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Public Participation in Green Infrastructure Planning: A Comparative Study of Liverpool and Valladolid

Environmental Management and Sustainability Science

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1. Introduction

Over the past century, the expansion of urban areas has risen rapidly to accommodate the growing urban population and human economic activities. However, despite the numerous benefits it brings to society, such as technological and social innovation, it also negatively impacts society (Wheeler, 2013). Rapid urbanisation has led to the degradation of natural habitats, declining wildlife populations, and reducing open landscapes. Furthermore, it also contributed to the rise in greenhouse gas emissions, higher energy consumption and water pollution (Behnisch et al., 2022). This has exacerbated the growing effects caused by climate change, leading to environmental decline and making cities and their residents more vulnerable to extreme weather changes (Bulkeley & Tuts, 2013).

Then, it is necessary to shape urban spaces through effective urban planning to support resilience and mitigate and adapt to the effects of climate change while considering the socio-economic reality. (Garschagen & Romero-Lankao et al. 2015). A way to promote urban resilience is to develop strategies that address the ecosystems that exist within the urban systems while considering both the social and ecological dimensions (McPhearson et al., 2015).

Implementing Nature-Based Solutions, such as Green Infrastructure, has gained traction in European countries over the past couple of years as a means to address urban resilience while supporting the socio-economic reality of urban spaces (Kabisch et al., 2016) (Monteiro et al., 2020).

To support meaningful positive changes in the urban context that enable resilience, it is critical to have a participatory approach that includes multiple local stakeholders, such as local citizens (Mehryar et al., 2022). Citizen involvement has significant positive impacts on enhancing the benefits of Green Infrastructure, such as promoting a green economy, pushing for better environmental legislation, or even enhancing the local community's environmental awareness (Liu & Martens, 2023).

The main aim of this project is to explore how citizen involvement is considered in Green Infrastructure projects and how policies or strategies related to green infrastructure influence citizen engagement practice.

1.1 Scope and Boundaries, Research Question and Structure

This chapter presents an overview of the project's focus and structure. Firstly, it describes the scope and boundaries of this project. I will list the main research question and subsequent research design.

1.1.1 Scope and Boundaries

This project investigates the role of citizen participation in green infrastructure projects through a comparative case study analysis. As climate change is increasingly becoming the foremost threat to the health of urban areas, it is necessary to develop solutions that improve resilience in urban areas while considering the importance of ecosystems. One of the current trends in urban planning is the use of Nature-Based Solutions (NBS) to enhance urban areas effectively. A type of NBS that can be used is Green Infrastructure (GI), a strategically planned network of natural and semi-natural areas managed to sustain ecosystem services. A key element of the planning process is the interaction between urban citizens and green infrastructure within urban areas. Therefore, looking at two practical cases of the implementation of GI and doing a comparative case study analysis can be extremely helpful in further understanding how citizens influence its performance.

The two case studies explored in this thesis are part of the Urban GreenUP(Urban GreenUP, 2020). This EU-funded project aims to mitigate the effects of climate change, improve air quality and water management, and increase urban sustainability through innovative nature-based solutions. One of the primary elements of Urban Green UP was the development of Green Infrastructure (GI) to increase climate mitigation and adaptation inside the urban areas. According to the Urban GreenUP project, two of its case studies were Liverpool and Valladolid, located in Spain and the UK. Both cases successfully implemented Green Infrastructure, making them good candidates for case studies in this research.

Regarding the feasibility of the data, there is already a significant amount of information regarding the implementation of green infrastructure in the respective urban areas due to the extensive data from the Urban GreenUP project. This enables an analysis of how citizens' involvement affects the performance of Green Infrastructure. Lastly, the researcher's familiarity with the Spanish language allowed him to look into Spanish policy documents regarding implementing Green Infrastructure.

This thesis builds on literature on urban development, urban resilience, and nature-based solutions to citizen involvement to investigate how public participation affects the performance of green infrastructures.

1.1.2 Research Question and Sub-Research Questions

This project aims to answer the following research question to understand the role of citizens' involvement in the development of urban green infrastructures:

How is citizen involvement considered urban green infrastructure projects, and what recommendations can be formulated to improve public participation in urban green infrastructure practice?

The sub-research questions presented below aim to assist in answering the main research question. They are used to support an accurate and thorough response to the respective parts of the research question.

1. **To what extent are citizens included in the planning, implementation and performance of Green Infrastructure?**

   The basis for this project is to understand how the involvement of citizens affects urban green infrastructure projects. This sub-research question aims to provide the project's core by analysing the policy or strategy documents and practical cases.

2. **How does policy influence the practice of citizen involvement in the development of urban green infrastructure?**

   This sub-research question examines how policies influence citizen engagement in green infrastructure projects. By understanding this, it will be possible to contrast theory and practice regarding the role of citizens in urban green infrastructure performance.

3. **What recommendations can be developed to improve public participation in urban green infrastructure development**

   This sub-question aims to expand the previous sub-questions and establish potential recommendations to improve the planning practice regarding citizen participation in urban green Infrastructure projects.

1.1.3 Research Design

Figure 1.1 presents a visualisation of this project's research design. This design helps us understand the core research question and consequent sub-research questions and their purpose and methodology.

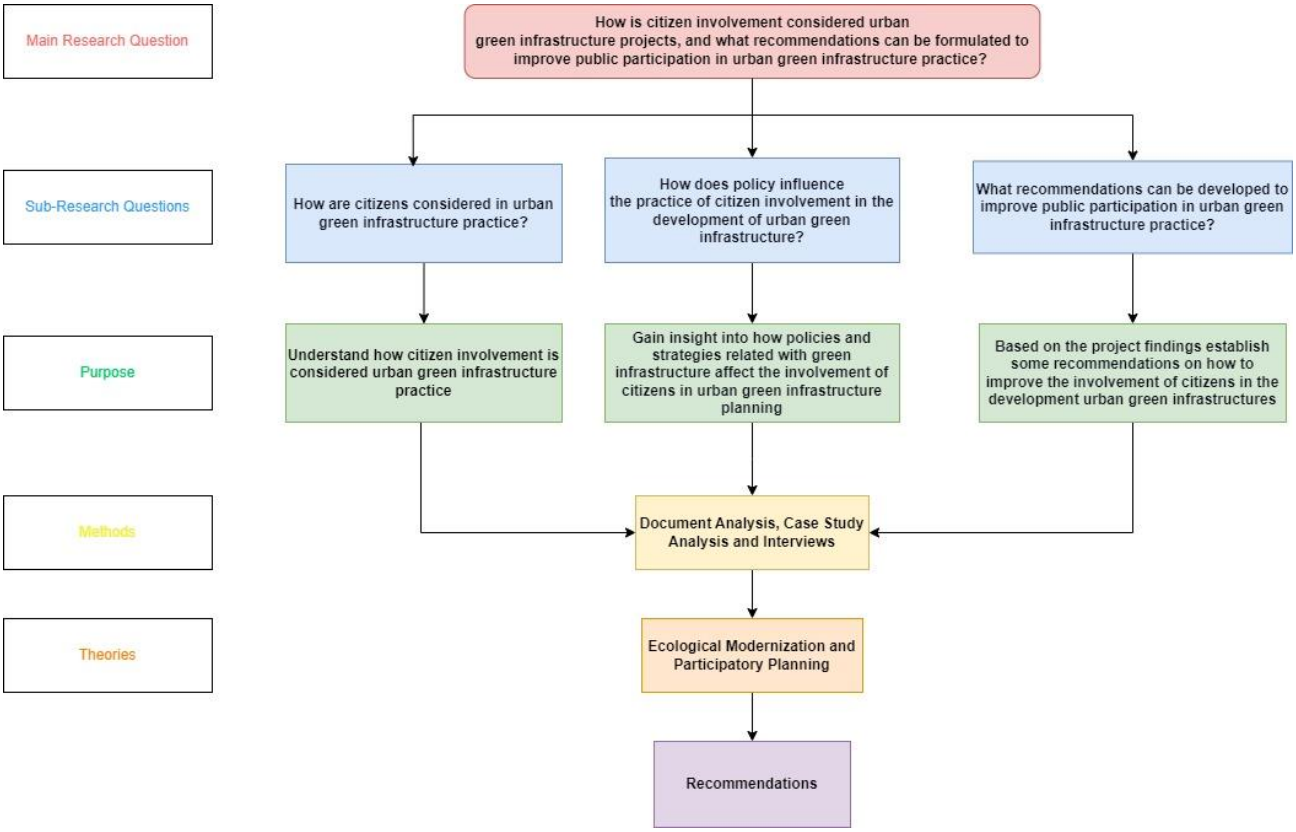

Figure 1.1- Research Design

The background information and theories that build green infrastructure and citizen participation are initially explored, providing the theoretical context for the project. The main theories and theoretical frameworks are then presented.

Policy documents related to the research topic from multiple levels (supranational, national, and potentially municipal levels) have been analysed. This is followed by a case study analysis to gain insight into how planners consider the role of citizens in both case studies. The results from each of the analyses are juxtaposed with each in order to understand the similarities and contrasts between policy and practice. An interview with a Liverpool practitioner was conducted to provide context and additional knowledge to the findings of the document and case study analysis.

All of the analyses culminate in a discussion where the findings are put through the lens of the project's theories. Which provides the necessary findings to answer the research question and sub-research questions

2. Problem Analysis

This chapter aims to provide the background information required to build the theoretical context required to follow the entirety of the research. Firstly, the problems of urban areas are described, followed by an explanation of the meaning of urban resilience and how to improve it. Next, ecosystem services and their relationship to urban planning are explained, which leads to an understanding of Nature-Based Solutions (NBS). One of the main NBS is Green Infrastructure (GI), so its definition and the factors that affect its performance are also addressed. Citizen involvement is vital to GI performance, so the benefits, challenges, and knowledge gaps on this subject are also developed. This chapter ends with a Problem Summary.

2.1- Problems with Urban Areas

Several researchers project that the global urban population will increase by 2.5 billion people in the next 30 years. This makes urban areas one of the current century's most fundamental spaces for transformation and development. To respond to this growth, urban areas must be expanded to ensure they have the capacity to accommodate urban citizens (Simkin et al., 2022).

Urban areas represent the centre of human activity. Economic, technological, and social innovation usually occur within the limits of these areas. According to (Wheeler, 2013), there can be different objectives to be achieved through urban planning, such as:

- Economic development
- Improvement of social well-being among citizens
- Sustainable management of the natural environment
- Reduce the disaster risk
- Increase the aesthetic value of urban spaces

As cities become increasingly exposed to environmental stresses like climate change and anthropological stresses like rapid urbanisation, the actors in the planning process have called for supporting more sustainable practices (Datola, 2023).

Rapid urbanisation and urban sprawl significantly impact climate change by reducing land cover, which only promotes the negative impacts of climate change (Beceiro et al., 2022). By burning fossil fuels, transporting goods and people, and engaging in industrial activity, humans have shaped urban spaces to a point where these areas exacerbate the current global warming trend. Such is the case of the urban “heat island” effect, which is becoming increasingly common in urban areas worldwide (Mehryar et al., 2022). Moreover, heat waves, sea-level rise, floods, and other extreme weather events are becoming increasingly common. This threatens the livelihoods of urban citizens, the critical infrastructure necessary for a functioning society, and

the businesses operating in cities. Due to this growing economic and social transformation, communities are increasingly more vulnerable with a reduction in their adaptive capacities to respond to an increasing change in climate (Garschagen & Romero-Lankao et al. 2015). Urban vulnerability is related to how an urban system cannot deal with the adverse effects of climate change, making the population and the urban infrastructure susceptible to climate risks (Bulkeley & Tuts, 2013).

An International (IPCC) report regarding the risk management of extreme events that advance climate change adaptation strongly emphasises how urban areas play a vital role in global climate change and vulnerability (van Vuuren et al., 2012). However, the current political and scientific debate over urban vulnerability is challenging due to its lack of attention to actual responses. A potential reason for this is the fact that there is a lack of studies focusing on the vulnerability and adaptive capacity of specific cities (Garschagen & Romero-Lankao et al. 2015).

Furthermore, developing countries tend to focus on their economic goals over ecological goals to ensure they meet citizens' societal needs, which is significant in urban development policies (Daramola & Ibem, 2010). This creates an imbalance between how developed countries approach sustainable urban development, aggravating the transferable nature of environmental impacts (Daramola & Ibem, 2010).

There are several reasons for this, but one of the main ones is an increasing focus by policymakers and multiple stakeholders on developing integrative policies that promote effective solutions that help urban areas improve their resilience to climate change impacts. To achieve these solutions, the concept of “urban resilience” has been increasingly used by different planners and active actors in planning systems (Mehryar et al., 2022)(Su et al., 2022).

Urbanisation and effective urban planning can positively impact, leading to efficient measures that tackle urban vulnerability to climate change. However, these measures can be costly, which means that high-income countries can achieve a higher level of urban resilience in their cities compared to low-income countries. Still, having financially effective and sustainable urban planning strategies is extremely important to reduce urban vulnerability to climate change (Garschagen & Romero-Lankao et al. 2015).

2.2 Urban Resilience

Urban resilience is viewed as a transformative approach to urban planning to make urban space more capable of adapting and responding to the pressures created by climate change (Datola, 2023). Urban Resilience can be defined as “the ability of an urban system, all its constituent socio-ecological and socio-technical networks across temporal and spatial scales to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity” (Meerow et al.,.2016, page 39). This makes it implicit that “urban resilience” supports a socio-ecological perspective, which implies the transformation of complex systems over time (Datola, 2023).

In practice, resilience is becoming increasingly an essential part of plans, programs, policies, and strategies that increase the capacity of the urban population to cope with the risks and threats of climate change (Mehryar et al., 2022). By developing planning strategies that mitigate and adapt to the environmental stresses of climate change, planning actors can conceive solutions that improve urban resilience (Bulkeley & Tuts, 2013). Furthermore, to enact actual changes in urban areas, there is a need to incorporate a transformational approach to go beyond traditional urban planning methodologies such as grey infrastructure (Kates et al., 2012) (Mehryar et al., 2022).

Figure 2.1 illustrates the elements that shape the potential evolution of urban planning to improve resilience. The most efficient strategies can be developed by understanding how these elements interact and affect urban spaces (Mehryar et al., 2022).

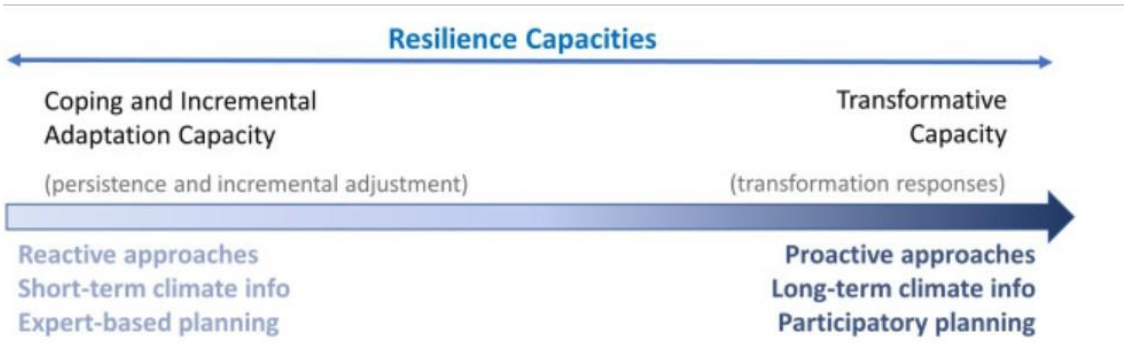

Figure 2.1- Key elements that can improve urban resilience (Mehryar et al., 2022)

Firstly, employing strategies that address climate risks and ecosystem services before any potential effects of climate change can improve urban sustainability and resilience (Kremer et al., 2015). Understanding how climate change impacts evolve through time is essential to developing intelligent urban planning. Therefore, by having access to long-term climate information, planners can develop effective strategies for the future effects of climate change in urban spaces (Mehryar et al., 2022). By proactively approaching urban planning, actors can seek innovative solutions that significantly reduce urban vulnerability (Mehryar et al., 2022).

Multiple stakeholders need to be involved in enacting positive, impactful changes in an urban context. A potential way to do this is through a participatory approach, where the decision-making process collaborates from many sectors, enabling a diversification of perspectives that improves the planning process (Fedele et al., 2019). These strategies address the climate risks posed to urban areas and can also impact other elements of urban spaces, such as urban sustainability and ecosystem services (Kremer et al., 2015).

