a just access, though approaching it from a political economy point of view by studying the relationship between the economic system, law and political system in an urban context. To conclude, the significance of not only recognising the normative and value-laden side of economic decisions and activities, but also of applying philosophical means to increase the awareness of one's own values as well as repeatedly reflecting and questioning these values with the same impetus dedicated to research can only be reiterated.

F ANNEX

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Coding	Target Group	Language	Document
I-EX-1	**Expert**	German	WD-2_Interviews_WrittenRecord_I-EX-1_2016-06-15_QDA
I-EX-2	**Expert**	German	WD-2_Interviews_WrittenRecord_I-EX-2_2016-10-21_QDA
I-EX-3	**Expert**	German	WD-2_Interviews_WrittenRecord_I-EX-3_2016-11-08_QDA
I-EX-light	**Expert**	German	WD-2_Interviews_WrittenRecord_I-EXlight_2015-2017_QDA
I-EXP-1	**Expert & Practitioner**	German	WD-2_Interviews_WrittenRecord_I-EX-P1_2016-10-14_QDA
I-EXP-2	**Expert & Practitioner**	German	WD-2_Interviews_WrittenRecord_I-EX-P2_2016-10-13_QDA
I-EXP-3	**Expert & Practitioner**	German	WD-2_Interviews_WrittenRecord_I-EX-P3_2016-10-11_QDA
I-CSI-1 to I-CSI-3	**Civil society initiatives**	German	WD-2_Interviews_WrittenRecord_I-CSI_2016-06 to 11_QDA
I-Inh-1 to I-Inh-7	**General public**	German	WD-2_Interviews_WrittenRecord_I-Inh_2016-08 to 09_QDA
I-PA-1 to I-PA-2	**Public administration**	German	WD-2_Interviews_WrittenRecord_I-PA_2015-2016_QDA

List of not anonymised, fully and partly consulted experts (in chronological order)

Name	Position	Interview date
Katharina Lange	Research fellow Urban planning and regional development Hafen-City University Hamburg (DE)	Sept. 30, 2015
Prof. Dr. Ulrich Brand + Andreas Exner and Sarah Kumnig	Professor for International Politics + Research fellows Universität Wien (AT)	Oct. 5, 2015
Prof. Dr. Stephan Pauleit + Werner Rolf	Chair for Strategic Landscape Planning and Management + Research fellow TU München (DE)	April 25, 2016
Christa Böhme	Research fellow Deutsches Institut für Urbanistik (DE)	June 16, 2016
Dr. Christa Müller	Director Anstiftung, München (DE)	Oct. 21, 2016
Prof. Dr. Heike Köckler	Professor for Place and Health Department of Community Health Hochschule für Gesundheit, Bochum (DE)	Nov. 11, 2016
Dr. Anne Ritzinger	Bereich Zentrale Aufgaben Bayerische Verwaltung Ländliche Entwicklung (DE)	Nov. 24, 2016
Prof. Dr. Michael Getzner	Head of Department of Spatial Development, Infrastructure and Environmental Planning TU Wien (AT)	Nov. 29, 2016
Prof. Dr. Alain Thierstein	Chair of Urban Development TU München (DE)	Jan. 1, 2017

Illustrations

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Glossary

ACCESSIBILITY:
Accessibility is defined as 'the ability to reach' an area (proximity) as well as by the ability to enter and use it, and the capability to occupy and command its design.

AESTHETICS:
Refers to the rational and sensual pleasures and displeasures an object creates, as interpreted by Alexander Gottlieb Baumgarten (1750-1758) in his work 'Aesthetica'. Baumgarten's definition of aesthetics mainly relates to the study of bad and good taste, linking the latter to beauty.

BIOLOGICAL DIVERSITY (BIODIVERSITY):
Biodiversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

CONSERVATION:
Definition much depends upon national, regional and local perspectives. In this study used as the effort of conserving and restoring nature/biological diversity as a dynamic system, including human influences, following an integrative approach

CONNECTIVITY:
Degree to which the landscape facilitates or impedes movement among different patches. Landscape connectivity is a combined product of structural and functional connectivity, i.e. the effect of physical landscape structure and the actual species use of the landscape.

ECOLOGICAL SPACE:
Following Hayward (2013), it refers to a multi-dimensional 'space' concept, which considers the complex of environmental variables that impose a defined space on a species. It offers a new mind-set by putting the provision of ecological 'functionings' into focus rather than the physical expansion of an area. What variables define the ecological space depends on the species central to the analysis, including but not limited to human beings.

ECOSYSTEM:
Ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

ECOSYSTEM APPROACH:
The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

ECOSYSTEM SERVICES:
The direct and indirect contributions of ecosystems to human well-being. The concept 'ecosystem goods and services' is synonymous with ecosystem services.

ENVIRONMENTAL AMENITY:

It more broadly refers to environmental features that provide enjoyment, and more narrowly to the attractiveness of such features to real estate (e.g. air quality, open landscape or private garden). With regard to the latter, it is usually grouped with other amenities, including structural factors (e.g. age of a house, number of rooms or floor space) and neighbourhood factors (e.g. level of traffic, accessibility, school quality or demographic and cultural aspects).

EQUALITY:

Does not mean all people becoming equal for instance on size or having the same abilities, but humans being equal relating to the fact of equal worth.

FUNCTION and FUNCTIONINGS:

In line with investigations by Jax (2005), the term function is more closely related to a defined role within a system, to interactions between two objects or processes or an attribute to a system linked to its use or purpose or the service provided to human beings. The term 'functioning' refers to a change of perspective from individual parts, roles or functions to the complex system of interactions or the 'sum of processes that sustain a system' (Jax 2005: 642).

HUMAN WELL-BEING:

Concept prominently used in the Millennium Ecosystem Assessment – it describes elements largely agreed to constitute ‚a good life', including basic material goods, freedom and choice, health and physical well-being, good social relations, security, peace of mind, and spiritual experience.

GREEN INFRASTRUCTURE:

Definition much depends upon national, regional and local perspectives. Here it follows the definition provided by the European Commission: a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings.

GREEN SPACE, URBAN:

Definition much depends on its application at urban level. Generally, it can refer to distinct sites, such as protected natural- or semi-natural areas, urban parks, vacant land, allotment and private gardens or cemeteries, as well as waterbodies, green roofs and walls, trees, verges and hedges.

GREY INFRASTRUCTURE:

Man-made systems that support communities, including roads and other transportation systems, stormwater management systems, and utilities. Also called built infrastructure.

INEQUALITY, ECONOMIC:

Generally refers to the unequal distribution of income, capital ownership and wealth. Income represents a periodical flow of money, and also goods and services that results from labour and capital. Capital represents the stock on which the economy builds at a given point in time. Some economists are hesitant in defining land and its resources as capital and rather link it to the general wealth.

INEQUALITY, SOCIO-ECOLOGICAL:

Refers to the accumulation and concentration and thus unequal distribution and access to (urban) nature or biological diversity, and in the end the supported functions and benefits it provides for human well-

being. If the ecological space concept is adopted, it refers to inequalities linked to the distribution and access to 'functionings' supported by Green Infrastructure.

JUSTICE:
Follows definitions by the philosopher Mario Bunge, according to which a person is treated fairly if 'being treated exclusively on the strength of [her] rights and merits'. A person is treated justly, if she 'is being treated fairly, and enjoys the benefits and carries the burdens', according to a qualified equality. Justice becomes thus a matter of 'adjusting the distribution of benefits and burdens in agreement with the available resources'.

JUSTICE, ENVIRONMENTAL:
The just spatial distribution of environmental goods and ills amongst people, including the 'fairness' in the distribution of environmental well-being.

LANDSCAPE:
An area perceived by people, whose character is the result of the action and interaction of natural and/or human factors. Landscapes are defined as one of the lower levels of ecological organisation within regional ecosystems (i.e. biomes). Alternatively, landscapes may be defined according to human perceptions of the predominant land-use (e.g. a farmland landscape).

MULTI-FUNCTIONALITY:
Refers to the provision of multiple rather than individual functions and the provision of a range of benefits rather than a few, weather for human well-being, wildlife or biological diversity. More recently it is often associated with the multitude of ecosystem services to be provided at a site.

MULTI-SCALE:
The multi-scale approach follows the hierarchy theory, which considers systems operating simultaneously at multiple levels or scales, from local to urban, regional, national and international. It assumes that in order to understand the dynamics at the local level an understanding of the larger system connecting to local elements is needed.

NATURE:
In the context of the thesis the term mostly refers to non-human biotic elements, i.e. flora and fauna, and their interaction with the environment.

OPEN SPACE:
Undeveloped lands suitable for recreation or conservation uses.

POLICY INTERVENTIONS:
They refer to means that impact fabric and disparities of the ecological, built-up physical and socio-economic space more broadly, including visions, objectives, governance processes and instruments.

SPATIAL PLANNING, STRATEGIC:
No common definition exists, and its meaning can range from ranging from long-term to higher-level and conception planning. According to Albrechts (2006:1152), strategic spatial planning is a transformative and integrative, (preferably) public-sector-led socio-spatial process through which a vision, coherent actions, and means for implementation are produced that shape and frame what a place is and what it may become.

