

Urban Forests and Environmental Justice

Insights from Padua and Turin

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Abstract

Cities around the world are employing strategies to become greener and more sustainable, and urban forests can play a major role in providing environmental benefits. However, it has been found that in many cities those benefits are not equally experienced by citizens, highlighting the importance of examining environmental justice. Environmental justice is commonly conceptualised as composed of three pillars, distributional, procedural and recognition justice. In Italy, there is a wide research gap on environmental justice and specifically on how it is understood and operationalised regarding urban forests. Furthermore, there is a gap of knowledge on how governance interacts with environmental justice.

Therefore, this thesis aims at exploring how the three pillars of environmental justice are understood and captured in urban governance, and at assessing how three governance principles, namely participation, inclusiveness, and transparency can impact environmental justice. To do so, a qualitative research approach, with multiple case studies, the cities of Turin and Padua, is adopted. A conceptual framework has been developed to combine the three fundamental pillars of environmental justice, with the three principles of governance. By interviewing ten actors working with the municipalities of Turin and Padua and analysing main planning documents, data and insights are gathered concerning environmental justice and the governance principles and their interaction. The results show environmental justice to be an underdeveloped topic, lacking a coherent and comprehensive conceptualisation in the two case studies, with the distributional pillar being central in both cities. Furthermore, governance principles, although considered fundamental, are only partially implemented to support environmental justice. The almost non-existent possibilities for citizens to meaningfully influence urban forests and their characteristics, coupled with a lack of inclusiveness in decision-making processes, can be indicators of critical issues from the point of view of procedural and recognition justice.

Keywords: Urban Forests, Environmental Justice, Governance, Italy

Executive Summary

Focusing on urban spaces is essential to address many of the major challenges in developing more sustainable societies, given the increasing urbanisation rate across the globe. One of the key challenges urban planners face is balancing these urbanisation trends yet providing sustainable and liveable urban spaces. Urban green spaces have been understood as an essential element of the urban ecosystem to create habitable and healthy cities, being able to potentially mitigate many of the environmental burdens that urban citizens face, such as pollution and heat stress. Urban forests, one form of urban green areas, play a major role in addressing challenges linked to climate change adaptation and mitigation, public health, and biodiversity conservation. Nevertheless, the provision of urban forests in many cities across the globe has often been found to be characterised by injustice and inequality towards marginalised parts of societies. Those groups often live in areas with fewer trees, and lower accessibility to urban green spaces than others, resulting in environmental injustice. As a growing number of cities aim at becoming greener in the next years, it is necessary to pay attention to environmental justice concerning urban forests, to understand the extent to which vulnerable and marginalised individuals and communities benefit less from urban nature than others. Furthermore, governance around urban forests is a key element in determining justice and equity.

However, while there is a considerably solid, and growing, literature on environmental justice concerning urban forests in some countries, there is a wide research gap in Italy on environmental justice both in general and in the context of urban forests. As a result, there is a lack of knowledge about how environmental justice is understood and operationalised in Italy regarding urban forests. Given the paucity of research, furthermore, it is unclear how governance can impact the environmental justice of urban forests in Italy. The broader aim of this thesis is therefore to add to the current understanding of environmental justice regarding urban forests in Italy, and thereby fill the major research gap that exists in this field. Two case studies have been chosen for this research, the cities of Padua and Turin, in Italy. The two cities, although different in history and size, have been chosen because of their current great efforts on urban forests and for having published, among the few cities in Italy, a municipal plan dealing with urban forests and green areas. Moreover, both Padua and Turin have been selected to participate in the EU Mission for 100 climate neutral cities by 2030.

To fulfil the aim, this thesis explores how the concept of environmental justice is understood in Italy concerning urban forests and analyses the relationship between governance and environmental justice. To achieve this, a theoretical framework combining environmental justice and governance has been developed for this thesis. Three pillars of environmental justice, namely distributional, procedural and recognition justice, have been brought together with three key governance principles, participation, inclusiveness, and transparency. This conceptual framework allowed exploring the understanding of environmental justice in a comprehensive and intertwined way. Two research questions (RQs) have been posed and analysed in this thesis:

RQ1: How is environmental justice with regards to urban forests understood in the case studies of this thesis concerning the three pillars of distributional, procedural, and recognition justice?

RQ2: How are the governance principles of participation, inclusiveness, and transparency operationalised with regards to environmental justice concerning urban forests in the case studies of this thesis?

To answer these RQs, this research followed a qualitative approach, collecting data with two methods. Semi-structured interviews with ten actors involved with the two municipalities' work on urban forests allowed for gathering insights into how the three pillars of environmental justice and the three governance principles are understood. Document review and analysis of

strategic municipal planning documents on urban forests allowed for an in-depth analysis of the distributional pillar. The conceptual framework developed for this thesis guided the data collection and the data analysis. The conceptual framework, acting as a backbone of the thesis, allowed for the collection of insights on how environmental justice for urban forests is conceptualised and how governance principles are operationalised and their impacts in terms of environmental justice. Participation, in this thesis, is understood as a continuum of practices, in which five main levels can be identified. These five levels identify different degrees of involvement and sharing of decision-making power. The boundaries between the levels, however, are rather fluid in reality, and practical experiences can manifest themselves with different combinations of practices and designs. The five levels considered are: 'informing', 'consulting', 'collaborating', 'co-deciding' and 'empowering'.

This thesis has shown that the issue of environmental justice, concerning urban forests, is still underdeveloped and conceived as a novelty in the two case studies. Environmental justice, in the two contexts considered, still lacks a unified and coherent conceptualisation with respect to urban forests. Principally, it is based on the right to live in a healthy environment regardless of social, ethnic, religious, or demographic characteristics and variables, in which urban forests and green spaces play a fundamental role. Secondly, environmental justice is often conceptualised as accessibility to urban green areas for all citizens. However, there seems to be a diffuse lack of awareness of the impact of socio-spatial inequalities in terms of justice. Nevertheless, the concept of environmental justice and its awareness are slowly emerging in the case studies. Regarding the three pillars of environmental justice, this thesis has shown that, aligned with what has been previously found, the distribution pillar is central and prioritised in the understanding of environmental justice, in both case studies. The documents showed the prioritisation of accessibility to specific green areas with stringent criteria, lacking an analysis of urban forests in their entirety. In addition, although the variables considered in both cities are only partially comprehensive, they suggest possible uneven distributions across the cities. This thesis has also found that procedural and recognition justice are only marginally considered by the actors interviewed, and absent in the document reviewed.

Concerning the three key governance principles considered, this thesis has generated interesting results. Although all respondents agreed on the importance of participation, inclusiveness, and transparency, their conceptualisation is significantly different from the framework of this thesis. Regarding participation, it was found that, in both cities, citizens have few opportunities to influence decisions about urban forests. Indeed, participation is often operationalised at the level of informing, consulting, and collaborating, and only rarely at the level of co-deciding or empowerment. Furthermore, the level of participation has a strong political component. Inclusiveness, in the two case studies, is mainly understood and operationalised as including the needs of different individuals and groups of citizens in the design of urban forests and urban green spaces. What is lacking, however, is a comprehensive understanding of inclusiveness in decision-making and participatory processes. Finally, transparency is not understood as a reaction to the decision-making procedures and processes that determine the characteristics of urban forests and green spaces, but primarily as an informational, communicative support when decisions are already made. These results further emphasise the low centrality of procedural justice, and recognition, in the two case studies. Citizens, therefore, can only participate and be included in a marginal way, without having real power to influence decisions. This is partly due to cultural barriers, including the very conceptualisation of participation, and partly to an often not full recognition of all citizens and their knowledge. Although the purpose of the research was not to develop injustice claims, the overall non-centrality of environmental justice may indicate the presence of problematic situations and procedures on this aspect.

It is, therefore, possible to conclude that the conceptualisation of environmental justice in the two case studies, compared to urban forests, is still underdeveloped, with a predominance of the distribution pillar. Accessibility to green areas, and marginally their maintenance and quality, are the most prevalent dimensions in the operationalisation of this pillar. There is also a lack of completeness in the socio-demographic variables to study the correlation with accessibility, although in a different way between the two cities considered. In addition, how the three governance principles are operationalised in the two case studies does not seem to strengthen and support the pillars of procedural and recognition justice. Hence, to comprehensively address environmental justice challenges, the analysis of these three principles is essential. Indeed, all three governance principles substantially impact the pillars of procedural and recognition justice, which in turn impact distributional justice.

Based on this research, it is recommended to policymakers to actively engage with environmental justice, to influence the administrative divisions of the municipalities. Political action is essential to trickle down the concept into actual practices and measures. This would help raise awareness and stimulate a public debate, also from a normative perspective, on what can be considered just with respect to urban forests and urban green spaces. Furthermore, it is recommended that political actors increase their efforts in allowing citizens to meaningfully participate in urban forests governance. They should allocate resources and direct the actions of the administrative elements so that deeper levels of participation processes, such as co-deciding and empowering, can be designed and actuated on urban forests in Padua and Turin. Moreover, it is recommended to the two municipalities to start a comprehensive and complete mapping process of the environmental and socio-economic indicators of vulnerabilities in the two cities, to create an awareness of the critical areas. This has been only partially done in Turin and Padua. Intentional recognition and consideration of the socio-spatial inequalities, socio-economic, and environmental vulnerabilities should also be transposed into the planning and implementation of strategies.

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Abbreviations

AI	Artificial Intelligence
ES	Ecosystem Services
EES	Environmental Ecosystem Services
GIS	Geographic Information System
GI	Green Infrastructure
GISP	Green Infrastructure Strategic Plan (Turin)
MGP	Municipal Green Plan (Padua)
NBS	Nature-based Solutions
RQ	Research Question
SDG	Sustainable Development Goal
TCC	Tree Canopy Cover
UF	Urban Forests

1 Introduction

With around 55% of the global population living in urban areas in 2018, which is projected to reach 68% in 2050, urban spaces are an extremely relevant focus for the wide sustainability debate and research (United Nations, 2019). One of the key challenges urban planners are facing is balancing the urbanisation trends, which require city expansion and development to accommodate more people, with the sustainability and liveability of urban spaces (Haase et al., 2017). On the global sustainability agenda, the importance of urban spaces and their sustainability is reflected in the United Nations Sustainable Development Goal (SDG) 11: Make cities and human settlements inclusive, safe, resilient, and sustainable (United Nations, 2015). In this context, urban green spaces have been understood as an essential element of the urban ecosystem to create habitable and healthy cities (Kabisch et al., 2016), in which urban nature can thrive and citizens can access and experience benefits from nature. Furthermore, the urban Green Infrastructure (GI) could potentially mitigate many of the environmental burdens that urban citizens face, such as pollution and heat stress (Baró et al., 2019; Lee et al., 2019). Additionally, Nature-based solutions (NBS), under which urban forest (UF) could be classified, have been increasingly promoted as a viable way to pursue and fulfil urban sustainability objectives in a ground-breaking and often cost-effective way (Toxopeus et al., 2020). Despite all the attention that UF and NBS have received, current and future urbanisation trends as well as increasing urban densification are threatening urban nature, exacerbating its loss (van der Jagt et al., 2021). UF can be defined as “all trees in the urban area, inclusive of individual street trees and clusters of park trees, and peri-urban forests extend to the outer metropolitan area” (Endreny, 2018, p. 1). They provide many environmental, social, and economic benefits to the urban ecosystems and to urban dwellers, such as microclimate regulation and supporting biodiversity.

However, as some scholars point out, the provision of urban green spaces and trees in several cities around the world has been characterized by injustice and inequality towards marginalised parts of societies, such as lack of accessibility to those spaces and an uneven distribution of the provided benefits (Greene et al., 2018; Lee et al., 2019; Mills et al., 2016). Therefore, adopting the lens of environmental justice to analyse the equity and accessibility of UF is vital, as greening cities does not per se increase social inclusiveness or contribute to sustainable cities (Haase et al., 2017). As emphasised by SDG 16, as part of the road towards a more sustainable world, justice concerns need to be considered and addressed systematically, and accountable and inclusive institutions at all levels must be built (United Nations, 2015). In a context of increasing competitive urbanism, in which many cities around the world “unproblematically brand themselves as being the most liveable green city to attract investment and creative class residents” (Anguelovski et al., 2019, p. 1071), those claims need to be thoroughly scrutinised under the lens of environmental justice. Urban forests are a good example to observe the dialectic between society and nature, as urban green spaces are immersed in and influenced by complex and multifaceted power relations (Heynen, 2003).

Many cities around the world are committing to planting trees to become greener and to capture the advantages of such urban ecosystems. The recent commitment to the C40 Urban Nature Declaration by several mayors, with one of the targets being to provide access to a green or blue space within 15 minutes’ walk to 70% of the urban population by 2030, highlights the current greening trend (Wray, 2021). Furthermore, over 600 NBS around the globe in the Urban Nature Atlas ([Urban Nature Atlas](#)) pertain to the category of *Parks and urban forests*, signalling the pivotal importance of UF. Some concrete examples are the concluded *MillionTreesNYC* initiative, which aimed at planting one million trees in New York City; or the *Forestami* project in Milan, which is targeting planting 30 million trees by 2030 (Forestami, n.d.; MillionTrees NYC, n.d.). Following this major global trend, several cities in Italy, similarly to Milan, are moving in the direction of

planting trees and increasing green spaces. Particularly interested in these themes are the two Italian cities of Turin and Padua, recently included by the European Commission among the 100 European cities that will participate in the EU Mission for 100 climate neutral cities by 2030 (European Commission, 2022). Turin, a post-industrial city in northern Italy, has applied for the European Green Capital Award and launched the ‘Torino 2030’ project for a sustainable and resilient city. The ‘Torino 2030 Action Plan’ also includes the vision of a liveable city, interpreted as an accessible, circular, healthy, and green city (Comune di Torino, 2019). Padua, another city in northern Italy, is also working on UF and urban green spaces. A first project, Padova O2, brought 10 000 trees to the city between 2018 and 2019 (*Progetto di riforestazione urbana ‘Padova O2’ - Comune di Padova*, n.d.). More recently, between the end of 2021 and the spring of 2022, another 10 000 trees have been planted in 536 areas of the city (*10mila Alberi per Padova - Presentazione Iniziativa*, n.d.). These two cities, Turin and Padua, are the main focus of this thesis.

1.1 Problem Definition

While UF become a topic of interest for many cities, scholars have found that the provision of UF has been characterised by injustice and inequity in several cities around the world, resulting in some individuals and communities benefitting less from urban nature than others (see for example: Flocks et al., 2011; Gerrish & Watkins, 2018; Heynen et al., 2006; Nyelele & Kroll, 2020; Schwarz et al., 2015). While providing a wide range of environmental and social benefits for the urban dwellers, UF do not per se deliver a holistic sustainable solution for urban spaces (Haase et al., 2017). To holistically contribute to sustainability in the urban spaces, environmental justice must be addressed concomitantly with the development and expansion of urban green spaces. However, while research on UF through the lens of environmental justice has a long history in the international academic world (see for example: Arantes et al., 2021; Greene et al., 2018; Heynen, 2003; Kwon et al., 2017; Mills et al., 2016; Threlfall et al., 2021; Walker, 2012), in several Mediterranean countries it remains rather limited and underexplored (Krajter Ostoić et al., 2018). This research gap is present also in Italy, where research on environmental justice, also outside the context of UF, is an underdeveloped, yet emerging, topic (Gemmiti & Prisco, 2019; Rosignoli, 2017). Many environmental conflicts and issues of the last decades have not been recognised explicitly as environmental injustice, and only a few empirical studies have been carried out (Rosignoli, 2017). As a result, there is a lack of knowledge about how environmental justice is understood and operationalised in Italy. This gap is found not only in academic research, where the term is not debated, but also in practice (Rosignoli, 2017). Even environmental activists and associations rarely use the term environmental justice and consider themselves as being part of the environmental justice movement (Rosignoli, 2017). Consequently, although there are many urban reforestation projects and increased green spaces in both Turin and Padua, the impacts in terms of environmental justice remain unclear, as literature dealing with environmental justice concerning UF is lacking.

Furthermore, the fair distribution between all citizens of the benefits and costs of UF greatly depends on their governance (Nyelele & Kroll, 2020; Threlfall et al., 2021; Toxopeus et al., 2020). The governance principles adopted, the rules, the actors involved, and the decision-making processes shape the UF, where it is located, how it is maintained and what it looks like. Therefore, UF governance is a key element in determining justice and equity for UF, especially because decision-making built on democratic and participatory procedures is a condition for justice (Schlosberg, 2004; Young, 1990). Besides, governance failures are most commonly reported as a cause of environmental injustice, and the “inadequate engagement with local communities in decision-making” is a key element in governance failures and injustices (Zuniga-Teran et al., 2021, p. 238). Nesbitt et al. (2018) point out a research gap in the area between urban vegetation governance and decision-making, especially focusing on recognition justice. Given the large research gap in Italy in environmental justice, it remains unclear how UF

governance interplays with environmental justice. Considering the importance that these urban ecosystems play and will play in the future for climate change adaptation, in the Italian context as elsewhere, it is necessary to understand how and whether governance and environmental justice relate to each other.

1.2 Aim and Research Questions

The broader aim of this thesis is to add to the current understanding of the principle of environmental justice regarding UF in Italy and thereby fill the major research gap that exists in this field. This is achieved by exploring how the concept of environmental justice is understood in Italy concerning UF and analysing the relationship between governance and environmental justice.

To achieve this, a theoretical framework combining environmental justice and governance has been developed for this thesis (see chapter 4). Environmental justice, in its three pillars of distribution, procedural and recognition, is thus analysed in conjunction with three governance principles, participation, inclusiveness, and transparency. This thesis focuses on two case studies, the city of Padua and Turin, in which the framework was applied to gather insights on environmental justice and UF. These two cities introduced UF strategies and are therefore suitable to investigate environmental justice and the governance principles, seeking to address the identified research gaps. Having those research gaps in mind, the choice to include two cities, instead of focusing on one case only, allowed for more and wider insights from different contexts, improving the representativeness of the research.

By conducting ten interviews with actors involved in the municipalities' work on UF and analysing documents of the municipalities, this thesis generates results for academia, UF practitioners as well as the wider public sector on environmental justice. For academia, firstly, the conceptualisation of environmental justice concerning UF is explored in two case studies in Italy. This enriches the literature with an understanding of environmental justice regarding UF in two Italian contexts and provides a basis for further research on the topic. Secondly, it is especially beneficial in uncovering the understanding of how the governance principles are operationalised in a specific context and how their operationalisation relates to environmental justice, reflecting on their value and relevance for UF governance in Italy. Given the fundamental importance of environmental justice in the creation of sustainable cities, this research provides knowledge about how environmental justice can be operationalised by employing certain governance principles concerning UF in the two study contexts. For practitioners, this research is relevant in the way that it can contribute to raising awareness of justice implications concerning UF in Italy and suggest some governance principles that should be considered when implementing and managing UF. In general, exploring the relationship between these principles and environmental justice can help generate useful knowledge to support UF managers, political actors, and citizens in the design of better UF governance arrangements that do not overlook justice concerns. Finally, this research can contribute to the wider public sector debate on environmental justice, sustainable development, and governance.

To achieve the overarching aim of this thesis, the following RQs are investigated:

RQ1: How is environmental justice with regards to urban forests understood in the case studies of this thesis concerning the three pillars of distributional, procedural, and recognition justice?

RQ2: How are the governance principles of participation, inclusiveness, and transparency operationalised with regards to environmental justice concerning urban forests in the case studies of this thesis?

1.3 Scope and Delimitations

The thesis focuses on exploring the current understanding of environmental justice regarding UF in Padua and Turin, two cities in northern Italy, and the interplay between environmental justice and some key governance principles. The conceptual framework developed for this thesis (see chapter 4) is composed of two parts, one dealing with environmental justice and one with governance. The chosen conceptualisation of environmental justice is based on the three pillars of distributional, recognition, and procedural justice, also called the radical justice framework. Therefore, other dimensions of environmental justice are not considered and addressed in this study. For governance, three key governance principles have been included in the conceptual framework, and these are participation, inclusiveness, and transparency. Other governance principles have been excluded from the conceptual framework and lie outside the scope of this thesis. The governance principles have been explored within UF governance. The research focuses only on environmental justice and UF, also considering the related concepts, therefore other contexts or issues, such as waste sites or pollution, in which environmental justice is relevant in Italy are not considered in this thesis. Turin and Padua are the two case studies for this thesis; therefore, the research's scope is geographically limited to the two cities of Padua and Turin, the case study locations of this thesis. Interviews have been carried out with ten actors across both case studies, and two main documents, one of each case, were reviewed, while other supporting documents were consulted. The data collection has been carried out between March 2022 and April 2022; the documents analysed have been published by the respective municipalities in the timeframe of 2020-2022. One of the major limitations of this thesis, also due to the timeframe of the Master thesis itself, is the limited variety of the actors interviewed, all of whom were involved in the two municipalities' work on UF. Thus, the spectrum of different perspectives on environmental justice was limited and could be expanded, in future research, to include NGOs and citizens to enrich the literature.

The delineation of the scope of this thesis is deemed relevant and necessary, as shown by the wide research gap in environmental justice and UF in the Italian context. The scope is coherent with the aim of this thesis to explore and add to the current understanding of environmental justice regarding UF in Italy. The three pillars were chosen for their relevance in the environmental justice literature, and to have a comprehensive but streamlined framework applicable in a context where environmental justice research is limited. Similarly, the three governance principles, based on the literature, were chosen to cover three key themes interacting with environmental justice, such as participation, inclusiveness, and transparency. This delimitation was dictated by the time available for this master thesis, which prevented the author from considering environmental justice in its different dimensions and governance in its entirety. This choice certainly impacted the data collected, their analysis, and the results of the research. The decision to adopt a multiple, rather than a single, case study certainly impacted the depth of data collection and analysis. At the same time, it made it possible to collect insights more broadly. Given the research gap in environmental justice concerning UF in Italy, this choice was considered valid, since it was possible to collect data and insights from different contexts.

1.4 Ethical Considerations

This research has not been funded or supported by any external organisation. The analysis, and therefore the conclusions, have not been influenced by any external party.

Participation in the research, and hence in the interviews, was completely voluntary. The interviews have been carried out under informed consent. Before the interviews, a document, in Italian, was sent to the interviewees. The document contained an overview and information about the research, its objectives, about data collection, storage and handling. It contained

information about the right of the interviewee to withdraw at any time without consequences and to ask the researcher for information at any time during the research. In addition, the document assured anonymity for research participants. At the beginning of each interview, the interviewees were asked whether the content of the document had been read and understood and if there were any questions, the researcher then explained the main points again and asked for consent to participate in the research and to record the interview. Informed consent was therefore requested at the beginning of each interview.

All the interviews' audio files, the transcriptions, and any data collected have been stored in a solid-state drive protected by a password and accessible to the researcher only. The data collected has not been shared with any party other than the author of this thesis, upon request respondents may request access to their respective transcript. To ensure that participants were not recognisable, audio files and transcripts were assigned an alphanumeric code. In a separate document, on hard copy and accessible only to the researcher, the codes were associated with the interviewees. The participants in this study are therefore anonymous. The job or profession of the respondents was generalised to reduce the possibility of identification. An overview of the participants is available in Appendix A: Interviewees. Although this led to a simplification and homogenisation of roles and professions, the author of this thesis considered this measure necessary to protect the identity of the respondents.

Although no sensitive personal data or information were collected during the interviews, these procedures ensure the anonymity of the participants. No possible negative consequences for the participants were anticipated based on their statements or participation in the research itself. Regarding the way the interviews were carried out, the researcher always ensured the utmost respect for the interviewees, avoiding behaviour that could damage and injure the dignity of the person. Any form of discrimination and omission was avoided by the researcher, who tried to be as neutral as possible during the interviews, to avoid any bias or stereotype.

Figure 7-1 and Figure 7-2 have been taken, with permission, from the annex of Turin's Green Infrastructure Strategic Plan (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020; Città di Torino - Area Verde, 2020). Therefore, ownership remains within the authors of that document.

The research design for this thesis has been reviewed against the criteria for research requiring an ethics board review at Lund University and has been found to not require a statement from the ethics committee.