2.3 Ecosystem Services

The natural components of urban areas – that is, ecosystems - are also fundamental to the health and resilience of urban areas, from flood mitigation, carbon sequestration, pollination, and many more (Sirakaya et al., 2018). Humans interact and engage with ecosystems in numerous ways, altering their structure and composition to achieve great human well-being. The benefits humanity can derive from the ecosystem can be defined as Ecosystem Services (ES) (Wallace, 2007). Consequently, how humanity affects ecosystem services has been at the core of many scientific studies and discussions (Weitzman, 2019).

For the interactions between biotic and abiotic elements of ecosystems, there are ecological processes that promote the flow and stock of natural resources that form these ecosystem services. Ecological processes such as nutrient cycles, water fluxes, and energy transfer are essential for human life (Fu et al., 2013). These goods are frequently managed to maintain their existence. Evaluating and assessing ecosystem services creates the baseline for interdisciplinary decision-making in ecological management by generating a link between governance and human benefits (Mace et al., 2012) (Weitzman, 2019).

In 2005, the Millennium Ecosystem Assessment identified the four major categories of ecosystem services: supporting, provisioning, regulating, and cultural (Mace et al., 2005).

1. **Provisioning** – An essential element of ecosystem services is that they provide natural resources necessary to a functioning society to humans. These resources include textiles, fuel, food, and all materials required to build infrastructure.

2. **Supporting—**All natural systems require a healthy function of ecosystem services because they support different ecological processes, such as photosynthesis, water purification, soil regeneration, and nutrients.

3. **Regulating** – Ecosystem services also function as a regulatory component of natural systems, which is critical for any moments where unsustainable exploitation of natural resources occurs due to anthropological pressures—for example, carbon storage, decomposition of organic matter, and water purification.

4. **Cultural** – Human interactions are highly dependent on the health of ecosystem services. Since the beginning of human development, ecosystem services have shaped cultural and intellectual interactions. For example, multiple cultural groups can be differentiated by the ecosystem services they can explore.

Moreover, ES offers an opportunity to develop a framework to integrate ecology and economics, representing these two perspectives at its core. By demonstrating the value of the ecosystem through ES, conservation scientists can show different stakeholders, such as policymakers and land managers, the benefits of protecting natural resources (Chan et al., 2012).

Humans have historically developed settlements around where most natural resources are, intending to extract the most benefits to further society's development. Therefore, urban areas are usually established in developed regions with higher availability of ecosystem services. In these spaces, the sustainable management of urban ecosystem services allows for minimising and mitigating some of the adverse environmental and socio-economic effects that result from urban living (Sirakaya et al., 2018).

2.3.1 Urban Ecosystem Services

Restoring and supporting ecosystems can provide solutions for climate change mitigation and adaptation in urban spaces. By helping regulate the temperature in urban areas, urban ecosystem services can effectively promote the reduction of energy consumption. Furthermore, they can also improve the air and water quality of a city, which not only enhances the environmental conditions of a city but also gives its citizens an active reduction of some of the causes of many diseases. This means that urban ecosystem services contribute to improving urban resilience, namely to climate change and other critical environmental issues such as biodiversity loss (Sirakaya et al., 2018) (McPhearson et al., 2015).

By considering urban ecosystem services in urban planning, design, and management, planners can promote that these services, critical for the social and economic dynamics of urban systems, can endure the effects of global climate change (McPhearson et al., 2015).

Figure 2.2 (cited from McPhearson et al., 2015) demonstrates the need to protect the resilient supply of ES from guaranteeing the well-being of human lives and the diversity of the ecosystems.

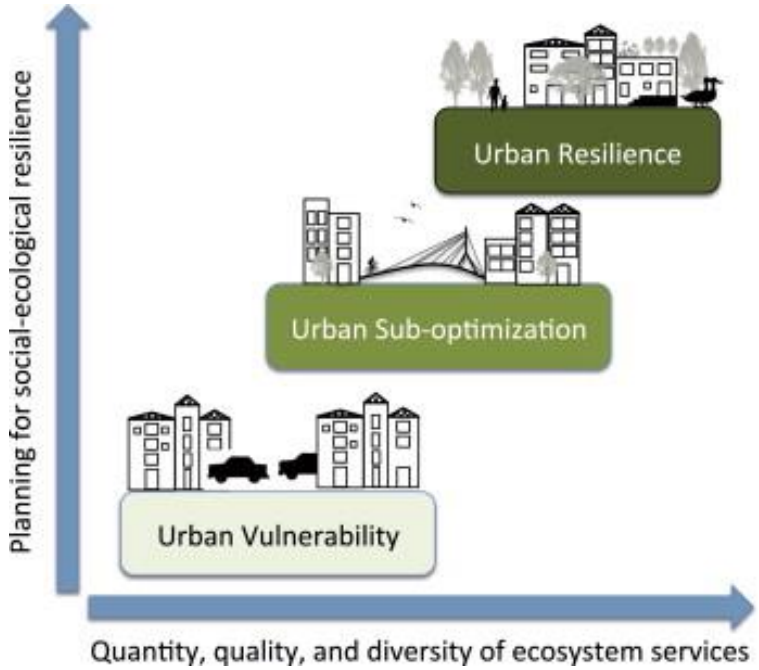

Figure 2.2- Ecological Resilience in Urban Spaces (McPhearson et al., 2015).

As illustrated in Figure 2.2, increasing the quantity, quality, and diversity of ecosystem services while enhancing the planning for social-ecological resilience can lead to urban spaces going from suffering from urban vulnerability to urban sub-optimization to finally achieving urban resilience.

Planning practices must consider urban spaces' ecological and social functions to achieve urban resilience and sustainability. Using nature-based solutions such as green infrastructure is critical to ensure that human well-being and health can be supported locally within urban ecosystem services (McPhearson et al., 2015).

2.4- Nature-Based Solutions

The concept of Nature-based solutions (NBS) relates to strategies that seek to enhance natural processes to address societal issues such as biodiversity decline and climate change. (Cohen-Shacham et al.,2016). NBS can be represented in various forms, including natural climate solutions, reduction of ecological disaster risk, ecosystem-based mitigation and adaptation, and green/blue infrastructure (Kooijman et al., 2021). A vital strength of the concept of nature-based solutions is that it takes an integrative perspective on societal challenges while promoting the transition from a resource-intensive society to a resource-efficient one (Faivre et al., 2017).

There has been a significant focus on research on this topic, namely that it can accelerate cities' sustainable transition and support social innovation. It does this by stimulating positive changes in planning and governance practices that involve many actors from different sectors (Wolfram & Frantzeskaki, 2016).

According to (Lafortezza et al., 2018), the four primary goals of NBS are:

- Strengthen sustainable urbanisation to support ecological functions while stimulating economic growth
- Support ecosystem restoration to augment their resilience
- Increase climate mitigation and adaptation of urban spaces
- Improve environmental resilience and risk management

Nature Based Solutions are critical in supporting the ecosystem services that can buffer urban areas by improving their urban resilience by mitigating sudden climate changes such as heatwaves and storms (Kabisch et al., 2016). By implementing NBS in urban areas, it is possible to increase the connectivity between green spaces, which, in turn, enhances the resilience of urban areas. However, several trade-offs exist between planning and managing NBS and enhancing urban resilience (Bush & Doyon, 2019). From temporal-spatial, social, functional, and species trade-offs, it is necessary to develop actions to maximise their effectiveness through strategic urban planning.

Figure 2.3 illustrates the relationship between urban resilience, urban planning, and nature-based solutions. By considering all of these concepts, strategically integrative solutions can be developed.

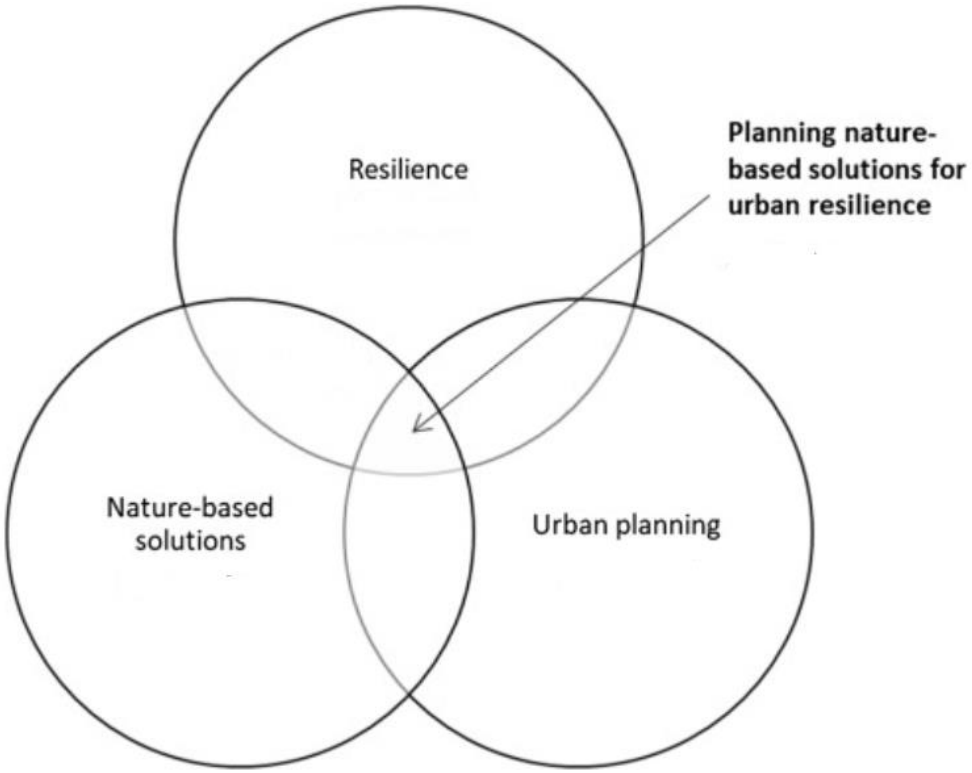

Figure 2.3- Relationship between NBS, Urban Planning, and Resilience (Bush & Doyon, 2019)

Since 2014, NBS has been a part of the European Union research and innovation funding agenda, Horizon 2020, connecting the strategy for ecosystem and biodiversity with innovation for growth and job creation. Furthermore, the Horizon 2020 Expert Group report on "Nature-Based Solutions and Re-Naturing Cities" became one of the predecessors of the R&I agenda on Nature-Based Solutions, which functions as the current EU agenda that tackles NBS (Kooijman et al., 2021). The main aim of this agenda is to incentivise member states to use more NBS by developing legal and institutional frameworks that support the long-term financing of projects related to Nature-Based Solutions. Several ongoing projects are currently associated with implementing NBS for climate and water resilience, such as CONNECTING, GROW GREEN, UNALAB, and URBAN Green UP (Faivre et al., 2017). Lastly, NBS played an essential role in the European Green Deal, where it presented its importance in climate adaptation and mitigation (European Commission, 2019)(UN, 2019).

Furthermore, the core principles of the R&I agenda, which NBS is a part of, hold immense potential to contribute to the UN Sustainable Development Goals (SDGs). Of particular

relevance is SDG 11, which focuses on Making Cities and Human Settlements Inclusive, Safe, Resilient, and Sustainable. This alignment underscores the optimistic outlook for NBS in the context of sustainable urban development (Faivre et al., 2017).

The following figure (Figure 2.3) illustrates the positive impacts caused by different Nature-Based Solutions that can lead to cities becoming more sustainable while increasing their social well-being by creating green roofs, community gardens, and green corridors (Faivre et al., 2017).

Figure 2.4 illustrates the potential contribution of NBS to the achievement of SDG 11.

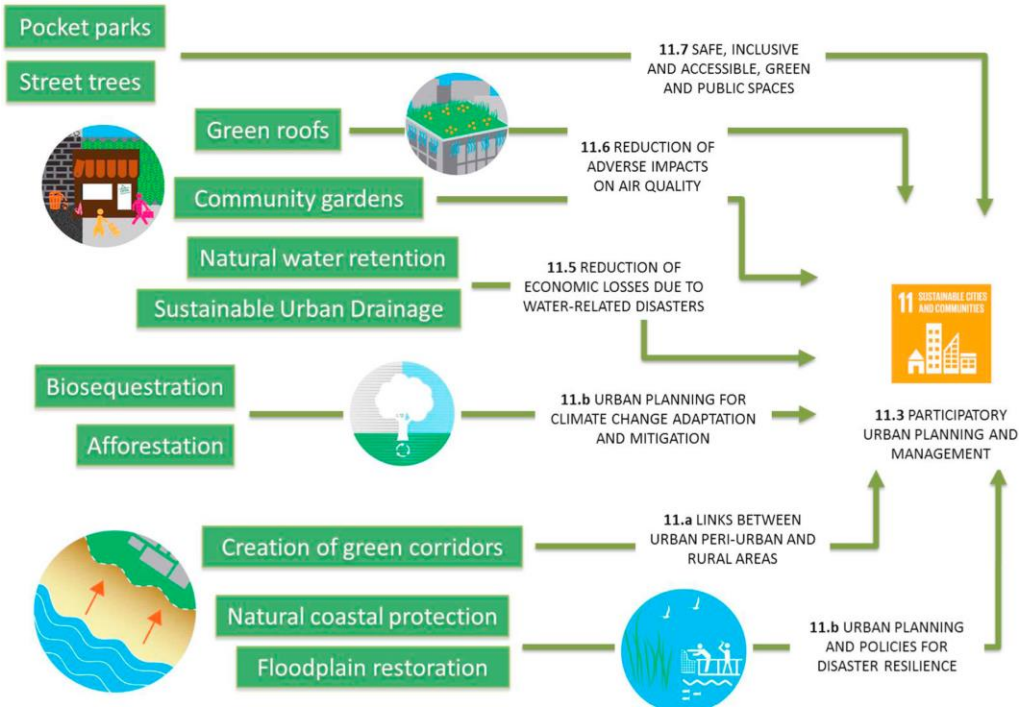

Figure 2.4- *Contributions of Nature-Based Solutions to Achieving SDG 11* (Faivre et al., 2017)

A key element of NBS is utilising natural alternatives instead of technological solutions to resolve society's issues. By supporting ecological functions at local and regional scales, they can enhance biodiversity, reduce urban heat, improve the sustainable production of food, promote a circular economy, and improve human well-being. In an urban context, urban planners and policymakers consider NBS to be a potential substitute for traditional civil engineering (Snep et al., 2020) (Kooijman et al., 2021).

Moreover, through urban planning, multiple stakeholders can be part of the decision-making process, ensuring the development of NBS while considering the necessities and perspectives of all involved actors (Bush & Doyon, 2019).

Despite the potential benefits of policymakers and urban planners implementing nature-based solutions, their adoption varies significantly (Kooijman et al., 2021). Firstly, there needs to be more explicit guidelines on how to successfully develop and integrate Nature-Based Solutions in

the decision-making process of urban planning, leading local authorities to consider the success of NBS in their implementation rather than the actual performance of these measures (Snep et al., 2020). Furthermore, local actors need to be made aware of how local conditions are affected by the effectiveness of NBS performance. A potential cause for this situation is that performance needs to be described in the early planning stages, allowing contractors to use cheaper and low-performance materials in the construction phase (Snep et al., 2020).

Another challenge in developing NBS is that it demands the participation of different actors from multiple sectors, including the private sector. Involvement from various stakeholders in the planning process of NBS is critical because it allows for knowledge sharing and, if insufficient, can create severe hindrances, especially when it comes to economic resources, that enable the functionality of NBS over an extensive period (Frantzeskaki et al., 2017).

There are also some knowledge gaps in determining the economic value of the ecosystem-provided ecological services that NBS aims to support. Moreover, the benefits that can be extracted from NBS can be valued differently by different stakeholders, which can cause severe trade-offs and even potential implementation of measures that negatively impact the environment (Kooijman et al., 2021).

2.5- Green Infrastructure

Green Infrastructure (GI) is an umbrella term for conservation sites, the network of green areas and wetlands strategically planned to benefit ecosystems and humans in urban areas (Grădinaru & Hersperger, 2019). It includes permeable vegetated surfaces, green streets and alleys, green roofs, public parks, community gardens, urban forests, and wetlands (Matthews et al., 2015).

The concept of Green Infrastructure emerged in the 90s based on other concepts adopted by planers, such as green belts and garden cities. (Monteiro et al., 2020). It was first developed by environmental researchers from the United States as a tool to tackle urban stormwater (Fabos, 1995). However, through the years, as the perception of the value of urban ecosystem services became more widely known among urban planners, landscape artists, ecologists, environmental groups, and even politicians, GI became an essential tool for planners to support ecological functions in urban areas (Monteiro et al., 2020) (Walmsley, 2006).