Ethical doctrines – methodical aspects and contents

Methodical aspects at the basis of ethical doctrines, according to Bunge (1989: 201-217)

Method	Key aspects and critiques
Religious to secular	Religion always includes morality, but not necessarily the other way around. Religious approach is often criticised for its lack of logical consistency and empirical support.
Monism to pluralism	Radical monism assumes only a single summum bonum or single dominant principle, whereas radical pluralism argues for several types of mutually independent principles. A moderate approach states that a single overarching principle can frame and link different moral codes due a common part (e.g. value of life).
Absolutism to relativism	Absolutism states moral norms being absolute, cross-cultural and independent of circumstances (e.g. Immanuel Kant). Relativism argues moral codes being cultural-bound, adapted to the needs of a society. A moderate approach iterates that not all moral codes are equivalent and that genuine moral progress can exist.
Objectivism to subjectivism	Objectivism assumes moral codes being objective the same way as values, and thus argues for the existence of moral facts. This assumption can be considered dangerous if not open to empirical tests. Subjectivists argue that moral codes are as subjective as values are and thus that no moral facts can be found. It bears the risk of irrationalism and anarchy, as no argument about moral codes is possible.
Emotivism, intuitionism to cognitivism	Cognitivists (e.g. Aristotle, Spinoza) assert and non-cognitivists/emotivists/intuitionist (e.g. Hume) deny moral principles having a cognitive status, which can be known, analysed, tested and altered. Emotivism views moral codes as an expression of feelings and attitudes. According to intuitionism, moral principles are self-evident and thus there is no need for empirical and rational justification.
Consequentialism to deontologism	Consequentalists judge moral rules and actions by the consequences they have. Goodness (axiological values) precedes rightness (ethical norm). Deontologists judge something 'good' only if resulting from the 'right' action. Rightness precedes 'goodness' (e.g. Immanuel Kant). A qualified, moderate consequentialism warns that a naïve and radical consequentialism might assume 'the end justifies the means', whereas a radical deontologism is thought to operate with categories of black and white, ignoring moral feelings and the circumstances of people.
Individualism, holism to systemism	Individualism focuses on the individual as a self-determined entity. Individual values (e.g. liberty) take precedence over social values (e.g. social justice), individual rights over social duties. Society exists to protect individual rights. Collectivists/socio-centric ethics/holism put their emphasis on the other-determined individuals. Social values (e.g. stability) are supra-imposed over individual values (e.g. liberty). Individuals are mere means to social goals (e.g. Durkheim, Hegel). Systemism recognises that individuals can only exist in a society, which, however, they can reform through individual and collective action. It emphasises that rights imply duties and conversely (e.g. Aristotle, Hume, Rawls).
Conservatives to reformists	Conservatives hang on to traditional values and morals, whereas reformists believe that some values and morals have to change along society. Both can be radical when arguing either values and norms being eternal or every society deserving new values and norms.

Moral-isms – the content of ethical doctrines, according to Bunge (1989: 224-394)

Egoistic	Key content and critiques
Libertarianism	The summum bonum is liberty. Traditional libertarians have focused on the different biological, economic, political and cultural dimensions of liberty (e.g. John Stuart Mill – 1806-1873). Contemporary representatives are argued to be mainly interested in the constraints imposed by the state on property rights (e.g. Friedrich Hayek – 1899-1992). Ideology may result in totally inegalitarian and authoritarian societies, if it does not address how to deal with colliding freedoms. This can for example be the case when a majority rules against minority rights.
Contractualism	Contractualism builds on assumptions of Thomas Hobbes (1588-1679) that all individuals are selfish and continuously at war with each other (see also chapter C 1.2.1.1). Society is perceived as a product of a deliberate agreement that reconciles opposed interests, following the perspective of selfish human individuals laying down a contract that helps to avoid self- and mutual destruction (e.g. economist James McGill Buchanan - 1919-1992). Risks failing to recognise that goal should not be the achievement of a general agreement but of fairness in the allotment of rights and duties. Contractualism also thought to ignore the most important social bonds, including friendship, care and solidarity.
Negative utilitarianism	Utilitarianism includes all those ethical doctrines that measure the worth of an action by the utility it produces or respectively the value of its outcome. Its negative form is focused on restraining egoism and minimising suffering, instead of for example maximising happiness and encouraging altruism (e.g. Hippocrates, Epicures or the economist Vilfredo Pareto – 1848-1923). Negative utilitarianism considered not to help in a position where you can do 'good' and thus recommending passivity in many situations.
Additional:	*Nihilism, Rational egoism*
Altruistic	**Key content and critiques**
Kantianism	Described as an offshoot of the natural law doctrine, which argues that all humans are born with defined and indisputable rights and duties, prior to any convention and legislation. Immanuel Kant presupposes the principle that all human beings are equal, however places duty before right and defines 'good' as the observation of duty. Consequently, the nature of moral norms becomes mostly prescriptive to the extent of categorical (i.e. unconditional) imperatives, failing to provide any explanation of reasons and causes one can argue about or can be tested.
Utilitarianism	Utilitarianism forms the ethical basis of economics. Bunge differs between individualistic/egoistic and universalistic/altruistic utilitarians. The former follow the credo of 'maximising one's expected utility', whereas the latter iterate to 'pursue the greatest happiness of the greatest number'. Utilitarianism argued of failing to propose concrete moral rules and thus remaining morally and politically uncommitted, given it also lacks a correct and applicable utility theory. It focuses on subjective values, neither interpersonally comparable, subject to general laws nor additive. By emphasising preferences and goals, it provides no safe basis for justice, and does not help in choosing the right means. It is considered by Bunge to be morally empty and focused on describing rational rather than actual behaviour.
Agathonism	Holds as supremum bonum the survival and well-being of humankind. The latter can only be achieved in a favourable environment and state of peace, putting environmental protection at the forefront of problems to solve. Proposed by Mario Bunge to be altruistic, though underlining the importance of egoistic stances. He iterates that different social groups might have different moral codes, but that rights and duties can be seen as 'natural' given they derive from biological needs. As a consequence, moral codes can be subject to testing and review, both conceptually and empirically. He agrees with consequentialism and utilitarianism in particular in only valuing actions that enhance social welfare, although he attempts in linking it to a definite value system and value theory.
Additional:	*Natural law*

Survey questionnaire to the public administration of Munich (German)

WESSEN NATUR IN DER STADT? Das Ziel eines gerechten Zugangs und die Rolle der Planung
Fragen an die Verwaltung der Stadt München

Einleitung

Sehr geehrte Teilnehmer*innen!

Wie hat sich Ihrer Meinung nach die Quantität und Qualität von Grünraum bzw. Natur in der Stadt München entwickelt?
Welche Faktoren sind Ihrer Meinung nach wesentlich für eine gerechte Verteilung, gerade auch aus der Perspektive Ihres Ressorts?
Welche Relevanz hat Ihrer Meinung nach das Thema der Ungleichheit von Einkommen und Vermögen?

Dies sind nur einige der Fragen, die in dieser Umfrage behandelt werden.

Eine Reihe von Wirtschafts- und Finanzkrisen haben die Aufmerksamkeit der Öffentlichkeit wie auch der Forschung verstärkt auf Ungleichheiten der Verteilung von Einkommen und Vermögen gelenkt. Von Interesse sind dabei auch die spezifischen Auswirkungen auf die Lebensqualität der städtischen Bevölkerung. Dies beinhaltet sowohl den Zugang zu leistbarem Wohnraum, Lebensraum mit geringen Umweltbelastungen als auch zur Natur in der Stadt, ob in Form privater Gärten, öffentlicher Parks oder natürlicher und naturnaher Lebensräume.

Im Rahmen des Internationalen Doktorandenkollegs „Forschungslabor Raum“ befasse ich mich mit der Frage, auf welche Weise Stadtpolitik sowie speziell die Raumplanung entsprechenden Entwicklungen im Sinne einer hohen Umweltgerechtigkeit bzw. Grünraumgerechtigkeit entgegenwirken sollen und können. Im Fokus stehen dabei die Anwendung strategischer Konzepte sowie einer Reihe politischer Instrumente und Planungsinstrumente.

Mit dieser Umfrage möchte ich Ihr Verständnis, Ihre Einschätzung und Ihre Erfahrungen in Bezug auf die Relevanz und den Umgang mit der Thematik als **Vertreter der Stadtverwaltung MÜNCHEN** erfassen.

- Das Ausfüllen des Fragebogens wird circa 20-25 Minuten in Anspruch nehmen.
- Bitte beantworten Sie alle Fragen möglichst spontan und ehrlich. **Es gibt keine richtige oder falsche Antwort.**
- Falls Sie Fragen nicht beantworten können, bitte ich Sie einen Schätzwert anzugeben oder mit der entsprechenden Auswahloption die Frage zu überspringen (z.B. weiß ich nicht).
- Die Daten werden selbstverständlich vertraulich behandelt und Ihre Anonymität ist gesichert. **Die Ergebnisse werden ausschließlich für wissenschaftliche Zwecke verwendet.**
- Der Fragebogen enthält zum Teil Fragen, die in ähnlicher Form bereits Verwendung in anderen Forschungsprojekten fanden. Dies soll es erlauben **wissenschaftliche Verknüpfungen** herzustellen.
- Aus Gründen der besseren Lesbarkeit wird auf die gleichzeitige Verwendung männlicher bis weiblicher Sprachformen verzichtet. Sämtliche Personenbezeichnungen gelten für alle Geschlechter.

Vielen Dank für Ihre Unterstützung!

Sonja Gantioler
Doktorandin
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http://www.lai.ar.tum.d

WESSEN NATUR IN DER STADT? Das Ziel eines gerechten Zugangs und die Rolle der Planung
Fragen an die Verwaltung der Stadt München

Einige Fragen zu Verteilung und Zugang zu Natur in der Stadt München

1. Welchen Stellenwert hat Ihrer Meinung nach derzeit das Thema der ungleichen Verteilung von Einkommen und Vermögen und seinen möglichen Auswirkungen auf Stadtentwicklung und Stadtraum in Ihrem Verwaltungsbereich?

1 — von "unwichtig" bis "sehr wichtig" — 4

2. Nehmen Ihrer Meinung nach Strategien Ihrer Stadt (z.B. Konzepte, Programme) explizit Bezug auf das Thema der ökonomischen Ungleichheit und seine möglichen Auswirkungen auf Stadtentwicklung und Stadtraum?

Wenn ja, wo und in welcher Form?

Wenn nein, was sind Ihrer Meinung nach Gründe für das Fehlen selbiger?

3. Werden in Ihrem Bereich derzeit Indikatoren eingesetzt, um das Thema der ökonomischen Ungleichheit und seine möglichen Auswirkungen auf Stadtentwicklung und Stadtraum integriert* zu beobachten?

*Dies bezieht sich auf die Nutzung, Verknüpfung und Weiterentwicklung vorliegender Daten und Indikatoren unter anderem aus den Bereichen Soziales, Wirtschaft, Umwelt, bebauter Raum und Gesundheit.

Wenn ja, welche?

Wenn nein, was sind Ihrer Meinung nach Defizite bzw. Hindernisse?