1.5 Audience

There are many expected audiences for this thesis. One audience is urban forest planners and practitioners who want to engage with the concept of environmental justice in a meaningful way. A second group would be policymakers at the local planning level who are dedicated to address and tackle environmental justice concerning the urban forestry of the city. The third audience is the academic community, as this thesis could provide useful insights from a case study about the interplay between participation, inclusiveness, and transparency of governance arrangements and environmental justice for UF projects.

1.6 Disposition

The following is the organisation of this thesis. Chapter 1 presents the research topic and delineates the research problem that the thesis addresses, its aim and RQs, scope and delimitations and the intended audience, concluding with the outline of the thesis. Chapter 2 provides background information about UF, related concepts, and the benefits they provide.

Chapter 3 presents the literature review on the existing knowledge related to environmental justice and UF. Chapter 4 describes the conceptual framework of environmental justice adopted as the backbone of this research. Chapter 5 explains and justifies the research design, the data collection, and analysis methods. Chapter 6 provides background information on the two case studies. Chapter 7 presents the main findings from the research. Chapter 8 contains the discussion of the main findings and a reflection on the results of the thesis. Chapter 9 concludes the thesis with practical implications and recommendations for non-academic audiences and further research.

2 An Introduction to Urban Forests

This chapter offers an overview of UF, the related concepts, and some of the most commonly considered benefits and disservices, providing background information on UF and their importance within urban ecosystems. Section 2.1 presents and defines UF and the related concepts. Next, the main benefits and disadvantages of UF are presented.

2.1 Urban Forests and Related Concepts

UF have been studied by researchers in many disciplines, like urban forestry, biology, landscape and urban planning, medicine, and geography to name a few. The term UF is commonly used as an umbrella term to define all those spaces, within cities or in the suburbs, where trees are present, ranging from small tree-lined spaces, tree-lined avenues, and single trees to whole woods, forests, and parks (Gerrish & Watkins, 2018; Nesbitt et al., 2018; O'Brien et al., 2017). This wide definition, aligned with the one by the Food and Agriculture Organisation of the United Nations (FAO, 2017), is adopted for this thesis. Escobedo et al. (2019) provide a useful picture of how UF, GI, NBS and ecosystem services (ES) are defined, and how their definition and the literature evolved over time. They found the concepts emerged, “in a roughly chronological order, ... [as] urban forests (UF), ecosystem services (ES), green infrastructure (GI) and, more recently, nature-based solutions (NBS)” and the UF concept incorporates many aspects of GI, ES and NBS (Escobedo et al., 2019, p. 3). The discipline of urban forestry, which firstly started at the end of the 19th century in the US, is closely related to arboriculture, with the former concerning tree population management while the latter single tree management (Escobedo et al., 2019; Vogt et al., 2016). However, while the discipline evolved, particularly since the 1960s, it still lacks interdisciplinarity (Escobedo et al., 2019; Vogt et al., 2016). Green Infrastructure is commonly defined as “an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations” (Benedict & McMahon, 2002, p. 12). Given the novelty of the concept, a unified definition of NBS is still missing, however, they are defined by the IUCN as “actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits” (Cohen-Shacham et al., 2016, p. XII). The European Commission defines NBS as “solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience” (European Commission, n.d.; European Commission & Directorate-General for Research and Innovation, 2015). ES are usually defined as “the benefits that people obtain from ecosystems”, “the direct and indirect contributions of ecosystems to human well-being”, “benefits that flow from nature to people”, “services which humans derive from ecological functions” (Escobedo et al., 2019, p. 11). Chan et al. suggest “services are the production of benefits, which are of value to people” (2012, p. 5). Finally, it is acknowledged that the terms UF, GI, ES and NBS are used in a rather compartmentalised manner, and only seldom, and partially, research integrates the concepts (Escobedo et al., 2019).

2.1.1 Benefits and Disadvantages of Urban Forests

It is widely understood that UF provide numerous ES and contribute to the UN SDGs (Bottalico et al., 2016; Endreny, 2018; Greene et al., 2018; Haase et al., 2014; Riley & Gardiner, 2020; Threlfall et al., 2021). As illustrated in Figure 2-1, the ES are grouped into two main categories: environmental ecosystem services (EES) and cultural services (Samson, 2017). The EES are multiple, such as provisioning services, supporting/habitat services, and regulating services (Haase et al., 2014; Samson, 2017). Additionally, there is a growing interest in the economic benefits and monetary evaluation of the ES for policymaking (Rogers et al., 2017).

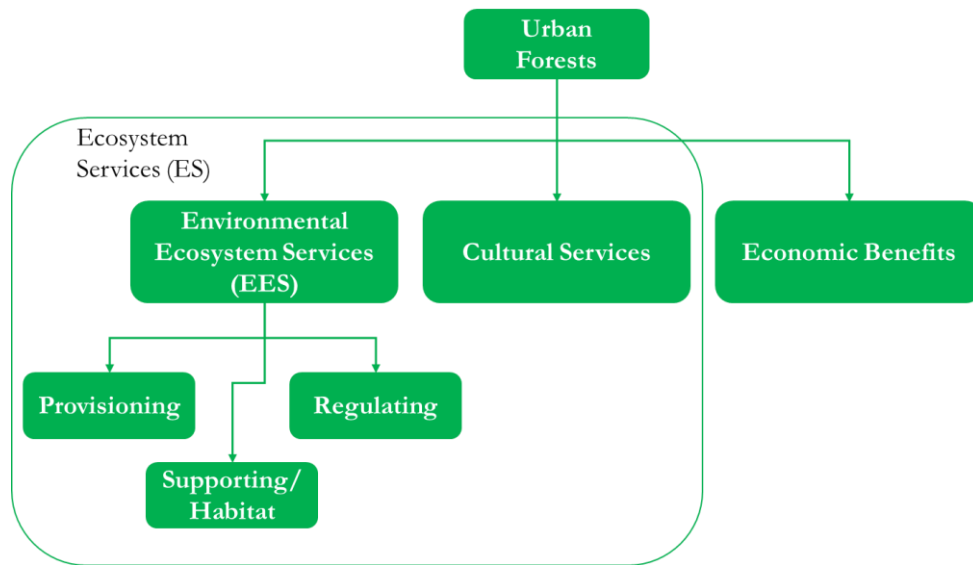


Figure 2-1. A representation of ES and economic benefits of UF
 Source: Own elaboration based on (Haase et al., 2014; Rogers et al., 2017; Samson, 2017)

Some of the regulating services provided by UF are mitigating the urban heat stress, moderating the microclimate, removing pollutants from the air, sequestering and storing carbon, regulating stormwater runoff and purifying water, and enhancing soil quality (Haase et al., 2014; Livesley et al., 2016; Riley & Gardiner, 2020; Tyrväinen et al., 2005). Provisioning services refer to material and energy outputs, such as food, water, raw materials, medicinal and genetic resources and building conservation (Tiwary et al., 2017). Habitat services provided by UF are critical for supporting biodiversity, by providing habitat to different species (Pinho et al., 2017; Samson, 2017). Some of the ES are especially interesting for climate change mitigation and adaptation, public health, and the liveability of urban spaces, and thus are presented in more detail in the following sections.

Urban Heat Stress Mitigation

Especially in the context of global warming and rising temperatures, the urban heat stress reduction properties that UF can provide are extremely appealing. Through the shading and evapotranspiration features of trees, it is possible to significantly moderate and mitigate the urban heat (Hiemstra et al., 2017). The term Urban Heat Island (UHI) has been used to refer to the phenomenon of higher air temperatures in cities compared to the rural surroundings, usually more prominent at night time (Hiemstra et al., 2017). The lack of vegetation and modified land surface, especially built and paved areas, increase the heat both through the “absorption of incident solar radiation and the retention of heat by drier, denser surface materials” (Hiemstra et al., 2017, p. 27). The UHI can be reduced through the cooling effect that certain configurations of vegetation can provide. While there is no convergence on the magnitude of the cooling effect, as it is highly dependent on the local weather and configurations of the green spaces, it has been found that the cooling effect can be very pronounced also in very hot weather, up to 9°C of difference, with a local air temperature above 35°C (Andrade & Vieira, 2012). In a study on 10 metropolitan cities in Italy, the highest surface UHI has been found in Turin, where it increased by 4.0 °C for every 10% increase in areas with low tree density and highly impermeable surfaces (Morabito et al., 2021). Similarly, a study on the UHI in Padua found an effect of up to 7°C in some areas of the city (Noro & Lazzarin, 2015).

Pollutants removal

The trees' capacity to remove pollutants from the air has also been widely studied and documented across the world (Amini Parsa et al., 2019; Baumgardner et al., 2012; Bottalico et al., 2016; Escobedo & Nowak, 2009; Nowak et al., 2018; Scott et al., 1998; Yang et al., 2005). Trees are effective in reducing a wide range of air pollution particles, such as PM_{2.5}, PM₁₀, CO, NO₂, O₃, and SO₃. Air pollution is strictly linked with mortality and hospital admissions (Kampa & Castanas, 2008) and the removal capacity can have consequences on the health of urban citizens, with reduced deaths and morbidity from pollution-related diseases (Burkart et al., 2016; Kondo et al., 2018; Tamosiunas et al., 2014). While air pollution affects the health of everyone, elderly people, children, and individuals with pre-existing health conditions are especially vulnerable and may experience more severe health impacts (European Environment Agency, 2018). In a study in Turin about green availability and respiratory health of children, an association between greenness and some respiratory symptoms and diseases has been found, with children living near green areas less likely to have asthma, bronchitis, and current wheezing (Squillacioti et al., 2019). Furthermore, a positive association was also found between greenness and lung function (Squillacioti et al., 2019). The role UF can have in relation to public health can be seen also during the contemporary sanitary crisis. Due to the damage of fine dust to the respiratory system, a correlation between particular matter in the air and the spread and lethality of COVID-19 was suggested, and UF, because of their ability to reduce PM in the air and its dispersion, play a significant role in providing and maintaining a healthy urban environment (Fares et al., 2020).

Carbon Sequestration and Storage

Trees affect the CO₂ concentration by sequestering carbon dioxide through the photosynthesis and the storage of carbon in their biomass and soil, and thus UF may affect significantly the local concentration of CO₂ in cities (Fares et al., 2017). However, direct estimates of the magnitude of the amount of carbon sequestered and stored by urban vegetation are very complex and difficult to calculate (Fares et al., 2017). This is because of the great variability in the characteristics of both urban spaces and plant species and their distribution. Nevertheless, some studies have estimated carbon sequestration and storage. In New York, the UF in Manhattan are estimated to have sequestered, and now store, 52 000 tonnes of carbon, while the estimates for the whole city rise to 1.2 million tonnes of carbon (Klein et al., 2021). Considering all the UF in Canada, it is estimated that 34 million tonnes of carbon are stored, with 2.5 million tonnes of carbon sequestered per year (Pasher et al., 2014). On a smaller scale, in Leipzig, Germany, UF are estimated to store 316 000 tonnes of carbon (Strohbach & Haase, 2012).

Socio-cultural services

Amongst the socio-cultural services, UF deliver a recreational infrastructure and provide many health and well-being related benefits, such as improving the mood and promoting physical activity, helping fight obesity, contributing to mental well-being and promoting social connections (Carrus et al., 2015; Kondo et al., 2018; Konijnendijk et al., 2005; Nielsen & Hansen, 2007; O'Brien et al., 2017). Less stress and a lower likelihood of obesity are associated with access to gardens or short distances to green areas from the homes (Nielsen & Hansen, 2007). UF, parks, and green spaces offer places where it is possible to recreate, do outdoor sports or other leisure activities, socialise, relax, and connect with nature (Terkenli et al., 2017). Urban green spaces can act as a meeting point for different urban dwellers, reducing the segregation of citizens from different socio-economic statuses (Bonilla-Bedoya et al., 2020). Furthermore, there are architectural and aesthetic impacts of UF on the urban tissue, as well as cultural and historical values (Konijnendijk et al., 2005).

Most recently, some studies focused on the role of urban green spaces in the face of the global pandemic. Lopez et al. (2021), through a survey distributed in New York City, found that the respondents' recognition of the importance of green spaces for their health, which was already high, increased after the beginning of the pandemic. However, it has also been found that apprehensions about safety when visiting green spaces, also linked to fear of infection, lack of access, and absence of desired characteristics in the spaces could also prevent people to visit these spaces and experience the associated benefits (Lopez et al., 2021). Through another survey, Larcher et al. (2021) analysed the perceptions of urban green areas during the strict lockdown period in spring 2020 in Italy, with interesting results. First, trees are the most preferred elements of the green spaces, with lawns being second, underlining the importance of trees in the urban landscape. Second, around 70% of the respondents felt, during the first lockdown in spring 2020, "a recurrent (47.5%) or pressing (23.3%) physical/psychological need for green areas" (Larcher et al., 2021, p. 7). Furthermore, for almost 60% of respondents the interest in green spaces near home increased due to the restrictions and for more than half the frequency of visiting urban green spaces would increase after the lift of the restrictions. More importantly, the research uncovers the importance of public and accessible green spaces, finding that "as the availability of green spaces in the home decreases, the need and desire to use and benefit from urban green areas increases considerably" (Larcher et al., 2021, p. 13). Higher use of urban green spaces during the pandemic was also reported in New York City, coupled with "a stronger sense of belonging" to those spaces (Pipitone & Jović, 2021). In the context of less strict lockdown measures, in Oslo municipality, the outdoor recreational activities of pedestrians and cyclists considerably increased by 291% during lockdown dates (Venter et al., 2020). It was especially in the peri-urban forested area and, for pedestrians, in urban parks and forests, that the activity took place, with a strong preference for pedestrians for green landscapes and tree canopy cover (Venter et al., 2020). These results, while being obtained with different methodologies, such as analysis of STRAVA¹ and Google mobility data, support findings from other studies on the importance and the role that UF and green spaces have in the urban landscape, especially in times of crisis.

Economic benefits

The monetary quantification of the ES provided by UF is often considered as their economic benefits. There is a growing interest in assigning monetary values to ES, as it is argued it can help management processes and the prioritisation of different projects (Rogers et al., 2017). The tendency is also being supported by the EU. In fact, in the *EU Biodiversity Strategy to 2020*, in the Action 5 of Target 2, it is mandated to the Member States to first map and assess ES and then assign them an economic value (European Commission. Directorate-General for the Environment, 2011). Some studies in the literature focused on one specific ecosystem service and calculate its economic value. For example, several analyses in different cities have been done to evaluate the economic benefits of the ES in regulating rain and stormwater runoff (Silvennoinen et al., 2017; Vargas, 2009; Zhang et al., 2012). However, results differ greatly, depending on both the adopted methodology and the specific context, characteristics, and features of natural ecosystems. The cooling effect that UF provide in cities has also been measured in monetary terms, referring to the energy savings it can produce, such as less electricity for cooling (Greene et al., 2018). For example, energy savings in California thanks to trees are estimated to "reduce annual air conditioning energy use by 2.5% with a wholesale value of \$ 485.8 million" (McPherson & Simpson, 2003, p. 73).

Other studies approached the issue by considering ES comprehensively, to estimate the value of UF themselves. For example, the total value of ES provided by UF in three Canadian cities,

¹ STRAVA is software that allows users to track and share the sport activities with other users.

Halifax, Toronto, and Vancouver, is estimated to be more than \$ 330 million per year (Alexander & DePratto, 2014). In Chicago, the net present value of the ES of one tree was estimated to be \$ 402 (McPherson et al., 1997). Nevertheless, the ES can variously bring economic benefits. For example, energy savings due to tree shading have also an impact on the release of pollutants, with associated health benefits for citizens and lower costs for the health system.

However, these economic benefits are not only limited to the monetary quantification of EES. Other economic benefits relate to monetary values of cultural and social ES, the impact on tourism and willingness to pay to visit natural urban areas, the value and prices of properties, crime reduction, and community economic development (For a complete overview, see for example: Nesbitt et al., 2017). Finally, other economic benefits originate from the value of direct use of UF, such as the value of timber products and other natural resources (Konijnendijk et al., 2005).

Disservices

While trees can provide numerous and abundant benefits and support human wellbeing, they are also associated with some hazards and disservices, perceived as negative from a human perspective. These are quite numerous and are of varied nature, such as environmental, health, economic, and social hazards. While some of the disservices are presented here, for a thorough overview please refer to Cariñanos et al. (2017). Although trees can improve air quality, they also release pollen and biogenic volatile organic compounds, the former potentially having health impacts on allergic people, and the latter impact the biosphere-atmosphere interactions (Calfapietra et al., 2013; Cariñanos et al., 2017; Niinemets & Peñuelas, 2008). Furthermore, excessive water consumption required for the maintenance of trees, especially in the cases where the selected species do not cope well with the local climate, is seen as a disservice, likely to increase due to climate change and extended droughts periods (Cariñanos et al., 2017). Finally, there are damages to infrastructure caused by trees, fallen branches and roots, that are linked with monetary costs for repairing.

3 Current Knowledge on Environmental Justice and Urban Forests

The relationship between justice and UF has been researched within a variety of disciplines, such as urban geography, environmental politics, environmental policy, political ecology, and ecological economics. This variety underlines the interdisciplinarity of research that is needed to deal with such complex issues. This chapter presents the results of the literature review on environmental justice and UF. Building on the literature review presented in this chapter, a conceptual framework for environmental justice has been developed and it is presented in chapter 4. It is important to highlight here, however, that being a complex subject, investigating environmental justice concerning UF means looking at different and often interrelated issues. While in the US environmental justice has been debated since the mid-1980s by scholars, activists, policymakers, and government agencies, in the European Union it is with the Aarhus Convention in 1998 that the debate started and that environmental and social perspectives began to be merged (Laurent, 2011; Petrić, 2019). Initially, in the US, it dealt with ethnic, and often associated income, disparities in the exposure to environmental risks, such as pollution, environmental degradation, and waste sites. The first environmental justice movements in the US were also strongly based on “the civil rights movement and linked to bottom-up, community-based activism” (Antal, 2022, p. 3). In Western Europe, on the other hand, historically there has never been a strong environmental justice movement and in turn, the concept has mostly stayed within the academics and public administration (Antal, 2022). The current understanding of environmental justice has broadened since the first use of the term, in the issues considered, to now encompass the ecological and climate crisis, and in the scope, firstly mainly local, now also on a global scale (Antal, 2022).

The literature review presented here draws from a variety of disciplines and includes studies that applied different methodologies to assess and measure environmental justice concerning UF. Several reviewed articles aimed at identifying and measuring the spatial relationships between urban green spaces and socio-economic dimensions. Methodologies and variables considered differed between the studies, as some considered the distribution of ES across the urban space, others the forest cover, urban tree canopy cover, or tree distribution. Some studies relied on quantitative approaches, integrating spatial information with other data to measure relationships using statistics. Other methods included geographic information system (GIS), artificial intelligence (AI), tree inventories, I-Tree Eco tool. The socio-economic and demographic variables that have been considered also differed, with some studies looking specifically at economic dimensions, such as per capita income, and others integrating the economic aspect with other variables, such as education, age, ethnicity, and property value. The main objective of these studies was to investigate the distribution of trees, or ES, in relation to socio-demographic characteristics, and to investigate the presence of socio-spatial inequalities across the city. Studies concerning gentrification used hedonic pricing methods, amongst others, to measure the impact of trees and urban green spaces on house prices and rents. Studies dealing with other issues than distribution only, employed different methods, such as surveys or interviews, to capture the perception and positions of different actors affected by UF and their governance.

Section 3.1 reviews and presents literature focusing on the distribution of UF or ES across cities, to provide an understanding of what is distributional injustice and what forms it might take. In section 3.2, different issues and aspects than distribution are reviewed and presented to give a holistic picture of environmental justice with regards to UF. Section 3.3 presents the results of the literature review dealing with governance and how to foster and assure environmental justice.

3.1 Evidence of Unjust Distribution

3.1.1 Forest and Canopy Cover

Some studies found and measured a positive link between urban forest cover and income (Arantes et al., 2021; Escobedo et al., 2015; Mills et al., 2016; Schwarz et al., 2015; Shiraishi, 2022). Schwarz et al. investigated the distribution of urban tree canopy cover (TCC) in relationship to “race/ethnicity and income”, at the census block level in seven cities in the US (2015, p. 3). While results differed across the seven considered cities, the study established that urban TCC is related to the socio-economic characteristics of the neighbourhoods. A strong positive relationship with income was found in all the cities in the study, while for ethnicity the strongest correlations were found in arid cities (Schwarz et al., 2015). Evidence of more TCC in areas with higher household income was found also in the US Pacific Northwest (Mills et al., 2016). Additionally, “the number of trees ... was positively related to home values after accounting for land use” (Mills et al., 2016, p. 194). Gerrish and Watkins (2018) carried out a meta-analysis and, in the 61 studies considered, they found “significant income inequity in forest cover” (Gerrish & Watkins, 2018, p. 304) both in private and public land. Evidence of uneven distribution was also found in Toronto, where the TCC was strongly associated with the median household income (Greene et al., 2018). In a meta-analysis specifically focusing on ethnicity, significant inequity has been found for the forest cover (Watkins & Gerrish, 2018). Uneven distribution of tree cover and income was also found in São Paulo (Arantes et al., 2021). In the urbanised area of the mega-city, wealthier neighbourhoods experience more tree cover compared to less privileged areas. The authors suggest urban green policies favour wealthier neighbourhoods and the higher land prices in greener areas, compared to less green areas, limit the possibility for lower-income residents to move (Arantes et al., 2021). A similar ‘feedback loop’ is proposed by Schwarz et al. as well, who argue that “high amounts of UTC [urban tree canopy] cover increase property values and further attract households with high incomes. This positive feedback loop may support the continued maintenance of UTC cover in neighborhoods [sic] with high-income households and high levels of homeownership” (2015, p. 11). Similar trends have also been measured in Cali, Colombia, where low-income communities have less tree canopy cover, and fewer and smaller parks, showing the inequity of UF distribution (Shiraishi, 2022). Threlfall et al. (2021) found that education, the proportion of renters, and English proficiency were significant in explaining injustices in certain municipalities in Melbourne. The authors found that tree density and diversity are positively impacted by education, and negatively by the proportion of renters and English proficiency.

3.1.2 Ecosystem Services

Another stream of literature focused on the distribution of ES across the city and the relationship with socio-economic and demographic characteristics (Baró et al., 2019; Battisti et al., 2020; Escobedo et al., 2015; Flocks et al., 2011; Ghorbani et al., 2022; M. S. Graça et al., 2017; Herreros-Cantis & McPhearson, 2021; Nyelele & Kroll, 2020). Baró et al. (2019) studied the distribution of some ES (amount of air purification, runoff mitigation, and temperature regulation) provided only by the circa 200 000 street trees in Barcelona. They considered five variables (income, residents from the Global South, residents with low educational attainment, elderly residents, and children) and found no evidence of a positive association between the ES considered and income, residents from the Global South and residents with low educational attainment. Furthermore, they also highlight that “street trees can play an important redistributive role in relation to the local provision of regulating ES due to the generally uneven and patchy distribution of other urban green infrastructure components such as urban forests, parks or gardens in compact cities” (Baró et al., 2019, p. 54). A study on Bogotá, on selected ES

(air quality improvements, climate regulation, habitat, and aesthetics²), first found a positive relationship between socio-economic characteristics and tree attributes, and second that the particulate removal was “notably proportional to socioeconomic strata with the wealthiest having the greatest potential while the poorest stratum had the lowest” (Escobedo et al., 2015, p. 1040). Flocks et al. (2011) found evidence that in Miami-Dade County, US, areas with predominantly African American residents have less tree cover than areas with predominantly white residents. Furthermore, they also found that “Hispanic areas received the most air pollution removal and benefits while African American areas receive the least. African American areas also receive substantially less energy savings in residential buildings that are two stories or less” (Flocks et al., 2011, p. 130). Nyelele and Kroll (2020) analysed the relationship between some ES (air pollution removal, stormwater runoff mitigation, urban heat reduction, and carbon sequestration and storage) and socio-demographic characteristics (median and per capita income, percentage of minorities, poverty percentage, density of population, and education), finding that, in the Bronx neighbourhood in NY, underprivileged socio-economic groups receive “disproportionately lower ecosystem services” from UF (Nyelele & Kroll, 2020, p. 1). In Tehran, it was found that the supply of the regulating ecosystem service of heat mitigation and cooling was higher in districts of the city with higher socio-economic status, even though its demand was greater in the neighbourhoods with lower socioeconomic characteristic, signalling a situation of injustice (Ghorbani et al., 2022). Within the same approach of analysing supply and demand for ES, a study in New York City revealed “distributional environmental injustice of access to the climate-regulating benefits of ecosystem services”, and less mismatch occurs in areas with a larger proportion of white residents with high incomes live (Herrerros-Cantis & McPhearson, 2021, p. 1). A study in Oslo considered the recreational opportunities that green spaces provide and found that, while accessibility to green spaces is provided for the population of the study area, the spaces are not distributed equally, with “migrants and low-income households having relatively less access” (Suárez et al., 2020, p. 133). Good accessibility and distance to urban green spaces are very important for usage patterns and for experiencing the benefits, as they greatly affect the frequency of visits (Nielsen & Hansen, 2007). As sufficient accessibility to urban green spaces is considered an important factor for liveability in the cities, and due to the often uneven distribution of such spaces, green space accessibility is a topic of environmental justice (Chen et al., 2020). Chen et al. (2020) found that residents of the city centre in Shanghai have better accessibility compared to urban dwellers living in the outer rings and in the peri-urban areas. Finally, the literature focusing on ES and environmental justice mostly addresses regulating and cultural services (Calderón-Argelich et al., 2021).