Consequently, in 2013, the European Commission developed its definition of green infrastructure to make it an essential part of urban planning in the EU. Green infrastructure is “a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas” (European Commission, 2013).

A literature review made by (Grădinaru & Hersperger, 2019) elaborates on a set of fundamental planning principles for Green Infrastructure:

- Coordination of GI elements with other strategic domains- This relates to the fact that GI should support critical urban elements such as quality of life, cultural assets, water management, food provision, air quality, and climate change mitigation and adaptation.

- Multi-functionality- This principle states that GI should address urban spaces' ecological, social, and economic functions.

- Connectivity of GI elements- Robust connectivity between GI allows for the movement of animal species, which is critical for a city's biodiversity. Moreover, it also supports human interaction with these elements.

- Multi-scale planning of GI- To maximise its potential benefits, a multi-scale perspective on Green Infrastructure should be developed, creating an urban-to-regional national network.

- Diversity of GI elements- GI constituting natural and semi-natural areas can be differentiated. Furthermore, Green Infrastructure can vary in size.

- Identity Building- GI can increase the local community's sense of identity in urban spaces, which can increase community engagement in their planning, implementation, and general maintenance.

Researchers and planners acknowledge how GI can lower wind speeds, reduce stormwater run-off, regulate temperature, reduce energy use, promote carbon sequestration, and support several other benefits from ecosystem services (Matthews et al., 2015). Another critical element is that it improves connectivity among green areas supporting the ecosystem network, which is fundamental to the flow and movement of natural species (Hansen & Pauleit, 2014). Also, maintaining connectivity within the GI network is imperative for the resilience and multifunctionality of urban spaces because it supports species migration and residents' social inclusion (Yuan et al., 2023). Furthermore, GI has several positive impacts on the socioeconomic state of urban areas by promoting social inclusion, communal activities, and recreational activities that positively impact the health of humans and ecosystems (Monteiro et al., 2020). GI can also create opportunities for businesses that support the development of the green economy (Liu & Martens, 2023). Promoting a connection between the urban population and nature creates an opportunity for local businesses, NGOs, and residents to collaborate further in stewarding the sustainable development of urban areas (Pauleit et al., 2019).

Despite the benefits of Green Infrastructure, planners and policymakers need to overcome several challenges. Firstly, different conceptualisations of green infrastructure can be derived from distinct academic disciplines. For planners, ambiguity in defining Green Infrastructure

hinders its response to climate change. Looking at Green Infrastructure through an economic lens, for example, can limit it to enhancing the flow of natural resources instead of an important tool to support ecological and social processes (Matthews et al., 2015). A lack of a precise aim for and the performance of GI can make it difficult for planners to secure funding from the municipalities for these projects. (Gordon et al., 2018).

Progressive innovations in planning are critical, especially when evaluating urban elements, to ensure the involvement of multiple stakeholders. However, considering Green Infrastructure is a relatively new concept compared to Grey Infrastructure in spatial planning, planners face difficulties because it requires rethinking urban planning practices and priorities (Matthews et al., 2015).

The effects of climate change can be challenging to assess and evaluate over time and space, sometimes limited to scientific experts' observation. This is because climate adaptation is highly dependent on the socio-economic and power relations of the local stakeholders. Therefore, the planning and implementation of Green Infrastructure as a tool for climate adaptation and mitigation relies on local actors' dynamics and knowledge (Matthews et al., 2015). Of these actors, citizens are one of the most important for the success of GI, considering how changes in the urban landscape affect their well-being (Andersson et al., 2014).

How urban residents interact with Green Infrastructure strongly influences its effectiveness for climate change mitigation (Barreira, 2023). Furthermore, recent research on the effectiveness of GI plans from 52 different cities confirmed this, revealing that public participation contributes heavily to the quality of these plans. It also demonstrated how a lack of participation can potentially lead to the abandonment of GI in the long term(Le & Tranq, 2023).

2.6 Citizen Involvement

A critical element of current environmental policies is participation. The reasoning is that there is a need to answer the social demand for legitimate actions to be implemented (Bally & Colleti, 2023). This is even more important in the GI domain, especially concerning citizens as their key to promoting the management of biodiversity and ecosystem services (Kenward et al., 2011). The participation of citizens in public services has been gaining prominence over the past decades, as they are among the stakeholders that design and implement these services. As a result, these collaborative arrangements are at the core of planning governance (Willems et al., 2020). Citizen participation can appear in different forms depending on the context and phase of development, from voting on city budgets, being involved in policy-related working groups, or being part of surveys in the development process (Bally & Colleti, 2023). These socio-cultural and governance dynamics are deeply connected with ecological processes, as people are not only users of Green Infrastructure but also part of their development and maintenance. Therefore, it is critical to involve active citizens in the decision-making process to ensure the effectiveness of GI benefits, such as fostering social cohesion and supporting ecosystem system services (Andersson et al., 2014).

Citizen involvement can contribute to the further evolution of public policy and increase the legitimisation of policies supporting GI implementation (Bally & Colleti, 2023). Furthermore, citizen participation can benefit Green Infrastructure and NBS (Liu & Martens, 2023). They can range from:

- Environmental Benefits- Support the efficient assessment of environmental risks while assisting in restoring and maintaining urban ecosystem services.

- Economic Benefits- Promote the stimulation of a green economy, which leads to more green jobs.

- Social Benefits- Enhancement of community cohesion, health benefits, and strengthening cultural values.

- Policy Benefits- Citizens can offer constructive ideas that improve the planning process and enhance the possibility of effective implementation.

- Citizens Benefits- By participating, citizens can feel ownership of the project planning and its results. Moreover, participants can promote awareness of environmental issues within the local community.

It is, then, important to consider the motivations and incentives that drive citizens to participate in the planning process. Sociocultural aspects such as ethnicity, socioeconomic status, and age might also impact citizens' participation levels (Sieber et al., 2015). Moreover, citizens can get involved in different stages of GI planning. This also affects the effectiveness of their participation (Willems et al., 2020).

Despite these benefits, many of the decisions related to public policy are still taken in a top-down system, leading to some key stakeholders being ignored, such as citizens (Bally & Colleti, 2023) (Slätmo et al., 2019). Citizen involvement is time-consuming and can lead to troubling results if the outputs are ignored or specific interest groups sabotage the process. Some challenges can then arise when planners want to include citizens in the planning process of Green Infrastructures (Ianniello et al., 2019). Firstly, there is a noticeable gap in knowledge regarding effective strategies for fostering individual and communal involvement in cooperative efforts, including the factors that encourage participation. This is connected to allocating resources and attention to certain aspects more than others, such as organisational practices, power dynamics, cultural influences and monitoring, which require further investigation (Møller et al., 2018).

As mentioned previously, effective public participation can be a key element in ensuring the success of Green Infrastructure implementation (Barreira, 2023). At the same time, planners' failure to address urban citizens' perceptions and preferences can lead to the

underperformance of Green Infrastructure benefits (Le & Tranq, 2023). Moreover, there is a danger that not considering poor neighbourhoods in the planning process of GI can lead to a rise in social-environmental injustice (Barreira, 2023).

Moreover, according to (Ferreira et al., 2020), there are several gaps in the current knowledge regarding citizen involvement in Green Infrastructure:

1. There is a lack of research applied to southern European countries.

2. Most of the literature deals with the perceptions, preferences, and perspectives of citizens and stakeholders engaged in planning participation processes and their anticipated benefits. Only a few studies discuss the potential economic benefits of public participation and how it can raise the city's quality of life.

3. There is a lack of exploration on how promoting public participation in Green Infrastructure projects has the potential to reduce conflicts between citizens and other local stakeholders.

As GI becomes more prominent in urban governance, it is critical to understand how planners can rethink public action and fill in the knowledge gaps to increase its benefits. Citizens are essential societal stakeholders, so it is critical to investigate their role in GI planning to support the sustainable transition of urban spaces and help them become more resilient (Bally & Colleti, 2023).

2.7- Problem Summary

As urban areas become the centre for human activity and population, they become increasingly exposed to environmental stresses like climate change and anthropological stresses like rapid urbanisation.
Urban resilience is increasingly becoming an essential component of plans, programs, policies, and strategies to enhance the urban population's ability to manage the risks and threats posed by climate change. These strategies tackle urban areas' climate risks and can influence other aspects of urban environments, including urban sustainability and urban ecosystem services.

Employing nature-based solutions like green infrastructure is critical to ensure that urban ecosystem services can support environmental human well-being and health locally. Implementing green infrastructures has several environmental benefits, such as regulating temperature, reducing energy use, and promoting carbon sequestration. Moreover, it also promotes social cohesion and businesses that support a green economy. However, the success of GI in addressing societal problems depends highly on the power dynamic between many stakeholders.

One of the primary stakeholder groups is citizens, who are not only affected by the implementation of GI but are also critical to its use and maintenance. Therefore, promoting citizen participation in the decision-making process is crucial to ensure the effectiveness of GI

benefits. Despite their importance, some knowledge gaps hamper their effective integration. There is a lack of studies regarding citizen involvement in South Europe and a limited amount of information about how citizen involvement can promote economic benefits and social justice, so this area requires further investigation.

The connection between urban citizens and nature is critical for the success of Green Infrastructure projects. This thesis aims to explore the topic of citizen involvement further and understand how, depending on the level of participation, the potential practice benefits and challenges they can bring to the success of Green Infrastructure's role in climate adaptation.

3. Theories and Theoretical Frameworks

This chapter will initially describe the core theories and how they relate to the thesis's main topic. Then, the main theoretical frameworks of the project will be described and illustrated. Finally, there will be an explanation of how this all fits into the research of this project.

3.1 Ecological Modernisation

Ecological modernisation (EM) constitutes a group of approaches related to the social construction of nature that are positive about the potential coexistence between humans and nature. Moreover, this theory argues that economic development should be conciliated with supporting ecological protection to provide positive economic and environmental outcomes through technological advancements, policy reforms and institutional changes(Thomas & Littlewood, 2010)(Jänicke, 2008). Beyond the industrial sector, this theory can be applied to various social institutions, such as politics and governance (Thomas & Littlewood, 2010). As urban areas become the centre of economic activity, the potential conflict between ecological sustainability and social-economic considerations can be addressed through ecological modernisation (De Jong et al., 2015).

Ecological Modernization (EM) transforms ecological challenges into economically beneficial opportunities, making sustainable business practices advantageous for society. Central to this approach is the emphasis on participatory governance. Governance structures that embrace ecological modernisation prioritise inclusive decision-making processes, actively involving the public to ensure that social justice impacts are addressed. This participatory framework is essential for the effective implementation of EM, as it integrates diverse perspectives and promotes community engagement in environmental governance (Curran, 2009).

The core principles of ecological modernisation include:

- Technological innovation- Developing and implementing green technologies that reduce environmental impacts while supporting economic growth (De Jong et al., 2015)
- Policy reform- Launching policies that generate incentives for sustainable practices and encourage the population to behave better towards environmental protection (Jänicke, 2008)
- Institutional change- Promote the adoption of sustainable operations within institutions, pushing for integration of ecological considerations in the decision-making process(Curran, 2009)

Since the turn of the century, ecological modernisation has significantly impacted urban policy and planning. This theoretical notion focuses on mutually improving urban areas' economic and environmental state. It does this by emphasising how the productive use of natural resources and ecosystem services can create jobs for citizens and increase economic resources (De Jong et al., 2015). Moreover, as mentioned before, the effects of climate change have been increasingly becoming a serious problem for urban areas, threatening the livelihoods and well-being of its citizens, so ecological modernisers push for strategies that improve their resilience (De Jong et al., 2015).

One recent environment-oriented strategy that has been gaining significant traction for reconciling ecological, economic and social benefits is the implementation of Green Infrastructure. Applying the ecological modernisation theory in the analysis and planning of GI helps build the reasoning for policymakers and stakeholders participating in its development process (De Jong et al., 2015). For example, Green Infrastructure can assist in managing water resources, reducing the speed at which they decrease. From an ecological modernisation perspective, ecological management can help sustain economic growth (Llausàs et al., 2020).

3.2 Participatory Planning

Participatory planning can be defined as a group of processes in which different groups with diverse interests participate together to achieve a consensus on a plan (Peerapun, 2012). It is related to collaboration between multiple actors in the planning process to find equality within the potential power relations, which reduces the chances of a conflict. By minimising the impact of antagonistic relations and promoting engagement between agents in the planning system, it is possible to achieve a desired outcome that considers the interests of the involved actors (Legacy, 2016). However, there is also the potential that participatory planning exacerbates elite views and enhances the centralisation of power in the planning system due to a lack of effort from the primary actors. Therefore, planners must actively engage with the local citizens, allocating resources and time to ensure that the language and public meetings are available to all community members (Lovell & Taylor, 2013).

Participation Planning can be done by any actor present in the planning process. In the case of green infrastructure, planners, ecologists, politicians, citizens, and designers can be involved (Peerapun, 2012)(Lovell & Taylor, 2013). If done well, citizens feel empowered to contribute to shaping their communities, leading to a greater sense of ownership and responsibility for the final outcome of the project in mind. By taking a participatory planning approach in the development of GI, planners can engage with citizens, which builds trust in the planning process. Additionally, participatory planning can bring innovative solutions and perspectives that planners might not have taken into account(Cilliers & Timmermans, 2014)(Lovell & Taylor, 2013). Furthermore, involving the local community in the initial stage allows for a more holistic problem identification that can result in more successful and durable intervention in the long term (Lovell & Taylor, 2013).

The success of participatory planning hinges on effective facilitation. Facilitators are crucial in creating a space where diverse voices can be heard and respected (IAP2, 2020). They ensure balanced participation, constructively manage conflict, and help the group achieve a shared vision (IAP2, 2020). Skilled facilitators utilise techniques like active listening, consensus-building methods, and clear communication to keep the process on track and productive. However, the degree of public involvement can vary depending on the project and context because of (IAP2, 2020).

In this context, participatory planning can potentially enhance the multifunctionality of green Infrastructures. It provides a space for citizens to contribute to the decision-making process, which empowers local communities. This can lead to the maximisation of GI social benefits, guaranteeing that the environmental benefits of these projects can be explored by all groups present (Lovell & Taylor, 2013).

3.3 Theoretical Framework

This thesis applies three theoretical frameworks. The first is an adaptation of Nabatchi's "Spectrum of Public Participation" (2012), which describes and qualifies the different levels of public participation observed in practice. The second is a model that identifies the most common impacts derived from public participation. The last one is a model developed by the researcher that combines knowledge regarding the main factors that can be present in the planning of green infrastructure and have the most influence in shaping public perception of GI. As the public perception increases, so does their willingness to be involved in the planning, implementing and maintaining green infrastructure.

One theoretical framework is the "Spectrum of Public Participation", developed by the International Association of Public Participation (IAP2, 2007) and adapted by Nabatchi (2012). This framework allows one to determine the level of public participation in any given project. Moreover, this model describes each public participation level and its associated methods.

- Informing- This method aims to share public information so participants can better understand a complex issue. Participants are passive recipients of information here. Some examples of the core methods that can be used at this stage are Fact sheets, websites, and Open houses.

- Consultation- In this stage, the public provides their opinions or viewpoints to the project leaders so that this information can contribute to the decision-making process. Some examples of the core methods that can be used at this stage are Surveys and Public meetings

- Involvement- At this stage, the public is active in decision-making, ensuring that their feedback concretely shapes the project. Some examples of the core methods that can be used at this stage are Workshops and Deliberate polling

- Collaboration- Through a buildup of official partnerships, public members work with planners to identify the key problems and develop together potential for solutions. Some examples of the core methods that can be used at this stage are having meetings with planners that tackle consensus-building

- Empowerment—In this phase, the public has control or at least partial control of the decision-making process, becoming part of the project's institutional leadership. Some examples of the core methods that can be used at this stage are the establishment of citizen juries and the development of a ballot system that puts the project's decisions in the hands of the democratic process.