4. Wie hat sich Ihrem Empfinden nach die Quantität urbanen Grüns bzw. Natur in den letzten 10 Jahren in München entwickelt? Welchen Trend beobachten Sie bei verschiedenen Formen urbanen Grüns/Natur?

	wachsend	gleichbleibend	schrumpfend	weiß nicht
Grün/Natur in privater Hand (z.B. Gärten)	◯	◯	◯	◯
Grün/Natur in öffentlicher Hand (z.B. Parks)	◯	◯	◯	◯
Grün/Natur mit hoher Tier- und Pflanzenvielfalt (z.B. Biotope,Naturschutzgebiete)	◯	◯	◯	◯

5. Wie hat sich Ihrer Meinung nach die Qualität urbanen Grüns bzw. Natur in den letzten 10 Jahren in München entwickelt? Welchen Trend beobachten Sie bei verschiedenen Formen urbanen Grüns/Natur?

	verbessert	gleichbleibend	verschlechtert	weiß nicht
Grün/Natur in privater Hand (z.B. Gärten)	◯	◯	◯	◯
Grün/Natur in öffentlicher Hand (z.B. Parks)	◯	◯	◯	◯
Grün/Natur mit hoher Tier- und Pflanzenvielfalt (z.B. Biotope, Naturschutzgebiete)	◯	◯	◯	◯

* 6. Welche Faktoren sind aus Ihrer Sicht besonders wichtig für die Beurteilung der Qualität des urbanen Grüns bzw. Natur in München?

Bitte wählen Sie **max. 4** für Sie wichtige Faktoren aus.

- ☐ Weiß nicht
- ☐ Größe der Fläche
- ☐ Vernetzte Flächen
- ☐ Anzahl und Vielfalt an Bäumen
- ☐ Vielfalt an Pflanzen- und Tierarten
- ☐ Unterschiedliche Vegetationsstrukturen (z.B. unterschiedliche Höhen)
- ☐ Naturbelassene Gewässer
- ☐ Möglichkeiten gärtnerischer Betätigung
- ☐ Blumenbeete
- ☐ Sportstätten
- ☐ Gastronomische Infrastrukturen
- ☐ Kinderspielplätze
- ☐ Sitzgelegenheiten
- ☐ Grasflächen für Sport, Bewegung oder Sonnenliegen
- ☐ Offene Flächen mit Sicht auf die Stadt
- ☐ Fehlender Straßenlärm
- ☐ Sonstiges:

Bitte angeben

7. Als wie gerecht oder ungerecht beurteilen Sie die derzeitige Verteilung verschiedener Formen urbanen Grüns bzw. Natur über die Stadt München und für seine Bewohner?

	ungerecht verteilt 1	2	3	gerecht verteilt 4	weiß nicht
Grün/Natur in privater Hand (z.B. Gärten)	◯	◯	◯	◯	◯
Grün/Natur in öffentlicher Hand (z.B. Parks)	◯	◯	◯	◯	◯
Grün/Natur mit hoher Tier- und Pflanzenvielfalt (z.B. Biotope, Naturschutzgebiete)	◯	◯	◯	◯	◯

8. Falls Sie möchten, nennen Sie bitte kurz Gründe, warum Sie die Verteilung als eher gerecht oder eher ungerecht empfinden.

Gerecht

Ungerecht

9. Wie wichtig sind Ihrer Meinung nach die folgenden Instrumente zur Erfassung der quantitativen und qualitativen Versorgung mit urbanem Grün Ihrer Einschätzung nach für die Ermittlung einer gerechten Verteilung in München?

Bitte bewerten Sie die Wichtigkeit **NUR** jener Instrumente, die Ihrer Meinung nach eingesetzt werden.

	unwichtig 1	2	3	sehr wichtig 4	weiß nicht
Grünflächenkataster	◯	◯	◯	◯	◯
Grünflächeninformationssystem, inkl. Flächen in privater Hand	◯	◯	◯	◯	◯
Baumkataster	◯	◯	◯	◯	◯
Gründachkataster	◯	◯	◯	◯	◯
Vor-Ort Begehungen	◯	◯	◯	◯	◯
Nutzerbefragungen	◯	◯	◯	◯	◯
Brachflächenkataster	◯	◯	◯	◯	◯
Baulückenkataster	◯	◯	◯	◯	◯
Weitere Instrumente:	◯	◯	◯	◯	◯

Bitte angeben:

10. Wie wichtig sind Ihrer Meinung nach die folgenden Ziele für eine gerechte Verteilung von Quantität und Qualität von urbanem Grün bzw. Natur in München?

Bitte bewerten Sie die Wichtigkeit **NUR** jener Ziele, die Ihrer Meinung nach in München verfolgt werden.

	unwichtig 1	2	3	sehr wichtig 4	weiß nicht
Erhalt der biologischen Vielfalt	◯	◯	◯	◯	◯
Arten- und Biotopschutz	◯	◯	◯	◯	◯
Steigerung der Wohn- und Lebensqualität	◯	◯	◯	◯	◯
Klimaschutz/ Anpassung Klimawandel	◯	◯	◯	◯	◯
Schaffung von Räumen für Erholung und Freizeit	◯	◯	◯	◯	◯
Schaffung von Räumen für Bewegung und Sport	◯	◯	◯	◯	◯

Schaffung von Begegnungs- und Kommunikationsräumen	◯	◯	◯	◯	◯
Schaffung von Flächen und Räumen für gärtnerische Betätigung	◯	◯	◯	◯	◯
Schaffung von Naturerfahrungsräumen	◯	◯	◯	◯	◯
Schaffung von multi-funktionalen Räumen	◯	◯	◯	◯	◯
Förderung der Gesundheit	◯	◯	◯	◯	◯
Umweltbildung	◯	◯	◯	◯	◯
Schaffung von Kultur und Identität	◯	◯	◯	◯	◯
Erhöhung Anziehungskraft der Stadt	◯	◯	◯	◯	◯
Sonstiges:	◯	◯	◯	◯	◯

Bitte angeben

11. Wie wichtig sind Ihrer Meinung nach die folgenden spezifischen Strategien in Stadtplanung und -politik für eine gerechte Verteilung von Quantität und Qualität von Grün/Natur in München?

Bitte bewerten Sie die Wichtigkeit **NUR** jener Strategien, die Ihrer Meinung nach Anwendung finden.

	unwichtig 1	2	3	**sehr wichtig** 4	**weiß nicht**
Entwicklung neuen urbanen Grüns/Natur für spezifische Zwecke (z.B. Freizeit und Erholung)	◯	◯	◯	◯	◯
Schaffung von wohnortnahem Grün/Natur (z.B. Innenhofbegrünung, Fassaden- und Dachbegrünung)	◯	◯	◯	◯	◯
Erhalt und Förderung vielfältiger Funktionen, die von urbanem Grün bereitgestellt werden (z.B. lokale Selbstversorgung, Stadtklima, Freizeit & Erholung, etc.)	◯	◯	◯	◯	◯
Temporäre Zwischennutzung von Brachflächen für spezifische Zwecke (z.B. gärtnerische Betätigung)	◯	◯	◯	◯	◯
Schaffung von dauerhaftem, urbanem Grün/Natur auf Brachflächen	◯	◯	◯	◯	◯
Naturschutzfachliche Entwicklung von Brachflächen (z.B. Renaturierung)	◯	◯	◯	◯	◯
Einschränkung von Baurechten (z.B. in Bezug auf die Schließung von Baulücken)	◯	◯	◯	◯	◯
Aufwertung von bestehendem Grün/ Natur (z.B. Wegenetz, künstlerische Gestaltung, Pflanzenreichtum)	◯	◯	◯	◯	◯
Einführung neuer, geschützter Flächen aus Arten- und Naturschutzgründen	◯	◯	◯	◯	◯
Maßnahmen zur Verbesserung des Lebensraums von Tier- und Pflanzenarten	◯	◯	◯	◯	◯
Vernetzung von urbanem Grün/Natur, als Teil eines großen regionalen und nationalen Netzwerkes	◯	◯	◯	◯	◯

Entwicklung erfolgt integriert in die Planung verschiedener Infrastruktur- (z.B. Radweg) und anderer Bauvorhaben (z.B. Erhalt und Berücksichtigung existierenden Grüns/Natur vor Beginn des Vorhabens)	◯	◯	◯	◯	◯
Sonstiges:	◯	◯	◯	◯	◯

Bitte angeben

12. Welche Relevanz haben die folgenden formellen und informellen Planungsinstrumente Ihrer Meinung nach für einen gerechten Zugang* zu Grün/Natur in München?

Bitte bewerten Sie die Relevanz **NUR** jener Instrumente/Konzepte/Planungen, die Ihrer Meinung nach Anwendung finden.

*Dies bezieht sich auf den physischen Zugang zu privaten und öffentlichen Flächen, deren Nutzung als auch den Genuss bereitgestellter Funktionen (z.B. Kühleffekt, sauberes Wasser).

	hoch	mittel	gering	weiß nicht
Flächenwidmungspläne	◯	◯	◯	◯
Bebauungspläne	◯	◯	◯	◯
Landschaftspläne (soweit eigenständig)	◯	◯	◯	◯
Grünordnungspläne (soweit eigenständig)	◯	◯	◯	◯
Innenentwicklungskonzept	◯	◯	◯	◯
Gesamtstädtisches Stadtentwicklungskonzept	◯	◯	◯	◯
Stadtteilentwicklungskonzepte	◯	◯	◯	◯
Gesamtstädtisches Frei/Grünraumentwicklungskonzept	◯	◯	◯	◯
Naturschutzfachliche Konzepte/Biotopverbundkonzepte	◯	◯	◯	◯
Flächenpool-/Landschafts- bzw. Ökokonto-Konzepte	◯	◯	◯	◯
Verkehrsentwicklungsplanung/ Verkehrskonzept	◯	◯	◯	◯
Klimaschutzkonzept	◯	◯	◯	◯
Weitere Planungsinstrumente:	◯	◯	◯	◯

Bitte angeben

13. Bitte begründen Sie kurz Ihre Bewertung in der vorhergegangenen Frage, bezugnehmend auf mögliche Potentiale, Defizite oder Hindernisse.

14. Bitte nennen Sie, falls möglich, Beispiele sonstiger politischer Instrumente aus den nachfolgenden Kategorien, die Ihrer Meinung nach eine hohe Relevanz für einen gerechten Zugang zu Grün/Natur in München haben?

- Rechtliche Instrumente (z.B. Umweltrecht, Verkehrsrecht)
- Finanzierungsinstrumente (z.B. Förderungen, Haushaltsmittel)
- Marktwirtschaftliche Instrumente (z.B. Steuern und Abgaben)
- Kooperationen (z.B. städtebauliche Verträge, Gebiets/Quartiersmanagement)
- Informative Instrumente (z.B. Umweltbildung)

WESSEN NATUR IN DER STADT? Das Ziel eines gerechten Zugangs und die Rolle der Planung
Fragen an die Verwaltung der Stadt München

Einige Fragen zu Steuerungs- und Gestaltungsmöglichkeiten

* 1. Welche Faktoren wirken sich Ihrer Meinung nach besonders hemmend auf den Zugang* der Bevölkerung zu hochwertigem, urbanem Grün/ Natur in München aus?