This body of literature has empirically found that in many cities around the world trees and the services they provide are not evenly distributed, and that often there is a relation between income, wealth, ethnicity, and the tree cover, accessibility and the amount of ES experienced (Chen et al., 2020; Escobedo et al., 2015; Flocks et al., 2011; Ghorbani et al., 2022; M. S. Graça et al., 2017; Herreros-Cantis & McPhearson, 2021; Jenerette et al., 2011; Landry & Chakraborty, 2009; Nyelele & Kroll, 2020; Suárez et al., 2020). The presented literature also gives an understanding of how academia analyses and understands distributional justice. Nesbitt et al. (2019) investigated how distributional justice is understood by urban forest managers and practitioners. The authors found that it is mostly centred around fair access to trees, parks, and ES. Specifically, fair access to trees is often articulated as having a similar canopy cover across neighbourhoods, and fair access to parks relates to their accessibility and proximity to citizens. These results and evidence raise concerns over the distributional justice of UF in cities. The empirical evidence gathered from different cities and continents highlights how certain individuals experience more benefits from the UF, can live in a greener neighbourhood, and

² Considered by the authors a cultural ES, measured with the proxy indicator of property price premium relationship (Baró et al., 2019).

have more access to green spaces. In particular, wealthy and white communities receive, and have historically received, more environmental privileges than working-class and lower-income communities (Anguelovski et al., 2019). Furthermore, green spaces in lower-income areas are often of lower quality and under-maintained, revealing yet another dimension of distributional injustice (Anguelovski et al., 2019).

3.2 Beyond Distribution

The distributional dimension, whether considered by analysing the forest or canopy cover, distribution of trees or ES, seems to be at the core of many municipalities' conception of environmental justice (Nesbitt et al., 2018, 2019). While it is only one aspect of many in environmental justice, in the studies focusing on environmental justice and ES, distribution is by far also the dominant theme in academia (Calderón-Argelich et al., 2021). In a systematic literature review, Calderón-Argelich et al. (2021) found that 65 studies out of 126 focused solely on distribution, while procedural and recognition aspects of justice remain less explored. Similarly, studies addressing GI and environmental justice predominantly focused on distribution (Zuniga-Teran et al., 2021). Injustices, however, incur in other ways than solely distributional aspects. Distributional injustice issues are argued to be only “the ‘tip of the iceberg’ of underlying processes in decision-making” (Zuniga-Teran et al., 2021, p. 241).

The benefits and services UF could provide in the urban context have been linked to access and provision (Kelly et al., 2021). Nonetheless, solely providing access might not be enough. In New York City, in which over 90% of the dwellers live within a 10-minute walk of a park, while accessibility seems not to be a problem, lack of safety and easy access stopped residents from visiting urban parks (Lopez et al., 2021). Kelly et al. (2021) argue that the link between access and benefits shaped the assumption that policies directed at supplying UF will always generate better outcomes for residents. This policy assumption nurtures policymakers' interest in programs that focus on the lack of green space in lower-income areas (Kelly et al., 2021). However, even when addressing and reducing distributive injustice is a priority in the planning, there is the risk of encountering an urban green paradox, in which greening interventions trigger gentrification (Anguelovski et al., 2019; Byrne & Wolch, 2009; Nyelele & Kroll, 2020; Wolch et al., 2014). Green gentrification has been defined as “new or intensified urban socio-spatial inequities produced by urban greening agendas and interventions” (Anguelovski et al., 2019, pp. 1064–1065). Increasing green space availability and accessibility may impact rents and house prices. Several studies from different parts of the world investigated the relationship between the presence of UF, parks and green spaces and property values (Bockarjova et al., 2020; Camargo, 2016; Chen et al., 2020; del Saz Salazar & García Menéndez, 2007; Hoshino & Kuriyama, 2010; Wu & Rowe, 2022). By conducting a meta-analysis of 37 studies that adopted the hedonic pricing method, Bockarjova et al. (2020) found that a decrease in 100 m distance to urban nature increased the property price by 1.497% in Europe and by 0.823% in North America. However, the phenomenon is not limited to those areas, as green gentrification has also been found in the inner ring of Shanghai. The greening efforts of the last 30 years in the central areas of the city, while providing better accessibility to green spaces for the residents, also raised property prices, with the highest mean price of housing in the whole city now being in the vicinity of the largest ecological park (Chen et al., 2020). In Beijing, an increase of 5.7% in housing sales prices was found due to the construction of new urban parks (Wu & Rowe, 2022). While there is variability in the magnitude of the effect and no convergence on a single number, as the green space and house characteristics and methodology choices impact the results, there is evidence that urban green spaces do affect positively house prices (Camargo, 2016). In the end, urban renewal through greening interventions usually targets and benefits the middle class and higher-income groups (Haase et al., 2017). The increase in the property value and rent due to proximity and better access to UF is a matter of environmental injustice, with more affluent citizens being able to live closer to parks and urban nature than others. Therefore,

greening programs that especially impact low-income neighbourhoods may have dramatic consequences, in terms of displacement and further segregation of already underprivileged communities. Anti-gentrification policies do exist, such as the provision of affordable housing and rent stabilisation programs (Wolch et al., 2014). Furthermore, designing greening projects that are “explicitly shaped by community concerns, needs, and desires rather than either conventional urban design formulae” might lead to the creation of ‘just green enough’ strategies (Wolch et al., 2014, p. 241).

From an urban political ecology lens, structural processes in the current dominant political-economic paradigm, like “income inequality, uneven property ownership, and the increased marketization of nature” (Heynen et al., 2006, p. 4) are perpetuated and incarnated in the provision of UF and have exacerbated “socio-spatial differentiation in cities” (Haase et al., 2017, p. 43). While the growth and presence of trees in urban contexts depend on natural and social factors, it is by processes of political economy that forests and trees arise and remain in one place and not another (Heynen, 2003). Greening interventions are also often formulated and promoted “in a positive consensual, apolitical, and green design-oriented fashion” (Anguelovski et al., 2019, p. 1065). Furthermore, in a study, it was found that “as the availability of green spaces in the home decreases, the need and desire to use and benefit from urban green areas increases considerably” (Larcher et al., 2021, p. 13). Poorer households and households without accessible green spaces, depend on public investment, which mainly targets public land, for their “collective consumption of urban ecological amenities”, as they might lack resources and property rights to satisfy their demand for green spaces (Heynen et al., 2006, p. 5). Accessible and fairly distributed public green spaces are thus essential to provide a healthy and liveable habitat to less privileged citizens. Private nature, and its privatization, increase injustice as it excludes certain individuals from benefiting from it. Socio-spatial disparities have also been widened by the COVID-19 pandemic, as marginalised communities experience less accessibility to green spaces, exacerbating environmental injustices (Pipitone & Jović, 2021; Triguero-Mas et al., 2022). Some of the reasons for the spatial distribution inequality of UF are different park design philosophies, land planning and development history and past and present class and ethnic-racial inequalities (Byrne & Wolch, 2009; Wolch et al., 2014). Unbalanced power across the governance structures, gentrification, and privatization of the public space due to urban planning are also seen to be among the causes of distributional injustice (Zuniga-Teran et al., 2021). An important element explaining the current distribution of UF is the historical development of the urban texture, also referred to as the ‘social and biophysical legacies’ (Baró et al., 2019; Nesbitt et al., 2018). Other causes identified in place-based studies are intentional, flawed, and opportunistic urban planning; unequal investments; and governance failures, in which a key aspect is the “inadequate engagement with local communities” (Zuniga-Teran et al., 2021, p. 238).

Increasing attention on procedural justice instead of only focusing on distribution, could lead to more equitable and just urban spaces (Bullard, 1990, as cited in Heynen et al., 2007). The inadequate engagement with local communities and non-participatory decision-making processes concern the pillar of procedural justice. Research has been done concerning procedural justice and UF. In Lisbon, participatory processes are applied very limitedly, often at a very late stage to receive inputs (Verheij & Corrêa Nunes, 2021). The strategies for urban green spaces are developed through processes in which only the technical staff, for the development and implementation, and the mayor and responsible officers, for the decision-making itself, are involved. Furthermore, no specific strategies are present to steer and govern public participation, and the authors thus conclude that “the variety of citizen preferences and needs regarding green space characteristics is less likely to be considered by the decision-makers”, resulting in injustice (Verheij & Corrêa Nunes, 2021, p. 338). Similar procedural injustice has been identified for some UF in Wales in terms of “failure to communicate

adequately with local communities” and their “inadequate access to the procedures of forestry governance and planning” (Kitchen, 2013, p. 1977,1978). On the felling of Sheffield’s street trees, Heydon identified procedural injustice in the “recurring exclusion of local citizens from key stages of the decision-making process” and the lack of public input from the beginning of the process (2020, p. 12). Residents and citizens had no chance to influence decisions through official and legal channels and ways, and from the beginning, “there was no acknowledgement that local citizen input should inform the felling programme” (Heydon, 2020, p. 13). The decision-making processes, marked by an absence of transparency, failed to build trust and respect, leading to marginalisation and misrecognition of local citizens (Heydon, 2020). In Helsinki, participation in UF planning date back to 1995, and a study evaluating the experiences of citizens and authorities in the collaborative planning process show interesting results (Sipilä & Tyrväinen, 2005). Firstly, most participants were satisfied with the process and acknowledged it prevented conflicts in the planning. Secondly, the ‘goals setting’ step was considered the most important for the citizens involvement, and the planning authorities found the process was overall useful. However, the authorities also believed that the participatory process was too time consuming and that they could be “capable of making effective plans even without involving local residents” (Sipilä & Tyrväinen, 2005, p. 1). On one hand, the study demonstrated the importance of early involvement and meaningful participation, on the other hand, it showed the dominant technocratic – often detached from the citizens - approach. However, when designing participation, there is often a wide gap “between policy aims and actual practice resulting in public participation becoming tokenistic” (Morrison & Dearden, 2013, p. 179).

It is this detachment from the citizens that also needs to be bridged. Planning and management activities should recognise the perception of citizens on UF and their benefits. These perceptions are not homogeneous across all the residents and depend on many factors (Madureira et al., 2015). Cultural differences impact the typologies of trees and landscapes that residents may prefer in their place of living (Fraser & Kenney, 2000). In Porto, the perception of the benefits of trees has been found to be strongly influenced by socio-economic characteristics, and it is suggested that these different perceptions should be recognised by the decision-makers to avoid conflicts (Graça et al., 2018). It is crucial, thus, to gather and assess local preferences and perceptions over urban green spaces and trees of the people living close to those spaces (Graça et al., 2018; Madureira et al., 2015). Many authors stress the importance of the local context and dynamics, which need to be fully considered during the planning and policymaking processes, and over which the policies should be based (Nyelele & Kroll, 2020; Riley & Gardiner, 2020; Threlfall et al., 2021; Wolch et al., 2014). In other words, there should be a recognition of the local context and its dynamics by the authorities and experts in charge. The recognition should also be directed at the diversity of users, needs, and desires of the population with regards to UF and its characteristics. This recognition of diversity from authorities and experts is key to environmental justice (Assmuth et al., 2017). However, in general, in the UF management plans, environmental justice is not a dominant issue (Grant et al., 2022, p. 4). In a recent study about 88 UF management plans in the US, where also historically much of the research on UF has been done (Calderón-Argelich et al., 2021), distributional and procedural concerns were addressed fairly often, even though only briefly and “lacking in substance”, recognition justice was missing practically for all the documents (Grant et al., 2022, p. 2). The authors suggest that as the municipal plans are a “key representation of the current state of urban forest management practice”, the findings corroborate the idea that environmental justice issues are not prioritized by practitioners (Grant et al., 2022, p. 27).

3.3 How to Foster Environmental Justice

Governance is a central aspect in the analysis of environmental justice concerning UF and several key concepts and solutions have been suggested in the literature to positively impact environmental justice concerns in urban contexts. According to the systematic review by

Zuniga-Teran et al. (2021), funding is identified as a crucial element affecting justice outcomes, especially long-lasting funding programmes for community engagement, financial support for low-income families, and capacity building. Moreover, capacity building programmes need to be coupled with educational strategies and informational campaigns for citizens. Additionally, funding directed at long term maintenance plans would help increase the quality of urban green spaces, which also affect environmental justice, when certain areas are better maintained than others.

Community engagement is often depicted as a valid “strategy to include the diverse voices, needs, desires, and concerns of the community” to both address procedural and recognition injustice (Zuniga-Teran et al., 2021, p. 239). Recognising community concerns, needs, and desires, will help shape the projects correctly, substituting market-driven approaches with ‘just green enough’ strategies (Wolch et al., 2014). The engagement, alongside traditional methods, can also be facilitated by the use of e-tools, which have been found to overall facilitate UF governance and strengthen the link between citizens and places (Møller et al., 2019). Considering the relationship between the distribution of trees and UF and income, it is also suggested to promote the active involvement of low-income communities, even though it is unclear in which phase the involvement should take place (Gerrish & Watkins, 2018).

In the planning phase, it is suggested that efforts should be directed at mapping and identifying priority areas (Zuniga-Teran et al., 2021), considering the current distribution, social vulnerabilities, and different needs. Furthermore, urban design strategies should be aimed at connecting people and places to the various urban green spaces, improving for example active and autonomous travel and public transport (Zuniga-Teran et al., 2021). These two measures would thus make it possible to gain knowledge of the areas and population groups that are worst served when it comes to distribution and to integrate the needs for accessibility to urban green spaces into urban mobility planning.

Some other measures relate to governance and policies, such as creating integrative policies and enhancing collaborative approaches (Zuniga-Teran et al., 2021). Co-management, defined as “the sharing of power and responsibility between the government and local resource users”, is also put forward as a strategy to increase empowerment, equity and justice, as “people whose livelihoods are affected by management decisions should have a say in how those decisions are made” (Berkes, 2009, p. 1692). Toxopeus et al. (2020), within the context of hybrid governance, identify three conditions that could potentially improve justice outcomes. First, it is important to make transparency a priority in the decision-making processes. Secondly, public control over the NBS should be secured to avoid the private interests of powerful groups from dominating the narrative and decisions. Thirdly, it is essential to allow for a combination of bottom-up consultations and scientific expertise in the decision-making process.

Therefore, on the one hand, the presence of funds and financing that can be used for the development of models of active participation, with particular attention to the most vulnerable groups, and for capacity building; on the other hand, a change in the conception of management, more attentive to co-management, to co-design, to models that provide for the meaningful involvement of residents and the most affected communities. These changes, at the same time, must consider the different local contexts.

4 Theoretical Framework

This chapter presents the conceptual framework which represents the backbone of this thesis. Frameworks are “ways of representing how complex things work” (Bordage, 2009, p. 312), and as environmental justice is a broad and complex field (Svarstad & Benjaminsen, 2020), the adopted framework provides lenses through which to look at certain elements, lenses that guide the researcher’s analysis of reality. The conceptual framework developed and adopted in this thesis is composed of two main parts, the environmental justice pillars and the governance principles. Section 4.1 presents and explains the three pillars of environmental justice, while section 4.2 describes the three governance principles. Section 4.3 brings to unity the elements of the conceptual framework and provides its graphic visualisation. This conceptual framework represents then the structure of the understanding of environmental justice of the researcher.

Environmental justice is a multi-faced concept, that has been widely and differently studied (see for example: Holifield, 2001; Nesbitt et al., 2018; O’Brien et al., 2017; Schlosberg, 2004; Schwarz et al., 2015; van der Jagt et al., 2021; Walker, 2012; Young, 1990). Often, environmental justice is defined as an objective, a condition to reach, and as different researchers or activists might have different objectives, there are also multiple different definitions of environmental justice (Walker, 2012). The action of creating a definition of environmental justice based on objectives is pivotal for the composition of a successful justice frame that can bring together different people.

The conceptual framework adopted in this thesis is based on the three pillars of distributional, procedural and recognition justice. This tripartite understanding of environmental justice is commonly used in literature and has been named the radical justice framework in political philosophy (Svarstad & Benjaminsen, 2020). This tripartite conceptualisation was chosen because of its widespread theoretical implementation in the justice literature (Schlosberg, 2003, 2004; Svarstad & Benjaminsen, 2020; Walker, 2012). While the pillars are presented and conceptualised separated, they are connected to some degree. For example, several authors argue that procedural injustice, alongside recognition, is a driver of distributional injustice (Rigolon & Gibson, 2021; Schlosberg, 2004).

4.1 The Three Pillars

The first part of the framework focuses on the radical justice framework, consisting of the three pillars of distributional, procedural and recognition justice. These three pillars are explained in the following sections, and it is outlined how they framed the data collection and analysis.

4.1.1 Distributional Justice

Distributive justice concerns the distribution of environmental goods and burdens across society, which is a result of several economic, political, and social processes. Different distributions can arise as a consequence of different processes and conditions. Key elements are what is distributed and what principle guides the distribution. About the object of the distribution, the current understanding evolved from the distribution of toxic waste sites in the 1980s to encompass a wide variety of burdens, such as different types of pollution, noise, flood risk, and benefits, such as energy and electricity, green spaces, access to water, biodiversity (Walker, 2012). In the context of this thesis, distributive justice concerns the spatial distribution of trees and green spaces across the cities, their quality, but also access to urban nature and resources invested.

There are many principles of distribution that have been developed and theorised to provide moral guidance for the political processes involved in the distribution of burdens or features across society. Some of these principles have been theorised in the broad literature on

distributive justice theory, which does not strictly relate to environmental goods, but also to how wealth and economic resources are distributed in society. An analysis of such principles and a discussion on distributive theories are outside the aim and scope of this thesis, therefore only three principles will be presented that are relevant for the analysis of the results of this research. Bell (2004) identified three common distributive principles that are applied: ‘principle of equality’, ‘principle of equality plus a guaranteed standard’ and finally ‘guaranteed minimum with variation above that minimum according to personal income and spending choices’. The principle of equality means an equal distribution of the environmental benefits or burden across society, for example, an equal distribution of trees across neighbourhoods, so that each neighbourhood has the same number of trees. The second principle means that, apart from an equal distribution, there should be a minimum standard ensured for all. In the context of UF, it could mean for example that not only trees are distributed equally, but that there are minimum standards for the number of trees per neighbourhood. The third principle is built over the other two, with the difference that above the guaranteed standard, people “can reasonably express their preferences in different ways” (Walker, 2012, p. 44). According to this principle, citizens can express their preferences regarding the quantity and quality of UF, by moving to greener areas or ensuring that they have more trees and green spaces in the area where they live. Therefore, there may be variations between the levels of quantity and quality of UF depending on the personal spending capacity of citizens, except that minimum standards must be guaranteed for all areas. This principle, therefore, allows for non-homogeneity within a city concerning the quantity and quality of UF in the various areas. By applying and adopting one of these principles, the decision-makers implicitly consider such distribution to be just. However, a distribution considered just from one part of society might not be considered just by another, and the same is true for different scales (individual, community, parts of society, political groups).

Distributional justice regarding UF is linked to a fair spatial distribution of and fair access to trees, parks, and ES. Distributions of trees, parks, and ES in which some groups and parts of the population have better accessibility to urban nature and trees due to their socio-economic status are profoundly unjust and unfair. The equal quality and maintenance across the green areas in cities are also characteristics affecting distributional justice. And as seen in section 3, this is the case in many cities around the world. Living in a healthy environment should be guaranteed for everyone, irrespectively of, for example, the economic status, demographic, ethnic, political, or religious aspects, and therefore, there should not be discrimination and differentiation.

The distribution of the urban tree canopy cover or the ES, in relation to socio-economic characteristics, as seen in chapter 3, is often considered a method to assess distributive justice and detect injustice. Other indicators include distance to the nearest park or percentage of the population with access to a certain amount of green space within usually a 5- or 15-minutes’ walk. A recently suggest guideline is the 3-30-300 rule, according to which all the citizens should be able to see at least three trees from their house, every neighbourhood should have a 30% of tree canopy cover, and 300 meters as a maximum distance to the nearest green space of at least one hectare (Konijnendijk van den Bosch, 2021).

For the thesis at hand, having a thorough understanding of the concept of distributional justice is crucial. While distribution might seem like the most self-explanatory pillar of the three and is also the pillar which has been studied the most, defining how a just distribution looks like is complex and often requires some form of value judgement. Principles to guide decision-making processes about environmental justice, as described in this section, can therefore be helpful. However, it still needs to be acknowledged that a distribution that is considered to be just for one person might be unjust for another.

4.1.2 Procedural Justice

Procedural justice is the pillar in the framework that encompasses various concerns over the procedures, who is involved, and who can influence the decision-making processes. Procedural justice can not only cause distributive injustice but can also be a subject of justice itself (Walker, 2012). This means that while an unjust distribution of environmental benefits or costs can be the outcome of unjust procedures, such as the exclusion of the disadvantaged individuals, or the lack of power of certain groups, the procedures can be considered unjust independently.

Procedural justice refers to the justice of procedures by which decisions are taken on UF and urban green spaces planning; it thus deals with the fairness and equity of institutional processes that influence the development of a specific urban plan over others and the state and characteristics of UF. Objectives of procedural justice claims focus strongly on inclusivity and democracy of decision-making processes, the degree to which power is shared and the meaningful participation, especially of affected residents and communities. Less powerful citizens are often excluded from decisional processes, resulting in procedural injustice (Zuniga-Teran et al., 2021). When citizens are allowed to participate, there should be a balanced representation of different stakeholders groups (Bäckstrand, 2006). Furthermore, the available resources, in terms of knowledge, skills, time, and money, of the participants in the decision-making processes are also extremely important (Walker, 2012). Important dimensions are also the desire, motivation, and ability to participate of citizens and residents in the decision-making processes (Nesbitt et al., 2018). Another angle of procedural justice is whether the actors involved can influence the distribution through “equitable labor practices and their inclusion in decision-making” (Heynen et al., 2007, p. 738).

Procedural justice is thus affected by the overall fairness of the processes, accessibility to the decision-making processes, the presence of meaningful involvement of different actors, by the availability of environmental information for the participants (Walker, 2012). The barriers to meaningful citizens’ participation in the decision-making processes and the remotion of such barriers are important aspects to consider within the procedural justice pillar. Procedural justice is seen as a decisive element to address injustice in its many forms due to the central role of decision-making processes in environmental justice concerns over UF (Zuniga-Teran et al., 2021).

4.1.3 Recognition Justice

Recognition justice is the third pillar of the selected conceptual framework of environmental justice. While some justice theorists considered it included, or often implied, in a certain understanding of distributive or procedural justice, recognition justice should be considered a separated pillar, while still being closely linked and tied to the other two (Schlosberg, 2004). Injustice in this dimension concerns misrecognition, which involves “cultural and institutional processes of disrespect which devalue some people in comparison to others, meaning that there are unequal patterns of recognition across social groups (defined by gender, race, religion, ethnicity and so on)”, but also “cultural domination and oppression, being rendered invisible through nonrecognition, and being routinely maligned or disparaged in stereotypical and stigmatising public and cultural representations” (Walker, 2012, p. 50,51). Recognition is thus linked with being considered and being treated with dignity and respect by authorities and by society. Recognition is thus, like procedures, both a subject of and a precondition for justice (Schlosberg, 2004; Walker, 2012).