Increase in Level of Public Participation 					
	One way communication	Two-way communication		Deliberate communication	
Stages	**Informing**	**Consultation**	**Involvement**	**Collaboration**	**Empowerment**
Purpose of public participation:	To provide the public with balanced and objective information to assist them in understanding the problems, opportunities and or solutions	To obtain public feedback on analysis, alternatives, and/or decisions	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered	To partner with the public in each aspect of the decision-making process, including the development of alternatives and the identification of the preferred solution	To place some of the final decision-making in the hands of the public
Methods of approaching examples:	- Fact sheets - Web Sites - Open houses	- Surveys - Focus groups - Public meetings	- Workshops - Deliberate polling	-Consensus building - Demonstration projects - Citizen advisory committees	- Citizen Juries - Ballots - Delegated Decision

Table 3.1- *Model based on the "Spectrum of Public Participation" developed by the International Association of Public Participation (IAP2, 2007) and adapted by (Nabatchi, 2012).*

As can be seen in Table 3.1, each stage represents an increase in public participation. A key element (Nabatchi, 2012) added to the original Spectrum is the additional factors relating to the level of communication between the public and the leading stakeholders. These factors highlight the transition from one-way communication to two-way communication to deliberate communication, where there is an assurance that the public's opinions and values are present in the project's final decisions (Nelimarkka et al. 2014).

It is then important to contextualise the planner's perspective on the potential benefits of public participation in Green Infrastructure planning. So, Figure 3.2 shows a model based on a project by (Jones & Russo, 2024) adapted by the researcher that demonstrates the most commonly expected positive impacts that can be derived from public participation. These identified a wide sample of planners and policymakers.

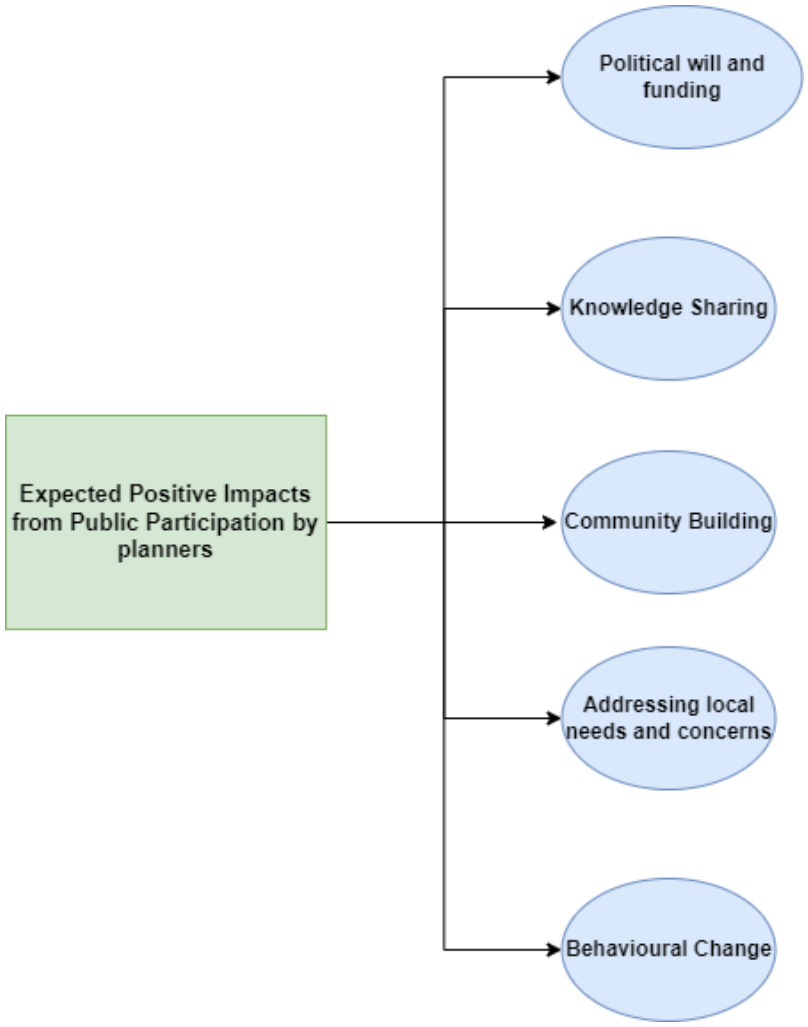

Figure 3.2- *Expected Positive Impacts from Public Participation by Planners (Jones & Russo, 2024)*

Figure 3.2 shows the expected positive impacts of public participation by planners and policymakers who worked on GI projects. These were:

- Improved political will and funding—Through citizen participation in these projects' design, implementation, and maintenance, planners expect increased political will and funding for Green Infrastructure projects.

- Knowledge sharing- By interacting with local citizens, planners expect their knowledge to elevate the benefits and solutions from GI projects

- Community Building- Planners expect that bringing the community together to develop a project that might be affected could improve the sense of community for local residents.

- Addressing local needs and concerns- GI projects should improve urban resilience to climate change and potentially address some of the local needs of the resident community. Therefore, by having better interaction with them, planners expect the needs and concerns of the residents to have a positive impact on the decision-making process

- Behavioral Change- Also, planners believe that public participation might lead the local community to be better informed regarding how to better interact with the urban environment so it can become more resilient, which leads to positive behaviour change.

The next step of this research is to combine both theoretical models to understand how public participation influences GI in theory and practice. Firstly, the level of public participation in the policy documents from the EU and national and regional levels related to Green Infrastructure will be assessed and described using the adapted “Spectrum of public participation”. The same will be done to the case studies so that it is possible to examine the difference between policy and practice regarding public participation in GI. Then, based on the model from Figure 3.2, the expected positive impacts of public participation in each case study will be analysed and contrasted with the corresponding level of public participation. Lastly, there will be some interviews with planners that can provide some context to the potential results.

It is then important to understand the primary factors that promote urban residents' positive perceptions of Green Infrastructure. By considering these factors in the development process of Green Infrastructure projects, planners ensure that citizens' needs and preferences are considered. A list of these factors was designed based on a collection of recent research papers that mention the important role that urban citizens have in assuring the success of Green Infrastructure projects (Le & Tranq, 2023) (Barreira, 2023) (Jones & Russo, 2024)(Farahani & Maller, 2018).

Figure 3.3 is a list developed by the researcher that combines the knowledge regarding the factors that influence the perception of urban residents gathered through the papers mentioned above.

Primary factors that influence urban residents' perception:
Safety
Inclusiveness
Multifunctionality
Attractiveness
Variability of public participation techniques

Figure 3.3- *Primary factors that influence citizens perception*

Regarding the interaction between citizens and green spaces in general, one of the most important factors is the safety of these spaces because they allow for any kind of interactivity to take place. (Farahani & Maller, 2018).

Then, Green Infrastructure must be placed in areas within the urban space to which residents of less socio-economic status have access. This ensures that less economically privileged people can access GI benefits and participate in these projects (Barreira, 2023) (Le & Tranq, 2023).

The multi-functionality of Green Infrastructure also contributes to the further involvement of citizens in these projects because it not only enhances the ecological dimensions of the place but also fosters community building and recreational use of the residents (Jones & Russo, 2024).

Attractiveness is another essential element that promotes the participation of citizens in these projects because it provides an immediate sense of quality to these places. Despite not being the most important factor, it can be vital in gathering public support and involvement (Jones & Russo, 2024).

Lastly, the variability of public participation techniques strongly influences the quality of Green Infrastructure plans because they shape how citizens can get involved in these projects (Le & Tranq, 2023). These techniques can vary from surveys to public meetings and workshops, among others.

These three frameworks serve different purposes in this research.

The first framework, Nabatchi's “Spectrum of Public Participation,” allows us to examine plans and policies and understand how they consider public participation in terms of level, main purpose, and techniques used to support it.

Then, through the second model, which addresses the expected positive from public participation, it’s possible to analyse the positive impacts that planners aim to obtain through public participation. In the case study analysis, this can be used to compare theory and the reality of the practice, which can used to identify potential strengths and flaws of both practice and theory.

Finally, by applying the third model, which relates the factors that influence public participation, it’s possible to understand if planners and policymakers consider any of these factors relevant and how they address them in the plans and policies.

4. Methodology

This chapter describes the methods used to develop the research project. First, a document analysis of policy documents and strategy reports related to green infrastructure from the EU, England, and Spain is conducted. Then, a case study analysis of GI projects from the cities of Liverpool and Valladolid is conducted. Lastly, interviews with stakeholders involved in these projects will be conducted to provide context to the results from the theory and the case studies.

4.1 Document Analysis

One of the main methodologies used in this project is document analysis. This is a systematic procedure for evaluating or reviewing documents. It can be the core methodology of a research project. However, it is mainly used in conjunction with other methods to enhance credibility (Bowen, 2009). Relevant data in this project is found, selected and integrated through a document analysis (Bowen, 2009). In the context of this project, different documents, be they policies, strategies or frameworks, shape the way Green Infrastructure is implemented in each case study.

The main case studies in this project are Green Infrastructure projects implemented in the cities of Liverpool and Valladolid by the Urban GreenUp project. So, to understand how citizens are engaged in these Green Infrastructure projects, it is first essential to comprehend the level of public participation demanded or suggested in policies/strategies at the Supranational, national, and municipal levels. Then, it is critical to determine the expected positive effects of public participation in GI projects from the same multiple levels. To do this, the frameworks from Table 3.1 and Figure 3.2 were used to develop a set of questions.

Here are the questions and brief description:

1. Is public participation mentioned? If yes, what is the **purpose** of involving citizens in GI planning?

   This question aims to determine whether public participation is mentioned in the documents and clarify whether it is a relevant component of GI planning for policymakers. Moreover, it provides insight into the potential of what the policymakers and planners aim to achieve through public participation in GI projects.

2. What are the **methods** of promoting public participation in GI planning?

   This question determines which methods policymakers and planners use to approach public participation in GI planning. Questions 2 and 3 give an idea of the public participation stage (based on the framework from Table 3.1) in GI promoted by these documents.~

3. Is there any mention of the **primary factors** that influence urban residents' perceptions? If yes, which?

This question refers to the **main factors** influencing urban residents' perceptions of Green Infrastructure, as mentioned in Table 3.2. It allows for understanding how policies and strategies related to GI consider these elements, which might reveal potential flaws in their design.

4. Is there any mention of the **potential benefits** of public participation? If yes, what are they?

This question aims to determine if policies and strategies related to GI expect any **positive effect** from public participation. Policies and strategies that address expected positive impacts from public participation in GI must be understood, as how they vary from document to document. These **potential benefits** are related to the ones mentioned in Figure 3.3.

Table 4.1 demonstrates the documents that will be analysed through the set of multiple questions previously mentioned.

Overview of the analysis documents for the case	
Source:	**Title:**
Natural England	UK's Green Infrastructure Framework
Mersey Forest	Liverpool Green Infrastructure Strategy
The European Commission	EU Green Infrastructure Strategy- Enhancing Europe's Natural Capital
Ministry for the Ecological Transition and the Demographic Challenge of Spain	National Strategy for Green Infrastructure and Ecological Restoration
Eulen S.A.	Direct Plan of the Green Areas of the Valladolid Municipality

Table 4.1- *Overview of the analysed documents*

For the Liverpool case, the "UK's Green Infrastructure Framework" is the primary framework for GI projects in the UK. Furthermore, the municipality of Liverpool developed the "Liverpool Green Infrastructure Strategy" as a more specific strategy tailored to the city's specific conditions.

The Valladolid case is slightly different. The "EU Green Infrastructure Strategy" aims to create a common GI framework for all member states. Then there is the "National Strategy for Green

Infrastructure and Ecological Restoration, which functions as the core strategy for all GI projects in Spain. Lastly, although the Valladolid municipality does not have a strategy or framework for GI projects, it mentions them in its municipal strategy for green spaces in the "Direct Plan of the Green Areas of the Valladolid Municipality."

Firstly, each document is assigned a code to make the comparison process easier. Then, the comparative table is developed to compare each document to the others based on their answers. This first allows us to determine how each of the strategies from the upper levels (supranational) influences the ones from the lower levels (municipal). Furthermore, it permits us to see if there are differences in the policies or strategies when public participation in Green Infrastructure could influence practice.

4.1.1 Comparative Analysis of the Policy Documents

After the document analysis results, which are presented in Table 5.2, a comparison analysis is performed. This comparative analysis was then done for each case to understand how citizen engagement is addressed through the policies and strategies that form the context in which these case studies are developed. The analysis is then subdivided into themes associated with the topics of each question.

This comparative analysis aims to understand policy context, which is critical to answer the second sub-research question: **How does policy influence the practice of citizen involvement in the development of urban green infrastructure?**

4.2 Case Study Analysis

A qualitative case study analysis is a research methodology that deeply examines one or more subjects to understand the research's object. Activity-based and temporal dimensions connect these subjects or cases, and the research provides comprehensive information through different data collection strategies (Hyett et al., 2014).

One of the key elements of case study analysis is its integration of each case's surrounding elements, maintaining a level of connection in a real-world environment (Flyberg, 2011). The fact that researchers have close to no influence over the behavioural events of each case is what separates case study analysis from other research methodologies (Yin et al., 2023).

This project has two case studies: green infrastructure projects/plans in the municipalities of Valladolid and Liverpool. Both were selected because they were two of the most successful cases in the Urban GreenUP project, an EU project that aimed to implement Nature-Based Solutions in urban areas located primarily in Europe.

The case study analysis aims to understand further how public participation is considered in both GI projects. To this end, a set of questions similar to those in the document analysis was developed to evaluate each case's methodology, implementation, and performance of public participation.

Here are the questions and brief description:

1. What is the **purpose** of involving citizens in Green Infrastructure projects?

   This question aims to indicate the main goal of promoting public participation in each GI case, which might differ, revealing some potential strengths and flaws of each case.

2. What are **the methods** of promoting public participation in the GI project?

   This question explains which methods were applied in each case to promote public participation. It can also give an idea of the public participation stage (based on the framework from Table 3.1) in GI promoted by each of these cases.

3. What **primary factors** influencing urban residents' perceptions were mentioned in each case?

   This question aims to determine which factors mentioned in Table 3.2 were mentioned in each case. It allows us to understand how each case considers the perception of urban residents, which is important for the success of Green Infrastructure projects.

4. What are the **expected positive impacts** of public participation?

   This question aims to understand the positive impacts planners expect from citizens' involvement in each Green Infrastructure project.

5. What are the **positive impacts** of public participation?

   This question aims to demonstrate the actual positive impacts of public participation in each project, juxtaposing question 3.

6. Were there any **limitations** on the consideration of public participation? If yes, what were they?

   The main aim of this question is to give insight into the potential barriers public participation caused in each project.

As mentioned before, these questions will be posed in documents related to each case's planning, implementation, and performance. This allows us to develop a table juxtaposing each component associated with public participation from the initial stages of Green Infrastructure development to its performance.

This serves the ultimate purpose of answering the first sub-research question: **“To what extent are citizens included in the planning, implementation, and performance of Green Infrastructure?”**

Tables 4.2 and 4.3 provide the list of documents from each case study that were analysed using the abovementioned questions.

Urban GreenUP	Integration and Articulation of the Methodology
Urban GreenUP	Second Methodology Validation
Urban GreenUP	Final report about the implementation and commissioning of NBS in Liverpool
Urban Green UP	Final Catalogue Results of KPIs and NBS Evaluated

Table 4.2- *Liverpool Case study documents*

Urban GreenUP	Integration and Articulation of the Methodology
Urban GreenUP	Second Methodology Validation
Urban GreenUP	Final report about implementation and commissioning of NBS in Valladolid
Urban Green UP	Final Catalogue Results of KPIs and NBS Evaluated

Table 4.3 – *Valladolid Case study documents*

4.2.1 Comparative Analysis of the Case Study Documents

Similar to the document analysis, a comparison analysis is performed to understand how citizen involvement is considered in the green infrastructure intervention of both Liverpool and Valladolid cases, which is presented in Table 5.8. The methodology of the URBAN GreenUP project is also considered to further understand how each case proceeded with its implementation, evaluating them separately first to see the differences between the methodology and the execution. Then, it is critical to juxtapose both of these cases with each other to see if there are any differences or similarities between them. To do this, the answers to each document were compared to each other, separated by themes associated with the

questions mentioned above. The analysis is then subdivided into themes associated with the topics of each question.

The analysis aims to answer the first and third sub-research questions: How does policy influence citizen involvement in the development of urban green infrastructure? **What recommendations can be developed to improve public participation in urban green infrastructure development?**

4.3 Comparative analysis of all the results

It's then important to compare the results from the document and the case study analysis to see how public participation is addressed in green infrastructure policies or strategies versus how citizens are actually engaged in green infrastructure planning.

This analysis is then used to answer the second research question: **How does policy influence the practice of citizen involvement in the development of urban green infrastructure?**

4.4 Interviews

Interviews were conducted to expand on the knowledge from the document analysis and contextualise some of the findings from the case studies. While reading the policy documents and comparing them to the case studies, especially when involving citizens in developing Green Infrastructure projects, it is necessary to understand professionals' points of view in real-world practice.