Bitte wählen Sie **max. 4** für Sie wichtige Faktoren aus.

*Dies bezieht sich auf den physischen Zugang zu privaten und öffentlichen Flächen, deren Nutzung als auch den Genuss bereitgestellter Funktionen (z.B. Kühleffekt, sauberes Wasser).

- [ ] Privateigentum
- [ ] Vorrang von Bauinteressen/ Bauliche Nutzungskonkurrenz
- [ ] Mangelnde kommunale Haushaltsmittel
- [ ] Finanzielle Abhängigkeit der Kommunen
- [ ] Konkurrierende Funktionen von Grünflächen/Natur (z.B. Erholung vs. Naturschutz)
- [ ] Mangelndes Interesse bei Investoren
- [ ] Mangelndes Interesse in der Politik
- [ ] Mangelndes Interesse in der Verwaltung
- [ ] Mangelndes Bedürfnis bei den Bürgern
- [ ] Ungleichgewicht in der Verteilung von Gestaltungsmacht
- [ ] Fehlender oder nicht-sichtbarer wirtschaftlicher Nutzen
- [ ] Mangelndes Einkommen und Vermögen
- [ ] Naturräumliche Gegebenheiten
- [ ] Historische Stadtentwicklung
- [ ] Sonstiges:

Bitte angeben

* 2. Welche Faktoren wirken sich Ihrer Meinung nach besonders fördernd auf den Zugang der Bevölkerung zu hochwertigem, urbanem Grün/ Natur in München aus?

Bitte wählen Sie **max. 4** für Sie wichtige Faktoren aus.

- [ ] Gemeinschaftseigentum von Flächen
- [ ] Flächen in öffentlichem Eigentum
- [ ] Langfristige, strategische Pläne zur Entwicklung von urbanem Grün/ Natur
- [ ] Verknüpfung der Entwicklung urbanen Grüns/ Natur mit anderen Umweltthemen (z.B. Klimaschutz, Luftqualität)
- [ ] Integration der Entwicklung urbanen Grüns/Natur in andere Bereiche der Stadtpolitik und-verwaltung (z.B. wirtschaftliche Entwicklung)
- [ ] Schaffung eines Rechts auf ökologischen Raum (z.B. saubere Luft, sauberes Wasser, Selbstversorgung)
- [ ] Beteiligungsverfahren im Planungsprozess
- [ ] Kooperation mit zivilgesellschaftlichen Organisationen
- [ ] Unabhängige Institution zur Verwaltung von Land in der Stadt
- [ ] Naturräumliche Gegebenheiten
- [ ] Historische Stadtentwicklung
- [ ] Sonstiges:

Bitte angeben

3. Wie würden Sie die folgenden Aussagen zum Entwicklungs- und Planungsprozess von urbanem Grün/ Natur in München bewerten?

	stimme ich überhaupt nicht zu 1	2	3	stimme ich voll und ganz zu 4	weiß nicht
Es existiert eine langfristige Vision, die unter Einbezug verschiedener Akteure entwickelt wurde.	◯	◯	◯	◯	◯
Es erfolgt eine klare, hierarchische Prioritätensetzung, unter Berücksichtigung sozio-ökonomischer Aspekte.	◯	◯	◯	◯	◯
Erhalt und Entwicklung von urbanem Grün/Natur werden vor der Realisierung eines Vorhabens berücksichtigt. Es bildet die Basis weiterer Entwicklungen.	◯	◯	◯	◯	◯
Es erfolgt ein horizontales Zusammenwirken verschiedener relevanter Verwaltungsbereiche auf Ebene der Stadtverwaltung.	◯	◯	◯	◯	◯
Es erfolgt ein ressortübergreifendes, vertikales Zusammenwirken auf Ebene von Bund, Ländern sowie Stadt, z.B. durch gemeinsame Programme und Strategien oder ‚Verschachtelung' von Plänen.	◯	◯	◯	◯	◯
Es erfolgt eine Stärkung der Methodenkompetenz der Verwaltung im Rahmen von Mitbestimmungs- und Beteiligungsarbeit.	◯	◯	◯	◯	◯
Sonstiges:	◯	◯	◯	◯	◯

Bitte angeben:

4. Falls Sie möchten, bitte begründen Sie kurz Ihre Bewertung in der vorhergegangenen Frage.

5. Können Sie eine Initiative nennen, im Rahmen dessen es zu einer hohen Integration von Akteuren und Themen mit Bezug zu urbanem Grün/ Natur kam?

6. Wie stark sind Ihrer Einschätzung nach einzelne Verwaltungsbereiche in Ihrer Stadt an der Verbesserung urbanem Grüns/ Natur beteiligt?

	gar nicht 1	2	3	sehr stark 4	weiß nicht
Architektur und Stadtbau	◯	◯	◯	◯	◯
Gesundheit und Soziales	◯	◯	◯	◯	◯
Wirtschaft und Arbeit	◯	◯	◯	◯	◯
Grünflächen	◯	◯	◯	◯	◯
Umweltschutz	◯	◯	◯	◯	◯
Naturschutz	◯	◯	◯	◯	◯
Stadtplanung	◯	◯	◯	◯	◯
Stadtentwicklung	◯	◯	◯	◯	◯
Finanzwesen	◯	◯	◯	◯	◯
Straßenverwaltung und -bau	◯	◯	◯	◯	◯
Verkehrsorganisation	◯	◯	◯	◯	◯
Weitere oder spezifische Verwaltungsbereiche:	◯	◯	◯	◯	◯

Bitte angeben:

7. Wie stark beeinflussen Ihrer Meinung nach die folgenden, verwaltungsexternen Akteure derzeit die Gestaltung* der Stadtumwelt, inkl. urbanem Grün/Natur?

*Die Gestaltung betrifft Zielsetzung, Planung, Design, Umsetzung und Betreuung.

	kein Einfluss 1	2	3	starker Einfluss 4	weiß nicht
Vertreter der Stadtpolitik	◯	◯	◯	◯	◯
Zivilgesellschaftliche Organisationen (z.B. Naturschutzverbände, Sozialverbände)	◯	◯	◯	◯	◯
Wirtschaftstreibende und Wirtschaftsverbände	◯	◯	◯	◯	◯
Nachbarschaftsverbände und -initiativen	◯	◯	◯	◯	◯
Städtische Verbände und Organisationen	◯	◯	◯	◯	◯

Einzelne Bürger	◯	◯	◯	◯	◯
Vertreter der Wissenschaften	◯	◯	◯	◯	◯
Planungs- und Architekturbüros	◯	◯	◯	◯	◯
Medien	◯	◯	◯	◯	◯
Sonstige:	◯	◯	◯	◯	◯

Bitte angeben:

8. Welche Akteure sollten Ihrer Meinung nach wie stark die Gestaltung der Stadtumwelt, inkl. urbanem Grün/Natur, in Zukunft beeinflussen?

	kein Einfluss 1	2	3	starker Einfluss 4	weiß nicht
Städtische Verwaltung Bereich Umwelt	◯	◯	◯	◯	◯
Städtische Verwaltung andere Bereiche	◯	◯	◯	◯	◯
Vertreter der Stadtpolitik	◯	◯	◯	◯	◯
Zivilgesellschaftliche Organisationen (z.B. Naturschutzverbände, Sozialverbände)	◯	◯	◯	◯	◯
Wirtschaftstreibende und Wirtschaftsverbände	◯	◯	◯	◯	◯
Nachbarschaftsverbände und -initiativen	◯	◯	◯	◯	◯
Städtische Verbände und Organisationen	◯	◯	◯	◯	◯
Einzelne Bürger	◯	◯	◯	◯	◯
Vertreter der Wissenschaften	◯	◯	◯	◯	◯
Planungs- und Architekturbüros	◯	◯	◯	◯	◯
Medien	◯	◯	◯	◯	◯
Sonstige:	◯	◯	◯	◯	◯

Bitte angeben:

9. In welchem Ausmaß stimmen Sie den folgenden möglichen Veränderungen der Gestaltungs- und Nutzungsmöglichkeiten von urbanem Grün/ Natur zu?

	stimme ich überhaupt nicht zu 1	2	3	stimme ich voll und ganz zu 4	weiß nicht
Verbesserter Zugang zu privatem Grün durch Erweiterung von Wegerechten über Privatgrundstücke oder Beschränkung von Grundstückseinfriedungen (z.B. Mauer, Zaun oder Hecke).	◯	◯	◯	◯	◯
Einführung eines Systems von Regeln zur gemeinschaftlichen Nutzung von privatem Grün/Natur (z.B. Zusammenarbeit bei Pflege, Ernte und Genuss von Stadtfrüchten).	◯	◯	◯	◯	◯
Einschränkung der Nutzung von privatem Grün zur Erhaltung des Lebensraums von Tier- und Pflanzenarten (z.B. durch Vorgaben zur Bewirtschaftung).	◯	◯	◯	◯	◯
Einschränkung des Zugangs zu öffentlichem Grün/ Natur zur Erhaltung des Lebensraums von Tier- und Pflanzenarten (z.B. durch bestimmte Wegführung, Begehverbot).	◯	◯	◯	◯	◯

	stimme ich überhaupt nicht zu 1	2	3	stimme ich voll und ganz zu 4	weiß nicht
Erweiterung der Nutzungsrechte öffentlichen Raums (z.B. gärtnerische Tätigkeiten, Gestaltung Straßenraum).	◯	◯	◯	◯	◯
Erhöhung der Anzahl an Bürgerbeteiligungsverfahren zur Gestaltung von urbanem Grün/ Natur	◯	◯	◯	◯	◯
Frühzeitige Einbindung der Bevölkerung und zivilgesellschaftlicher Organisationen in die Definition von Zielen für die Stadtentwicklung.	◯	◯	◯	◯	◯
Zunahme von Verfahren direkter Demokratie mit Einfluss auf die Gestaltung von urbanem Grün/Natur (z.B. Volksbefragung, gesetzlich verankerte Einbindung von Bürgerinitiativen).	◯	◯	◯	◯	◯
Schaffung einer unabhängigen Institution, welche die Interessen der Umwelt vertritt.	◯	◯	◯	◯	◯
Ansteigende Besteuerung von Wohneigentum abhängig von Einkommen und Vermögen zur Lenkung der Verteilung von privatem, urbanem Grün/ Natur.	◯	◯	◯	◯	◯
Finanzielle Unterstützung für den Erwerb von Wohneigentum abhängig von Einkommen und Vermögen zur Steuerung der Verteilung von privatem, urbanem Grün/ Natur.	◯	◯	◯	◯	◯
Erweiterung der politischen und finanziellen Kapazitäten der Kommunen in Zusammenspiel mit Bund und Ländern.	◯	◯	◯	◯	◯
Sonstiges:	◯	◯	◯	◯	◯

Bitte angeben:

10. Wie bewerten Sie derzeit den Einfluss Ihres Bereiches Flächen bzw. Raum in privatem Eigentum (z.B. Grünflächen, Wohnraum, Bau- und Nutzungstypologien) direkt mitzugestalten?