The lack of recognition is a foundation for distributional injustice (Schlosberg, 2004). If particular social groups, characterised by some features, are not recognised or misrecognised and are devalued in comparison to others, by society and by the decision-makers, then their

needs and desires are not heard and considered. The extent to which citizens are recognised also impacts the possibility to influence and affect UF management and, thus, the distribution, functions, and characteristics of UF (Nesbitt et al., 2018). However, a form of recognition that simply assumes peoples' needs and requests, instead of truly listening and engaging with citizens, may lead to paternalism by authorities and decision-makers (Svarstad & Benjaminsen, 2020). Moreover, this pillar is closely linked to participation, as those who are not recognised feel excluded from the community and society and do not participate (Schlosberg, 2004). Therefore, democratic, inclusive, and participatory decision-making processes are also a way to challenge social and institutional exclusion. The concepts are strictly intertwined, as a truly democratic and inclusive process cannot arise if everyone is not recognised and treated with respect and dignity, given the ability and possibility of participating. Recognition affects knowledge as well, and different sources and typologies of knowledge, such as community and local knowledge, should be recognised by the experts (Verheij & Corrêa Nunes, 2021). If non-institutionalised types of knowledge are not recognised and are devalued in relation to other types, individuals possessing such knowledge will not be given the same recognition and importance in a dialogue.

Evaluating if recognitional justice is considered and how is understood by the actors involved in the case studies of this study is challenging. Recognitional justice, in this context of analysis, is related not only to providing inclusive processes, but assuring that different groups of citizens, individuals, and communities, are not devalued in comparison to others due to cultural and institutional processes. At the core of recognition injustice, therefore, it is possible to find the misrecognition of individuals or communities through insults, stigmatisation, and devaluation, in a way that also delegitimises individuals and groups from participating, as they are not recognised as being worthy of having a stake, for example in the design of an urban park or forest.

4.2 The Governance Principles

The second part of the framework focuses on governance principles, as it has been found that the degree of fair distribution of benefits and costs of UF greatly depends on governance (Nyelele & Kroll, 2020; Threlfall et al., 2021; Toxopeus et al., 2020). Governance influences the implementation of UF, where it is located, how it is maintained and what it looks like. In addition, governance failures are most commonly reported as a cause of environmental injustice (Zuniga-Teran et al., 2021, p. 238).

For the thesis at hand, three key governance principles have been chosen based on the reviewed literature (see chapter 3): participation, inclusiveness, and transparency. The thesis aims to create an understanding of how the principles are operationalised in the case study and how they relate to environmental justice in two case studies. The following sections describe the three principles in detail.

4.2.1 Participation

Participation is a governance principle central and critical for environmental justice concerns in UF (Brooks & Davoudi, 2018; Verheij & Corrêa Nunes, 2021) and it is advocated to be a key element in the interplay between UF and environmental justice (Cousins, 2021). As seen in the literature review and the procedural pillar, participation is often considered a solution to improve environmental justice, and a “cornerstone of democracy” (Arnstein, 1969, p. 216). Instead, more conventional, top-down and technocratic approaches might not guarantee holistic and long-term sustainability if concerns over justice, social inclusion, and the engagement with the citizens are not addressed (Kiss et al., 2022). Participation is a broad term, and already in 1969, Arnstein, in a seminal work, proposed a ‘ladder of participation’ to distinguish different settings and situations in a spectrum of practices (manipulation, therapy,

informing, consultation, placation, partnership, delegated power, citizen control) (Arnstein, 1969). Quite relevant in a discussion on environmental justice is Arnstein's definition of citizen participation, which is associated with citizen power, that "it is the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future" (Arnstein, 1969, p. 216). Starting from here, not only citizens previously excluded should be included, but also, they should be given enough power to influence the outcomes of the participatory process. A more recent categorisation on five levels is adopted by Kiss et al. (2022), depending on the role of citizens and the shared power, from low to high. The five levels are: 'informing', 'consulting', 'collaborating', 'co-deciding', and 'empowering'. Each level of participation has positive and negative features. The lowest level, informing, presents low costs and expenses, and while it can be oriented at educating and rising awareness over the benefits of UF, it is a one-way communication that leaves the door open to powerful actors dominating the narrative and increases the risk of social exclusion (Kiss et al., 2022). Consulting is a form of participation in which inputs from participants are registered on top of the informing purpose, and whether this is a 'tick the box' process is highly dependent on its design and execution (Kiss et al., 2022). However, generally, citizens may be heard but there is no assurance that the inputs will even be considered (Arnstein, 1969). The third level, collaborating, usually identify processes in which the inputs are considered, and citizens are involved in the implementation of the project, whether through money or labour donation, often through engagement with organisations or movements. There is a risk, however, of these selective forms of collaboration to be exploitative and exclusive (Kiss et al., 2022). Co-deciding identifies a strong cooperation between citizens and project leaders, especially, but not only, in the planning phase, through which each part can learn and build trust, while making its position heard and understood (Kiss et al., 2022). Nevertheless, the authors identified that social groups lacking "assets and skills (e.g., language, culture) required for decision-making might be left out" (Kiss et al., 2022, p. 5). This issue can be linked to both the procedural and recognition justice pillars. Within just and inclusive procedures, in which participants are recognised and respected, resources should be made available to allow meaningful and influential participation. The last level is empowering, in which the final decisions are made by the citizens themselves. Fundamental to this process, again, are the trust-building activities and the necessary resources, such as knowledge and capacities. Kiss et al. (2022) argue that within this level, focusing too strongly on environmental justice could hinder short term environmental benefits. Despite these distinctions between levels, the boundaries are very fluid and different combinations and configurations can be found in reality. Furthermore, research says that although participation brings benefits to citizens and an improvement in the quality of processes, it is not so clear whether participation improves the physical quality of green spaces as an outcome (Fors et al., 2015). Similarly, deeper level of participation – collaborating, co-deciding and empowering - do not automatically improve "ecological and sustainability outcomes", however, they support and consolidate the social sustainability outcomes, such as "knowledge mobilization, social learning, enhanced sense of belonging and greater motivation for environmental stewardship" (Kiss et al., 2022, p. 6). Social inclusion and the creation of a stronger sense of place can benefit from participatory planning processes coupled with procedural justice reforms and measures (Lopez et al., 2021). Against these concepts, it is possible to conclude that only the deeper levels of participation, the two levels of empowering and co-deciding, can be considered aligned with the conceptualisation of environmental justice presented in this thesis. Less deep levels do not assure that citizens and residents can influence the decisions over UF. From a justice perspective, simply informing and gathering input does not ensure that people living or working in an area are recognised, that their needs are heard and considered, and that they can influence decisions that affect them. Being informed about a forestation project or the future of a park and being able to give input, although essential, is not enough. Community engagement is considered a successful "strategy to include the diverse voices, needs, desires, and concerns of the community ... can address procedural ... injustices" (Zuniga-Teran et al., 2021, p. 239).

However, this community engagement should be designed and performed in a way that allows citizens and communities to influence the processes, and not only to gather inputs that can be disregarded. A “real understanding of what communities need and want” from UF, to inform policy-makers and planners to determine priorities is thus needed (Lopez et al., 2021, p. 7).

4.2.2 Inclusiveness

Inclusiveness in governance has been included in the ‘good governance principles’ by Lockwood et al. (2010) and it should aim at “continuously creating a community involved in coproducing processes, policies, and programs for defining and addressing public issues” (Quick & Feldman, 2011, p. 272). Systemically inclusive governance approaches have been demonstrated to deliver better outcomes, and inclusiveness is considered a requirement for successful engagement with communities and citizens (Akhmouch & Clavreul, 2016). Therefore, it is essential to map all the stakeholders and affected people, their motivations and responsibilities (Akhmouch & Clavreul, 2016). The principle refers also to how inclusive the actors in power are toward different views and needs of different parts of the society. Inclusiveness leads to the possibility of gathering types of knowledge from different sources, and different perspectives, which are essential in solving complex problems (Lockwood et al., 2010). Furthermore, inclusiveness is strongly linked with recognition justice, which for example has been defined also as “providing racially and ethnically inclusive political and urban regeneration processes in a fitted institutional structure” (van der Jagt et al., 2021, p. 3). To be recognised is then a prerequisite to being included, and the two concepts are also intertwined with participation. Deeper levels of participation require different individuals and communities to be recognised and included. However, individuals and communities could still be recognised and included, but no power is shared with them and their possibilities to influence the decision-making processes could still be rather limited. Governance is inclusive when all the stakeholders and affected individuals and communities can engage in the governance processes, on “a basis equal to that provided to all other stakeholders” (Lockwood et al., 2010, p. 994). However, the possibility of such engagement is also dependent on the procedural justice of the processes. A prerequisite for inclusiveness in urban greening is also the “deliberate acknowledgement and consideration of socio-spatial inequalities in the planning, implementation and monitoring/evaluating of greening strategies by scientists and planners” (Haase et al., 2017, p. 45).

4.2.3 Transparency

Transparency in this thesis is linked both to “open decision-making by governments and nonprofits” and as a “tool of good governance in programs, policies, organizations, and nations” (Ball, 2009, p. 293). Transparency has been included as well in the ‘good governance principles’ by Lockwood et al., as “(a) visibility of decision-making processes; (b) the clarity with which the reasoning behind decisions is communicated; and (c) the ready availability of relevant information about governance and performance in an organisation” (2010, p. 993). Transparency is important for environmental justice and the pillars for several reasons. Firstly, concerning distributional justice, transparency is important in the provision of information about the current distribution of trees, UF, and green spaces. Without access to this information, citizens, researchers, and various actors would not be able to determine the presence or absence of injustices concerning distribution, form justice claims, and take action to change the situation. Although with the development of GIS systems and satellite data analysis, it is possible to overcome the lack of official data in a certain way, these systems are not easily accessible to the majority of citizens. Consequently, transparency in the sense of ready availability of information for all is essential, and also means the provision of information in different languages, so that all citizens can access it. However, being inclusive, for example in the languages in which disseminating environmental information, and fully transparent requires a degree of recognition

towards those citizens that do not easily understand the main language of the country. Secondly, transparency and procedural justice are closely intertwined (Huang & Chen, 2021; Sovacool et al., 2016, 2017). Availability of information is a condition necessary for participation in the decision-making processes and high levels of transparency presuppose clear visibility of decision-making processes and their openness. Since procedural justice deals with decision-making processes, who has access to them, how power is shared, and the fairness of procedures, the lack of transparency of the processes limits the possibility of verifying the fairness and equity of the processes. Procedural injustices can then arise when processes are untransparent, information is not readily available so citizens cannot create an informed judgment and participate meaningfully. The principle of transparency, therefore, impact not only the three pillars of environmental justice but also interacts with the other two governance principles. Transparency is important also with regards to the justification of why certain actors and groups are included and others not, why certain participation processes are designed in a certain way and finally why certain decisions are made in a certain way.

4.3 Conceptual Framework

This section presents how the single elements of the theoretical framework are understood and adopted in this thesis. Figure 4-1 below is the graphical representation of the conceptual framework.

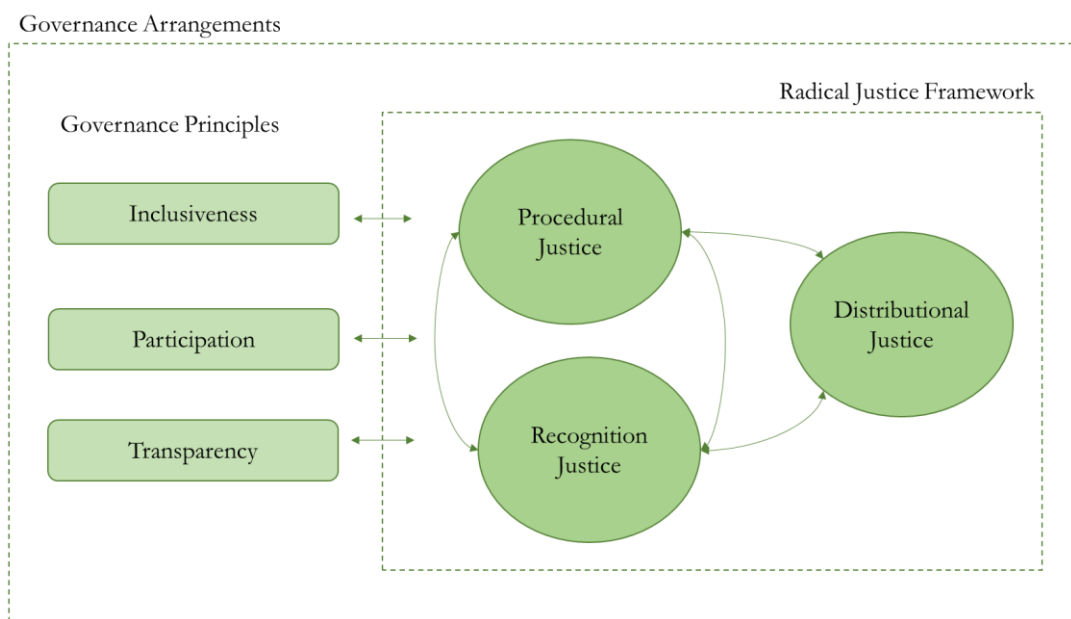


Figure 4-1. The conceptual framework adopted in this thesis
 Source: own elaboration

The three pillars of justice of the radical justice framework are all interlinked, as they interact and influence each other. However, the pillars of procedures and recognition, which closely influence each other, are important drivers of distribution. Distributional justice is thus seen as an outcome of certain decision-making processes and is impacted by the presence of justice in procedures and the recognition of individuals. This is because the UF present in the urban context are outcomes of political and economic processes and depend strongly on social factors, especially in highly anthropized contexts (Heynen, 2003). While it is possible to have spontaneous and natural UF, their existence and permanence in a place are also a result of decision-making processes. The current distribution of UF is a result of past decisions and processes, and its justice is affected by the procedural and recognition justice of those processes

and decisions that gave shape to the current UF. Similarly, the current procedures and decision-making processes shape both the current distribution, as they can change it, but also the future distribution of UF. The governance principles considered, inclusiveness, participation, and transparency, impact environmental justice, especially the two pillars of procedures and recognition. The way the principles are applied, so the level of inclusiveness, participation, and transparency, impact, but are also characteristics of, procedural, and recognition justice. For this reason, the arrows linking the principles to environmental justice have a double direction. The last element of the conceptual framework is the governance arrangements, which provide a boundary within which the elements are located. Although the analysis of governance arrangements is beyond the scope and aim of this thesis, they are often configured in four dimensions: discourses, actors, resources, and rules of the game (Buizer et al., 2015). Bearing in mind the variability of these arrangements both at a general level on UF and for specific projects, they provide a frame that encompasses the decision-making processes, the actors involved, the resources available, and the rules, or procedures, that influence UF and policies.

5 Research Design, Materials, and Methods

This chapter presents and outlines the research methodology employed for this study. First, the research design is presented, explaining the multiple case study design (section 5.1). Section 5.2 describes the methods chosen for the data collection, while section 5.3 provides an outline of the material collected to validate the findings. Section 5.4 deals with data analysis and the methods used to interpret data.

5.1 Research Design

Given the nature of the aim and goal of the research, the thesis will follow a qualitative exploratory research approach. This type of approach allows for “exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (Creswell & Creswell, 2018, p. 41), therefore particularly fitting to understand how environmental justice is understood in two cities in Italy, Padua and Turin, especially given the wide research gap on the topic (Krajter Ostoić et al., 2018; Rosignoli, 2017).

The worldview of the researcher for this thesis can be situated within constructivist and transformative (Creswell & Creswell, 2018). The meanings that are developed by individuals are varied and multiple, subjective, complex, and based on experience (Creswell & Creswell, 2018). One of the characteristics of this research is to rely on the views, perspectives, and experiences of the individuals about the situation being studied, and inductively try to extrapolate patterns and themes to create an understanding of the context through the interpretation of the researcher. The researcher’s interpretation is shaped by their knowledge, personal, and cultural experiences. An underlying assumption is that the “generation of meaning is always social, arising in and out of interaction with a human community” (Creswell & Creswell, 2018, p. 46). However, some features of the transformative worldview, namely the justice and change oriented focus, are acknowledged by the researcher as shaping their assumption and understanding of the world.

The qualitative research design of this thesis is multiple case studies. Firstly, a case study as a design is deemed fit for the purpose because it allows in-depth analysis in a specific context (Creswell & Creswell, 2018), but also the related contextual conditions (Sovacool et al., 2018). The understanding of the real-life phenomenon object of the research, the perception of environmental justice concerning UF, is deeply entangled with the contextual conditions in the specific, considered, municipalities. Because of its focus on the phenomenon and the context, a case study is considered appropriate (Yin, 2009). Furthermore, placed based studies are important when examining environmental justice (Mohai et al., 2009). The case studies are two cities in northern Italy, Padua and Turin. The choice of having two case studies, instead of focusing on one only, allowed for more and wider insights from different contexts, improving the representativeness of the research, especially considering the wide research gap on environmental justice in Italy. The two case studies are not used for a *compare and contrast* logic (Bartlett & Vavrus, 2017). Instead, it mostly adopts the logic of *tracing across*, to comprehend the meanings and differences in the understanding of environmental justice, but also to trace the linkages across different scales and sites (Bartlett & Vavrus, 2017).

5.2 Case Study Selection

A non-probability sampling method was employed for this thesis. An initial screening of the municipality websites of the largest Italian cities was carried out to gather information on urban forestry. Further grey literature was consulted regarding some specific urban forestation projects in the considered cities. Initial contact was made with multiple actors involved with urban green and urban forest management. This resulted in the identification of two suitable cities that have a municipal plan for urban green space management and whose contacts show interest in

collaborating in the research. A telephone interview was made with two of the actors, one in Turin and one in Padua, to collect initial information, and discuss and analyse feasibility. Padua was chosen because of the recent publication of the municipal green plan (in the first quarter of 2022), an instrument that has not yet been widely applied in Italy. Moreover, the participatory process that accompanied the birth of the plan was a very important criterion for the choice of the city as a case study. A forestry researcher, contacted by the author of this thesis, provided the initial contact for the case of Turin. The researcher, in addition, additionally suggested Turin as a case study for its municipal green plan published in 2020. During a telephone conversation with a municipal officer, the interest in collaborating emerged immediately. In addition, Turin was also chosen for its candidature for the European Green Capital Awards, which was seen as a sign of an active willingness to increase and improve urban green areas. As Turin's plan was developed without the public participation programme that was followed in Padua, the two case studies represent two different topical realities for the municipal green plan. In addition, the selection of two cities with a different history, size, and characteristics, such as Padua and Turin, provides insights from different contexts, a medium compact city and a large metropolitan city.

5.3 Methods Used to Collect Data

Qualitative methods have been used for the data collection, in coherence with the research approach and design. These methods included interviews and document review to reconstruct the case study and gather insights and meaning from the participants.

In total, ten interviews have been done with different actors in Padua and Turin. An overview of the interviewees can be found in Appendix A: Interviewees. The interviews focused on how environmental justice is understood and operationalised in the two case studies. Furthermore, attention has been given to understanding how the three governance principles, participation, inclusiveness, and transparency, interact with the three pillars of environmental justice in the specific context. The interviews also helped reconstruct the case study characteristics and features that shape the understanding in the specific contexts. The sampling of interviewees has been done in a mixed way. A first initial contact, via email and telephone calls, was done with one person working for the municipality for each case study. These first meetings also provided an idea of the possible interviewees in the two cities, thanks to the help of the initial contacts. Snowball sampling was partially used as a method, together with convenience sampling. Actors involved with the two municipalities' work on UF have been chosen given the essential role of municipalities as a provider of UF for society. As regards the number of interviews, saturation has been used as a criterion to limit the interviews. The interviews have been conducted in Italian. The interviews were semi-structured, to assure the collection of comparable data across interviews. However, as the research deals also with actors' perceptions and understanding of environmental justice in UF, it is important to be able to capture the nuances and differences. The questions have thus been open-ended, to capture the construction of meaning by participants. An interview guide has been formulated to collect empirical data to answer the RQs, of which the English translation can be found in Appendix B: Interview Guide. However, often follow-up questions arose during the interviews, depending on the specific answers. Following previous agreements with the interviewees, interviews have been recorded and transcribed. The recording and transcription process assured the truthfulness of the information and reduces the risk of the researcher missing out on critical information, and generally improves the data analysis. This method also helped reduce the risk of selecting, even unconsciously, data by taking notes on particular aspects over others. Interviews are deemed to be a valid data collection method because they overcome the challenge of directly observing participants in their daily work, participants can provide information and dialogue with the researcher, while still giving the research the control over the discourse (Creswell & Creswell, 2018).

Document review is also deemed to be a prominent data collection procedure for the reconstruction of the case study, providing useful information on the city-wide greening policies. This procedure presents numerous advantages, such as time availability and its characteristics of dealing with already written evidence (Creswell & Creswell, 2018). Two main documents were used to collect data, which are the two municipal plans for green areas. These two documents have been selected because they represent a quite new tool in the Italian context. The Italian Committee for the development of the public green areas [*Comitato per lo sviluppo del verde pubblico*] published, in 2017 and 2018, two documents providing guidelines, the first, and strategies, the second, for urban green spaces. These high-level documents identify in the voluntary municipal plan for the urban green spaces [*Piano comunale del Verde*] the appropriate tool for the strategic definition and for the establishment of guiding criteria for the creation of public green areas. However, these municipal plans are still rarely used by the municipalities in Italy (Comitato per lo sviluppo del verde pubblico, 2019). Nevertheless, Turin in 2020 and Padua in 2022 published such voluntary municipal plans, which are now the main strategic and planning tool for municipalities on these themes. For the case of Padua, the main reviewed document is the Municipal Green Plan (MGP) [*Piano del Verde del Comune di Padova*], a recently published (February 2022) and approved (March 2022), strategic document for the planning of urban green spaces (Comune di Padova, 2022). Additionally, two documents summarising the results of a participatory process carried out regarding the municipal plan were also reviewed (Comune di Padova, n.d.-b, n.d.-a). For the case of Turin, the main reviewed document is the Green Infrastructure Strategic Plan (GISP) [*Piano Strategico dell'Infrastruttura Verde*], published in December 2020, and its annex document (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020; Città di Torino - Area Verde, 2020). The two municipal plans have been chosen because of their central role in the strategy of municipalities on UF and green spaces. Furthermore, these documents contain interesting analyses and data on the distribution of urban green spaces and their accessibility that are of relevance to this research. An overview of the documents reviewed and analysed in this thesis is available in Appendix C: Overview of the Reviewed Documents.

5.4 Methods Used to Analyse Data

In line with an exploratory qualitative research design and qualitative data collection methods, a thematic analysis with a reflexive approach has been used for the data analysis (Braun et al., 2019). A reflexive approach to thematic analysis means that “the aim is to provide a coherent and compelling interpretation of the data”, with themes being considered as “meaning-based patterns” (Braun et al., 2019, p. 848). However, the codes for the analysis have been generated both deductively and inductively. The conceptual framework outlined in chapter 4 was used as the structure for the collection of the data but also as the basis for a set of initial codes. Nevertheless, some codes emerged during the analysis process and were grounded in the data, coding being an iterative process. The coding framework can be found in Appendix D: Coding Framework. With this analysis method, the researcher has an active role, and their subjectivity is a resource for the analysis. The interpretation of the data to categorise and map themes and common patterns is done through filters and lenses, such as “own cultural membership and social positionings, their [of the researchers] theoretical assumptions and ideological commitments” (Braun et al., 2019, pp. 848–849). The first step of the analysis, after having prepared the data by transcribing the interviews, was to familiarise with the data, to create a general understanding. After, the initial set of codes was applied to the collected data, assigning text portions to the respective codes. During this process, in which the research engaged with the collected data in detail, new codes were also generated inductively and applied. Afterwards, the codes were assigned to the general themes relevant to answering the RQs. These steps were iterative, and both the codes and the themes were refined several times until resulting in the final coding framework and themes. The coding process was supported by the software NVivo, allowing for easier and more efficient data analysis.