To further explore this practice within urban planning, an interview guide with six questions was developed based on previous theoretical knowledge to help answer the research question. A semi-structured interview is the most suitable methodology because it allows for open-ended questions. This approach permits the interviewer to use an interview guide, which keeps the discussion focused on the research subject while allowing the interviewee to expand on topics without being limited to the topics it chooses to explore (Adeoye-Olatunde & Olenik, 2021).

4.4.1 Interviewees

To gather additional knowledge and provide context to the findings from both cases, 15 professionals were contacted, prioritising those involved in the Liverpool and Valladolid cases from the URBAN GreenUP project.

Of these 15, only three responded positively, but because two of the responses were by late May, it was already too late in the development of the thesis for these interviews to take place. Only one interview was possible with a senior project manager from the Urban GreenUP project associated with the Liverpool case study. Unfortunately, this means that the project analysis is weakened by a lack of perspective from someone involved in the Valladolid case or even a Spanish planner who could have provided some context to the results and the differences in the approach to public participation. It is unclear why some of the responses from the Spanish planners took such a long time to reply. However, considering that the inquiries for the interviews only started in early April, it could have been useful to start the process earlier.

Considering the interview was conducted using a semi-structured approach, the guide was mainly based on the research, sub-research questions, and questions developed for the comparative analysis. This was done so the information gathered from the interview could provide a perspective for results from the document and case study analysis.

4.4.2 Thematic Analysis

A thematic analysis was used as the primary method to analyse data from the interview.

Thematic analysis is a method for identifying, analysing, and interpreting qualitative data. It's an adaptive research tool that provides accessible and systematic procedures based on qualitative data. Furthermore, it allows for the identification of patterns within and across data that relate to the participants' opinions, perspectives, experiences, behaviours, and practices (Clarke & Braun, 2017). This method was chosen for its flexibility, allowing us to take into account the interview perspectives while also being compatible with comparative analysis, making it possible to identify patterns and themes throughout different data. Through this process, the aim is for the entire methodology to facilitate the understanding of the research subject

The first step was to transcribe the interview and read it multiple times to gain a perspective on Juliet's information. Then, coding was done by going through the interview and looking for data that could be relevant to answering the research questions, which led to the identification of themes. These themes were also in accordance with the questions from the comparative analysis, especially considering the interview questions and document/case study questions were developed together.

The last step of the thematic analysis was to write the report in a form that ensured its cohesiveness with the rest of the research and analysis.

The results from the thematic analysis aimed to contextualise the findings from the comparative analysis to help answer all of the sub-research questions and ultimately answer the main research question: **How is citizen involvement considered urban green infrastructure projects, and what recommendations can be formulated to improve public participation in urban green infrastructure practice?**

5. Analysis

This chapter covers the analysis of the policies and strategies documents related to Green Infrastructure in effect in the municipalities associated with the case studies, as mentioned in Table 4.1. Firstly, each document is described and how it mentions citizen involvement. The comparative analysis then follows this. Then, there is the case study analysis, where each case is described and similarly mentions how citizen involvement is addressed, ending with a comparative analysis.

5.1 Green Infrastructure Policies and Strategies

UK's Green Infrastructure Framework- Principles and Standards

The UK's Green Infrastructure Framework was launched in 2023. It was developed by Natural England, a non-departmental public body sponsored by the Department for Environment, Food and Rural Affairs(UK Government, 2024). This framework is aimed at planners and developers and aims to increase the amount of green cover in urban residential areas by 40%. Furthermore, it generates a structure to analyse where greenspaces are most needed in urban spaces (UK Government, 2024).

Figures 5.1, 5.2, and 5.3 illustrate some examples of Green Infrastructure integrated into the urban landscape in the UK.

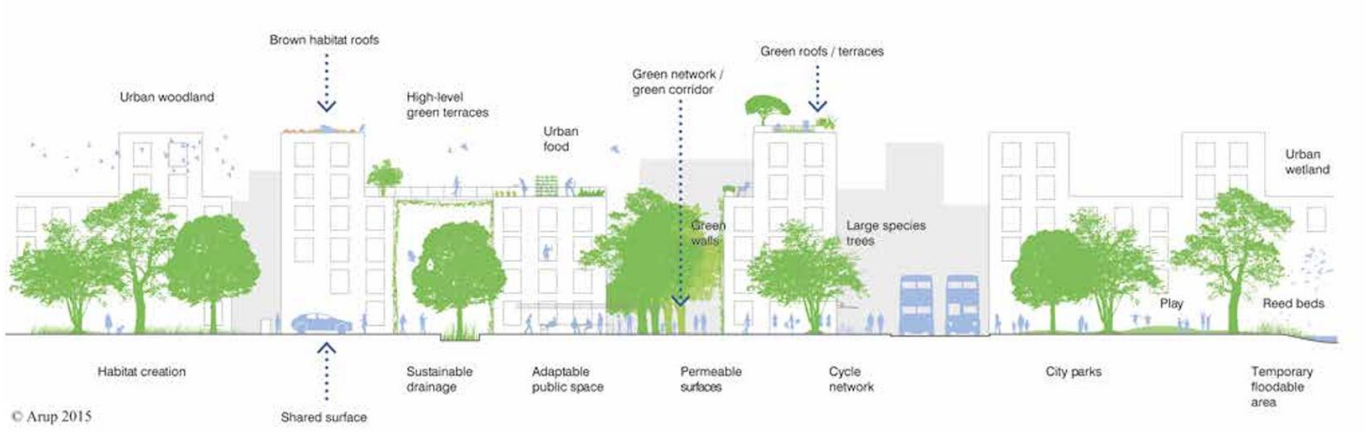

Figure 5.1- *Green Infrastructure integrated into the urban landscape* (UK Green Building, Council, 2015)

Figure 5.2- *Green Wall in London City Council* (Greater London Authority, 2024)

Figure 5.3- *Rain Garden at Bridget Joyce Square change* (Natural England, 2024)

Through the Green Infrastructure Framework (GIF), the UK government aims to increase connectivity through natural habitats to improve conditions for wildlife populations to thrive. It also believes that Green Infrastructure can help augment urban resilience, ensuring that cities in the UK can stay habitable in the future when faced with the effects of climate change (Natural England, 2024).

The Green Infrastructure Framework comprises five sections: Green Infrastructure Principles, Green Infrastructure Standards, Green Infrastructure Maps, Green Infrastructure Planning and Design Guide, and Green Infrastructure Process Journeys. Out of these sections, the Principals, Standards, and Planning and Design Guide were analysed because they are the parts that actually address the planning, implementation, and performance of GIs.

Public participation is indeed mentioned in this framework. It's first addressed as one of the key elements of the Principles of Green Infrastructure, where local residents and stakeholders are deemed to be at the centre of the planning and design to address the long-term concerns of the community. Moreover, public participation is mentioned as a way to create a sense of ownership, belonging, and inclusion for the local population. The Green Infrastructure Planning and Design Guide specifically mention how, by promoting citizen participation in the decision-making process, they hope to increase the use and promote the maintenance of these spaces by residents.

Regarding public participation methods, the Green Infrastructure Framework mainly specifies the establishment of workshops, public meetings, and citizen committees to advise in situations that might affect the entire community. Furthermore, inclusivity, attractiveness, safety and multifunctionality are all important elements considered in the Green Infrastructure Framework. These factors are described as elements that should be present in all GI planning in the UK.

Liverpool Green Infrastructure Strategy

The Liverpool City Council Planning Department developed Liverpool's Green Infrastructure Strategy in collaboration with The Mersey Forest, a Community Forest Trust that works closely with partners all over the UK to promote sustainable environmental practices (Mersey Forest, 2011). The main objective of this strategy is to enhance the benefits that the city can gain from the sustainable management of the natural environment (Mersey Forest, 2011). Furthermore, the Liverpool City Council aims to use Green Infrastructure to boost the local economy, community cohesion, and quality of life for the residents.

Figure 5.4 illustrates Chavesse Park, an example of Green Infrastructure in Liverpool.

Figure 5.4- *Chavesse Park* (Mersey Forest, 2011)

This document considers public participation in the planning process mainly as a way to provide residents with a sense of community ownership and inclusion. Furthermore, it mentions how citizens' involvement can help manage and maintain Green Infrastructure in the face of scarce public resources. The core purpose of this participation is to collaborate with local citizens to enhance the community's benefits of Green Infrastructure.

The main methods incentivising this participation are citizen committees and public meetings, in which planners and citizens agree according to this strategy. Furthermore, factors such as inclusivity, safety, attractiveness and multifunctionality of Green Infrastructure are given significant importance in this strategy.

EU Green Infrastructure Strategy- Enhancing Europe's Natural Capital

The EU Green Infrastructure Strategy was developed in 2013 by the EU Commission to promote preserving, restoring, and enhancing green infrastructure in each Member State. This would help reduce the current trend of biodiversity loss and support ecosystem services throughout the EU (EU Commission, 2013). Moreover, the EU Commission argues for the potential of Green Infrastructure to boost the green economy and create job opportunities while supporting social cohesion in urban spaces (EU Commission, 2013).

This strategy mentions the involvement of local stakeholders in the planning process but does not specify which type of stakeholder. Moreover, when residents or citizens are mentioned in the document, it is always through the lens of being the passive agents in the planning process as beneficiaries of Green Infrastructure and not as part of the actual decision-making process.

It describes the safety and inclusiveness of different types of stakeholders as critical elements of any GI project. Furthermore, it suggests that planners of green infrastructure should pay attention to the aesthetic value it adds to the landscape as it can serve cultural ecosystem services.

Spanish National Strategy for Green Infrastructure and Ecological Connectivity Restoration

The Spanish National Strategy for Green Infrastructure and Ecological Connectivity Restoration was developed in 2021 by the ”Ministry of the Ecological Transition and the Demographic Challenge” to serve as the strategic planning document regulating the implementation and development of Green Infrastructure in Spain (Ministry of the Ecological Transition and the Demographic Challenge, 2021).

This strategy conceives Green Infrastructure as a set of natural or semi-natural areas and other environmental elements strategically planned to promote the preservation of ecosystems and ecosystem services. Furthermore, it recognises GI as a way to promote the green economy, improve social cohesion and increase urban resilience to climate change in Spanish cities (Ministry of the Ecological Transition and the Demographic Challenge, 2021).

This strategy considers public participation to be of significant importance. Its main purpose is to empower citizen groups to improve the management and maintenance of these spaces. It mentioned throughout the report how public participation is critical to ensure the success of the Green Infrastructure project. At the same time, it is mentioned how it ensures that citizens' concerns and needs are heard, improves social cohesion, supports change in the behaviour of citizens when it comes to the environment and promotes environmental education through knowledge sharing, which leads to a potential increase in political will and funding for more GI projects.

Also, this strategy recognises that, in the past, public participation has had quite a limited impact on the decision-making process of green infrastructure projects. Its methodologies for public participation used to lack variety and primarily focus on public consultations with a small sample of the local residents being considered. Therefore, this strategy pushes for diverse methods to be applied, such as citizen advisory committees, delegating part of the decision-making process to these committees in partnership with the local government bodies. Furthermore, it mentions the use of fact sheets, awareness campaigns and workshops to push citizens to get involved in the development process of Green Infrastructure.

It mentions how safety for users in these spaces is imperative and should be considered during its development. Moreover, this report describes how citizens from different economic realities should have access to GI, ensuring that inclusiveness is a primary value during the planning process. To ensure that GI is used by the local residents, a consideration of the added aesthetic value is also considered extremely important. Lastly, to maximise the benefits that can be derived from these spaces, GI's multiple functions for society, be it climate resilience, increasing social cohesion or support of the green economy, also need to be part of its planning.

Directors Plan of the Green Areas of Valladolid

The Directors Plan of the Green Areas of the Valladolid Municipality was developed by a consulting company called Group Eulen in 2021 to establish a strategic vision and plan for the green areas inside the Municipality of Valladolid (Group Eulen, 2021).

Even though it's the main focus, Green Infrastructure is mentioned as part of these green areas. Valladolid City Council is currently developing a green infrastructure strategy to improve the management and maintenance of these areas, which could explain why public participation is not mentioned in this report (Group Eulen, 2021).

5.1.1 Presentation of the results

Herein are the documents analysed based on the methodology described in Chapter 4, section 4.1. To make Table 5.6 more understandable, the researcher labelled each document with a code, as seen in Table 5.5.

	Document	Code
England	UK's Green Infrastructure Framework	**UK 1**
	Liverpool Green Infrastructure Strategy	**UK 2**
Spain	EU Green Infrastructure Strategy- Enhancing Europe's Natural Capital	**SP 1**
	Spanish National Strategy for Green Infrastructure and Ecological Restoration	**SP 2**
	Directors Plan of the Green Areas of Valladolid	**SP 3**

Table 5.5- *Codes for the policy documents*

Documents	Is public participation **mentioned**? If yes, what is the **purpose** of involving citizens in GI planning?	What are the **methods** of promoting public participation in GI planning?	Is there any mention of the **primary factors** that influence urban residents' perceptions? If yes, which?	Is there any mention of the **potential benefits** of public participation? If yes, what are they?
UK 1	Yes. The main purpose of involving citizens is to support their empowerment in the planning process of Green Infrastructure.	Citizen advisory committees Workshops, Public meetings,	Safety Inclusiveness, Attractiveness, Multifunctionality	Community Building, Knowledge Sharing, Addressing local needs and concerns
UK 2	Yes. The main purpose of involvement is to promote collaboration with the community while enhancing social cohesion and the local economy.	Citizen advisory committees, Workshops, Public meetings,	Safety, Inclusiveness, Attractiveness, Multifunctionality	Community Building, Knowledge Sharing,
SP 1	No	X	Safety, Inclusiveness, Attractiveness, Multifunctionality,	X
SP 2	Yes. The main purpose of public participation is to empower citizens to participate in the decision-making process of Green Infrastructure planning.	Citizen advisory committees, Public meetings, Delegated Decision, Fact sheets, Workshops, Awareness Campaigns,	Safety, Inclusiveness, Attractiveness, Multifunctionality, Variability of public participation techniques,	Community Building, Behaviour Change, Knowledge Sharing, Addressing local needs and concerns Political will and funding
SP 3	No	X	X	X

Table 5.6- *Comparative Analysis Table 1*

5.2 Case Studies

Urban GreenUP

The Urban GreenUP project is funded by the European Union's Horizon 2020 programme. Its main objective is to mitigate the effects of climate change, improve water management and air quality, and enhance the sustainability of urban areas through nature-based solutions. The partner cities involved in this project are both European and non-European, with the cities of Liverpool(UK), Valladolid(Spain), and Izmir(Turkey) being the ones involved, which applied the Urban GreenUP methodology to demonstrate its effectiveness (Urban GreenUP, 2022).

By implementing nature-based solutions such as Green Infrastructure, the Urban GreenUP project aims to positively impact the correspondent urban areas beyond the environmental dimension. It seeks to improve the quality of life in urban areas, raise awareness of environmental preservation among citizens, and support the local green economy. Moreover, the active participation of local communities in the planning process is considered a critical element of this project (Urban GreenUP, 2022).

Integration and Articulation of the Methodology

The "Integration and Articulation of the Methodology" document represents the first draft of the Urban GreenUP project's proposed methodology for enhancing the benefits of implementing Nature-Based Solutions, focusing on Green Infrastructure (Rozanska, 2019).

This strategy mentions how citizens should be encouraged to observe, document, and provide feedback on their needs and concerns, especially regarding ecological elements. Moreover, it describes how committees where practitioners and citizens can engage should be established to ensure the benefits from these plans are reflected in society (Rozanska, 2019). It also adds that citizens should be involved in the development from its inception to taking part in the monitoring and maintenance phase (Rozanska, 2019). Furthermore, it adds that workshops and awareness campaigns can be two primary communication methods to generate engagement and promote environmental education regarding NBS, GI and environmental topics in general (Rozanska, 2019). It's also mentioned how engaging with the local community and increasing the public interest in GI can lead to more political interest in these interventions (Rozanska, 2019)

This strategy focuses mainly on addressing citizens' needs and concerns about the added benefits that can be derived from public participation. Furthermore, it promotes interaction between local stakeholders in these urban spaces, including local business holders and residents (Rozanska, 2019). The technique proposed by which this public participation is mostly made is public meetings. It is also stated that awareness of these interventions and environmental topics should be raised to engage and communicate with the community further (Rozanska, 2019)

According to this report, two of the development objectives for Green Infrastructure are to contribute to reducing crime and improving social inclusion. It also mentions how GI should have multiple functions within urban spaces, so a multidisciplinary committee should be created to ensure its benefits are felt throughout multiple sectors. (Rozanska, 2019).