1	von "kein Einfluss" bis "starker Einfluss"	4	

11. Kommen in Ihrem Bereich Instrumente zur Anwendung, die es Ihnen erlauben direkten Einfluss auf die Gestaltung von Flächen bzw. Raum in privatem Eigentum auszuüben?

Wenn ja, welche?

Wenn nein, was sind Ihrer Meinung nach Gründe für das Fehlen selbiger?

WESSEN NATUR IN DER STADT? Das Ziel eines gerechten Zugangs und die Rolle der Planung
Fragen an die Verwaltung der Stadt München

Einige Fragen zum Verständnis wichtiger Begriffe und Ideen und deren Einsatz

1. In welchem Ausmaß stimmen Sie den folgenden Aussagen zu Umweltgerechtigkeit in der Stadt zu?

	stimme ich überhaupt nicht zu 1	2	3	stimme ich voll und ganz zu 4	weiß nicht
Umweltbelastungen (z.B. Luftschadstoffe, Lärm, Hitze, Wasserverunreinigung) konzentrieren sich nicht auf einzelne Stadtbereiche.	◯	◯	◯	◯	◯
Jene Teile der Stadtbevölkerung mit geringem Einkommen und Vermögen sind nicht stärker Umweltbelastungen ausgesetzt als andere.	◯	◯	◯	◯	◯
Jene Teile der Stadtbevölkerung mit hohem Einkommen und Vermögen sind nicht weniger von Umweltbelastungen betroffen als andere.	◯	◯	◯	◯	◯
Umweltressourcen (z.B. Grünflächen, Naturschutzgebiete) sind gleichmäßig über die Stadt verteilt.	◯	◯	◯	◯	◯
Jene Teile der Stadtbevölkerung mit geringem Einkommen und Vermögen haben einen höheren Zugang zu Umweltressourcen.	◯	◯	◯	◯	◯
Jene Teile der Stadtbevölkerung mit hohem Einkommen und Vermögen, haben einen geringeren Zugang zu den Umweltressourcen der Stadt.	◯	◯	◯	◯	◯
Umweltbelastungen und Umweltressourcen sind so verteilt, dass der Lebensraum verschiedener Pflanzen- und Tierarten in der Stadt erhalten bleibt.	◯	◯	◯	◯	◯
Die Gestaltung der Stadtumwelt erfolgt eigenverantwortlich durch die Bürger, wobei politische Prozesse den Rahmen setzen. Oberstes Ziel sind gleichwertige Lebensverhältnisse.	◯	◯	◯	◯	◯
Die Gestaltung erfolgt im Rahmen politischer, demokratischer Prozesse. Das Hauptaugenmerk liegt dabei auf einkommensschwachen, benachteiligten und ausgegrenzten Bevölkerungsgruppen.	◯	◯	◯	◯	◯
Die Gestaltung erfolgt als Teil von Planungsprozessen mit umfassender Beteiligung verschiedener Akteure (z.B. Bürger, zivilgesellschaftliche Organisationen, Wirtschaftstreibende).	◯	◯	◯	◯	◯
Die Gestaltung wird bestimmt durch Angebot und Nachfrage, das entsprechende Aushandeln sowie Preisbildung am Markt (z.B. Wohnungsmarkt). Dieser Prozess gewährleistet das optimalste Ergebnis in Bezug auf Umweltgerechtigkeit.	◯	◯	◯	◯	◯
Sonstiges:	◯	◯	◯	◯	◯

Bitte angeben:

2. Wie wichtig sind Ihrer Meinung nach die folgenden Handlungsfelder für das Recht auf ökologischen Raum in Ihrer Stadt?

	unwichtig 1	2	3	sehr wichtig 4	weiß nicht
Reduzierung der Verkehrslärmbelästigung	◯	◯	◯	◯	◯
Luftreinhaltung	◯	◯	◯	◯	◯
Stadtklima	◯	◯	◯	◯	◯
Arten- und Biotopschutz	◯	◯	◯	◯	◯
Erhalt biologischer Vielfalt	◯	◯	◯	◯	◯
Energetische Sanierung des Gebäudebestandes	◯	◯	◯	◯	◯
Städtebauliche Sanierungsmaßnahmen	◯	◯	◯	◯	◯

Förderung erneuerbarer Energien	◯	◯	◯	◯	◯
Umweltfreundliche Mobilität	◯	◯	◯	◯	◯
Wassermanagement	◯	◯	◯	◯	◯
Entwicklung von öffentlichen Grün- und Spielflächen für Erholung und Bewegung	◯	◯	◯	◯	◯
Förderung gärtnerischer Tätigkeiten (z.B. Kleingärten, Gemeinschaftsgärten)	◯	◯	◯	◯	◯
Erhalt Bodenfurchtbarkeit land- und forstwirtschaftlicher Flächen	◯	◯	◯	◯	◯
Reduzierung der Stadtversiegelung	◯	◯	◯	◯	◯
Bewahrung kultureller Identität und des kulturellen Erbes	◯	◯	◯	◯	◯
Schutz vor Naturkatastrophen oder Krankheiten	◯	◯	◯	◯	◯
Sonstiges:	◯	◯	◯	◯	◯

Bitte angeben

3. Welche Beobachtungsinstrumente oder Indikatoren halten Sie für besonders geeignet, um mögliche Ungerechtigkeiten in Bezug auf das Recht auf ökologischen Raum einzufangen?

4. Wie vertraut sind Sie in Ihrem Bereich mit den folgenden Begriffen?

	ja	teils/teils	nein
Grüne Infrastruktur: Ein strategisch geplantes Netzwerk natürlicher und naturnaher Flächen mit unterschiedlichen Umweltmerkmalen, das mit Blick auf die Bereitstellung eines breiten Spektrums an Funktionen angelegt ist und bewirtschaftet wird.	◯	◯	◯
Biologische Vielfalt: Umfasst die Vielfalt innerhalb der Arten und zwischen den Arten und die Vielfalt der Ökosysteme.	◯	◯	◯
Ökosystemdienstleistungen: Direkte und indirekte Beiträge von ökologischen Systemen zum menschlichen Wohlergehen durch die Stiftung von Nutzen. Dies umfasst bereitstellende Leistungen wie Nahrung, oder regulierende Leistungen wie Luftreinigung.	◯	◯	◯
Ökonomische Ungleichheit: Bezieht sich allgemein auf die ungleiche Verteilung von Einkommen, Kapitalbesitz und Wohlstand.	◯	◯	◯
Umweltgerechtigkeit: Die gerechte Verteilung von Umweltbelastungen und Umweltressourcen, und somit auch Fairness in der Verteilung von Umweltgüte für das menschliche Wohlbefinden.	◯	◯	◯

WESSEN NATUR IN DER STADT? Das Ziel eines gerechten Zugangs und die Rolle der Planung
Fragen an die Verwaltung der Stadt München

Und zum Abschluss

Vielen Dank!

Bitte teilen Sie mir zum Abschluß noch mit, welchem Verwaltungsbereich Sie sich zuordnen.

Falls Sie möchten, beantworten Sie noch die letzte Frage zu Ihrer Vision des zukünftigen München mit einer kurzen Beschreibung oder schicken Sie mir Fotomaterial zu, welches Ihre Antwort am besten wiederspiegelt.

Auch weitere Fragen oder Anmerkungen können Sie an die folgende E-Mail Adresse senden:

Gruene.Infrastruktur@gmail.com

* 1. Welchem Verwaltungsbereich ordnen Sie sich zu?

- [ ] Baureferat
- [ ] Kommunalreferat
- [ ] Kreisverwaltungsreferat
- [ ] Kulturreferat
- [ ] Personal- und Organisationsreferat
- [ ] Referat für Arbeit und Wirtschaft
- [ ] Referat für Gesundheit und Umwelt
- [ ] Referat für Stadtplanung und Bauordnung
- [ ] Referat für Bildung und Sport
- [ ] Sozialreferat
- [ ] Stadtkämmerei
- [ ] Sonstiger Bereich oder Angabe spezifische Abteilung:

Bitte angeben:

2. München in 100 Jahren: Wie sieht die Stadt aus, die Sie sich als Lebensraum wünschen?

Survey questionnaire to individuals of the general public of Vienna (German)

Sehr geehrte Teilnehmer*innen!

- *Wie hat sich Ihrer Meinung nach die Quantität und Qualität von Grünraum/Natur in der Stadt Wien entwickelt?*
- *Empfinden Sie den Zugang zu Grünraum/Natur, sowohl in privater als auch öffentlicher Hand, als gerecht?*
- *Was verstehen Sie unter Umweltgerechtigkeit?*
- *Und wie sehen Sie Ihre Gestaltungsmöglichkeiten?*

Ihr persönliches Verständnis, Ihre persönliche Einschätzung und Ihre Erfahrungen als Einwohner der Stadt Wien oder des Wiener Umlandes zu diesen und weiteren Fragen möchte ich im Rahmen dieser Online-Umfrage erfassen.

Dadurch helfen Sie der Beantwortung der Forschungsfrage, auf welche Weise Stadtpolitik und -verwaltung sowie speziell die Raumplanung möglichen Auswirkungen aus der Ungleichheit von Einkommen und Vermögen auf den Zugang zu Grünraum/ Natur entgegenwirken können - im Sinne einer hohen Umwelt- bzw. Grünraumgerechtigkeit.