6 Background of the Case Studies

This chapter briefly describes the two cities, which delimitate the geographical scope of this thesis, with a particular focus on urban green spaces and the municipal plans under analysis, providing background information helpful for the readers' understanding.

6.1 Padua

Padua is a municipality in the Veneto Region, situated in Northern Italy, with just over 200 000 inhabitants. The town has a long history, dating back to the 11th-10th centuries BC, becoming an important centre first in Roman and then Venetian times. In recent centuries, it came under the jurisdiction of the French and Habsburg kingdoms, before being annexed to the then Kingdom of Italy (*Storia Della Città Di Padova - Comune Di Padova*, n.d.). The city was destroyed during the Second World War, and reconstruction has changed its urban structure. At the beginning of the 20th century, the first public gardens were built (*Giardini dell 'Arena*) and today six areas are considered to be gardens of historical, cultural, and environmental importance (*Parchi Storici Di Padova*, n.d.). The municipal area is 93 square kilometres, with an average density of 2 235 inhabitants/square kilometre (Comune di Padova, 2022, p. 19). While the city is divided into six districts³, the municipality created ten neighbourhood councils (*Consulte di Quartiere*) with a specific spatial area of competence⁴. These councils and the area under their competence are the units of analysis considered in the MGP. Padua is also home to one of the oldest universities, founded in 1222, now a large university with more than 60 000 students (Università di Padova, 2012; USTAT, n.d.).

Total green areas, including public and private, agricultural and non-agricultural, cover 56% of the municipal territory, for a total of 53.28 square kilometres, resulting in 251.39 m² of total green space per capita (Comune di Padova, 2022, p. 31). However, Padua has a very high level of soil consumption, according to recent data, reaching 49.6% in 2020 (Munafò, 2021). Soil sealing, which is one of the main causes of soil loss at the European level, contributes directly to the creation of urban heat islands (Munafò, 2021). In Padua, due to also to the compactness of the built environment and the soil sealing rates, the heat island phenomenon is particularly strong in some areas of the city. In the zone of the historic city centre, temperatures in summer were found to be up to 7°C than in cooler, rural areas, with significant implications for the population groups most sensitive to high temperatures (Noro & Lazzarin, 2015).

The agricultural areas account for 55% of the total 53.28 square kilometres of green areas, and private green spaces account for 80% of the total, while less than 10% are owned by the municipality (Pristeri et al., 2021). The municipality thus owns only 5.80 square kilometres of green areas, and therefore there are 28 m² of municipal green space per capita available (Comune di Padova, 2022, p. 31). The city's tree inventory amounts to around 49.000 trees, of which 23% are street trees, with over 261 different species. The current urban tree canopy cover is 1.8%, and the MGP sets a target for 2041 of 5%.

The MGP is a planning tool, containing a strategic vision of urban and peri-urban green for the medium to long term. One of the novelties, for Padua, is the approach taken, which frames the overall public green assets from a GI perspective. It was developed in coordination and collaboration between different working groups, professionals, and experts from the University of Padua. Strategic actions identified within the plan, to be undertaken, are environmental awareness and education; planning and design of green areas; and monitoring of the strategy.

³ Center, Nord, Est, Southeast, Southwest, West.

⁴ District Center and Nord have one council each, the other districts have two councils each.

The MGP, recently adopted, in setting the visions for the management of the green spaces, defines three main objectives (Comune di Padova, 2022):

1. Improving the functionality (in terms of ES) and increasing the surface area of the GI, to mitigate the urban heat stress and climate change.
2. Improving the health and well-being of citizens by removal of pollutants by the UF, increasing the quality of life.
3. Protecting biodiversity to ensure the full functionality of ecosystems and GI in a resilient city.

To pursue these objectives, the plan articulates four macro strategies. The first one concerns the tree heritage, considered a fundamental element of the urban green infrastructure, which, following the general objectives of the plan, foresees an increase in tree canopy cover, the selection of species adapted to climate change, an increase in biodiversity and finally the dissemination of information to the population. The second strategy concerns soil sealing and rainwater management, intending to depave the built environment where possible, by installing NBS. The third strategy deals with biodiversity, and it is especially aimed at mapping Padua's biodiversity and identifying current and potential ecological corridors. The fourth strategy is called "Parks and accessibility" and targets improving accessibility for citizens by identifying areas, already owned by the municipality, that can be transformed to meet certain criteria, as explained later in section 7.1.1.

In addition, a participatory process was carried out in 2021, through the municipal Agenda 21 office, to draft the MGP. The process allowed the separate participation of three categories of actors: specific technical stakeholders; the city councils and citizens; and sports, environmental and cultural organisations of the city. The modes of participation were slightly different for the three categories, while the common trait was the presence of an informative part about the plan, its contents and objectives, and the general aim of collecting input and proposals from the participants. The first and third categories of actors were involved through meetings in which there was the collection of proposals and indications from the actors, discussion, and confrontation. As far as city councils and citizens are concerned, six focus groups were organised, with a total of 80 participants amongst citizens and council councillors. These focus groups aimed to collect ideas, indications, and proposals from citizens and councillors on three specific areas: accessibility, usability, and communication and information between municipality and citizens. Two documents, analysed in this research and published on the municipality's website, summarise the proposals gathered at the meetings (Comune di Padova, n.d.-b, n.d.-a). The concluding documents were not voted on by a majority but shared by all the participants in terms of content, bringing together the proposals common to all and leaving separate those on which there was less agreement (R2P⁵).

6.2 Turin

Turin is a municipality in the Piedmont region, situated in the North-west part of Italy, with just over 850 000 citizens. The city of Turin is also part of a larger metropolitan area, which encompasses more than 300 municipalities, with a population in the metropolitan area of more than 2 200 000 inhabitants. The city lies at the foot of several wooded hills, in a lowland area crossed by four main rivers. The city was founded by the Romans, and until the 16th century, the provision of urban greenery and trees was rather scarce, but also not considered as much as today. The city then became the capital of the then Kingdom of Italy and underwent numerous transformations, also concerning the green spaces. Nobles and royalty had residences with parks

⁵ Respondents in this thesis are referred to with the letter R followed by the number of the interviewee and a letter indicating the case study, P for Padua and T for Turin. The overview can be found in Appendix A: Interviewees

and gardens and during Napoleonic control, many tree-lined boulevards were built to connect the noble residences. At the beginning of the 19th century, the first public gardens were created, including the famous Valentino Park, where the then summer residence of the royal family is located. During the 20th century, there was a major industrial expansion, led by the automobile industry, whose peak was in the 1970s. At that time, there were 1 100 000 inhabitants, and the city undertook an expansion to provide housing for workers. Green areas still played a residual and non-priority role, and there were 4 000 000 m², resulting in 3.6 m² per capita. Following the crisis in the industrial sector after the peak, the relocation of factories, and a deep economic, social, and environmental crisis, there were also efforts to redevelop many areas, including public green spaces. The first work was done during the 1980s and 1990s on the city's river axes, creating several river parks, with the underlying idea of linking various green spaces together. Subsequently, efforts were directed towards the recovery of abandoned former industrial areas, with their transformation into parks, which however also need to be reclaimed beforehand. The city has been greatly transformed in the last 25 years, “especially considering the starting point: from 10 million square meters of abandoned industrial lands to an almost doubling of green open space” (Office of Strategic Projects Turin, 2020, p. 3). Furthermore, in 2020 Turin arrived among the four finalists for the European Green Capital Award 2022. The city of Turin has two main universities, with a total of around 100 000 students.

In terms of land area, the municipality covers 137 square kilometres, with public and private green space assets of 48 000 000 m², covering 37% of the municipal area (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020). Available for the citizens are 55 m² of total green space per capita. Of the total green areas, 12.5% is agricultural land and around 20% is wooded. Concerning ownership, the municipality owns 38% of the areas, while the rest is private; therefore, there are 20 m² per capita of municipally-owned green spaces. There are 110 000 trees in the urban areas and 230 000 in the wooded hills near the city. The tree canopy cover of the city is close to 16%, however, half of the urban trees are at a maturity stage (more than 50 years old), and 5% are more than 90 years old (R4T). On green space availability and usability for citizens, Turin is amongst the greenest cities in Italy (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020).

The GISP was prepared mainly in-house in the municipality, with the support of two other public bodies active in environmental management and protection. In contrast to Padua's plan, therefore, there was no strong collaboration with the academic and professional world. In addition, there was no participatory process to gather input from citizens on the plan and its content. The GISP is presented as an analysis and programming tool to direct investments and management policies for the public urban green system in the coming decades, supplementing urban planning tools. Concerning strategies and objectives in the plan, they are less explicit than in the Padua plan and are distributed in the document according to the themes. The presence of specific objectives and targets to be achieved is limited. In this regard, two interviewees suggested that the plan is more a snapshot of the current state than a strategic plan (R1T, R3T).

7 Findings and Analysis

In this chapter, the results on UF and environmental justice are presented, based on the case studies of Padua and Turin. Section 7.1 presents the findings on how environmental justice is understood in the two case studies, first in a general way, then concerning the three pillars of distributional, procedural, and recognition justice. Section 7.2 presents the findings of the research on the governance principles and their interplay with environmental justice. It has to be noted that environmental justice and the governance principles chosen are strictly interlinked, and a clear separation is often impossible. However, for structure and clarity needs, they are presented separately, while still explicating the interweaving.

7.1 How is Environmental Justice Understood?

This section presents the findings of the research relating to how environmental justice is understood and conceptualised in the two case studies, Padua and Turin, by actors involved in the municipality's work around the green environment and in the planning documents analysed. This section seeks to provide an answer to RQ1:

RQ1: How is environmental justice with regards to urban forests understood in the case studies of this thesis concerning the three pillars of distributional, procedural, and recognition justice?

First, environmental justice is a quite new and not very used term in the Italian context (R8P). Furthermore, the level of perception and understanding of environmental justice was not the same among the various actors interviewed, with some having never heard of the term in its general sense, and others in relation to UF. A second consideration can be made about the fact that the concept of environmental justice concerning urban green spaces was often preferred to UF in the interviews. Although the definition of the UF adopted in this thesis was given at the beginning of the interviews, the concept of urban green spaces is still prevalent in the two case studies. This issue is discussed more thoroughly in chapter 8.

From the interviews, a fairly common understanding of environmental justice is of ensuring equal access for all people, without any form of discrimination, to green spaces and a healthy environment (R1T, R2P, R10T). More specifically, environmental justice has been defined in one interview as *"equal access for all people, without discrimination, to the benefits of a healthy environment, an environment that enables people to develop their potential, spiritually, personally, socially and economically"* (R2P). It was also explicitly mentioned an equal distribution of the negative effects of human activities on the environment. The element of the equal distribution of burdens rarely came up during the interviews, but is part of the conceptual framework presented in chapter 4.

There was an awareness of the role of UF and urban green spaces in terms of their role in mitigating urban heat, pollution, and climate change, and providing cultural services that enhance well-being. Thus, the conception of environmental justice was often oriented toward the presence of a healthy urban environment, both in terms of clean air, the presence of water and green spaces, and the repercussions on the health and well-being of citizens. Two interviewees, in particular, conceptualised environmental justice concerning UF. One respondent defined environmental justice as the condition in which all areas and zones of the city have an adequate endowment of trees (R4T). At the same time, however, the respondent acknowledged the absence of a current definition of what is an 'adequate endowment' for each area. Another interviewee defined environmental justice as *"the possibility for everyone, whatever background, whatever condition they have, to be able to access these forests, to be able to enjoy this urban green"* (R3T). Only one interviewee, in Turin, referred to ES as a key element when talking about environmental justice (R1T). Another interviewee, even though stated to never have heard the term environmental justice, described it as everyone having the right to use and access, freely,

open green spaces, whether public or private (R6P). For two interviewees, environmental justice meant combining, in the short and long term, the management of the tree stock, respecting environmental needs and the needs of citizens (R4T, R9P). Only one interviewee referred to the development of policies, laws, and actions that are fair to ecosystems, not necessarily including social concerns (R8P).

According to an interviewee, environmental justice is also about breaking the dynamic of urban development in which the suburbs are predominantly occupied by concrete, by housing that is inadequate in terms of quality of life, even if it does serve the function of providing accommodation for people, and instead in residential areas are present many green and blue spaces, rethinking cities paying attention to equal opportunities for all in terms of accessibility to green spaces (R2P). The same interviewee, placing environmental justice in the context of UF in Padua, considered their distribution and presence in urban spaces, with the need to improve the current situation, in which some areas of the city are underserved.

Important themes that emerged from the interviews are the accessibility and usability of urban green spaces. In particular, the COVID-19 pandemic, for two respondents, made the importance of accessibility to urban nature even more apparent. In a situation where the substitute for urban green spaces, which can be visiting the outdoors outside urban boundaries, was not available, such as during lockdown periods, citizens turned to urban spaces to meet their needs. This fact is also seen as an incentive to invest in urban green spaces (R4T). The importance of accessibility and usability of urban green spaces was confirmed by the analysis of the two municipal plans, in which the main focus in both case studies is on accessibility to areas with stringent usability features. With respect to the results concerning the understanding of environmental justice, there is a focus on the distribution of trees and green areas. Ensuring that everyone can live in a healthy environment and the accessibility and usability of green spaces are linked to the spatial distribution of these spaces in the urban texture. The other two justice pillars, procedural and recognition, were only marginally mentioned by respondents when explaining their understanding of environmental justice. Thus, a finding of this research is that the distributional pillar is preponderant in the understanding of environmental justice.

One respondent explicitly linked their conception of environmental justice to social justice, saying public green spaces, which must be guaranteed for all, play an essential role in enabling those who cannot afford to enjoy the benefits of nature and ES to enjoy them in other ways, such as travelling to natural extra-urban areas (R5T). The importance not only of the accessibility of these spaces but also of their configuration, which impacts usability, was emphasised. An example provided by the respondent is the importance of playground areas in parks in vulnerable zones, to enable families who cannot afford to go on holiday to have leisure time. The importance of the configuration of green spaces, therefore, implies urban planners should consider the different needs and requirements that different groups of the population may have. Similarly, a respondent stated that the distribution of green spaces should be considered also towards workers, not only residents, within the city, in the sense that even in industrial or commercial areas, green spaces and trees should be present (R6P). These considerations fall within the pillar of recognition, which is explored more in detail in section 7.1.3.

While all respondents were able to articulate their understanding of environmental justice, the two main documents analysed, i.e., the green plans of the two cities, do not present direct and explicit references to environmental justice, which is not mentioned. The analyses contained therein, however, are explained in detail in section 7.1.1, as they pertain to the distribution pillar as conceptualised in chapter 4.

In addition, the problem of gentrification was not mentioned in relation to environmental justice in the two case studies. While it seems that no studies have been done to trace or measure possible gentrification, in the case of Turin two interviewees agreed that it was not a problem present and relevant to their context (R1T, R4T).

During the interviews, participants were also asked to identify situations of environmental injustice concerning UF or urban green spaces in their respective contexts. The answers and examples cited varied between the respondents. The impossibility of accessing certain areas that are perceived as unsafe by certain users was considered an injustice (R3T). A practical example given during the interview concerned a park in Turin which, for various reasons, including the lack of maintenance, control, and action by the municipality, had become a place for illegal activities. Therefore, there was a perception of insecurity for citizens frequenting that park. Another example of injustice for a respondent in Turin was the fact that the city's peripheral green areas have a lower level of maintenance, hence more damage, more time for repair, more time for replacement of trees, than areas in the city centre, although these areas may be larger (R5T). Two interviewees for the Padua case mentioned the unequal accessibility level among citizens living in different parts of the city as an environmental injustice (R6P, R8P). A different example of injustice was mentioned by a member of an environmental association in Padua. Regarding participatory processes, and specifically, the participatory process for the drafting of the MGP, the interviewee stated that *"if the message of participation did not reach everybody, then yes, I am sure I am talking about injustice, because if not all citizens knew and had information that there was this participatory process and that they could participate, even if they were not experts, if the message did not reach everybody, then yes, I can say one hundred per cent that this is an injustice"* (R8P).

In conclusion, environmental justice is understood and conceptualised differently by the respondents in this research, depending on their skills, knowledge, and roles. Thus, there appears not yet to be a widespread and unified conceptualisation among practitioners, perhaps due to unfamiliarity with the concept in the contexts analysed. However, from interviews with actors in both cities, it emerged that the distribution pillar is the dominant one in the conceptualisation of environmental justice. This can be seen from the strong focus on the right to a clean and healthy environment, where the distribution of risks and environmental quality is central, on the accessibility of green spaces and, partially, on the distribution of trees and UF. At the same time, though, the concept of environmental justice does not revolve around trees and forests as elements, but rather urban green spaces, especially ones having certain features that increase their usability for the citizens. Furthermore, there is a lack of direct and explicit mention of the issues of environmental justice in the planning documents reviewed.

7.1.1 Distributional Justice

This section deals specifically with the distribution pillar, which is the dominant one in the respondents' conception of environmental justice and in the documents analysed. The case of Padua is presented first, and after, Turin. Before delving, however, into how distribution is analysed in the two case studies, which provide interesting insights into how environmental justice is understood and addressed, it is useful to make some considerations. There are, in fact, for some of the actors interviewed, different principles of distribution of the environmental good, in this case UF and urban green spaces, to be pursued, showing a more nuanced understanding of the topic of environmental justice.

A municipal technician in Turin stressed the need to provide minimum standards for all areas of the city, regardless of land use, for green spaces and trees. In this case, it is the 'principle of equality plus a guaranteed standard' introduced in chapter 4 as one of the possible distribution principles (R4T). Two interviewees in Turin referred to a recently suggest guideline, the 3-30-300 rule (Konijnendijk van den Bosch, 2021), explained in section 4.1.1, as the ideal target to

reach (R1T, R4T). One interviewee, on the other hand, still referred to guaranteeing minimum standards, which can be raised over time, but with variation between neighbourhoods of the city, depending on both the historical and present conformation of the area, and on the socio-demographic characteristics of the resident population, which can result in conditions of exceptionality and privilege in some areas (R1T). This principle can be traced back to that of a 'guaranteed minimum with variation above that minimum according to personal income and spending choices'. This means that certain individuals have the economic capacity and the possibility to live in particularly greener areas, but at the same time, minimum standards are guaranteed for all areas. Interestingly, specifically talking about ES, the same interviewee said that their distribution should not be indiscriminate, but optimised, and targeted in certain areas of the city, even depending on the socio-demographic characteristics of the resident population. A vision, therefore, on the one hand at odds with an egalitarian principle, aimed at providing ES "*where they are needed*" (R1T). This presumes a differentiated model both of the distribution of UF, as providers of ES, and of the quality of green spaces, among various neighbourhoods of the city. Areas lacking ES, and areas with high pollution or urban heat stress could benefit from a higher quality and quantity of green space to mitigate the negative effects of both climate change and human activities. It seems then that, similar to other respondents, the outcome, or end state, which would be a healthy urban environment, should be guaranteed for all. At the same time, to achieve this state, the distribution may not be equal across areas. This can be considered as a concept perhaps similar to that of equity, as opposed to equality, in which differentiated treatment between areas is necessary given the different starting positions.

Padua

The distribution pillar was central to the conception of environmental justice during the interviews with actors from Padua. Similarly, the MGP of Padua contains an analysis of the distribution of green spaces, although it is not explicitly linked to environmental justice. In the following, the analyses contained in the MGP are presented. It is important to note that the MGP of Padua is considered to be an important and big step forward in the management of UF and urban green spaces, in comparison to the previous planning and management tools (R2P, R6P).

The analysis on the distribution of green areas carried out in Padua and included in the MGP (Comune di Padova, 2022), refers to green areas that are owned by the municipality and are freely accessible and usable by citizens, called *proximity green areas*. These proximity green areas are thus only a fraction of the green spaces owned by the municipality, which amounts to 10% of the total (Pristeri et al., 2021). As 80% of the green spaces in Padua are private (Pristeri et al., 2021), the analyses in the MGP are not comprehensive of the total green areas of the city, giving only a partial picture. In the analyses, only green areas that are usable by citizens for relaxation, leisure, outdoor activities, games, and socialisation are considered. Usability is the cornerstone and a criterion for inclusion in spatial analyses. Included are those areas having easy and accessible paths, benches or other furniture, and trees to enjoy the shadow. Excluded, thus, are all the town trees without facilities for use, street green areas, and private and school green areas, which are not accessible to all.

In total, there are 245 proximity green areas considered in the analysis and represent 42% of the total green spaces owned by the municipality. Therefore, the analysis conducted for the MGP only considers 4.2% of the total green spaces in Padua. Most of the proximity green areas (53.47%) are smaller than 5 000 m² and only 6 are larger than 50 000 m². These proximity green areas cover 3% of the urban surface, providing 11.50 m² of proximity green areas per capita. Their distribution has been studied in two ways in the plan.

In the first analysis of distribution, the percentage of the area of each council covered by *proximity green areas* was considered. The distribution of the coverage was not even across the ten neighbourhoods, with some reaching almost 6% of coverage, while others well below 2%. Some of the neighbourhoods with a low cover percentage do have, in absolute terms, the highest m² of *proximity green areas*, however, due to the high total surface of the council, the percentage is lower. The MGP also contains some considerations detailing the situation in the councils concerning the surface area and the presence of certain proximity green areas. In addition, the number of certain characteristics and features of neighbourhood green areas per consultation is shown. These are children's play areas, dog areas, sports facilities, toilets or refreshments facilities for food and drinks, water fountains, urban gardens, and inclusive facilities. Scores are then calculated for each area concerning surface area, the presence or absence of certain services, safety, and accessibility by different means of transport. This analysis considers then the quality of proximity green areas in each council, a characteristic often mentioned as important in the consideration of distributive justice.

The second analysis of distribution, the accessibility analysis, was done by calculating how many citizens in Padua can access a green space of at least 500 m² within 300 meters (5 minutes' walk) and how many people can access a green space of at least 5000 m² and/or a proximity green space⁶ within 800 m (15 minutes' walk). In the MGP, it is mentioned that this analysis responds to the aim of identifying disparities and inequalities in the opportunity to access green spaces. This is the most explicit mention of environmental justice, or injustice, found in the plan. A relatively simple and widely used methodology is to calculate buffer zones with diameters of 300 and 800 metres from each access point of the selected green spaces and then merge them to calculate the catchment area (see, for example: Comber et al., 2008; Nicholls, 2001). However, a different methodology has been used in Padua, which instead looked at the road network to calculate the actual 300 and 800 metres routes to the green space. Subsequently, all dwellings in which people and families reside that have access to the 300- and 800-metre routes to green spaces were selected and analysed. The demographic data considered are gender, age, and citizenship status⁷. These analyses are then used to identify areas in the ten councils that can be transformed and converted into proximity green areas, improving accessibility rates for the population (R6P).

Results show substantially equal accessibility to the green spaces in 300 meters across all categories considered, with 55.90% of all the citizens in Padua having access to at least 500 m² within 300 meters from home. Regarding green spaces of at least 5000 m² or a proximity green area, 75.39% of the total population have access within 800 meters. While there is more variability across the categories considered compared to the previous case, the authors of the analysis consider the accessibility within 800 meters equal. In both cases, accessibility did not vary significantly considering sex and age, while more non-Italian citizens have access to a green space both within 300 and 800 meters⁸. However, the accessibility levels are not distributed equally across the ten councils in Padua and present a much higher variability in the percentages of citizens having access, as shown in Table 7-1. The same level of accessibility is thus not ensured across all the councils, as the fluctuating percentages of accessibility within 300 and 800 metres demonstrate, although with higher percentages for 800 metres. Only 21.31% of citizens living in council 4B, for example, can access a green space within 300 metres, compared to the 82.34% of citizens in council 5A. Nevertheless, in the MGP, no considerations of environmental

⁶ Therefore, also a smaller than 5000 m² area but with the facilities and characteristics to be considered a proximity green space.

⁷ For the citizenship status, Italian and non-Italian are considered.

⁸ 58.12% of non-Italians citizens, compared to 55.46%, have access within 300 metres; and 78.79%, compared to 74.72%, within 800 m.

justice's distributional concerns have been made, and only the data and a very brief summary of the analysis are provided. However, an interviewee, involved in the drafting of the MGP, identified these uneven accessibility patterns across the ten councils as an example of environmental injustice (R6P).