Second Methodology Validation

The “Second Methodology Validation” report corresponds to the methodology of the URBAN GreenUP after it was adapted due to feedback from external stakeholders, including planners from the urban spaces where this methodology is applied, through several stages of questionnaires, workshops and decision discussions with several stakeholders, which varied from industry and business partners to public authorities and citizens (Rozanska & Sánchez, 2020).

In this report, citizens gain significantly more relevance in the planning process. A quote from this report demonstrates this increased relevance: “When citizens are engaged in shaping their public spaces and services, and there is a culture of empowerment and co-creation between citizen and local authorities, then NBS are thought to be more effective in addressing societal challenges”. It even adds “Citizens are central stakeholders because they not only help to build the cities and the services to better focused their (users) interest but also will automatically protect the environment once created” (Rozanska & Sánchez, 2020, p).

This shows how, through the validation process, the planners enhanced the role of citizen involvement in the different stages of the development of this project. Moreover, it describes how having different interactions between various stakeholders within the planning process and their exchange of knowledge might lead to a better understanding of the societal needs of this urban space. This process can then help maximise the benefits from the Urban GreenUP project itself ” (Rozanska & Sánchez, 2020).

This community involvement is done through citizen committees, where members engage public authorities to shape these spaces' implementation, monitoring, and maintenance. It also describes how, through questionnaires and workshops with stakeholders from different backgrounds, including citizens, planners can get clear feedback on how the project is evolving (Rozanska & Sánchez, 2020). It is also stated that awareness of these interventions and environmental topics should be raised to engage and communicate with the community further (Rozanska & Sánchez, 2020).

Safety is mentioned as an element that needs to be considered in the planning phase of these interventions. Furthermore, inclusiveness and multifunctionality are critical for GI development to support economic and social stability in urban areas. Lastly, it describes how employing different techniques to support public participation is critical for maximising the benefits of GI(Rozanska & Sánchez, 2020).

Liverpool Municipality Case

By the 19th Century, Liverpool was one of the world's most important global trade centres. However, the city's development was hampered by an economic and demographic decline from the latter half of the 20th century until the mid-90s. Then, it regained economic growth partially due to its service sector industries (Urban GreenUP, 2020). Nowadays, Liverpool has roughly 500,000 residents in the Northwest of England, which has a maritime temperate climate with mild summers and cold winters. It's characterised by its thriving historical and cultural background with much architectural variety, making it attractive for tourists. It is also one of the most visited cities in the United Kingdom (Urban GreenUP, 2020).

Over the past years, the municipality of Liverpool has supported several initiatives regarding developing and implementing Green Infrastructure. Following the establishment of the "Liverpool Green Infrastructure Strategy," it joined the URBAN Green UP project to solve some of its urban problems while fostering urban resilience and supporting urban ecosystem services. These problems range from poor connectivity for pedestrians and cyclists between different parts of the city to improving the city's environment to reduce the risk of flooding and improve the area's biodiversity status (Urban GreenUP, 2020).

Figures 5.7 and 5.8 illustrate examples of Green Infrastructures implemented in Liverpool.

Figure 5.7- *Green Wall on Parr Street* (URBAN GreenUP, 2020)

Figure 5.8- *Green Island* (URBAN GreenUP, 2020)

The URBAN GreenUP expects that the interventions in the area of Liverpool will have the following impacts:

- Renaturing of urban spaces- Decrease of greenhouse gas emissions, decrease of ambient temperature and increase CO_2 sequestration (Urban GreenUP, 2020).

- Water Interventions- Decrease flood risk, improve water quality and reduce ambient temperature (Urban GreenUP, 2020).

- Singular Green Infrastructure- Increase habitat connectivity, decrease the heat island effect in the city and increase tourism flow (Urban GreenUP, 2020).

- Non-technical interventions- Promote the facilitation of green projects and businesses developed by local stakeholders, increase environmental awareness, enhance social cohesion, and increase citizens' well-being (Urban GreenUP, 2020).

Final report about the implementation and commissioning of NBS in Liverpool

This report entails the implementation procedure of the various Nature-Based Solutions in the city of Liverpool, with details on their level of progress, future establishment, and maintenance. Furthermore, there is an overview of the procurement method relative to these interventions, on-site delivery, and a review of the core issues affecting the implementation (Staples & Olver, 2020).

It's also important to note that at the time this report was developed, Liverpool was well into the UK lockdown due to the COVID-19 pandemic. Although many of these interventions were delivered through the summer of 2020, this still created some limitations, especially regarding citizen engagement (Staples & Olver, 2020). Several of the proposed measures to stimulate public participation, such as public meetings, citizen advisory committees and workshops, were hampered due to the lockdown. Despite these constraints, planners still place significant importance on the role of citizen involvement in implementing these measures(Staples & Olver, 2020).

Some of these public participation measures were postponed to be implemented in 2021 once some restrictions were lifted or adapted into an online format. The adapted measures translated into online meetings, forums, workshops, and awareness campaigns (Staples & Olver, 2020). One of these measures was the development of an app called "Bio-App iNaturalist", which encouraged citizens to monitor the local biodiversity in the intervention areas. This data can then be analysed by biologists and planners to determine how to adapt these interventions to maximise their benefits to biodiversity (Staples & Olver, 2020). An online forum called the "Baltic Stakeholder Forum" was established to create a platform for stakeholders, such as community groups, local business holders and planners, to engage and discuss the planning and development of these interventions (Staples & Olver, 2020).

This report mentions the role of knowledge sharing as a fundamental element added to the development process through public participation. It describes how having citizens engage in participatory action in different stages of GI, be it planning, implementation or maintenance, can lead to an increased sense of community. Moreover, it also mentions how, by understanding the needs and concerns of the local residents, planners can adjust these interventions to fit the context of the local community better. As the pandemic eases and the vaccination processes start, planners seek to extend efforts for actions that stimulate public participation (Staples & Olver, 2020).

This report considers safety fundamental during the maintenance of these spaces, as it mentions that these areas should be regularly supervised to ensure safety. Attractiveness is described in this report as an element of different interventions to increase visitors and users. Lastly, when describing the impacts of these interventions, it's mentioned that they can serve multiple functions, such as supporting different types of ecosystem services, be it cultural, provisioning, supporting, or regulating (Staples & Olver, 2020).

Final Catalogue Results of KPIs and NBS Evaluated

The report was developed in 2023 by different partners who worked on the URBAN GreenUP project. It aims to demonstrate the project's final conclusions and associated results with the designated KPIs (URBAN GreenUP, 2023).

According to URBAN GreenUP (2023), of the KPIs related to the Liverpool case, there are three that directly address citizen participation and impact in the implementation of Green Infrastructure and other NBS:

- Social Learning- This KPI focuses on understanding how Green Infrastructure and urban greening in general can stimulate a change in multiple stakeholders' perceptions of urban sustainability challenges. It also gives insight into local citizens' responses and involvement in developing these Green Infrastructure interventions (Ortuño et al., 2023).

In the Liverpool case, the method to evaluate this KPI was a series of surveys regarding how two interventions affected local citizens' mental health. Also, the different types of events designed to stimulate public participation, including the number of attendees and their evolution from 2017 to 2022, were evaluated. These events included conferences, meetings, workshops, and public lectures(URBAN GreenUP, 2023).

Due to lockdown restrictions during the COVID-19 pandemic, face-to-face surveys were limited. Instead, online interviews and postal surveys were conducted (URBAN GreenUP, 2023).

The survey results demonstrated a positive influence of GI interventions on the mental health of the public. Furthermore, the interviews showed that the local stakeholders believe that urban greening has other beneficial impacts on society, such as increased business rates relative to the green economy. The events designed to stimulate public participation received increased attendance until 2019, when they declined due to the pandemic (URBAN GreenUP, 2023).

- Citizen perception- This KPI seeks to understand citizens' perceptions of these interventions. Understanding the level of satisfaction and value that citizens attribute to these spaces can indicate their quality or functionality. Furthermore, it reflects how people see the change made in their local environments regarding satisfaction and its impact on the quality of life (URBAN GreenUP, 2023).

In the Liverpool case, this KPI was evaluated using a toolkit called GI-VAL, which assesses the potential benefits of green infrastructure within a defined project area through standard valuation techniques.

This toolkit provides a set of calculator tools organised under eleven key benefits of green infrastructure, illustrated in Figure 5.9.

Figure 5.9- *GI intervention benefits evaluated through the toolkit(The Mersey Forest, 2020)*

Moreover, a series of surveys were also used to ask members of the local community regarding their perception of these interventions, primarily regarding how their mental and physical well-being was affected. It was also considered how the citizens' connection with nature evolved after the implementation process.

Similar to the previous KPI, the COVID lockdown affected how these surveys were conducted, and they had to be transformed into online interviews and postal surveys.

The overall results appear positive, as both methods confirmed that residents considered these interventions beneficial to their overall well-being and felt increasingly connected to nature.

- Engagement with NBS- This KIP monitors citizen involvement and engagement with NBS. In Liverpool, this represents mainly the Green Infrastructure interventions. It is critical to know how much citizens feel connected with nature and what their main motivations and experiences are regarding their engagement with these interventions (Ortuño et al., 2023).

The methods to evaluate this KPI in the Liverpool case were, firstly, a content analysis of engagement materials, including documents from the engagement activities. This is then complimented by a series of semi-structured interviews with selected participants, such as community organisation representatives, individual citizens or members of interest groups interests (URBAN GreenUP, 2023).

Similar to the previous KPIs, the lockdown restrictions during the COVID-19 pandemic led to most surveys, interviews, and events being conducted online, reducing the number of potential participants(URBAN GreenUP, 2023).

The primary results showed that citizens' engagement with Green Infrastructure increased awareness and knowledge regarding ecological issues. Participants also felt an increased sense of community. These interviews also augmented the planner's understanding of the public's wants and needs, which can shape the future planning of GI interventions (URBAN GreenUP, 2023).

The “Crime Reduction” KPI in the Liverpool KPI report addresses safety. Despite the decrease in crime in the intervention areas, the results were considered inconclusive because of a lack of qualitative and contextual data. This meant that it wasn’t possible to associate these interventions with increased safety. It’s that multifunctionality is addressed through the variety of dimensions evaluated in the KPIs. It shows a variety of KPIs that evaluate ecological, social and economic dynamics in urban spaces, such as “Temperature Decrease”, “Job Creation”, or “Citizen Perception for example.

Valladolid Municipality Case

Valladolid is a city located in the Northwest part of Spain. It is the capital of the autonomous region of Castilla and Leon, the biggest region in Europe. The city has about 300,000 inhabitants. Its climate can be considered continental Mediterranean, and it is situated in a valley crossed by the Pisuerga and Esgueva rivers. The local economy is primarily based on the industrial and tertiary sectors. At the same time, Valladolid is an important cultural centre in Spain, being the home of several museums and one of the oldest universities in the world (URBAN GreenUP, 2020).

The city of Valladolid started developing green infrastructure to address some problems, such as the heat island effect, which is being exacerbated by climate change, poor air quality, flooding, and disconnection among its green areas. Then, in 2018, the city joined the URBAN GreenUP project to further engage in solutions that can help solve these urban problems (URBAN GreenUP, 2020).

Figure 5.10- *Green Canopies* (URBAN GreenUP, 2020)

Figure 5.11- *Green Roof* (URBAN GreenUP, 2020)

The URBAN GreenUP expects that the interventions in the area of Liverpool will have the following impacts:

- Re-naturing urbanisation- Increase of connectivity between green urban areas, reduction of the ambient temperature, reduction of greenhouse gas emissions and increase of CO_2 sequestration.
- Water Interventions- Decrease in water usage as rainwater can be reused, reduction of flood risk, and reduction of greenhouse gas emissions.
- Singular Green Infrastructure- Improvement of energy efficiency, improvement of air quality, increased environmental education among the public and improvement of mental well-being for the general public.
- Non-technical interventions- Increase environmental awareness and create opportunities for the public to be involved in developing these interventions.

Final report about implementation and commissioning of NBS in Valladolid

The main purpose of this report is to demonstrate the final developments of the interventions implemented in the city of Valladolid, showing the implementation process, the evolution of these solutions and the challenges the planners faced (Villazán, 2020).

As with the Liverpool case implementation process, the interventions in Valladolid also suffered some consequences due to the COVID lockdown in 2020. This delayed the implementation of some of the proposed interventions mitigating the effects of the pandemic and became the primary focus of the planning in the city of Valladolid. Similarly, events and actions planned for March 2020 designed to stimulate public participation had to be delayed, adapted or cancelled altogether (Villazán, 2020).

It's important to note that several actions to promote community engagement in these interventions have already been taken before the lockdown since 2017. These included:

- A series of forums where citizens and planners were asked to share their vision of the future of Valladolid in terms of Green Infrastructure and urban greening, including the establishment of citizen advisory committees.

- Initiatives for scholars and organisations to design and develop ideas for new NBS that could potentially increase the city's urban resilience, among multiple congresses and workshops designed to generate environmental awareness while further understanding the wants and needs of the community (Villazán, 2020).

- Information about green infrastructure was also disseminated through pamphlets and online campaigns to increase the public's environmental awareness.

- Lastly, the Innovation Agency of Valladolid City Council created an online portal called "Engagement Portal for Citizens" to allow citizens to engage with the municipality regarding re-naturing interventions (Villazán, 2020).

According to this report, public participation is critical to Valladolid interventions as it promotes knowledge sharing. This leads to an increase in environmental awareness and intelligence and allows for an enhancement of the functionality of the green infrastructure. It is also described as taking part in the implementation, which is considered to have a significant impact on supporting the social cohesion of local communities (Villazán, 2020).

In this report, safety and health are considered among the necessary elements of these interventions that require quality control by the Valladolid City Council. Moreover, the city of Valladolid aims for GI to have multiple functions within the urban space, bringing ecological, social, and economic benefits. At the same time, it states how important it is to develop multiple techniques to support citizen participation, as it can foster ecological intelligence and

improve the implementation and maintenance of current and future interventions (Villazán, 2020).

Final Catalogue Results of KPIs and NBS Evaluated

As mentioned before, this report was developed by multiple partners of the URBAN GreenUP project. Its goal is to show and evaluate the final results of the interventions done relative to each case through the use of KPIs.

According to this report, the KPIs that address citizen involvement in the Valladolid case are the following:

- Openness of Participatory Processes- This KPI seeks to understand how local stakeholders, including planners, citizens, business holders and experts, are involved in developing these interventions. It defines participation as "a process through which stakeholders influence and share control over development initiatives and the decision and resources which affect them". Moreover, this KIP is based on the participatory actions that occurred in the city of Valladolid (Ortuño et al., 2023).

To do this, it first used the "Spectrum of Public Participation" model developed by the International Association of Public Participation mentioned in section 3.3 to classify the different stages of public participation in different interventions: Information, Consultation, Collaboration, Co-decision and Empowerment (Ortuño et al., 2023). Then, by examining each action, the participation technique, the stakeholders involved, and the communication model (if it's in person, an online video conference, or an audio conference) are determined. Each element is then assigned a value so it's possible to quantify the quality of each participation action with an attributed score (URBAN GreenUP, 2023).

Table 5.12 demonstrates how this quantification was done in the "Openness of Participatory Processes" KPI.

Criteria	Type	Score (points)
Scope	Quantitative	International, National, Regional = 1 point. Local = 0 points.
Communication model	Quantitative	In-person meeting = 1 point. Video conference/Online meeting/Audio conference/Call = 0,5 points. Email = 0 points.
Participation technique	Qualitative	From 0-1 depending on the quality and different types (Newsletter, Reports, Presentations, public hearings, Internet webpage, Interviews, questionnaires and surveys, Field visit and interactions, Workshop, Participatory mapping, Focus group, Citizen jury, Geospatial/ decision support system, Cognitive map, Role playing, Multicriteria analysis, Scenario analysis, Consensus conference)
Degree of participation	Quantitative	Information, Consultation = 0 points. Collaboration = 0,5 points. Co-decission, Empowerment = 1 point.
Attendees type	Quantitative	For >1 type = 1 point. Only 1 type = 0 points.

Table 5.12- *Quantification table for the "Openesses of Participatory Processes KPI"* (URBAN GreenUP, 2023)

There is then the creation of a table that shows the yearly evolution of the number of participatory actions, the number of attendees and the total score of each action(summed score of all participatory actions that occurred that year). This data is then processed by the Valladolid City Council and used to improve and adapt these interventions.