Dieser Frage stelle ich mich in meiner Doktorarbeit im Rahmen des Internationalen Doktorandenkollegs ‚Forschungslabor Raum – Urbane Transformationslandschaften' an der TU München. Ausgangspunkt des Kollegs, an dem sich Universitäten aus drei Ländern beteiligen, sind schwierige, komplexe und unübersichtliche Probleme der Stadtentwicklung und -planung.

- Das Ausfüllen des Fragebogens wird circa 15 Minuten in Anspruch nehmen.
- Bitte beantworten Sie alle Fragen möglichst spontan und ehrlich. **Es gibt keine richtige oder falsche Antwort.**
- Falls Sie Fragen nicht beantworten können, bitte ich Sie, einen Schätzwert anzugeben oder mit der entsprechenden Auswahloption die Frage zu überspringen (z.B. weiß ich nicht).
- Die Daten werden selbstverständlich vertraulich behandelt und Ihre Anonymität ist gesichert. Die Ergebnisse werden ausschließlich für wissenschaftliche Zwecke verwendet.
- Aus Gründen der besseren Lesbarkeit wird auf die gleichzeitige Verwendung männlicher bis weiblicher Sprachformen verzichtet. Sämtliche Personenbezeichnungen gelten für alle Geschlechter.

Vielen Dank für Ihre Unterstützung!

Sonja Gantioler

Doktorandin
Internationales Doktorandenkolleg „Forschungslabor Raum"
TU München, Lehrstuhl für Landschaftsarchitektur und industrielle Landschaft

Befragung unterbrechen | Weiter

Einige Fragen zu Verteilung und Zugang zu Natur in der Stadt Wien

1. Wie hat sich Ihrem Empfinden nach die Quantität urbanen Grüns bzw. Natur in den letzten 10 Jahren in Wien entwickelt? Welchen Trend beobachten Sie bei verschiedenen Formen urbanen Grüns/Natur?

	wachsend	gleichbleibend	schrumpfend	weiß nicht
Grün/Natur in privater Hand (z.B. Gärten)	○	○	○	○
Grün/Natur in öffentlicher Hand (z.B. Parks)	○	○	○	○
Grün/Natur mit hoher Tier- und Pflanzenvielfalt (z.B. Biotope, Naturschutzgebiete)	○	○	○	○

2. Wie hat sich Ihrem Empfinden nach die Qualität urbanen Grüns bzw. Natur in den letzten 10 Jahren in Wien entwickelt? Welchen Trend beobachten Sie bei verschiedenen Formen urbanen Grüns/Natur?

	verbessert	gleichbleibend	verschlechtert	weiß nicht
Grün/Natur in privater Hand (z.B. Gärten)	○	○	○	○
Grün/Natur in öffentlicher Hand (z.B. Parks)	○	○	○	○
Grün/Natur mit hoher Tier- und Pflanzenvielfalt (z.B. Biotope, Naturschutzgebiete)	○	○	○	○

3. Welche Eigenschaften sind Ihnen bei der Qualität des urbanen Grüns bzw. Natur in Wien besonders wichtig?

Sie können **max. 4** für Sie wichtige Eigenschaften auswählen.

- ☐ Größe der Fläche
- ☐ Vernetzte Flächen
- ☐ Anzahl und Vielfalt an Bäumen
- ☐ Vielfalt an Pflanzen- und Tierarten
- ☐ Unterschiedliche Vegetationsstrukturen (d.h. unterschiedliche Höhen)
- ☐ Naturbelassene Gewässer
- ☐ Möglichkeiten gärtnerischer Betätigung
- ☐ Blumenbeete
- ☐ Sportstätten
- ☐ Gastronomische Infrastrukturen
- ☐ Kinderspielplätze
- ☐ Sitzgelegenheiten
- ☐ Grasflächen für Sport, Bewegung oder Sonnenliegen
- ☐ Offene Flächen mit Sicht auf die Stadt
- ☐ Fehlender Straßenlärm
- ☐ Sonstiges _____ (bitte angeben)

4. Als wie gerecht oder ungerecht beurteilen Sie die derzeitige Verteilung verschiedener Formen urbanen Grüns bzw. Natur über die Stadt Wien und für seine Bewohner?

	ungerecht verteilt 1	2	3	gerecht verteilt 4	weiß nicht
Grün/Natur in privater Hand (z.B. Gärten)	○	○	○	○	○
Grün/Natur in öffentlicher Hand (z.B. Parks)	○	○	○	○	○
Grün/Natur mit hoher Tier- und Pflanzenvielfalt (z.B. Biotope,Naturschutzgebiete)	○	○	○	○	○

5. Falls Sie möchten, nennen Sie bitte kurz Gründe, warum Sie die Verteilung als eher gerecht oder eher ungerecht empfinden.

Gerecht

Ungerecht

6. Welche der folgenden Strategien in Stadtplanung und -politik zur Entwicklung von urbanem Grün bzw. Natur in Wien halten Sie für besonders wichtig?

Sie können **max. 3** für Sie wichtige Strategien auswählen.

- ☐ Zeitweise Zwischennutzung von Brachflächen (z.B. gärtnerische Betätigung)
- ☐ Schaffung von dauerhaftem, urbanem Grün/Natur auf Brachflächen
- ☐ Naturschutzfachliche Entwicklung von Brachflächen (z.B. Renaturierung)
- ☐ Entwicklung neuen urbanen Grüns/Natur für spezifische Zwecke (z.B. Freizeit und Erholung)
- ☐ Schaffung von wohnortnahem Grün/Natur (z.B. Innenhofbegrünung, Fassaden- und Dachbegrünung)
- ☐ Erhalt und Förderung vielfältiger Funktionen, die von urbanem Grün bereitgestellt werden (z.B. lokale Selbstversorgung,Stadtklima, Freizeit & Erholung, etc.)
- ☐ Einschränkung von Baurechten (z.B. in Bezug auf die Schließung von Baulücken)
- ☐ Aufwertung von bestehendem Grün/ Natur (z.B. Wegenetz, künstlerische Gestaltung, Pflanzenreichtum)
- ☐ Einführung neuer, geschützter Flächen aus Arten- und Naturschutzgründen
- ☐ Maßnahmen zur Verbesserung des Lebensraums von Tier- und Pflanzenarten
- ☐ Vernetzung von urbanem Grün/Natur, als Teil eines großen regionalen und nationalen Netzwerkes
- ☐ Entwicklung erfolgt integriert in die Planung verschiedener Infrastruktur- (z.B. Radweg) und anderer Bauvorhaben (z.B. Erhalt und Berücksichtigung existierenden Grüns/Natur vor Beginn des Vorhabens)
- ☐ Sonstiges: (bitte angeben)

7. Welche Bedürfnisse sind Ihnen persönlich bei der Entwicklung urbanen Grüns bzw. urbaner Natur besonders wichtig?

Sie können **max. 4** für Sie wichtige Bedürfnisse auswählen.

- ☐ Schutz von speziellen Tier- und Pflanzenarten
- ☐ Erhalt an Vielfalt von Tier- und Pflanzenarten
- ☐ Schutz naturnaher Räume
- ☐ Steigerung Wohn- und Lebensqualität
- ☐ Räume für Erholung und Freizeit
- ☐ Räume für Bewegung und Sport
- ☐ Räume für Begegnung
- ☐ Räume für Rückzug
- ☐ Räume der Ruhe
- ☐ Saubere Stadtluft
- ☐ Sauberes Wasser
- ☐ Risikominderung Überschwemmungen
- ☐ Selbstversorgung
- ☐ Lokale Nahrungsmittelversorgung
- ☐ Günstiges Stadtklima
- ☐ Gärtnerische Betätigung
- ☐ Sicherheit
- ☐ Gepflegtes Umfeld
- ☐ Sonstiges: _____ (bitte angeben)

8. Angenommen Sie hätten ein Nettoeinkommen von monatlich € 2.000. Davon geben Sie monatlich € 700 Miete (inkl. € 100 Betriebskosten) für eine 50m^2 große Altbauwohnung aus. Wieviel mehr an Miete wären Sie bereit monatlich zu zahlen, falls Ihnen dadurch in nächster Umgebung eine öffentliche Grün- bzw. Freifläche zur Verfügung stände?

Größenvergleiche: Wiener Prater ca. 600ha - Schlosspark Schönbrunn 160ha - Wiener Augarten 5.2ha - Burggarten 4ha

	0 €	< 35	35-140	> 140-280	> 280-350	> 350
Stadtwald	○	○	○	○	○	○
Große Parkanlage bzw. Landschaftsgarten (>10ha)	○	○	○	○	○	○
Mittelgroße bis große Parkanlage (1-10 ha)	○	○	○	○	○	○
Kleine Parkanlage (< 1ha)	○	○	○	○	○	○
Kleine Grünflächen und Blumenbeete	○	○	○	○	○	○
Fluss oder stehendes Gewässer	○	○	○	○	○	○

Spielstraße	○	○	○	○	○	○
Verschiedene Sportstätten	○	○	○	○	○	○
Kinderspielplatz	○	○	○	○	○	○
Platz ohne motorisierten Verkehr und mit Sitzgelegenheiten	○	○	○	○	○	○
Mit Pflanzen bewachsene Brachfläche	○	○	○	○	○	○
Blick auf begrünte Nachbarschaft, mit zahlreichen Gärten und Bäumen	○	○	○	○	○	○

9. Angenommen sie besäßen € 200.000 an erspartem Kapital und könnten einen Kredit von über € 100.000 aufnehmen. Eine in Aussicht stehende Neubauwohnung von 50m^2 würde Sie € 200.000 kosten. Wieviel wären Sie bereit zusätzlich zu zahlen, falls Ihnen dadurch eine eigene private oder halb-private Grün- bzw. Freifläche zur Verfügung stände?

	0 €	< 10.000	10.000 - 40.000	> 40.000 - 80.000	> 80.000 - 100.000	>100.000
Eigener Balkon	○	○	○	○	○	○
Eigene Terrasse	○	○	○	○	○	○
Eigener Garten	○	○	○	○	○	○
Begrünter, gemeinsam nutzbarer Garten	○	○	○	○	○	○
Begrünter, gemeinsam nutzbarer Innenhof	○	○	○	○	○	○
Begrünte, nicht-direkt nutzbare Fläche	○	○	○	○	○	○
Nicht-begrünter, nutzbarer Innenhof	○	○	○	○	○	○

10. Warum wäre Ihnen eine eigene private oder halb-private Grün- bzw. Freifläche besonders wichtig?

Sie können **max. 3** für Sie wichtige Gründe auswählen.