Table 7-1. Accessibility levels within the councils of Padua

Councils	Accessibility within 300m		Accessibility within 800m		Total citizens in the council
	N° of citizens	%	N° of citizens	%	
1 CENTER	15 844	61.59%	20 753	80.67%	25 726
2 NORD	25 188	63.62%	34 950	88.28%	39 590
3A	9 305	42.72%	11 606	53.28%	21 782
3B	10 111	66.26%	12 667	83.01%	15 259
4A	13 999	64.62%	20 138	92.96%	21 664
4B	5 364	21.31%	12 257	48.70%	25 166
5A	8 322	82.34%	6 495	64.26%	10 107
5B	8 322	47.24%	13 634	77.40%	17 615
6A	9 804	62.46%	11 538	73.51%	15 696
6B	10 742	64.35%	13 754	82.40%	16 692

Source: own elaboration based on Comune di Padova, 2022

Additionally, in the analyses, the socio-demographic characteristics considered concern sex (males and females), age and citizenship status (Italians and non-Italians), without considering any income-related variables, either individual, at the household level, or by income class. This can be considered as a shortcoming because, as it has been shown in the reviewed literature, the distribution of green spaces, trees or ES is often positively related to income (or wealth).

Turin

As in Padua with the respective plan, Turin's GISP is seen as a novelty by the interviewees, an essential first step towards a new way of managing GI (R4T, R5T). In this regard, it should be noted that the first monitoring process has yet to be carried out (R5T). In Turin's plan are presented results of quantitative and accessibility analyses for *recreational green areas*, carried out for a project called Torino Green Print, which aimed at quantitatively evaluating the GI of Turin (*Torino Green Print*, n.d.). The Torino Green Print analyses are incorporated both within the GISP and also, more in detail, as an annex to the plan (Città di Torino - Area Verde, 2020). As also seen in the case of Padua, these analyses consider those green areas of the city that are freely accessible and usable by citizens for walking, free sports activities, playing, socialising and relaxing. This excludes tree-lined areas without equipment, roadside areas with trees and vegetation, school or private green areas, and in general those not freely accessible to the public. At the same time, however, it is useful to note that some tree-lined and equipped avenues have been included. These recreational green areas, thus defined, amount to about 8% of the municipal area, covering more than 11 000 000 m², providing 12 m² per capita of recreational green space (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020). Similar to the case of Padua, the usability of the areas is a key element for their inclusion in accessibility analyses. In the territory of Turin, however, further indications on distributional justice can be gathered from a study, by Battisti et al. (2020) performed to assess and map the ES provision and the socio-demographic characteristics of the population in different areas of the city.

In total, there are 517 recreational green areas in Turin, covering 8.5% of the city's territory and providing 12.72 m² per capita of these spaces. Several quantitative analyses have been carried out, with interesting results. The first set of considerations is made by analysing accessibility to green areas based on proximity, with various radii and buffers considered. First, a buffer radius

of 300 metres was applied to each recreational green area, revealing that 93% of the population of Turin has access to a green area within this distance. Secondly, different radii⁹, up to 500 metres, were applied to areas of different sizes, to consider the different attractiveness and load of each area. This analysis shows that 89% of the population has access to a green area. Thirdly, the percentage of the population with access within a 10-minute walk was calculated, with a result of 97%. Although the results show widespread accessibility, there is a methodological difference compared to the analysis carried out in Padua, which considered the actual distance along the roads that citizens could walk to the access points to the selected areas. By using a circular buffer from the access points, on the other hand, portions of the population living at a greater effective distance, on the road, and not linear, are included in the catchment area. In fact, 69% of the city area is covered by these 300 metres buffers, rising to 79% for the 500 metres.

The second set of considerations is made by analysing the accessibility at 25 m² per capita within 300 metres, declined for different characteristics of the population, such as age, average income and citizenship status, presented through a map. A first analysis of the whole population shows that 85% of the population resides in an area with more than 25 m² per capita within 300 metres. However, there are some areas of the city that have a lower amount per capita than other areas. Next, young people (0-14) and elderly (65+) are separately considered, however with same results, that show that 93% of the respective group live in an area with at least 25 m² per capita within 300 metres of their residence. As far as average per capita income, results are presented only graphically, as seen in Figure 7-1 below¹⁰, taken from the annex to the GISP (Città di Torino - Area Verde, 2020).

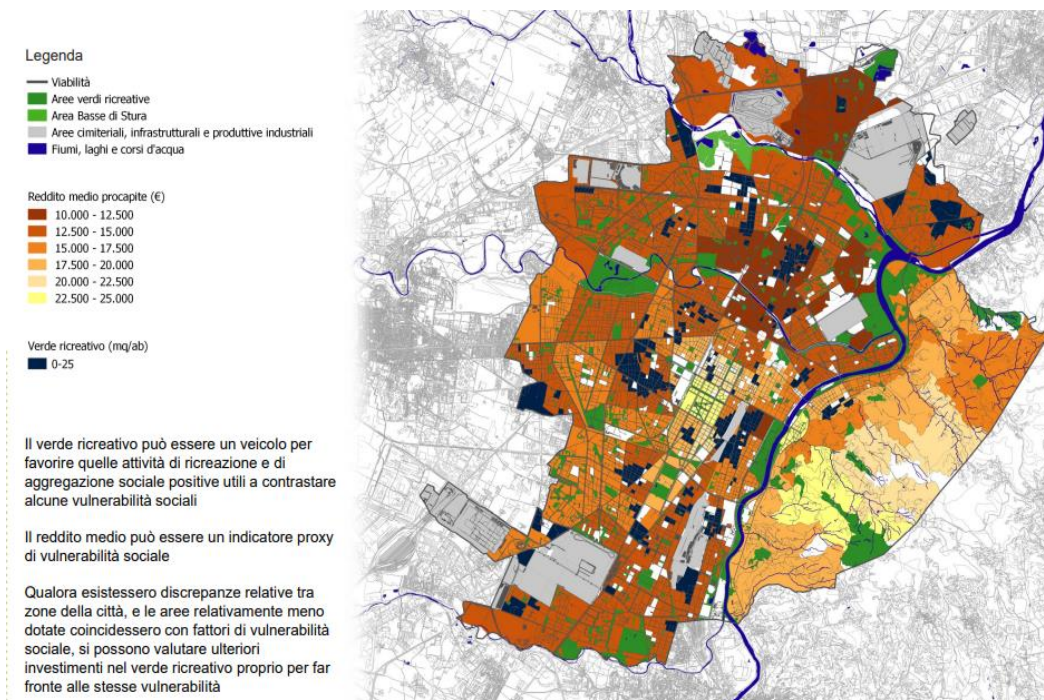


Figure 7-1. Average income and areas below target of 25m² per capita in Turin
Source: Città di Torino – Area Verde (2020)

⁹ Specifically, for bigger areas (>1000 m²) the radius considered is 300 metres, for medium areas (500> m² < 1000) the radius is 200 metres; and for smaller (<500 m²) the radius is 100 metres.

¹⁰ In dark blu, in Figure 7-1, are highlighted areas of the city that provide less than 25 m² per capita of recreational green areas, different classes of average per capita income are represented with colors from dark red to yellow.

No percentage or number is presented to explain the figure and no links to environmental justice are made, neither in the plan nor in the annex. The map shows the different classes of average income per capita and in dark blue the areas of the city with less than 25 m² of recreational green space per inhabitant. From the map, it can be seen that most of the areas where recreational green space is less than 25 m² are in areas where the average income is among the lower classes considered. This possible correlation was also confirmed by a respondent for the case study of Turin (R5T). It is furthermore acknowledged, in the municipal plan, that average income may be an indicator of social vulnerability, while green areas are a driver for social aggregation and encounters. In the GISP, it is then stated that “it would be appropriate to allocate more investments in recreational green areas to those areas of the city (this is the case in some neighbourhoods in northern Turin) in which vulnerability situations are more evident” (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020, p. 28). However, this prioritisation did not emerge from any of the interviews or in the rest of the GISP.

The next variable considered is the citizenship status. The results are presented only graphically, and no comment or numbers are given. Figure 7-2 below¹¹ is the only way data are presented.

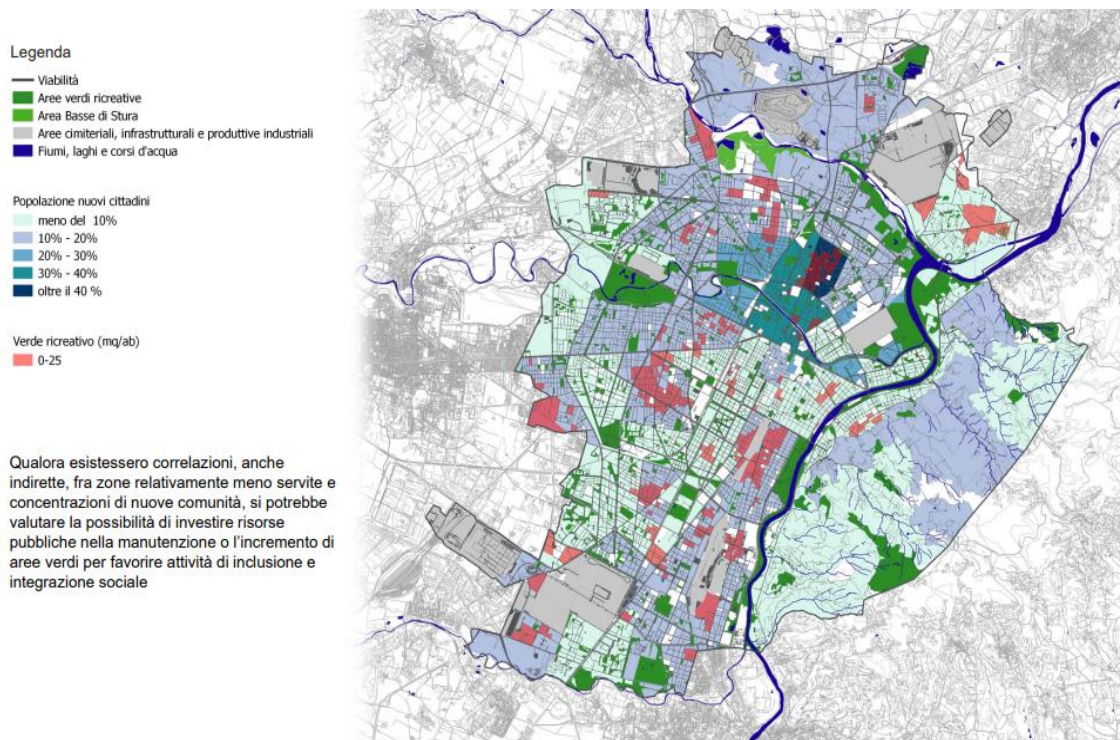


Figure 7-2. New citizens and areas below target of 25m² per capita in Turin
Source: Città di Torino – Area Verde (2020)

From the map it is possible to note that most of the areas providing less than 25 m² per capita of recreational green spaces are located in zones with a percentage of non-Italian residents between 10 and 20%. However, only a few of the red areas in the map are located in parts of the city in which residents are less than 10% of non-Italians. In these areas, additionally, the population density is also particularly low. What stands out is an area in the city centre with more than 40% non-Italian residents, which has not only a few but also small recreational areas, in which the 25 m² target is not met. This area is also characterised by low average per capita income. Even though numeric and clear results of the analyses are not presented in the GISP,

¹¹ In Figure 7-2, in red are highlighted areas of the city that provide less than 25 m² per capita of recreational green areas, while the different gradient of blue depends on the percentage of new citizens in the total for each area.

there seem to be correlations between ethnicity and income and availability, thus distribution, of green spaces in Turin. While the possible correlation between availability of recreational green spaces and average per capita income was confirmed by an interviewee, it was not labelled as an environmental injustice, nor as an example of it, by any of the interviewees. The same applies to the possible correlation with ethnicity. Finally, subsequent analyses in the GISP are only directed at mapping different typologies of areas and equipment that are present in such areas, such as fitness areas, or picnic areas.¹²

However, ES are not evenly distributed across the city and its neighbourhoods (Battisti et al., 2020). Three out of four neighbourhoods with a high level of ES present socio-demographic conditions medium (one neighbourhood) and high (two neighbourhoods). There is only one neighbourhood that presents high socio-demographic conditions and low ES, and only one that presents high ES and low socio-demographic conditions. As highlighted by the authors of the study, “citizens’ socio-demographic characteristics and green urban area’s distribution are not evenly distributed around the city” and “more than 50% of the city strongly needs actions ... to improve human well-being through the provision of ecosystem services” (Battisti et al., 2020, p. 11,13). Furthermore, the city centre has a poorer provision of ES compared to peripheral areas of the city (Battisti et al., 2020), as the suburbs of the city present more green spaces compared to the centre, which is more compact.

Interviewees agreed that the historic legacies of urban development and urbanisation, especially in a city with a long history, are a major explanation of current patterns. The urban development that has characterised Turin, from the 16th century to the 19th especially, is a major limitation to the adaptation of the city centre to contemporary challenges, given the structural and infrastructural rigidity. The expansion of the city during the flourishing of the automobile industry, which led Turin to be the most important industrial city in Italy after World War II, brought a massive and rapid urban expansion, sometimes uncontrolled, to accommodate industry and population growth. This expansion, furthermore, often happened at the expense of the marginal agricultural and natural land, while the economic and development interests were prioritised. The failure of the industrial system led to the loss of a quarter of the city's population, which, deprived of the workforce, had an upward shift in average age, and about 10 000 000 m² of abandoned industrial space (Office of Strategic Projects Turin, 2020) This is the second important factor that explains the current distribution of trees and green spaces in the city.

About the current distribution, two interviewees in Turin stated that the possibilities to expand and create new green spaces are rather limited, in the sense that saturation has been reached in terms of municipally-owned spaces that can be transformed into green spaces (R4T, R5T). In the last two and a half years, 50 000 new trees have been planted (R4T), and although the municipality owns a considerable amount of land with no intended use, it will depend on the results of the ongoing review of the Master Plan whether they can be turned into green space.

Considered an environmental injustice by an interviewee, the level of maintenance in suburban areas is not the same as in the centre, in terms of parks, trees, and equipment maintenance. Although peripheral areas have larger green areas, their quality is rated as lower than in the centre by the interviewee (R5T). When asked about the reasons for this disparity, on the one hand, the lack of resources for current expenditure, which in addition to the large size of certain

¹² The equipment considered is, for completeness: fitness areas, skating rinks, sports fields, skateparks, event areas, bowls courts and picnic areas.

areas, makes it difficult to maintain the same level of quality, emerged; on the other hand, the need to keep the central areas better maintained, as a matter of the city's image.

7.1.2 Procedural Justice

The interviews showed that procedural justice is not a widely known or adopted concept. Environmental justice concerning procedures and related issues were rarely mentioned by the interviewees. Currently, considerations regarding procedural justice concerning UF do not appear to be a priority for interviewees. This can in part be explained by the generally centralised, top-down, municipal-controlled nature of the decision-making procedures. This can be seen in contrast to democratic participatory processes, often a focus of procedural justice claims. According to one respondent's perspective, the city government, in general, often sees itself to be delegated to decisions because it won the elections, although, currently, this dynamic of pure representation is seen to be in a state of difficulty (R2P). In the context of Turin, an interviewed member of an environmental NGO denounced a low level of democratic decision-making on environmental issues, calling for the establishment of citizen assemblies with deliberative power on environmental issues (R7T). In addition, according to their experience, collaboration, but also simply confrontation, with the political side is seen as useless and unsuccessful. Therefore, a lack of trust in political institutions was detected, which, according to the interviewee, were not ready to establish a constructive dialogue.

About the procedures of a participatory process, respect and listening to each other during confrontations, the right for all to speak, and dialogue in a neutral place, thus not controlled by some more influential actors, are themes that emerged as essential to successful engagement (R2P).

The analysis of the interviews and documents generated limited results with respect to the conceptualisation of procedural justice. However, the sections focusing on participation and inclusiveness will refer back to and include certain aspects of the procedural justice pillar.

7.1.3 Recognition Justice

From the interviews carried out and the document analysed, it is found that the pillar of recognition, in the two case studies, is generally oriented towards the recognition of different needs of the population concerning urban greenery. There is an awareness of the importance of planning and providing certain characteristics and functionalities according to the type of users and the different ways of using green spaces that different people have. This was exemplified with regard to some types of people using green spaces for barbecues, others for sports, and others for socialising (R1T). This is seen as a need of the municipality to respond to the different needs of the population residing in a certain area. In addition to the needs, an interviewee added that it is important to consider in the planning the social, economic, and demographic characteristics of the area, and the GI structure, to allocate the services to specific areas where they are needed (R6P). However, in the case of Padua, the socio-economic characteristics of the population are only limitedly considered in the analysis of the accessibility to green spaces. From the two main documents of Padua and Turin it is possible to draw some insights into which characteristics and functionalities, and which types of users, are recognised by the municipalities. In the distributional analysis, in Padua, age, sex, and citizenship status are variables considered separately; in Turin, sex is not considered, but the average per capita income is. In both municipal plans, areas for children and green areas with fitness activities are an important focus, with analyses of these areas and their characteristics. Urban gardens, dog areas, and the presence of water fountains are also included in the analysis of both plans. Inclusive green areas and inclusive playgrounds have a special focus in both cities. These needs and categories can, to a

certain extent, be considered recognised by the administrations concerned. Full recognition, linked to participation, still seems to be lacking.

Another important issue concerns the skills and knowledge needed for planning and decision-making regarding UF and green spaces. Regarding this, one respondent said that *“sometimes the citizen does not have the skills and technical knowledge to be able to understand where an urban forest can be planted...So I don't think the citizen always has the technical knowledge to decide where. There are phases and phases, in my opinion. The technical part of the city has to understand where it is possible to go and plant new trees, and the city has been doing that a lot in recent years. And then there is a phase in which we can go and discuss with the citizens”* (R3T). This idea of a clear separation between citizens and technicians was confirmed, albeit less explicitly, by other interviewees. While this clear separation is clear on the one hand, on the other hand, there is a recognition of the need to listen to local citizens, or associations operating in an area, who have specific knowledge related to the critical issues of a place. For example, an interviewee stated that *“by listening you always learn something and you see perspectives that we may not be able to get to, because we may not know that area as well as those who know it and those who live it”* (R6P). From the data gathered, however, this recognition is limited and never implies valuing such knowledge to the point of including citizens in planning and empowering them to influence decisions. The recognition of different types of knowledge by experts is an important part of recognition justice. In the participatory process in the city of Padua, actors who were invited to participate were recognised, but also their knowledge was recognised by the organisers. There thus seems to be a link between being recognised and being considered for participation.

7.2 Governance Principles

This section presents the findings of the research relating to how the governance principles considered in this thesis are operationalised concerning environmental justice in the two case studies, Turin and Padua. This section seeks to provide an answer to RQ2:

RQ2: How are the governance principles of participation, inclusiveness, and transparency operationalised with regards to environmental justice concerning urban forests in the case studies of this thesis?

Specifically, section 7.2.1 presents the finding on the principle of participation, section 7.2.2 on the principle of inclusiveness, and section 7.2.3 on transparency.

7.2.1 Participation

In this section, the governance principle of participation is considered jointly for the two case studies. Results and analyses of interview data and document analysis are presented to understand the role of participation in Padua and Turin and their relationship with environmental justice. This is followed by a focus on the participatory process in Padua for the drafting of the MGP.

Overall, an initial finding is that participation is considered an important and fundamental tool by all respondents. However, a second important finding of the research is that participation is most commonly associated with the less deep levels of participation as presented in section 4.2.1. From the interviews, it can be drawn that citizens do not have many possibilities to influence the planning and design phases of UF or urban green spaces in general. Although there have been specific projects in both cities that have included citizens at a co-deciding level, they remain marginal, rather an exception than the norm. This was confirmed by the respondents for both case studies.

Citizen participation, when it happens, does not take place on a deep level, but rather on a superficial level. In the words of an interviewee, holding somehow an external perspective from the municipality in Turin on how participation is commonly applied: “[participation] it is more a matter of accompanying, of making the population aware of what is happening, but not of including their opinions [of the citizens] in the decisions that are taken” (R1T). In other interviews, when talking about participation, the focus was often on informing citizens about what is happening around UF and green spaces, about new trees and the maintenance of existing ones, and the current practices. An interviewee in Turin, talking about UF and citizens participation, stated that they operate “trying to involve citizens in a differentiated way; I'm not saying so much in the design choices, but all along the way and make them understand what the various pros and cons of having trees in the city may be, so that they can also accept what may be some discomfort” (R4T). Participation is thus often understood at the ‘informing’ level, as classified in Kiss et al. (2022), with an explicit goal of disseminating information, educating, and raising awareness of the benefits of UF and green spaces. Informing citizens about UF choices is therefore considered essential, especially regarding the pruning, felling, and planting of trees in certain areas. In fact, some interviewees often reported situations of conflict and contrast regarding the choices of technicians, on the pruning and felling of trees, by groups of citizens (R4T, R5T). The limited possibilities to influence choices were also confirmed by an environmental association in Padua, which is consulted by the municipality on specific topics but does not possess much power or influence on a regular and broader basis (R8P). Lower levels of participation are thus often dominant, sometimes even reaching tokenistic participation¹³. One interviewee said: “I think we need to improve on participatory planning, whereas participation as the presence of citizens [during planting] and as the management of activities in green areas, adoption activities, things like that, is more widespread” (R5T). Examples cited in the interviews were the presence of citizens at the installation of new UF, the adoption of an area, which consists of the donation of funds for a specific area, the provision of free labour and time by volunteers for the planting and maintenance of trees and green areas. In Turin, before the COVID-19 pandemic started, two participatory forestation initiatives were organised every year by the municipality, defined as a “concrete, direct participation” by an interviewee (R4T). During these events, citizens, members of associations, municipality employees and political actors would plant together trees in designated areas. It is recognised that this type of participation helps citizens to strengthen their ties with places and with nature, raise awareness of the importance of these places, and reinforce a sense of stewardship towards green spaces. These examples can be associated with the ‘collaborating’ level presented in section 4.2.1, as participants are involved in the implementation of a project, either through labour or funds donation. In the opinion of the interviewee, it is considered concrete participation, yet that level of participation provides no opportunity for citizens to influence projects, but only allows them to provide voluntary labour and be involved in the practical phase of planting and maintenance, in some cases. During the interviews, it was also found that deeper levels of participation were more frequent on projects with EU funding, and in such cases, the dialogue with stakeholders and citizens also turned into co-decision-making processes.

Moreover, concerning the lack of participation at deep levels, one interviewee in Padua stated that “citizens being protagonists and bottom-up actions, with respect to the issue of urban forests, I think, are still in an embryonic phase, and I do not think there is yet a mutual awareness on the part of those who govern the cities and the citizens themselves, of the mutual role of an alliance in this direction” (R2P). Additionally, the respondent affirmed that participation is “often seen as a counterpart to traditional administrative, top-down, action, and not instead as a complement and a strengthening of administrative action” (R2P). This aspect often touches on a cultural aspect, both from the point of view of administrators and citizens, which was frequently mentioned in the interviews. Speaking of participation, the interviewees often referred to a different sense of community and consideration of public goods

¹³ Tokenistic participation can be defined as an apparent involvement of actors with a lack of real change and impact.

between the citizens of their respective cities and the Nordic countries, also concerning participation. This topic, however, needs more in-depth research to understand whether cultural differences exist and how they might impact participation. However, there is a certain degree of recognition that deep and meaningful participation needs to be fostered and increased, and that in the future it will be essential for the municipality to steer and design co-designing and empowering processes.

A third important finding related to participation is that the lack of deeper levels of participation is not seen as environmental injustice by the respondents. Nevertheless, there may be issues related to procedural justice for citizens who are very often denied access to decision-making processes. However, procedural injustice claims should be the result of collaborative research with local citizens and associations, because their perceptions and opinions must be listened to establish the absence of recognition and unfair procedures. What can be noted in this thesis concerns the notion of participation, relegated to the lowest levels, synonymous with top-down decision-making processes, in which situations of the dominance of a certain narrative or position might occur. However, a common perception by all the interviewees is that there is progressively more attention and more awareness of the need and value of meaningful participation.