In terms of limitations, as covered before, the COVID pandemic gravely affected the quality of some of these participatory actions, obliging some to be cancelled, postponed, or adapted (either moving to an online format or reducing the number of possible participants in face-to-face events). Moreover, it's also mentioned that some of the more expansive participatory actions had some additional costs that had to be covered by Valladolid City Council.

The results from this KPI showed that despite the constraints, the overall quality and attendance of the participatory actions rose every year, reflecting the Valladolid planners' efforts to ensure that public participation is part of the development process of these interventions.

- Citizen Perception- As in the Liverpool case, this KPI aims to consider citizens' perceptions of these interventions. Evaluating the level of satisfaction and value that citizens attribute to these spaces can indicate their quality or functionality.

In the Valladolid case, this KPI was evaluated using social surveys to ask community members and key stakeholders to rate each of these interventions regarding their use/functionality, accessibility, and aesthetic value. Valladolid also developed a questionnaire with 30 questions for citizens to determine their perception on a Likert scale (1-5; 1- very dissatisfied and 5- very satisfied) regarding the quality of nature, capacity for recreation, and visual appearance, among other things.

In terms of limitations, because this was mainly through online surveys, older citizens participated significantly less. However, according to this report, the degree of participation exceeded the planners' expectations.

Not all results regarding the citizens' perception of some interventions were positive. However, the overall results showed that, in general, their impact was positive. This information will then be used to develop future interventions.

In terms of safety, similarly to the Liverpool case, safety is addressed through a KPI called "Crime reduction". However, it also faced problems in evaluating the relationship between GI intervention areas and crime, mainly due to a limitation in the accessible data, which made the analysis incomplete, according to the report.

Also, as in the Liverpool case, multifunctionality is addressed through the variety of subject matters evaluated by the KPIs. There are KPIs that access the multiple functions of GI from "Job creation", "Citizen Perception", or "Air quality".

As mentioned before, “Citizen Perception” also measures the aesthetic value of these interventions by using questionnaires to community members and key stakeholders regarding their views on visual appearance.

Lastly, as can be observed in Table 5.6, the “Openness of Participatory Processes” KPI, one of the measured elements was the variability of participation techniques.

5.2.1 Presentation of the Results 2

Table 5.13 represents the documents analysed using the methodology described in Chapter 4, section 4.2. The researcher labelled each document with codes to make Table 5.14 more understandable.

	Documents	Code
Urban GreenUP	Integration and Articulation of the Methodology	**U1**
	Second Methodology Validation	**U2**
Liverpool	Final report about the implementation and commissioning of NBS in Liverpool	**L1**
	Final Catalogue Results of KPIs and NBS Evaluated	**L2**
Valladolid	Final report about implementation and commissioning of NBS in Valladolid	**V1**
	Final Catalogue Results of KPIs and NBS Evaluated	**V2**

Table 5.13- *Codes for the case documents*

Reports	What is the **purpose** of involving citizens in Green Infrastructure projects?	What are the **methods** of promoting public participation in GI planning?	What **primary factors** influencing urban residents' perceptions were mentioned in each case?	What are the **expected positive impacts** of public participation?	What are the **positive impacts** of public participation that can be derived from practice?	Were there any **limitations** on the consideration of public participation? If yes, what were they?
U1	Empowerment: It deems citizens should take a level of responsibility in the decision-making process of GI planning	Citizen advisory committees, Workshops, Public meetings, Surveys, Awareness Campaigns	Safety, Inclusiveness, Attractiveness, Multifunctionality,	Knowledge Sharing, Addressing local needs and concerns, Community Building, Political will,	*not relevant	*not relevant
U2	Empowerment: It deems citizens should take a level of responsibility in the decision-making process of GI planning.	Citizen advisory committees, Workshops, Public meetings, Surveys, Awareness Campaigns,	Safety, Inclusiveness, Multifunctionality, Variability of public participation techniques,	Knowledge Sharing, Addressing local needs and concerns, Community Building, Behavioural Change	*not relevant	*not relevant
L1	Collaboration- It deems citizens as being a part of the decision-making process. Still, all of the project's responsibility relies on the planners.	Workshops, Public meetings, Surveys, Public lectures, Awareness Campaigns	Safety, Multifunctionality, Attractiveness,	Knowledge Sharing, Addressing local needs and concerns, Community Building,	*not relevant	Mostly related to limitations due to the COVID-19 pandemic.
L2	*not relevant	Workshops, Public meetings, Surveys, Public lectures, Awareness Campaigns,	Safety, Multifunctionality,	*not relevant	Knowledge Sharing, Addressing local needs and concerns,	Mostly related to limitations due to the COVID-19 pandemic.
V1	Empowerment: It deems citizens should take a level of responsibility in the decision-making process of GI planning	Citizen advisory committees, Workshops, Public meetings, Surveys, Awareness Campaigns,	Safety, Multifunctionality, Attractiveness, Variability of public participation techniques,	Knowledge Sharing, Addressing local needs and concerns, Community Building,	*not relevant	Mostly related to limitations due to the COVID-19 pandemic.
V2	*not relevant	Citizen advisory committees, Workshops, Public meetings, Surveys, Awareness Campaigns,	Safety, Multifunctionality, Attractiveness, Variability of public participation techniques,	*not relevant	Knowledge Sharing, Addressing local needs and concerns, Community Building,	The COVID-19 pandemic limited some participatory actions. Expansive participatory actions had some unaccounted additional costs.

Table 5.14- *Results Table 2*

* explain not relevant- in this report, this question is not relevant/possible to associate a result

5.3 Comparative Analysis

5.3.1 Comparison Result of the Policy/Strategy Documents

Purpose of Public Participation

Regarding the results from the policy and strategy documents(Table 5.2), one key takeaway is that, in the case of Liverpool, the involvement of citizens in green infrastructure is supported by more policies compared to Valladolid. The contrast in policy approach from both cases can be observed more at the municipal level. Liverpool has had a GI strategy since 2011. Here, public participation is viewed as a way to collaborate with citizens in planning, implementing and maintaining these interventions, potentially enhancing social cohesion and the local green economy.

On the other hand, Valladolid has yet to implement its own strategy. In the most recently developed municipal plan, GI is only briefly mentioned as part of the city's green areas.

Despite this, at the national level, both the UK and Spain have recently launched strategies that address strategies that tackle green infrastructure where citizen involvement plays an important role. Also, both strategies consider that the purpose of public participation is to empower citizens, having them be active members of the decision-making process.

It’s also important to note that the EU has a strategy for Green Infrastructure, which only briefly mentions citizens without mentioning their potential role in GI planning.

Methods for Public Participation

The methods related to addressing public participation in green infrastructure planning mentioned in the UK GI and Liverpool GI strategies are the same, which means that the practice is nationally standardised. Regarding the Spanish strategy, the methods addressed differ from practice, with an increased focus on tools such as fact sheets, awareness campaigns, and workshops that aim to communicate the value and importance of green infrastructure to the community.

Primary Factors that influence citizens' perception

Similarly, when it comes to the “factors that influence citizen's perception”, the UK and Liverpool consider the same factors: safety, the aesthetics of these interventions, the multifunctionality of GI and the inclusiveness of citizens from different socio-economic values. However, this similarity appears to be only circumstantial. Meanwhile, the Spanish strategy recognises the potential value of having variability in public participation techniques with the goal of increasing the impact of citizen involvement in GI projects.

Expected benefits from public participation

This increased sense of value for public participation from Spain can also be observed in the "potential benefits" that can be derived from public participation. The UK and Liverpool strategy mentions increased community building and knowledge sharing inside the local community and a way to address citizens' local needs and concerns as the benefits that can be derived from public participation, as in the UK and Liverpool strategy. Meanwhile, the Spanish strategy adds how the improvement of political will and funding for GI projects and a positive behaviour change regarding environmental topics by the population. This can also explain the added methods mentioned previously.

The main takeaway from this analysis is that although Valladolid has significantly less historical and policy context for citizen participation in Green Infrastructure projects, the primary strategy associated with GI relevant to this case has the most holistic approach to this subject matter.

5.3.2 Comparison Results of the Case Study Documents

Purpose of public participation and methods

Considering the results from Table 5.8, one of the first main takeaways is how, in both stages of the development of the methodology of the URBAN GreenUP project, the goal of public participation is to empower citizens to take significant responsibility in the decision-making of GI planning. It suggests the use of citizen advisory committees and public meetings. Moreover, they suggest implementing surveys and public meetings to get feedback from the population on these interventions. Lastly, it describes establishing awareness campaigns as a way to support environmental education citizens on both GI and environmental subjects.

This, however, translated differently in both cases. The Liverpool case took more of a collaborative approach to citizen involvement by including citizens in the decision-making process and its implementation through the use of public meetings. Then, it used the tools mentioned in the methodology reports to get feedback and inform the local population. On the other hand, the Valladolid case uses the same approach of empowering citizens when it comes to citizen involvement, employing the same methods. It's also relevant to note that the methods from the implementation reports on both cases translated to their respective KPI reports.

Two potential reasons that can explain this difference in approach:

- Effect of COVID-19- The pandemic severely impacted how participatory actions were done. Having to change public meetings, workshops, and surveys to an online format or only being able to involve a small number of people hampers public participation significantly. So, all these practicalities might have led the Liverpool City Council to change its approach to citizen involvement.

- Early citizen involvement by Valladolid- Participatory actions started quite early in the development process of the Valladolid case before 2020. This could explain why the Valladolid City Council could still consider empowerment as its approach to public participation.

Primary factors that influence citizens' perception

Some differences between reports regarding the primary factors influencing the citizen's perspective can be observed. Both methodology reports address safety, inclusiveness and multifunctionality of GI. However, in the U1 report, the significance of the aesthetic value of GI is mentioned, which is missing from the U2. Here, the importance of the variability of participatory techniques is mentioned instead, being described as “critical in maximising the benefits from GI”, which is missing from the U1 report. This then translates very differently to each case.

The implementation report for Liverpool(L1) addresses the safety, multifunctionality, and aesthetic value of Green Infrastructure, which will then be expected to be similar to the KPI report(L2). Nonetheless, the KPI report doesn’t mention the attractiveness or aesthetic value. This means that despite its relevance in the implementation process, the planners choose not to evaluate it. Both reports don’t address the variability of participatory actions or inclusiveness.

The implementation report for the Valladolid(V1) case also tackles safety, multifunctionality, and GI's attractiveness/aesthetic value. However, similar to the U2 document, it describes the importance of ensuring the variability of participatory techniques. All of these factors are then evaluated in the Valladolid KPI report(V2) either independently in their own KPI, such as safety, or are evaluated together in a single KPI. Despite this addition, similar to the Liverpool case, neither report mentions or evaluates “inclusiveness.”

The main reasonings for the differences and similarities between how both cases address the **primary factors that influence citizen perspective** might rely on the ones mentioned above. COVID-19 and its impacts of the pandemic with the subsequent lockdown affected both Liverpool and Valladolid, making it hard to address and evaluate the inclusiveness of different types of citizens. Furthermore, because Valladolid started implementing participatory actions in the early stages of the development process of this project, it enabled its further consideration of the “variability of public participation techniques”.

Benefits from public participation in GI planning

There are also other significant differences between the methodology and implementation reports. Both methodology reports regard knowledge sharing, addressing local needs and concerns, and community building as the expected impacts that can be derived from public participation. Similarly, the Liverpool and Valladolid case implementation describe the same benefits, which also translates closely in the KPI reports, only missing an assessment on community building in the Liverpool KPI report. There is, however, a slight difference between

methodology and implementation, with the U1 report describing how it can increase political support for GI interventions and the U2 report replacing it by mentioning how it can make the local population change their behaviour towards being more protective of the natural environment.

As mentioned before, the primary limitation for public participation in both reports was the COVID-19 pandemic. The KPI report from the Valladolid case further adds that there were some unexpected additional costs related to more expansive participatory actions.

5.3.3 Comparison of all the results

Purpose of Public Participation

Comparing the results from the policy and strategy documents and the case studies documents, the first aspect that stands out is how citizen participation empowers citizens by giving them responsibility in the decision-making process of green infrastructure. This is true except for the Liverpool strategy, which has more of a collaborative approach, which means that even though the planners still consider citizens' opinions, the ultimate decision on these interventions still relies on the planners. This translates relatively well to practice, where the Liverpool case implementation also took a collaborative approach.

In the Valladolid case, both the main policy for GI(Spanish Green Infrastructure Strategy) and the practice, as observed in the case documents, define the same purpose of empowerment when it comes to addressing public participation in GI planning. Even though when this project was initially developed, there was no policy, strategy or framework regarding GI at the national and municipal levels, it was still successful in implementing GI and integrating citizens early into its development process.

Methods for Public Participation

There are some differences between policy and practice in terms of methods. The UK and Liverpool both mention citizen advisory committees, which, according to the case study documents, haven’t been implemented but are using more tools to spread awareness and information regarding GI. The Valladolid case's methods are fairly similar from policy to practice.

Primary factors that influence citizens' perception

The primary factors that influence urban residents' perceptions are significantly more prominent in policy than in practices, especially when it comes to inclusiveness, which is present in all policy documents and not in either case implementation reports. The mention of “variability of public participation techniques” as an important element of GI planning is present in the Spanish GI strategy and the Valladolid case, both in the implementation and subsequent KPI reports. It’s important to note that the Spanish strategy was launched after the development of the URBAN GreenUP project, so this can potentially be a case of practice informing policy and not the other way around. On the other hand, the “variability of public

participation techniques" is missing from the UK and Liverpool GI strategies, which might explain why it's also not considered in practice, as observed in Liverpool case study reports.

Benefits from public participation in GI planning

Lastly, when it comes to the potential benefits that can be derived from public participation, there are, again, differences and similarities between policy and practice. The Liverpool case implementation report considers the same potential benefits as the UK strategy, adding one more benefit(addressing local needs and concerns) than the one present in the Liverpool strategy. In the Valladolid case, where the Spanish strategy considers all of the potential benefits, as mentioned in Figure 3.2, the practice lacks the mention of the political will and funding and the citizens' behaviour change that results from public participation in GI planning.

5.3.4 Summary of the comparative analysis

This analysis demonstrates how practice and policy differ when addressing public participation and its various elements.

In the Liverpool case, some policy elements, such as the purpose of public participation and its expected benefits, are completely aligned with practice and show some potential influence from the policy. Meanwhile, the **methods** and **primary factors** that influence the citizens' perspectives show some prominent differences. In the case of the methods, a potential explanation is the impact of the URBAN GreenUP methodology. The lack of difference in the primary factors considered by the practice can be due to COVID-19, as mentioned before.

In Valladolid's case, interestingly, despite the lack of policy regarding GI at the beginning of the URBAN GreenUP project, it could still concretely address public participation in GI planning as it closely followed the project's methodology. The practice results then align with the Spanish GI strategy in terms of the **purpose** of public participation, the **methods**, and most of **the primary factors**, which might

As said before, the primary factors also align very well between policy and practice, lacking only inclusiveness, which might have been due to COVID-19. The only major difference is that policy has a wider view of the potential benefits of public participation than practice.

5.4 Interview Analysis

This section presents an analysis of the interview conducted with a planner involved in the URBAN GreenUP project. This serves to contextualise and potentially provide some reasoning behind some of the findings from the document analysis and the case study analysis. The analysis is divided into topics related to questions and themes addressed in the interview.

Interview with Juliet Staples

Juliet Staples is a senior project manager for environmental projects at the Liverpool City Council. Her experience with green infrastructure dates back to her education, and over the past 10 to 12 years, one of her primary focuses has been green and blue infrastructure projects.

In 2016, Juliet participated in a project to review Liverpool's green and open spaces. The report required them to examine various types of green spaces in the city and find ways to better maintain them despite decreasing funding, as the government does not provide funding for park maintenance. Over the next two years, Juliet and a review board of about a dozen people worked on identifying new approaches to managing these spaces.

Following the review process, a report was produced, and one of the recommendations was to seek external funding and consider the opportunity for green corridors. As the board wrote that report, a Spanish consortium interested in finding partner cities to bid for EU funding approached them, which did exactly that. It would attract external funding to create green corridors through nature-based solutions in Liverpool. They worked with them, and that was the URBAN GreenUP project. The five-year project ran from May 2017 to May 2023, being extended one extra year because of COVID, and completed last summer and in the final year of 2023.

After COVID-19, Juliet and her team received money from the government to do a Green Recovery project, which involved making space for nature. With this, the team replicated some of the URBAN GreenUP works. Moreover, early this year, they successfully secured government funding with the goal of using NBS in big open spaces. The goal is to use NBS to create flood storage areas and the natural environment to help tackle climate change issues.