- ☐ Erhöhung des Wertes einer Wohnung/eines Wohnhauses bei Verkauf/Vermietung
- ☐ Ausschlussmöglichkeit anderer
- ☐ Steigerung Wohn- und Lebensqualität
- ☐ Rückzugsort
- ☐ Ort der Ruhe
- ☐ Sicherheit
- ☐ Gepflegtes Umfeld
- ☐ Persönliche Gestaltung (z.B. naturbelassen oder ausgiebige Blumenbeete)
- ☐ Gärtnerische Betätigung

- [ ] Selbstversorgung
- [ ] Erholung und Freizeit
- [ ] Bewegung
- [ ] Sonstiges: (bitte angeben)

Zurück | Befragung unterbrechen | Weiter

Sonja Gantioler – 2016 20% ausgefüllt

Einige Fragen zu Steuerungs- und Gestaltungsmöglichkeiten

11. Welche Umstände wirken sich Ihrer Meinung nach besonders hinderlich auf den Zugang* der Bevölkerung zu hochwertigem, urbanem Grün/ Natur in Wien aus?

Sie können **max. 3** für Sie wichtige Umstände auswählen.

*Dies bezieht sich auf den physischen Zugang zu privaten und öffentlichen Flächen, deren Nutzung als auch den Genuss bereitgestellter Funktionen (z.B. Kühleffekt, sauberes Wasser).

- [ ] Privateigentum
- [ ] Vorrang von Bauinteressen/ Bauliche Nutzungskonkurrenz
- [ ] Mangelnde kommunale Haushaltsmittel
- [ ] Finanzielle Abhängigkeit der Kommunen
- [ ] Konkurrierende Funktionen von Grünflächen/Natur (z.B. Erholung vs. Naturschutz)
- [ ] Mangelndes Interesse bei Investoren
- [ ] Mangelndes Interesse in der Politik
- [ ] Mangelndes Interesse in der Verwaltung
- [ ] Mangelndes Bedürfnis bei den Bürgern
- [ ] Ungleichgewicht in der Verteilung von Gestaltungsmacht
- [ ] Fehlender oder nicht-sichtbarer wirtschaftlicher Nutzen
- [ ] Mangelndes Einkommen und Vermögen
- [ ] Naturräumliche Gegebenheiten
- [ ] Historische Stadtentwicklung
- [ ] Sonstiges: (bitte angeben)

12. Welche Umstände wirken sich Ihrer Meinung nach besonders fördernd auf den Zugang* der Bevölkerung zu hochwertigem, urbanem Grün/ Natur in Wien aus?

Sie können **max. 3** für Sie wichtige Umstände auswählen.

*Dies bezieht sich auf den physischen Zugang zu privaten und öffentlichen Flächen, deren Nutzung als auch den Genuss bereitgestellter Funktionen (z.B. Kühleffekt, sauberes Wasser).

- [ ] Gemeinschaftseigentum von Flächen
- [ ] Flächen in öffentlichem Eigentum
- [ ] Langfristige, strategische Pläne zur Entwicklung von urbanem Grün/ Natur
- [ ] Verknüpfung der Entwicklung urbanen Grüns/ Natur mit anderen Umweltthemen (z.B. Klimaschutz, Luftqualität)

- ☐ Integration der Entwicklung urbanen Grüns/Natur in andere Bereiche der Stadtpolitik und-verwaltung (z.B. wirtschaftliche Entwicklung)
- ☐ Schaffung eines Rechts auf ökologischen Raum (z.B. saubere Luft, sauberes Wasser, Selbstversorgung)
- ☐ Beteiligungsverfahren im Planungsprozess
- ☐ Kooperation mit zivilgesellschaftlichen Organisationen
- ☐ Unabhängige Institution zur Verwaltung von Land in der Stadt
- ☐ Naturräumliche Gegebenheiten
- ☐ Historische Stadtentwicklung
- ☐ Sonstiges: _____ (bitte angeben)

13. Wie stark beeinflussen Ihrer Meinung nach die folgenden Akteure derzeit die Gestaltung der Stadtumwelt, inkl. urbanem Grün/Natur?

	kein Einfluss → starker Einfluss
Vertreter der Stadtpolitik	
Städtische Verwaltung Bereich Umwelt	
Städtische Verwaltung andere Bereiche	
Zivilgesellschaftliche Organisationen (z.B. Naturschutzverbände, Sozialverbände)	
Wirtschaftstreibende und Wirtschaftsverbände	
Nachbarschaftsverbände und -initiativen	
Städtische Verbände und Organisationen	
Einzelne Bürger	
Vertreter der Wissenschaften	
Medien	
Planungs- und Architekturbüros	
Sonstige	

(Bitte angeben) _____

14. Wie stark sollten Ihrer Meinung nach die folgenden Akteure die Gestaltung der Stadtumwelt, inkl. urbanem Grün/Natur, in Zukunft beeinflussen?

	kein Einfluss → starker Einfluss
Vertreter der Stadtpolitik	
Städtische Verwaltung Bereich Umwelt	
Städtische Verwaltung andere Bereiche	

Zivilgesellschaftliche Organisationen (z.B. Naturschutzverbände, Sozialverbände)	
Wirtschaftstreibende und Wirtschaftsverbände	
Nachbarschaftsverbände und -initiativen	
Städtische Verbände und Organisationen	
Einzelne Bürger	
Vertreter der Wissenschaften	
Medien	
Planungs- und Architekturbüros	
Sonstige	

(Bitte angeben)

15. Haben Sie selbst die Gestaltung der Stadtumwelt inkl. urbanem Grün/Natur als Akteur direkt beeinflusst? Wenn ja, in welcher Rolle oder als Vertreter welcher Organisation?

Mehrfachnennungen sind möglich.

- ☐ Nein
- ☐ Ja, als Teilnehmer in der Stadtpolitik
- ☐ Ja, als Vertreter der städtischen Verwaltung – Bereich Umwelt
- ☐ Ja, als Vertreter der städtischen Verwaltung – andere Bereiche
- ☐ Ja, als Mitglied einer zivilgesellschaftlichen Organisation
- ☐ Ja, als Wirtschaftstreibender oder Vertreter der Wirtschaftsverbände
- ☐ Ja, als Mitglied von Nachbarschaftsverbänden und -initiativen
- ☐ Ja, als Mitglied städtischer Verbände und Organisationen
- ☐ Ja, als einzelner Bürger
- ☐ Ja, als Vertreter der Wissenschaften
- ☐ Ja, als Vertreter der Medien
- ☐ Ja, als Mitarbeiter in einem Planungs- oder Architekturbüro
- ☐ Ja, sonstiges: (bitte angeben)

16. Bitte nennen Sie kurz drei Gründe, warum Sie sich engagieren oder warum Sie sich nicht engagieren.

Engagement	
Nicht-Engagement	

17. In welchem Ausmaß stimmen Sie den folgenden möglichen Veränderungen der Gestaltungs- und Nutzungsmöglichkeiten von urbanem Grün/ Natur zu?

Verbesserter Zugang zu privatem Grün, z.B. durch die Erweiterung von Wegerechten über Privatgrundstücke oder Beschränkung von Grundstückseinfriedungen (z.B. Mauer, Zaun oder Hecke)

Einführung eines Systems von Regeln zur gemeinschaftlichen Nutzung von privatem Grün/Natur (z.B. Zusammenarbeit bei Pflege, Ernte und Genuss von Stadtfrüchten)

Einschränkung der Nutzung von privatem Grün, für den Erhalt des Lebensraums verschiedener Tier- und Pflanzenarten (z.B. durch Vorgaben zur Bewirtschaftung)

Einschränkung des Zugangs zu öffentlichem Grün/ Natur für den Erhalt des Lebensraums verschiedener Tier- und Pflanzenarten (z.B. durch bestimmte Wegführung, Begehverbot)

Erweiterung der Nutzungsrechte öffentlichen Raums (z.B. gärtnerische Tätigkeiten, Gestaltung Straßenraum)

Erhöhung der Anzahl an Bürgerbeteiligungsverfahren zur Gestaltung von urbanem Grün/ Natur

Frühzeitige Einbindung der Bevölkerung und zivilgesellschaftlicher Organisationen in die Definition von Zielen für die Stadtentwicklung

Zunahme von Verfahren direkter Demokratie mit Einfluss auf die Gestaltung von urbanem Grün/Natur (z.B. Volksbefragung, gesetzlich verankerte Einbindung von Bürgerinitiativen)

Schaffung einer unabhängigen Institution, welche die Interessen der Umwelt vertritt

Ansteigende Besteuerung von Wohneigentum abhängig von Einkommen und Vermögen zur Lenkung der Verteilung von privatem, urbanem Grün/ Natur

Finanzielle Unterstützung für den Erwerb von Wohneigentum abhängig von Einkommen und Vermögen zur Steuerung der Verteilung von privatem, urbanem Grün/ Natur

Erweiterung der politischen und finanziellen Kapazitäten der Kommunen in Zusammenspiel mit Bund und Ländern

18. Wie bewerten Sie derzeit Ihren Einfluss urbanes Grün/ Natur zu gestalten?

kein Einfluss — starker Einfluss

Einflussgrad

19. In welchem Ausmaß stimmen Sie den folgenden Aussagen zu Umweltgerechtigkeit in der Stadt zu?

Umweltressourcen (z.B. Grünflächen, Naturschutzgebiete) sind gleichmäßig über die Stadt verteilt.

Jene mit geringem Einkommen und Vermögen haben einen höheren Zugang zu den Umweltressourcen der Stadt.

Jene mit hohem Einkommen und Vermögen, haben einen geringeren Zugang zu den Umweltressourcen der Stadt.

Umweltbelastungen (z.B. Luftschadstoffe, Lärm, Hitze, Wasserverunreinigung) konzentrieren sich nicht auf einzelne Stadtbereiche.

Jene mit geringem Einkommen und Vermögen sind nicht stärker Umweltbelastungen ausgesetzt als andere.

Jene mit hohem Einkommen und Vermögen sind nicht weniger von Umweltbelastungen betroffen als andere.

Umweltbelastungen und Umweltressourcen sind so verteilt, dass der Lebensraum verschiedener Pflanzen- und Tierarten in der Stadt erhalten bleibt.