A fourth important finding relates to the barriers that hinder more deep and meaningful participation of citizens in the decision-making processes. A first important barrier concerns the availability of economic resources for the design and development of participatory processes of co-decision and empowerment of citizens. All respondents agreed that such processes are more expensive in monetary terms than either adopting lower levels, such as informing, consulting and collaborating, or excluding participation in toto. Consequently, if the municipality has no resources available, or if the political party does not allocate sufficient resources to the relevant department, it is very difficult to start such processes. A second barrier relates to the lack of time, which is also linked to staff shortages. In the case of Turin, for example, a lack of funds and high debts meant that recruitment was limited and this, together with the retirement of many employees, marked a shortage of staff. In addition, the everyday tasks, for example, the routine maintenance of green spaces, and the programming of tree maintenance and analysis, are considered a priority in time allocation, leaving marginal time resources to be allocated to the design of participatory processes (R3T). At the moment, both municipalities included in this research are obtaining funding from the national recovery and resilience plan and funds such as REACT-EU. According to some interviewees, however, the timeframe for drafting and implementing projects is relatively short, further reducing the possibility of establishing participatory processes. This is seen as a major limitation to deeper participation by some of the interviewees, representing the fourth barrier. Additionally, the depth and breadth of citizen participation have a strong political component, i.e., it depends on the choices of the political actors more than on the technical departments, according to the opinion of one respondent (R5T). Consequently, with a city council and councillors who support participation at the deeper levels, it is easier for the technical offices to have the resources and direction to design participatory processes in which power is shared. On the other hand, if the importance of participation is taken less into account, a classic, top-down approach will be more likely. Since it is the political component of the administration that is responsible for allocating resources, the importance of politics in the thicket of environmental justice is noted and emphasised. Finally, another frequently mentioned barrier concerns the administrative division into silos, with a difficulty in transferring skills, resources, and responsibilities from one sector to another within the same municipality. This was also made explicit by the interviewees concerning the skills needed to develop and manage a participatory process. Employees in the municipal sectors dealing with the environment, trees, and green spaces have often not received the appropriate training to create and manage such processes (R9P). In this context, the interviews revealed the

importance of mediators who are capable of designing participatory processes, managing them, and synthesising proposals and requests.

To deepen the understanding of the link between participation and environmental justice, it is useful to focus on the participatory process implemented by the Agenda 21 office of the Municipality of Padua to contribute to the MGP. From the information obtained from documents of the municipality of Padua and interviews with two actors involved in participatory processes, it appears that the processes were mainly aimed at listening to citizens and associations and collecting ideas and proposals. Listening, and marginally discussing, were therefore the main objectives. Based on how the participatory process in Padua has been designed, some implications for environmental justice can be drawn and identified. The level of participation refers to the 'consulting' level as defined in chapter 4. In general, therefore, the actors involved had no power to influence decisions, as providing proposals and input was the main reason for involvement. The lack of power to influence the decisions was criticised by a member of a citizens association included in the meetings of the specific technical stakeholders. The interviewee, although the association's requests were accepted and incorporated in the MGP, suggested workshops as a better participation design, in which ideas can be put on the table, discussed together, and co-decided by the participants, rather than a system of *"accepting requests but I work them out myself"* (R8P). At the same time, the interviewee was not sure whether these types of procedures and participation, in which there is mainly listening by the municipality but no possibility to influence decisions, can be considered an environmental injustice. Nevertheless, the 'consulting' level, by denying the possibility, de facto, of citizens and associations to influence decisions, does not fully reflect the claims of procedural justice, which aim at inclusive and participatory decision-making processes in which power is shared between actors. Furthermore, there was also no guarantee that inputs and proposals would be accepted by the municipality. The acceptance of the proposals and their inclusion in the MGP has been indeed partial (R2P). This can partly be explained by the fact that the MGP is a long-term planning document, and some of the proposals and requests, especially those that emerged in the focus groups, concerned specific and punctual actions. From the point of view of procedures, informal rules were given, such as the recognition of the right to speak for everyone and reciprocal respect. In this regard, one interviewee said: *"in the context of the working groups, everyone has the right to speak because everyone is competent, because the fact of being resident in a territory brings knowledge of that territory which allows them, albeit with different specificities, to be credible interlocutors at a working table"* (R2P). Another choice was to have the 'playing field' defined by the administration (i.e., the macro themes of accessibility, usability, and communication), to avoid proposals and inputs being directed outside the feasibility of the municipality with the MGP. From the point of view of recognition, in the case of associations, organisations interested in these topics¹⁴ were invited and recognised. As regards focus groups, the city councils were also informed of the need to find participants who were in some way active in the council's activities and interested in the subject of green and UF. Although this responds to the need for efficiency in the processes, associations that could have provided a different perspective were not included in the processes, e.g., associations active in assisting people with disabilities, or cultural and linguistic minorities. Therefore, recognition was given only to certain associations and citizens, and to certain types of knowledge, and thus only certain actors were invited to participate. For the rest of the citizens, it was possible to send written comments between the 15th of February and the 19th of March. Only 10 citizens sent their comments, on a document of almost 500 pages. Recognition is also important within participatory processes and should not only come from the administration or the actor organising the participatory process. One interviewee stated that *"listening must be a reciprocal listening, so not only the administration must recognise the participants, but the participants must also recognise each other. Because if the environmental association and the business*

¹⁴ Broad themes such as urban greenery, UF, GI and related themes.

association don't recognise that they are interlocutors with their own skills and knowledge to bring to the table, it's clear that it's not a dialogue, it doesn't work, it's no longer a dialogue, it's simply a question of talking over each other, of their own positions" (R2P). One interviewee participated in this process, saying that it was a very good experience overall and that the recognition was mutual, although one interview alone is not enough to draw definitive conclusions (R8P).

7.2.2 Inclusiveness

Inclusiveness, as adopted in the conceptual framework of this thesis, refers to “continuously creating a community involved in coproducing processes, policies, and programs for defining and addressing public issues” (Quick & Feldman, 2011, p. 272).

A finding of this thesis, however, is that inclusiveness is almost often associated with the inclusivity of different citizens, who may have specific needs, in the green spaces, in terms of accessibility and usability. For example, an interviewee in Padua, while discussing the role of inclusiveness, stated that *“for me it has to be physical inclusiveness, or income inclusiveness, or other dimensions; and somehow the open space has to be open, for everyone, with a series of arrangements”*, stressing the importance of a *“network of spaces, which in different ways are truly usable by all, I think this is absolutely the way we have to work today”* (R6P). This aspect of inclusiveness is also strongly present in the two municipal plans analysed in this research. Both include, in the quantitative and qualitative analysis of the green spaces owned by the municipality, a focus on areas with inclusive facilities for children, adults with disabilities and the elderly, and, in the case of Turin, an analysis of the architectural barriers in the areas. As confirmed also by the interviewees, there is greater attention than in the past to the issue of physical inclusiveness for access to public green spaces. In Turin’s GISP, for example, it was found that the inclusive facilities are distributed in a non-homogeneous way, although rather widespread, and the presence is strongly related to newly built or recently redeveloped areas (Assessorato per le Politiche Ambientali e Verde Pubblico, 2020, p. 40). Inclusivity in this sense, i.e., in relation to green areas that are inclusive towards people with disabilities, has important links with distributional justice. The distribution of inclusive areas, and inclusive equipment in the areas, can lead to situations of environmental injustice if they are not distributed evenly or where they are needed the most.

However, an interviewee had a more nuanced understanding of inclusiveness, rather in line with the principle adopted in the conceptual framework of this thesis. Acknowledging the central and essential role of inclusiveness, the interviewee stated that *“what can be seen in Padua is that the green areas that are most appreciated and frequented by citizens are those where the management and implementation of activities is carried out and thought out together with local organisations”* (R2P). Inclusiveness in decision-making and management, in the opinion of the interviewee, seems to lead to greater use of certain areas and a greater appreciation of them. Except for this specific interviewee, inclusiveness in participatory processes and decision-making processes seems not to be a priority issue from what emerges from the interviews, although there is a need for further research specifically on this issue. In the case of Padua, an indicator of the lack of inclusiveness can be seen in the fact that certain groups are more or less represented than others. For example, in the case of participants in the meetings for associations and organisations, only five participants out of 32 were female. While this element alone cannot be seen as proof that there is a lack of inclusiveness, it should raise the question of whether all groups and individuals are represented in the processes. Another aspect concerns the citizens included in the focus groups, who were only those who were in some way already active in the life of the councils, while other citizens were not taken into consideration. In addition, invitations to these focus groups were sent out via the city councils' newsletters (R2P). Communication was not targeted at all citizens and therefore information did not reach everyone, limiting the possibility of citizens to participate. This limited the ‘ability and possibility’ to participate to a large part of the citizenry. As seen in section 4.1.2, the concepts of ability and possibility to participate concern the

procedural justice pillar, as citizens should, first and foremost, be informed about the possibility of participating, and then have the opportunity to participate

Another important aspect of inclusiveness that emerged during an interview concerns linguistic inclusiveness for both foreign students and families. Inclusivity therefore also concerns access to information for non-Italian speakers about green areas, parks and UFs that foreign students and citizens can visit. According to an interviewee, the municipality is still lacking in this aspect, but the issue is topical and important. The respondent further articulated that *“Today we have to realise that we have an increasing number of young people, thousands of non-Europeans who do not speak Italian, living in Padua and who have the right to access information, which is not only access to those primary goods such as health and services, but also access to equally primary goods such as the possibility to know what the services, functions and realities of the green spaces are. Because it also puts them in a position to appreciate more and to be able to live those spaces better, if you give them the information”* (R2P). This aspect is also linked to the recognition of the needs and requirements of different groups of citizens living in a given area. Recognition of these needs, and implicitly recognition of these groups of people, is the first step towards increasing inclusiveness towards them.

Inclusiveness, combined with participation processes that allow citizens to influence decisions, impacts the justice of procedures and should be a focus for improvement by administrations. However, procedural justice does not seem to be explicitly considered in the case studies at hand.

7.2.3 Transparency

The results of the interviews regarding transparency were varied and scattered. However, the insights provide some indications about the understanding of the importance of transparency in the context of UF, especially for public organisations. For example, respondents working closely with trees referred to the transparency of communication about the maintenance of trees, the reasons for felling, and the justification for it (R4T, R5T). Another interview conceptualised transparency as an important and fundamental principle to build trust between citizens and public administration, and as the foundation of democracy (R2P). In addition, transparency is significant in relation to the decisions taken, why some proposals are accepted, and why others are not. It is important to provide the justification of the choices (R2P). The same interviewee affirmed that there could not be environmental justice without full transparency of the administration. However, an interviewee, while acknowledging the importance of being transparent with decisions, stated *“I have to explain everything that is necessary, because I am a public official and therefore use public funds. It is obvious that having to explain everything, in the face of requests, does not mean having to justify every choice to everyone”* (RT5). Furthermore, some respondents highlighted the role social media can play to increase transparency (R4T, R5T, R6P), and some elaborated on their efforts to publish realised installation, new initiatives, and maintenance works on social media platforms (R4T, R5T). However, they also pointed out challenges connected to these practices, especially when it comes to negative reactions and controversy to their publications, which, in the opinion of one interviewee, diminishes the positive effects of social media (R5T). In general, the data collected revealed the importance of transparency, conceptualised as the publication of relevant information on the administrations' web portals and communications channels. This communication and transparency, however, is often related to the outcomes, such as new projects or maintenance to be done, and not to procedures and decision-making processes themselves. Finally, while some interviewees elaborated on transparency and reiterated the importance of this principle as presented above, the topics discussed touched upon different and diverse aspects, and only partially fit into the conceptualisation presented in section 4.2.3.

8 Discussion

This thesis aimed, on the one hand, to understand how environmental justice concerning UF is understood in two case studies in Italy, and to start filling an important research gap on these issues. In doing so, it aimed to understand how the three pillars of environmental justice are understood and operationalised. On the other hand, this thesis aimed to understand how, in the two case studies, three principles of governance, inclusiveness, participation and transparency, are implemented concerning environmental justice. This chapter interprets the findings of the research, discussing the results of this thesis in relation to the reviewed literature (section 8.1). Section 8.2 reflects on the study, its limitations, and lessons learnt.

8.1 Discussion of the Findings

8.1.1 Usefulness of the concept of Urban Forests

The first finding of this research to be discussed concerns the usefulness of the concept of UF in Italy at the current stage. In fact, from the interviews and the analysis of the documents, it emerged that the focus is mostly on urban green spaces with certain characteristics (the proximity green areas in Padua and the recreational green areas in Turin, as explained in section 7.1.1), and not on UF. Although the definition of UF was given at the beginning of each interview, the concept of urban green space seems to remain established. In this thesis, based on the literature, the term UF collects a variety of spaces within the city that present trees, from wooded areas, parks, and tree-lined streets to gardens and single trees. However, in the case studies of this thesis, the term UF is mainly associated with a specific typology of implantation, losing this feature of being an umbrella term. This aspect was not foreseen by the author beforehand. It seems to be the result, however, of a past vision in which more importance was given to confined, anthropically shaped urban green spaces. Less importance was given to areas with spontaneous vegetation, not managed and maintained by the municipality, and to generic, residual, green areas that do not have specific features such as benches, and paths amongst others. It is worth noting, however, that both the majority of the interviews and the two municipal plans show and expect a shift towards the concepts of GI and UF in the near future. This change, however, besides nomenclature, must also be cultural and conceptual, and this transformation is currently in the initial stages. For practitioners, therefore, it would be beneficial to adopt a broad definition of UF. This would allow them to consider the city's overall tree stock and focus on ecosystems and the services provided by them holistically. Since environmental justice was often associated with living in a healthy and safe environment in the interviews, it is necessary to move beyond focusing only on green areas with usability criteria, since not only those areas contribute to the creation of a healthy and liveable environment. Especially in the long-term perspective of mitigating and combating climate change, to create liveable and sustainable cities, a change of paradigm is required. At the same time, it is necessary now, at the beginning of this paradigm shift, to initiate the development of an understanding of environmental justice concerning UF that is holistic and inclusive of the various aspects outlined in this thesis. Thus, not only will a definition and conceptualisation of environmental justice need to be outlined, but it will also need to permeate the public sector, given the essential function it plays in the delivery of UF.

8.1.2 Reflections on Environmental Justice

An important result of the research concerns the fact that, in the two study cities, environmental justice is a relatively new term, not very used, especially in relation to UF and green spaces. This may indicate that the issue of environmental justice is not highly prioritised in the environmental policies of administrations regarding UF and urban green spaces. The fact that there are also no explicit references to the concept of environmental justice or related concepts in the documents reinforces this insight. While certain analyses of the two municipal plans can be traced back to

environmental justice, this link is never explicit. Although some examples of injustice from the interviews related to unequal levels of accessibility, or lack of access to certain areas, interviewees were often unsure whether they could ascribe these examples to environmental injustice and lacked a full awareness of the implications of such injustices. This lack of awareness can pave the way for unrecognised and unlabelled environmental injustices towards citizens and specific groups and communities. In addition to the term being new, and perhaps also as a consequence of this, the understanding of the concept of environmental justice is not well developed in the two cities analysed, with a lack of a common or similar understanding. Different interviewees had different understandings, often dictated by professional and academic backgrounds. Others, in addition, had never heard of environmental justice concerning UF or urban green spaces. The results of this research, therefore, indicate that the concept of environmental justice is still underdeveloped by practitioners in the two case studies. This validates previous findings in literature stating that environmental justice is an underdeveloped topic in the Italian context (Gemmiti & Prisco, 2019; Rosignoli, 2017, 2020). However, the findings of this research also show that there seems to be a growing awareness of these issues compared to the past decades, also confirming the emergence of the concept (Rosignoli, 2017).

As was shown in the results, this research reveals that the distribution pillar, albeit with varying degrees of explicitness, is central to the conception of environmental justice. This result validates the conclusions of other studies, carried out in different contexts, that for municipalities distribution is central (Nesbitt et al., 2018, 2019). This centrality was unmasked both in the interviews and in the document analysis. The results also demonstrate that accessibility to certain green areas is how the distributional pillar is most strongly operationalised, with the aim of increasing and improving accessibility for citizens. The quantitative and qualitative analyses included in the two municipal plans, although without explicit references to environmental justice, allow for a further discussion on the distributional pillar. In the case of Turin, the analyses of the availability of green areas in relation to the average per capita income and the ethnicity of the residents are a clear step towards quantitatively measure environmental justice in its distributional pillar. This suggests that when the analyses were commissioned and carried out, there was a desire to measure the distribution of availability and accessibility also from a social perspective, considering the income and ethnicity of the residents. However, neither in Turin's GISP itself nor in the interviews are these analyses labelled as environmental justice analyses. This may be related to the fact that the term environmental justice is rather new and uncommon in the case studies, and its conceptualisation does not align much with that of the literature and that adopted in this thesis. Only rarely is environmental justice juxtaposed with social justice, including the dimensions of income and ethnicity as variables on which discrimination and injustice can materialise. However, this juxtaposition is necessary, as social justice and environmental justice are deeply intertwined. Considering environmental justice solely as the right of all citizens, without discrimination, to access a healthy and liveable urban environment is not sufficient to encompass all dimensions of this complex issue. Although this right is essential, a deliberate recognition of the multiplicity of factors that impact environmental justice in relation to UF and green spaces is also necessary. This means, in the case of the Turin's analysis, explicitly recognising that income and ethnicity are key dimensions in assessing environmental justice. These historically marginalised groups should be prioritised in the planning, as they are more in need of the public provision of UF and green spaces, having less possibilities of privately finding substitutes compared to privileged groups. The act of explicit recognition is important because it prevents these dimensions from being overlooked by keeping them implicit, or not considered at all. Furthermore, it can be criticised that not all the results of the analyses are published and presented in the Turin's GISP. The results that consider average per capita income and ethnicity as dimension to evaluate the distribution are not made publicly accessible and available other than graphically, which, however, does not allow any firm conclusions to be drawn. It is important to note, however, that the analyses contained in both

municipal plans give only a partial view. On the one hand, the focus is on green areas owned by the municipality, on the other hand, only certain green areas with specific characteristics are included. In both case studies, the municipality owns only part of the total green areas, less than 10% in Padua and about 38% in Turin. The focus on specific areas thus excludes all those green and tree-lined spaces that, although do not meet the usability requirements, still provide ES, both in terms of climate change mitigation and environmental quality improvement. In this regard, Baró et al. suggested that “street trees can play an important redistributive role ... due to the generally uneven and patchy distribution of other urban green infrastructure components” (2019). These two factors in particular limit the scope of the analyses, which are therefore not comprehensive. A comprehensive analysis is important especially in compact cities (Baró et al., 2019), in which, like Padua and Turin, the available space for the expansions of UF is limited. The first weakness of the approaches can be partially explained by the municipality's need to focus on its own spaces, while impacting private green spaces with other instruments, e.g., municipal regulations for tree maintenance. However, the analyses in the plans are considered in both case studies as innovations and improvements compared to how green areas, UF and GI were managed and planned in the past. Thus, they could serve as a starting point for future, more comprehensive, analyses. For example, an analysis of the distribution of TCC could help in the identification of areas to be prioritised and combined with the analysis of socio-economic and demographic variables could provide useful information on possible additional situations of environmental injustice. Whether in the case of Turin, which currently has a TCC of 16%, or Padua, which has a very low TCC of 1.8%, these analyses could be very useful in understanding critical issues.

From these municipal plans, however, it is possible to deduce that in both cities there are critical issues with respect to distribution, albeit in different ways. In the case of Padua, from the point of view of accessibility within 300 metres to a green area, for a large part of the population, 44%, this accessibility is not guaranteed. The same is true for accessibility within 800 metres, although with lower percentages, around 24%. Although with respect to sex, age, and citizenship status, at the city scale the percentages of citizens with access to the considered green areas are similar, there appears to be a substantial difference between the groups who have access and the groups to whom this access is not currently provided by the municipality. However, these considerations are always partial, given the limited amount of municipal green areas that are included in the study, only 4.2% of total green spaces in Padua. In addition, citizens' accessibility to these areas presents criticalities at the level of its distribution among the various councils. The level of accessibility to these spaces is therefore not uniform across the city, with councils in the city providing better accessibility than others, suggesting possible environmental justice concerns. However, more elaborate considerations are difficult, as fundamental variables such as income per capita or at the household level are not considered in Padua. In the case of Turin, guaranteed accessibility is higher, with 93% of the citizens living within 300 metres from a green area, and similar values for youth and elderly citizens. Furthermore, when considering a minimum of 25 m² of green space within 300 metres, a sort of minimum standard, for 85% of the population is respected. However, there appears to be some critical issues concerning income and citizenship status, as there seems to be a correlation the areas in which the minimum standard is not met and. While there is somehow a lack of transparency in providing the results of the analyses considering average per capita income and the percentage non-Italian citizens in Turin's GISP, a similar correlation was found and studied, albeit in relation to the provision of ES, by another research (Battisti et al., 2020). A further critical point in Turin is that maintenance of green spaces is not evenly distributed, with the central areas better maintained than the suburbs. In the literature, this aspect is often considered an environmental injustice, especially in contexts where the suburbs are inhabited by ethnic or linguistic minorities and citizens with lower incomes than the city centre. These elements could suggest that in Turin, in line with

other studies around the world, ethnic minorities and poorer households experience less benefits from urban nature.

This thesis analysed two voluntary strategic documents, still seldomly used in Italy, which are the municipal green plans. It is interesting that both contain, although not explicitly, analyses with respect to the distribution of green areas, albeit with the limitations mentioned above. It is certainly a positive sign of a change taking place in Italian cities towards greater attention to these issues. One of the commonalities of the two municipal plans is that age and citizenship status are considered in the analyses. In terms of differences, however, income is considered only in Turin and sex only in Padua. Both studies, therefore, entail strengths and weaknesses. Moreover, the methodology for calculating accessibility differs, as described previously, in the variables considered and in the way the catchment areas are calculated. In Turin, in fact, round radii are applied to areas, while in Padua the actual distance on the road network is considered. In Padua, moreover, a disaggregation by councils makes it possible to understand the pattern of accessibility between the different zones of the city, which is missing in Turin. This inconsistency may be dictated by the fact that, as this type of distribution analysis is relatively new, there is also no consistent methodology adopted by the municipalities.

Specifically for the city of Turin, the results of this thesis validate the importance of historical legacies as a driver and explanation of current distributions (Baró et al., 2019; Nesbitt et al., 2018). The urban development history of a city, thus, shapes the current distribution of urban nature and UF, especially in cities with a long history of major urban transformation, such as Turin. Furthermore, these historic legacies also impact the possibility to expand and modify the structure and patterns of UF and green spaces. While it is true that historic buildings, large housing estates, and compact, concreted-out historic city centres, for example, can hardly be completely redeveloped, enhanced public transport and other sustainable mobility solutions can be implemented to improve accessibility. At the same time, other solutions, such as micro-NBS, can be realized to improve ecological connectivity, mitigate urban heat stress, and reduce pollution and other negative externalities. Especially in historic cities, urban planners are thus facing a complex challenge to increase the presence of natural elements in the urban fabric, both to provide benefits to citizens and to mitigate climate change.

The findings of this thesis, and the overall centrality of the distribution pillar, highlight that the procedural and recognition pillars are marginal in the understanding of environmental justice in the two case studies. While the non-recognition of certain individuals or groups, or their misrecognition, gives rise to injustices, which can transcend recognition justice itself into procedural and distributional injustices, the non-recognition of the two pillars in the understanding of environmental justice is equally problematic. This is because procedures and recognition are not considered elements that can impact environmental justice, and cases of actual unfair procedures, and misrecognition, are not associated with justice. This fact also makes it difficult to develop justice – or injustice - claims, since they are not recognised as such. One possible explanation stems from the relative simplicity of the distribution, a pillar that, although in multiple ways, can be measured and represented numerically. In contrast, procedural and recognition justice cannot be measured and assessed numerically, and often require a value judgement. Procedures, in both case studies, are not considered a subject of justice, which can be partially explained by the general centralised, top-down, municipal-controlled nature of the decision-making procedures. This trend can be seen in contrast to democratic participatory processes, often a focus of procedural justice claims.