Die Gestaltung der Stadtumwelt erfolgt eigenverantwortlich durch die Bürger. Oberstes Ziel sind gleichwertige Lebensverhältnisse.

Die Gestaltung erfolgt im Rahmen politischer, demokratischer Prozesse . Das Hauptaugenmerk liegt dabei auf einkommensschwachen, benachteiligten und ausgegrenzten Bevölkerungsgruppen.

Die Gestaltung erfolgt als Teil von Planungsprozessen mit umfassender Beteiligung verschiedener Akteure (z.B. Bürger, zivilgesellschaftliche Organisationen, Wirtschaftstreibende).

Die Gestaltung wird bestimmt durch Angebot und Nachfrage , das entsprechende Aushandeln sowie Preisbildung am Markt (z.B. Wohnungsmarkt). Dieser Prozess gewährleistet das optimalste Ergebnis in Bezug auf Umweltgerechtigkeit.

20. Können Sie einen Vorfall beschreiben oder ein Beispiel nennen, das Ihrer Meinung nach Ihr Verständnis von Umweltgerechtigkeit gut darstellt? Was bedeutet Umweltgerechtigkeit für Sie persönlich?

Zurück | Befragung unterbrechen | Weiter

Sonja Gantioler – 2016

40% ausgefüllt

Einige Fragen zu Ihrer Wohnumgebung

21. Wie viele Quadratmeter Netto-Wohnfläche hat Ihre Wohnung/Ihr Haus ungefähr?

m^2

22. In welchem Jahr wurde das Haus, in dem Sie leben, gebaut?

Wenn Sie sich nicht sicher sind, bitte schätzen Sie.

- ☐ vor 1919
- ☐ 1919-1948
- ☐ 1949-1971
- ☐ 1972-1980
- ☐ 1981-1990
- ☐ 1991-2000
- ☐ 2001 und später

23. Leben Sie in Miete, oder gehört Ihnen die Immobilie, in der Sie wohnen?

- ☐ Miete
- ☐ Selbst genutztes Wohneigentum
- ☐ Weder noch (z.B. Fruchtgenuss, Genossenschaft)

24. In welchem Haustyp wohnen Sie?

- ☐ Freistehendes Einfamilienhaus (1-2 Geschosse)
- ☐ Reihenhaus oder Doppelhaus
- ☐ Freistehendes Zwei- bis Dreifamilienhaus (2-3 Geschosse)
- ☐ Mehrfamilienhaus (3-5 Geschosse)
- ☐ Mehrfamilienhaus (7-8 Geschosse)
- ☐ Hoch- oder Vielfamilienhaus (9 oder mehr Geschosse)

25. Wer oder welche Einrichtung/Körperschaft ist hauptsächlich der Eigentümer Ihres Wohnhauses/ Mehrfamilienhaus?

- ☐ Private Eigentümer
- ☐ Öffentliche Eigentümer
- ☐ Genossenschaft
- ☐ Sonstiges: _____ (bitte angeben)

26. Inwieweit trifft Folgendes für das Haus, in dem Sie leben, zu?

	ja	teil/teils	nein
Außenfassade, insgesamt renovierungsbedürftig	○	○	○
Gemeinschaftliche Flächen, insgesamt renovierungsbedürftig	○	○	○
Zeichen von Verschmutzung/Vandalismus	○	○	○
Wohnraum, insgesamt renovierungsbedürftig	○	○	○
Wohnraum, hohe Luftfeuchtigkeit	○	○	○
Wohnraum, Schimmelbefall	○	○	○
Wohnraum, hoher Luftdurchzug	○	○	○
Wohnraum, hohe Geräuschdurchlässigkeit	○	○	○

27. Steht Ihnen eine eigene nicht-öffentliche oder halb-öffentliche Grün- bzw. Freifläche zur Verfügung?
Mehrfachnennungen möglich.

- ☐ Nein
- ☐ Ja, eigener Balkon
- ☐ Ja, eigene Terrasse
- ☐ Ja, eigener Garten
- ☐ Ja, begrünter, gemeinsam nutzbarer Garten
- ☐ Ja, begrünter, gemeinsam nutzbarer Innenhof
- ☐ Ja, begrünte, nicht-direkt nutzbare Fläche
- ☐ Ja, nicht-begrünter, nutzbarer Innenhof
- ☐ Ja, sonstiges _____ (bitte angeben)

28. Inwieweit trifft Folgendes für das nähere Umfeld (max. 5 Gehminuten, ca. 150m) Ihres Wohnhauses zu?

	ja	teil/teils	nein
Zahlreiche Bäume	○	○	○
Zahlreiche private Gärten	○	○	○
Landwirtschaftliche Flächen	○	○	○
Wald	○	○	○
Sicht- und hörbare Fledermausaktivitäten	○	○	○
Vorkommen verschiedener Vogelarten	○	○	○
Vorkommen von Schmetterlingen	○	○	○
Begrünte Fassaden und Dächer	○	○	○
Blick vorwiegend auf Grün	○	○	○
Blick vorwiegend auf überbaute Fläche	○	○	○
Blick vorwiegend auf Industriefläche	○	○	○
Blick vorwiegend auf kommerzielle Flächen	○	○	○
Zugeparkte Verkehrsflächen	○	○	○
Von motorisiertem Verkehr stark genutzte Verkehrsflächen	○	○	○
Einige leerstehende Gebäude mit zerbrochenen Fenstern	○	○	○
Verschmutzung der Freiflächen durch Müll	○	○	○
Schlecht beleuchtete Bereiche, die beängstigend wirken	○	○	○
Anzeichen von Vandalismus	○	○	○

29. Steht Ihnen im näherem Umfeld (max. 5 Gehminuten, ca. 150m) Ihres Wohnhauses eine öffentliche oder öffentlich zugängliche Grün- bzw. Freifläche zur Verfügung?

Mehrfachnennungen möglich.

Größenvergleiche: Wiener Prater ca. 600ha - Schlosspark Schönbrunn 160ha - Wiener Augarten 5.2ha - Burggarten 4ha

- ☐ Nein
- ☐ Ja, Stadtwald
- ☐ Ja, zugängliches Ufer eines Gewässers
- ☐ Ja, kleine Parkanlage (< 1 ha)
- ☐ Ja, mittel bis große Parkanlage (1-10 ha)
- ☐ Ja, große Parkanlage bzw. Landschaftsgarten (>10 ha)
- ☐ Ja, kleine Grünflächen
- ☐ Ja, Spielstraße
- ☐ Ja, verschiedene Sportstätten
- ☐ Ja, Kinderspielplatz
- ☐ Ja, Friedhof
- ☐ Ja, Platz ohne motorisierten Verkehr
- ☐ Ja, mit Pflanzen bewachsene Brachfläche
- ☐ Ja, sonstiges _____ (bitte angeben)

30. Welche öffentliche Grünfläche ist für Sie in Wien von besonderer Bedeutung? Aus welchen Gründen?

Zurück | Befragung unterbrechen | Weiter

Sonja Gantioler – 2016

60% ausgefüllt

Einige Fragen zu Ihrer Person

31. Sie sind....

- ☐ männlich
- ☐ weiblich
- ☐ keine Angabe

32. Wie alt sind Sie?

- ☐ <18
- ☐ 18-29
- ☐ 30-39
- ☐ 40-49
- ☐ 50-65
- ☐ >65

33. Wie viele Personen, Sie selbst eingeschlossen, leben in Ihrem Haushalt? Wie viele davon sind Kinder?

Anzahl Personen insgesamt im Haushalt ☐

Anzahl Kinder im Haushalt ☐

34. Bitte geben Sie an, welche Erwerbssituation für Sie zutrifft.

- ☐ ganztags hauptberuflich erwerbstätig
- ☐ halbtags hauptberuflich erwerbstätig
- ☐ gelegentlich oder unregelmäßig erwerbstätig
- ☐ geringfügig erwerbstätig
- ☐ nicht erwerbstätig

35. Wie hoch ist Ihr monatliches Nettoeinkommen (inkl. Rente/Pension, Kindergeld, Studienbeihilfen etc.)?

- ☐ <1.000 €
- ☐ <1.800 €
- ☐ <2.500 €
- ☐ <4.000 €
- ☐ >4.000 €
- ☐ keine Angabe

36. Welchen höchsten Bildungsabschluss haben Sie?

- ☐ Allgemeinbildender Pflichtschulabschluss (inkl. solcher ohne Pflichtschulabschluss)
- ☐ Lehre / berufsbildende mittlere Schulen
- ☐ Allgemeinbildende höhere Schule (AHS), berufsbildende höhere Schule (BHS), Kolleg
- ☐ Universität, Fachhochschule, Akademie
- ☐ Anderen Bildungsabschluss, und zwar ☐ (bitte angeben)

37. In welchem Gemeindebezirk leben Sie?

- ☐ 1 – Innere Stadt
- ☐ 2 – Leopoldstadt
- ☐ 3 – Landstraße
- ☐ 4 – Wieden
- ☐ 5 – Margareten
- ☐ 6 – Mariahilf
- ☐ 7 – Neubau
- ☐ 8 – Josefstadt

- [ ] 9 – Alsergrund
- [ ] 10 – Favoriten
- [ ] 11 – Simmering
- [ ] 12 – Meidling
- [ ] 13 – Hietzing
- [ ] 14 – Penzing
- [ ] 15 – Rudolfsheim-Fünfhaus
- [ ] 16 – Ottakring
- [ ] 17 – Hernals
- [ ] 18 – Währing
- [ ] 19 – Döbling
- [ ] 20 – Brigittenau
- [ ] 21 – Floridsdorf
- [ ] 22 – Donaustadt
- [ ] 23 – Liesing
- [ ] Außerhalb von Wien, aber Arbeitsplatz in der Stadt
- [ ] Außerhalb von Wien, aber häufig aus privaten Gründen in der Stadt

Und zum Abschluss

38. Wien in 100 Jahren: Wie sieht die Stadt aus, die Sie sich als Lebensraum wünschen?

Zurück | Befragung unterbrechen | Weiter

Sonja Gantioler – 2016

80% ausgefüllt

Vielen Dank für Ihre Teilnahme!

Ich möchte mich ganz herzlich für Ihre Mithilfe bedanken.

Falls Sie noch Fragen oder Anmerkungen haben, können Sie mich unter der folgenden E-Mail Adresse kontaktieren:

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