8.1.3 Discussion of Governance

It is important to discuss the findings of this thesis on the governance principles and their relationship with environmental justice in the two case studies. In both cities, the principle of

participation in UF governance is considered fundamental and useful, however, the operationalisation is limited to less deep levels, as conceptualised in section 4.2.1. The participation levels that are predominant in the case studies are informing, consulting, and collaborating, as the principle of participation is often associated with the presence of citizens at reforestation projects, their provision of labour and money, providing citizens with information and listening to their requests. As recently reported by Kiss et al. (2022), participation tends to be more tokenistic around UF, green spaces and associated policies, with a predominance of consultations, in the planning phase, and collaboration, from planning to implementation. What has been found in Padua and Turin generally supports and validates these findings, with the addition of a strong presence of the informing level as a participatory design. These three participation levels do provide benefits for both the municipality and citizens. Citizens can strengthen their connections with places, their awareness of the importance of trees and ecosystems and in general the possibility of contributing practically. The municipality, in turn, can receive labour and money support, albeit partial, and collect inputs to be considered. At the same time, informing citizens about choices, projects and how they are carried out is essential for the proper functioning of public society. However, these three levels do not ensure that citizens' demands are met and even less than citizens can influence decisions. From this point of view, there are critical issues in both case studies from the point of view of procedural justice. Indeed, this research shows that citizens have practically no chance of being involved in a meaningful way, i.e., at the co-deciding and empowering levels. This means that it remains within the will and power of the municipality to choose the specific characteristics of the green areas and UF. The municipality, both administratively and politically, therefore retains the fulcrum of power and influence over choices and decisions, recognition of needs and people, and their participation and inclusion. In the absence of the possibility to participate deeply and to influence decisions, the possibility of certain groups of people to have their needs and demands recognised by the administration remains limited. As conceptualised in section 4.1.3, recognition is essential, a prerequisite, for participation. The results of this research, specifically regarding the participatory process of the MGP in Padua, support this claim. Those who are included and able to participate are therefore those stakeholders who are recognised by the municipality and the organisers, also by virtue of their knowledge, often technical knowledge. Although the focus groups organised aimed to involve citizens, this participation was not extended to all, but only to some. The essentiality of proper recognition is also manifested in the extent to which its absence is also associated with a decrease in people's participation and involvement in communities (Schlosberg, 2004). Deeply intertwined with participation and recognition, inclusiveness also impacts overall environmental justice. In the two case studies of this thesis, inclusiveness in decision-making processes, given the limited meaningful participation, is rather partial. Although the inclusivity of people's different needs, e.g., of people with disabilities or playgrounds areas with schools, is considered important, the results of this research, showing that inclusivity in decision-making processes is still marginal, underline the criticality from a procedural point of view. In other words, there seems to be a failure to provide that redistribution of power that would allow citizens currently excluded from the political and economic process to be "deliberately included in the future" (Arnstein, 1969, p. 216). Finally, the governance principle of transparency was problematic to analyse concerning environmental justice. Only one respondent elaborated on it concerning environmental justice and the decision-making processes, somehow adhering to its conceptualisation adopted in section 4.2.3. Therefore, while the findings of this research suggest that transparency is important, they do not allow an in-depth understanding of the role of this governance principle in the interplay with environmental justice in the two case studies considered. In conclusion, the findings of this thesis suggest that the full potential of citizens' participation has not been unlocked yet, even though participation is included in policy goals in both case studies in various policy domains. One of the barriers to participation found in this research concerns political will. Political actors who are more or less interested in increasing meaningful participation of citizens therefore

strongly impact the strategies of the administration and the processes initiated. In the case of Padua, for example, the participatory process was supported by political actors. This finding supports and reiterates the importance of bringing back the political aspect into greening practice (Anguelovski et al., 2019), especially in the form of more inclusive, participatory and democratic policies.

8.2 Reflections on Methodology and Limitations

There are multiple limitations to this study's methodology and reflections that have to be made. Firstly, one of the challenges of multiple case studies is that it demands similar access to data. Multiple case studies, in addition, limit the depth of the study in contrast to a single case study (Sovacool et al., 2018), however, given the exploratory angle of this research, multiple case studies allow to broaden the geographical scope and gather additional insights on environmental justice in UF from two cities in Italy, instead of focusing only on one case study. On data similarity, as this research is configured, it means both analysing similar documents and being able to interview individuals with similar roles in the two case study cities. Concerning document analysis, it is reasonable to assume that this similarity was respected, as the two main reviewed and analysed documents, the two municipal plans, perform the same function in both cities. Regarding data collection through interviews, the majority of the sample pertained to the case of Turin (6), compared to Padua (4). This majority suggests that the perspective of actors involved in Turin's municipality work is slightly overrepresented. Also, concerning the roles and positions of the interviewees, this similarity is not reached between the two case studies. Only in Turin, for example, policymakers are represented in the study. However, it was very difficult, especially in the case of Padua, to find available actors for interviews. For both case studies, in addition, policymakers directly involved with the development of UF and green spaces are not represented, due to unavailability from their side. The asymmetry between the two case studies also limited the possibility of drawing comparisons between the two cities. The nature of the thesis and the construction of meaning by individuals, lead to the fact that by interviewing different actors, the answers, and thus the results, could have been different. Nonetheless, the document review and analysis showed a rather limited presence of environmental justice issues. Therefore, despite these limitations, the results of this thesis still provide a first indication of the limited understanding of environmental justice, also suggesting that an environmental justice movement and debate around UF themes have yet to be formed in Italy.

Second, another limitation of the research regards the sample composition for the interviews. While there have been significant efforts to include interviews with actors like NGOs, citizens, and researchers, there was a limited response and participation in the research. As a result, it was not possible to obtain the perspectives of citizens, and only in a limited way, and not representative of the category, those of NGOs. Given the exploratory nature of this research, aimed at providing a first understanding of how environmental justice is understood in two study cities in Italy, a major limitation of the research lies in the lack of perspectives of citizens, various NGOs, and researchers working on the topic. Similarly, only one interview was carried out with a political actor, so even that crucial group of actors was underrepresented.

Data collected through interviews have possibly been filtered by both the interviewees and the interviewer. This bias is particularly difficult to reduce, especially because of the constructivist philosophical assumption regarding the process of constructing meanings. The knowledge and experiences of both the researcher and interviewees impact and shape how individuals perceive and give meaning to the topic at hand. This can be seen as a significant limitation since the experiences, values and knowledge of the researcher also come into play when analysing the data. Another researcher, with a different background and with different values, could analyse the data collected through the interviews and the review of documents and give a different meaning than the one presented in this thesis. Moreover, data collected through open-ended

questions during semi-structured interviews are also subjected to the ability of both the interviewees and the interviewer to articulate and express opinions and facts (Creswell & Creswell, 2018). This limitation may have impacted the data collected during the interviews. Also influencing this issue was the difficulty of transporting concepts, developed in the Anglo-Saxon context, into the context of two Italian cities. Another limitation concerns the length of the interviews in relation to the scope of the thesis, which impacted the data collected during the interviews and thereby also the overall results. Restricted time availability of the interviewees often limited the possibility to discuss all topics in depth. Even though the interview questions aimed for a balanced discussion concerning all three pillars of environmental justice and the three principles of governance, the interviewees often focussed on certain aspects, which, in turn, restricted the possibility to discuss other topics in detail. In further research, the author would aim for increasing the interview time or restrict the scope even further. However, the overall data collected in form of the various interviews and documents allowed the author to create a general understanding of all relevant aspects. Despite the challenges interviews pose, they are still considered a valid data collection method, as they allowed the interviewees to articulate the concept of environmental justice.

Some other reflections regard the topic of environmental justice. As articulated by Walker, “evidence about environmental inequality is not conceived ... as unproblematic, a matter of simple fact and truth. Evidence is produced through social processes, with the attendant selections, contingencies and uncertainties this entails.” (2012, p. 54). Therefore, this study does not have the aim to produce evidence of environmental injustice in the two case studies, as to do so, a careful and in-depth analysis of the social processes and power relations of the individuals affected needs to be done. In addition, participatory research with the involvement of citizens and marginalised groups is needed to understand in depth the environmental injustices present, also to avoid paternalism on the part of the researcher. As explained by Walker, when including procedural and recognition, evidence of injustices should be “captured qualitatively through the accounts and observations of those involved” (2012, p. 61).

The results of the case studies need to be considered in their specific contexts and are not generalisable as the data collected are tied to the context and the participants currently involved in the governance of UF in the two case studies. Thus, external validity is not given, as differences in the context and characteristics of other sites would likely change the results and reduce their generalisability (Sovacool et al., 2018). Nevertheless, the multiple case study format and the connected spatial variation helped to collect wider insights on how environmental justice is understood and on the role of the governance principles.

Finally, it is necessary to discuss the generalisability of the results of this thesis. Given the limitations presented earlier, and the close linkage of environmental justice to context and place, generalisability is very low. The results of this thesis cannot, therefore, be considered valid for all Italian cities. The results and conclusions might have been different if other cities had been considered instead of Turin and Padua. At the same time, however, the results and conclusions of this thesis may provide an initial basis for future research on the issue of environmental justice concerning UF in Italy (see section 9.3).

9 Conclusions

This chapter concludes this thesis, by answering the RQs and summarising the main findings (section 9.1). Then, policy implications and recommendations are outlined in section 9.2. Finally, the need for further research on this topic is highlighted and presented in section 9.3.

9.1 Conclusions and Answer to the Research Questions

The important role that UF can play in making cities sustainable and adapted to climate change is well known. At the same time, however, the provision of UF in several cities is often characterised by environmental injustice in various forms. In Italy, there is currently little knowledge of how environmental justice is understood and operationalised with respect to UF and how governance can impact it. Therefore, this thesis focused on exploring the current understanding of environmental justice in two cities in Italy, Padua and Turin, and the relationship between environmental justice and some key governance principles, participation, inclusiveness, and transparency. This thesis starts addressing the research gap, considering two case studies, the cities of Turin and Padua. The findings and conclusions of this thesis are thus valid only for the two case studies considered, in relation to UF and urban green spaces, and not for other issues relevant to environmental justice, nor the two cities as a whole. Given the identified research problem, two RQs have been posed and answered in this thesis.

RQ1: How is environmental justice with regards to urban forests understood in the case studies of this thesis concerning the three pillars of distributional, procedural, and recognition justice?

This thesis investigated and analysed the understanding of environmental justice of actors involved with the two municipalities of Turin and Padua, based on the three pillars of distribution, recognition, and procedural justice. The research has shown that the concept of environmental justice is rather new in the two case studies considered and that a uniform and common conceptualisation is still missing. Furthermore, this thesis showed that the term UF is not widely adopted in Turin and Padua, and the concept of urban green spaces is preferred. Environmental justice is often understood in relation to the right of citizens to live in a healthy and liveable environment, regardless of socio-economic and demographic characteristics. Moreover, environmental justice is not an explicit policy priority in the two cities regarding UF. In both case studies it has been found that the distributional pillar is central in the understanding of environmental justice, while the other two pillars are marginal. Therefore, the understanding and operationalisation of procedural and recognition justice is rather underdeveloped compared to the distributional pillar. Specifically, concerning distribution, the operationalisation of the principle by the municipalities considered is primarily concerned with accessibility to citizens to green areas meeting specific criteria. Environmental justice, although considered, on a general level, linked to the right to live in a healthy and liveable environment, is operationalised, in the distribution pillar, only in relation to green areas with certain characteristics. What is lacking, therefore, is an understanding of distribution, as a pillar of environmental justice, that comprehensively considers all UF and natural elements that provide environmental and socio-cultural benefits to citizens. Only marginally, additionally, quality and maintenance are included in the distributional justice considerations. Moreover, from the point of view of the analyses included in the municipal plans, the variables considered are partial, with shortcomings in both cities from a socio-demographic and economic point of view. This limits the possibility of a comprehensive assessment and awareness of the environmental justice implications. In fact, even though the results of some of the analyses suggest uneven patterns of accessibility and distribution, they are marginally identified and explicitly labelled as such. Finally, the lack of consideration of the two pillars of procedural and recognition justice is critical, as it may conceal possible injustice patterns on less visible features of the UF governance.

RQ2: How are the governance principles of participation, inclusiveness, and transparency operationalised with regards to environmental justice concerning urban forests in the case studies of this thesis?

Concerning the second RQ, this thesis showed that participation and inclusiveness, although considered important, are marginally operationalised in the two case studies. Citizens have little opportunity to participate in a meaningful way and to influence decisions that affect the places where they live and work. This thesis has shown, in both case studies, that participation is understood and implemented at the lowest levels compared to the scale presented in the conceptual framework (chapter 4), and only rarely at the co-deciding and empowering levels. Furthermore, citizens are often not fully recognised as capable actors to be involved and as actors holding valuable knowledge. When they do are considered, the amount of power given to the citizens that can participate is most of the times very limited. Similarly, inclusiveness is not operationalised with respect to decision-making processes, but on the contrary, inclusiveness is understood in relation to the characteristics of the green spaces that have to meet the needs and requirements of different citizens and groups and allow accessibility for everyone. Thus, it is only the green spaces that are supposed to be inclusive, not the decision-making processes. Consequently, the lack of comprehensive inclusiveness in the decision-making processes leaves the power to influence the UF and green spaces' characteristics in the hand of the planners and the municipality. In relation to transparency, the results of this thesis do not allow to fully understand how this principle interact with environmental justice in the two case studies. From the results of this thesis, it is possible to conclude that there are critical issues from the point of view of recognition, since citizens, not being recognised as capable enough interlocutors, are not included, and therefore have no possibility to participate. This in turn suggests criticalities from the point of view of procedures, since not only is participation limited, but it is difficult to ensure that citizens' needs and requirements are truly heard. Thus, it can be concluded that two of the three governance principle considered closely interact with environmental justice. Specifically, participation and inclusiveness are closely influenced by recognition justice and vice versa. Procedural justice can be considered both at the level of general UF governance, but also at the level of participatory processes. Superficial participatory processes, in which power is not shared equally among actors, in which full inclusiveness is not ensured, present problems from the point of view of procedural justice. The results of this thesis therefore demonstrate the great impact of governance, and specifically of participation and inclusiveness, on environmental justice in relation to UF.

9.2 Policy Implications and Recommendations

The results of this thesis may be useful for UF practitioners in Italy to start a debate on environmental justice concerning UF. In general, they highlight the need to be aware of the concept of environmental justice, adopting a holistic and all-encompassing definition. Second, the thesis points out the need to make environmental justice an explicit priority, to avoid the occurrence of various situations of injustice, in which underrepresented individuals, communities and groups, not only benefit less from urban nature but are also not recognised and excluded from inclusive participatory decision-making processes.

Specifically, for policymakers, it is suggested to consider environmental justice in high-level strategies regarding UF, making it an explicit dimension. Making environmental justice explicit and prioritising it in UF governance would be an important first step in raising awareness of the issue. This awareness and prioritisation from the political side would trickle down to the administrative staff and processes, helping to identify certain unequal distributions and unfair processes as environmental injustices and directing actions to address the critical issues. Political action is important as “we cannot simply presume some common egalitarian frame of understanding about what matters, what is wrong and what should be done about it” (Walker,

2012, p. 219). Politics, therefore, must take responsibility for marking the way, even in a normative manner, in defining what is just, in terms of distribution, procedures, and recognition.

In addition, given the importance of political stimulus in modelling participatory processes on UF and urban green spaces, political actors should aim to increase participation at meaningful levels. As this study has shown, participation is often lacking completely or, when present, is at the lowest levels, and rarely citizens can influence decisions. The importance of meaningful participation, and the benefits it can bring, have been demonstrated, therefore a crucial recommendation for policymakers is to increase meaningful participation in all the phases of the UF governance. This means, more concretely, that citizens should not only be informed of an initiative or participate in the planting sessions but also involved in all the stages of the processes, such as the planning of projects, the choices of the places, features, and characteristics of UF and urban green spaces. Although technical knowledge is essential, it must be brought into the dialogue constructively and must not be a barrier to the inclusiveness and participation of citizens. Technical knowledge must therefore be put at the service of the participatory process, acting as a support to debate and confrontation. Recognition of other types of knowledge, and recognition of the individuals that possess them, other than technical knowledge, is therefore essential for shared and participatory planning. These processes could be facilitated by a series of workshops, in which citizens and associations can debate with the support of the technical staff. It can be difficult to fully engage citizens from various and different groups, given the many barriers and resource constraints. However, these challenges should not be used as an excuse to exclude these groups and rely on more simple participatory procedures, but they should be an incentive for policymakers to engage in real efforts to create communities. The participation levels that the workshops should aim for are the empowering and co-deciding levels so that citizens can be included and influence decisions impacting the places they live, work, and spent their leisure time. Finally, participatory processes should be designed to foster lasting relationships and rebuild trust between citizens and institutions, and not merely as a check box. All these arrangements, which require a strong political choice, also require explicit consideration of environmental justice from the point of view of procedures and recognition. A modification of participatory practices going in the direction of co-deciding and empowering can likely impact the environmental justice of UF.

For employees in the technical division of municipalities, a practical implication regards the importance of mapping vulnerabilities within the city context to be able to respond and to make sure the distribution of UF is adequate. Mapping and being aware of critical areas are a prerequisite for taking corrective action. It is, therefore, necessary, on the one hand, to thoroughly map the natural and social fabric of the city, with a focus on social and environmental vulnerabilities, and, on the other hand, to be able to recognise certain situations as environmental injustices. Consequently, it is recommended to start comprehensive analyses, and not only on green areas with strict criteria, to assess the actual distribution of UF and urban nature. Comprehensive analyses of the distribution of natural elements and ES would help to create a more complete understanding than what has been done in the two municipal plans. An analysis of tree distribution or TCC, for example, could provide additional information on possible uneven patterns. These data, complemented with an analysis of the socio-economic and demographic characteristics of the population, could greatly complement the analysis already performed, both in Padua and Turin. In the case of Turin, in addition, there is already a study that maps the ES (Battisti et al., 2020), however, it remains unclear whether, and how much, the results of that study are integrated into planning. At the same time, the variables considered in the analyses should be comprehensive and complete, to investigate correlations with socio-economic status as well. A specific recommendation for the municipality of Padua is therefore to include economic variables in the analysis, to assess whether correlations exist between income and accessibility to green spaces. To perform comprehensive and complete

analysis more easily, collaboration with universities, as done in the case of Padua, is recommended. This knowledge would help guide urban development policies for UF and urban green spaces so that the benefits, accessibility, and costs of these spaces are distributed equitably among all citizens and communities, and spatial inequalities are reduced. To the municipality of Turin, but valid elsewhere, it is recommended to assure full transparency on the results of the analyses carried out and on the various procedures that shape and influence the UF governance. As an essential element of democracy, transparency is even more important for public bodies. Citizens, NGOs, and other actors must be able to access environmental information, clearly presented and understandable.

Given the lack of awareness of the procedures and recognition as subjects of justice, on the one hand, there is a need for a political impetus to bring a different sensitivity within the governance bodies, on the other hand, the need concerns the analysis of decision-making procedures to increase their transparency, inclusiveness, and the possibility for citizens to participate in an active and meaningful way. It is therefore recommended to initiate processes to identify the critical aspects of the procedures by involving citizens, environmental organisations, and experts on these issues. These processes, however, must be designed to include all those who wish to participate, and care must be taken to remove institutional and other barriers that may block access to these processes. First and foremost, the transparency and communication of these processes must be inclusive, clear, widespread, and profound. In addition, the recognition of the value of knowledge of citizens, communities, and organisations, who live in the area, must be strengthened and embraced. In addition, the recognition of the value of knowledge of citizens, communities, and organisations, who live in the area, must be strengthened and embraced. This local knowledge should not be seen as a contrast to that of the administrations; on the contrary, they should be combined with the technical knowledge of municipal offices and universities, to reinforce and complement each other.

9.3 Needs for Future Research

This research has started filling a gap in the literature on environmental justice concerning UF. By exploring the conceptualisation of environmental justice, it is possible to draw a first portrayal of how environmental justice is understood in two cities, Turin and Padua, concerning UF. Furthermore, this thesis makes a valuable theoretical contribution with the elaboration of a framework for environmental justice and its interrelation to governance to be diffused to practitioners and citizens. From an empirical point of view, this research can be useful as a basis for the in-depth research of the topic. In addition, insights were generated on the relationship between participation, inclusiveness, and environmental justice, especially for procedural and recognition justice.

Nevertheless, there is a need for future research on several topics. Further research is needed to understand the role of culture and sense of community with respect to active participation and involvement. A widespread feeling among the interviewees of this thesis is that the different culture and sense of community of Northern European citizens make it easier to organise and manage meaningful participatory processes. Exploring this hypothesis with multiple case studies could provide important insights for optimising participation.

Research on the distribution of UF in Padua and Turin, from a holistic perspective and not only considering urban green spaces with certain characteristics, as done in the two municipal plans, is strongly needed. Research on this would help understand whether there are uneven spatial distributions and along which variables, in the two cities. In the case of uneven distributions, the results of such research can help generate environmental justice claims more clearly.

In addition, future research should focus on studying the participatory processes of the two cities, concerning UF, in detail. On the one hand, to understand the concrete current levels of inclusion, on the other hand, to understand the impacts in terms of justice for participants and excluded persons. Based also on the limitations of this thesis, further research involving civil society, citizens and associations is needed. Specifically, participatory research with citizens and vulnerable and disadvantaged communities could generate very important results on the presence of environmental injustices, especially when it comes to procedures and recognition. Lastly, research is needed to explore the power dynamics around the two municipalities on UF and urban green spaces, to add important knowledge on the procedural pillar, and overall, on environmental justice in these two cities.

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Appendix A: Interviewees

Respondent	Case Study	Generic Role	Date
R1T	Turin	External collaborator	March 2022
R2P	Padua	External collaborator	March 2022
R3T	Turin	Municipal Employee	March 2022
R4T	Turin	Municipal Employee	March 2022
R5T	Turin	Municipal Employee	April 2022
R6P	Padua	External collaborator	April 2022
R7T	Turin	Environmental NGO	April 2022
R8P	Padua	Citizen Association	April 2022
R9P	Padua	Municipal Employee	April 2022
R10T	Turin	Municipal Employee	April 2022

Appendix B: Interview Guide

Introduction:

- Description of the research and relevant information
- Definition of UF adopted in this thesis
- What are your role, tasks, and responsibilities within municipality X?

General:

- Have you ever encountered the term environmental justice and what is your understanding of the term?
- How would you describe environmental justice in relation to UF?
- Do you have any examples of environmental injustice concerning UF in city X?

Distributional Justice:

- How is the distribution of UF considered in city X?
- What principles or trends lead to the current distribution of UF?
- What are the factors, in your opinion, that impact the distributional pattern of UF in city X?
- What types of analysis are done to assess the distribution of the UF and how are the results impacting the strategy and decisions?

Recognition Justice:

- How would you describe the level of recognition?
- Are different types of knowledge considered and included?
- How are the citizens' needs and views collected by the municipality?

Procedural justice:

- What do you think is the relationship between procedures and environmental justice?
- What measures are put in place to ensure that procedures in UF governance are fair?

Governance principles:

- How would you describe the usual participation level in UF governance?
- What are the barriers to participation in city X?
- How would you describe the relationship between participation and environmental justice?
- What do you think is the link between inclusiveness in decision-making and environmental justice?
- What do you think is the link between the transparency of the administration and its procedures and environmental justice?

The interview guide was slightly adapted for each interview.

Appendix C: Overview of the Reviewed Documents

	Padua	Turin
Main Document	Il Piano del verde del Comune di Padova [Padua Municipal Green Plan] (MGP)	Piano Strategico dell'Infrastruttura Verde [Green Infrastructure Strategic Plan] (GISP)
Supporting documents	Sintesi primo incontro di Agenda 21 sul Piano del Verde Comunale [Summary of the first Agenda 21 meeting on the Municipal Green Plan]	Allegato 1 Tavole di Piano [Annex 1 Graphics of the Green Infrastructure Strategic Plan]
	Sintesi Focus Group sul Piano del Verde [Summary of focus groups on the Municipal Green Plan]	

Appendix D: Coding Framework

Themes	Codes	Sub-codes within the main codes
Environmental Justice	Definition of environmental justice	
	Distribution	History of the city
	Procedures	
	Recognition	
	Examples of environmental injustice	
Governance	Participation	Role of the mediator
		Barriers in the municipality
		Politics' role
	Inclusiveness	
	Transparency	
Important factors	COVID-19	
	Gentrification	
	Barriers and challenges for the municipalities	