Role of Public Participation in the Development of Green Infrastructure

According to Juliet, it’s first important to note that Liverpool has a long tradition and history of public consultation. She mentions how, when developing projects, the Liverpool City Council seek to engage the local community in designs and plans. Elaborating on how to ensure the success of the public project, it’s imperative for it to be supported by the local community because there's not much point in doing projects people don't like or don't want.

She further mentions how her team has consulted community groups, allowing them to comment on the planning process, which they did during the implementation of the URBAN GreenUP project. Furthermore, these community members were also involved in implementing some of the GI interventions. For example, in the case of the floating islands, community members planted them before they floated on the water.

In terms of maintenance, there is a team within the Liverpool City Council dedicated to “green space maintenance.” However, the funding is insufficient for this. Juliet elaborates that she and her team have worked hard with volunteers and community groups to take some responsibility for managing some green spaces.

Moreover, she specifically mentions a group composed of Liverpool residents called the “Good Gym” who run or cycle to the site, do the digging and weeding, and then run or cycle home. Despite not being involved in the consultation process, this group has helped greatly with the maintenance of green spaces, including green infrastructure. They took it upon themselves to manage these sites as a communal activity.

Community members can also be extremely valuable because they can become, according to Juliet, the “eyes and ears in the parks” describing what is working and what is not in GI, which can be critical to further improving these areas. Furthermore, these local residents also understand the history of these spaces, knowing local history and knowledge, which can be fundamental to fostering a sense of identity.

Juliet also mentions that the government provides funding to the community if residents ask for it. This funding can then be used to support green urban spaces and green infrastructure.

In her opinion, this level of citizen engagement is critical for the success of Green Infrastructure. This is exemplified by this quote of hers: “Creating this kind of site and doing this good project is what brings out the true benefits of green infrastructure, right? Yeah, it makes people feel needed and that they own it or that they've got some say and power over that space.”

Methods for supporting citizen participation in GI planning

As mentioned before, Juliet and her team conducted consultations and public meetings with local residents with the goal of collaborating with them in the development process of green infrastructure interventions.

The Liverpool City Council also hired external contractors to help implement these GI interventions. Juliet further elaborated that one of these contractors became very passionate and enthusiastic about the project, giving a lot of her time free of charge. Furthermore, she enjoys working and engaging with social groups. By gathering all these volunteers, coordinating, instructing, and teaching about landscape and horticulture, she became the “leader for these sites", further promoting citizen participation.

She adds that one way to support citizen participation is to update community members on planning or implementation developments and invite them when feasible. Another extremely useful method, according to Juliet, is to install signage in urban green spaces explaining their ecological value and the “invisible benefits” they can have for residents, such as health benefits.

Citizen participation support in GI planning by policies and planners

Juliet argues that she doesn’t see policies or strategies playing an essential role in shaping community or citizen engagement. She believes that developing a personal connection with the local community is crucial to ensure participatory actions are not just activities but social events. Furthermore, she adds that their success in implementing and maintaining these sites

Through community engagement can inform policies or strategies for Green Infrastructure, as relying solely on people's goodwill and free time may become a constraint in the future.

Regarding the importance of planners in this process, Juliet mentions that a technical planner typically functions as someone who simply approves a change in land use, which is quite different from somebody like her who might plan a project at a local level and then deliver it. She adds that if she could allocate more of her work time to citizen engagement, she would engage communities or local people, establishing more community groups to further improve the collaboration between the City Council and the citizens concerning GI planning.

However, as Juliet says, the way of engaging with the community observed in this project is sustained by the community itself and is impossible to replicate. Promoting community engagement is possible, but it also requires someone passionate, enthusiastic, and willing to take on the responsibility of attracting others to participate in these participatory actions.

Potential Barriers to Citizen Participation

There are then barriers that limit citizen participation in these interventions. Based on her experience, Juliet points out some of these potential barriers:

- Time- One of the main barriers to support community engagement is a lack of time. When managing environmental projects, there is much work to be done, from administration and paperwork related to approvals, licences and permits while on tight deadlines. This doesn't leave much time to dedicate to planning for the involvement of citizens in these projects. Especially because, as Juliet mentions, it's important to plan in advance to accommodate citizens properly and make them active members of these projects.

- Lack of funding- According to Juliet, this is one of the main barriers to community involvement. In her case, there was no initial budget for community consultation. She and her team had to find the time and resources, as they knew its importance and how it could improve their project. As she said in this following quote: "I had to find the money to add that because I thought unless you tell people why you've changed the space or how you've changed it and the benefits, then nobody understands the value or the importance". Some projects don't have the resources for elements such as community involvement, as the only priority becomes the output.

- Unexpected change - Another factor that hampers participatory actions is unexpected events, such as COVID-19, which critically limited contact between people. It wasn't possible to either go outside or meet people outside their own households, which critically limited how it was possible to engage with citizens. Juliet also mentions how, as it was said, group and community dynamics are highly dependent on a handful of

individuals. In case of a sudden change, either a death or someone moving away, that can negatively influence how these community groups engage in participatory actions.

- Practicalities- According to Juliet, Certain practicalities can also generate problems in community engagement because participatory actions involve different liabilities and legalities. Therefore, the public authority must be aware of health, safety, and risk assessments. Also, some of these GI interventions sometimes require very specialised work, making it hard for people to be involved. For example, in the case of a "living green wall" that was implemented in Liverpool, the planning and the implementation had to be done by specialists, especially because, as mentioned by Juliet, "we'd never done a green wall in the city before". In this case, the involvement of untrained or unqualified citizens compromises the success of this intervention, setting back the whole agenda about green infrastructure.

Recommendations for future practice

Juliet's last question was about her recommendations for future practice regarding improving public participation in GI planning.

Firstly, she recommends an early consultation process with the local communities, creating opportunities for the residents to be involved in the design of the interventions. This will increase the value of these interventions. She mentions a case where, in one of the intervention sites, they actually built the proper pathway on the desired line so that you could walk through the wildflowers because people always took that route.

Then, throughout the implementation process, citizens are invited to participate in planting while being given regular updates and possibilities. She elaborates that sometimes, even when there are contractors on site for some of the younger volunteers, quite often under social value, the contractors will offer training days or will go into local schools. This can increase the knowledge sharing and environmental awareness in the community.

As mentioned before, enthusiastic people involved in the project can bring plenty of benefits, including increasing the local residents' sense of ownership of the sites. These people also ensure the proper organisation of the participatory actions, which is critical for their success.

Having enough time and resources for community engagement can determine the success or failure of citizen participation. Juliet further mentions how this enables the development of the signage mentioned before, which can function as a way to demonstrate the value of these interventions to the community, increasing the perception of their societal value.

6. Discussion and recommendations

This chapter discusses the project's results. First, the comparative analysis results are contextualised with the interview. Then, the findings are analysed through the lens of the theories from Chapter 3 and the concepts from Chapter 2. Lastly, the research question and sub-research questions are answered based on the findings from this research project

6.1 Contextualisation of the results through the interview

The interview with Juliet provided insight into the planner's perspective of GI planning, namely regarding the involvement of citizens in the Liverpool case, which can explain the reasoning behind some of the findings of the comparative analysis.

Firstly, the planners who work in the Liverpool City Council understand the value of involving citizens in GI planning. As Juliet describes it, the community's support is one element that determines GI interventions' success. As in her practice, she actively pursued the engagement of citizens despite the lack of resources and time for it, emphasising how practitioners understand the importance of public participation. However, as she mentions, the lack of time and funding while also dealing with the COVID-19 pandemic hampered how they involved citizens, which might explain some of the results from the Liverpool case, namely the **purpose** and **methods**.

These limitations might also explain why, in comparison with the Valladolid case, public participation was planned for a later stage in projects. As Juliet notes, one of her recommendations for ensuring the successful involvement of citizens in GI planning is early consultation. This can also explain why “variability of public participation techniques” is not being considered in the Liverpool GI planning practice, as that would potentially take more time and resources.

Despite these limitations, Juliet went on to explain that citizens took it upon themselves to participate in implementing and managing these interventions. Considering that Liverpool City launched its GI in 2013 and that, as she mentioned, there is a long tradition in the municipality of involving citizens in public projects, this can explain why citizens put effort into this participation. This also demonstrates the value of this community group and its members with their knowledge sharing and community building, and it fosters an improvement of GI itself by taking part in informing their local needs and concerns and acting upon them. Despite this, as Juliet mentioned, it’s hard to plan this beforehand, as time is of the essence in these projects.

It’s hard for planners to allocate much time depending on actors such as the external contractor mentioned or community group members promoting these participatory actions. Moreover, this is an indication that there is already a positive perspective on Green Infrastructure pushing for involvement, which guarantees the success of public participation even if the proposed practice could use improvements.

Juliet says that she doesn't believe policies and strategies significantly impact how a community is shaped, determining their openness to involving themselves in these projects. This statement also makes sense when looking at the Valladolid case. At the time the URBAN GreenUP project started, no municipal or national policy addressed GI, and the EU strategy barely mentioned citizens. Despite this, Valladolid was still able to successfully implement green infrastructure in its urban spaces while prioritising the integration of citizens early in the planning process. This ensured that the purpose of public participation was kept as proposed in the methodology for the URBAN GreenUP project.

Juliet made the point that the success of implementing and maintaining GI sites through citizen involvement can inform then policies or strategies for Green Infrastructure. Policies or strategies that acknowledge the importance of community engagement in green infrastructure projects, its multiple benefits, and different public participation techniques can potentially ensure that planners are less reliant on community members' goodwill and free time for successful citizen integration.

She also notes the importance of the City Council employing planners who are aware of the potential benefits of public participation and are passionate about it while providing them with the resources and time to foster these community connections. This can shape community involvement and ensure that go beyond what the policies or projects require.

6.2 Application of the Theories

6.2.1 Ecological Modernisation Theory

The Ecological modernisation theory asserts that it's possible for economic growth and environmental protection to coexist. To do this, policy reforms, institutional changes, and technological innovations must be implemented. Moreover, it mentions that the potential conflict between ecological sustainability and social-economic considerations can be addressed through ecological modernisation. For this, environmental solutions should be developed within the society's economic, social and political systems.

This theory is particularly relevant for this project because green infrastructure projects, such as URBAN GreenUP, aim to improve urban systems by supporting ecosystem services and enhancing urban resilience. This aligns with the EMT notions of supporting the ecological and socio-economic dynamics by employing technological innovations. Public participation and participatory governance are central to this approach, ensuring that green infrastructure projects address local needs and preferences. This involvement increases the effectiveness and sustainability of the projects. It fosters social cohesion within the local community, which becomes active members of these spaces' planning, implementation, and management.

In both case studies, the EMT principles are applied. For Liverpool and Valladolid, technologies, such as green roofs, permeable pavements, and green walls, have been implemented to enhance urban resilience while engaging with local citizens. Their primary goal was to solve

some of their local environmental issues while enhancing urban resilience and the local ecosystem services.

These technological advancements align with EMT's argument that modern innovations can mitigate environmental impacts and promote urban resilience. As seen in this project, GI interventions can also support cultural ecosystem services, which gain value with the involvement of communities that use these spaces to connect with the urban space and each other. Also, by implementing NBS in urban spaces, such as green infrastructure, while valuing citizen involvement, it's possible to extract environmental, social and economic benefits. These include improving air and water quality, enhancing biodiversity, increasing social cohesion, and fostering a green economy by creating green jobs such as external contractors, all of which contribute to a more sustainable and resilient urban environment.

On the other hand, the effectiveness of these technologies is closely linked to the degree of public participation in their planning and maintenance. COVID-19 forced planners to adapt participatory actions into an online format, which decreased the number of potential, especially older citizens. Moreover, as mentioned in the interview, there were interventions that the planners were technically unfamiliar which meant they didn't want to risk the involvement of citizens potentially compromising it. These challenges in sustaining public engagement demonstrate the need for better integration of technological and social strategies, which EMT advocates.

The comparative analysis reveals that although the Liverpool case is based on URBAN GreenUP methodology, its practice is closer to the one described in Liverpool's green infrastructure strategy. While the URBAN GreenUP methodology and Liverpool's GI strategy describe citizen engagement as a critical element of GI planning, it's given more importance in the former rather than the latter, with the purpose of public participation being citizen empowerment and considering "variability of public participation techniques" an important factor to taken into, are some of the key differences. Moreover, considering how citizen engagement can maximise GI benefits, which can bring further economic benefits for the city, from the EMT perspective, this is another example of the fact that Liverpool might be compromising green innovation.

Also, time and funding, which were needed for proper citizen engagement, were limited. This then impacted Liverpool's GI planning practice, making them rely on the goodwill of external contractors and community members to properly ensure citizen engagement's effectiveness. EMT argues for the need for coherent policies supported by governance structures capable of adapting to local conditions and challenges to solve this.

Unlike Liverpool, Valladolid did not have a solid initial framework of municipal or national policies addressing GI at the project's inception. Instead, the URBAN GreenUP project provided the necessary structure and support to initiate these green infrastructure interventions, translating into how it engages with citizens. Valladolid GI planning followed the URBAN GreenUP methodology closely, which resulted in both its public participation purpose, methods

and primary factors correlating with each other. EMT describes sustainable development as requiring integrated and adaptive governance structures supporting continuous public engagement and technological advancement.

In Valladolid, the dependence on an external project framework like URBAN GreenUP underscores a lack of inherent institutional capacity and policy support for GI initiatives. This dependence can be seen as a vulnerability, as the sustainability of these projects may be at risk once the external support and funding of the URBAN GreenUP project concludes. Moreover, even though Valladolid put significant relevance on "variability of public participation techniques". Some of these expansive public participation actions lead to some unaccounted additional costs, which can cause economic burdens to the overall GI project and the Valladolid municipality itself

6.2.2 Participatory Planning Theory

Participatory planning theory argues for including diverse stakeholders in the decision-making process of projects. It argues for a better balance of power dynamics and fostering collaborative solutions in urban planning. This approach is relevant for green infrastructure(GI) projects that support urban ecosystem services and strengthen urban resilience. This theory states that to ensure that GI projects are supported and maintained in the long term, it is critical to involve local communities in the planning, implementation and maintenance of these interventions.

In the Liverpool case, community groups actively planned, implemented, and maintained GI interventions. The main coordinator of these interventions, Juliet, considered citizens to be a fundamental part of ensuring the success of green infrastructure projects that align with the Participatory planning approach of promoting the inclusion of multiple stakeholders. As observed in the project, this creates a sense of ownership and responsibility for these interventions. One potential explanation for this is that the Liverpool city council has a long tradition of community engagement, which means that its citizens are already pre-disposed to these participatory actions. Also, one key method that is included in Liverpool GI strategy but is lacking in practice is the citizen advisory committee. From a participatory planning perspective, this means that the fullest potential of public participation wasn't realised, which goes with its principles. A potential reason for this is the COVID-19 pandemic, which disrupted participatory actions.

Applying the Participatory planning theory to the public participation approach of the Liverpool and Valladolid green infrastructure projects reveals its strengths and weaknesses. Liverpool focuses on collaboration that involves citizens in citizens in the decision-making process by fostering cooperation and taking into account multiple perspectives. This builds trust in the community and legitimises the outcomes of planning. However, this approach also fails to fully empower citizens, potentially limiting the potential depth of public involvement, which can be observed by the fact that most of the participatory actions in Liverpool came later in the planning process.

In contrast, in Valladolid's case, the goal of public participation is to "empower", which grants citizens significant authority in the GI interventions, assuring that they directly impact the outcomes. This approach more closely aligns with the ideals of participatory planning to increase public ownership and accountability in public interventions. However, this also comes with potential problems, exemplified by the additional costs of more expansive participatory actions.

The Liverpool case also had significant hindrances to community engagement, such as limited time and funding. Furthermore, certain practicalities, such as a lack of technical knowledge in some of the interventions, disturbed this process. In practice, this translated to a lack of early consultation, a failure to integrate deeper stakeholder integration through more intensive participatory methods like advisory committees, and a reliance on the goodwill of external contractors and community members for proper public participation. These challenges demonstrate the need for an adaptive governance structure that supports adequate resource allocation, which is critical to sustaining citizen involvement and, in turn, the effectiveness of GI initiatives.

Contrary to what happened in Liverpool, where participatory planning was already used in its municipal green infrastructure strategy, which addresses the involvement of citizens, Valladolid didn't have any clear strategy or policy related to this subject. It relied on the methodology from the URBAN GreenUP to develop its approach to developing green infrastructure and involving citizens in its process. This led it to consider citizen involvement as a way for citizens to take a level of responsibility in the decision-making process of GI planning. Furthermore, it employed participatory actions such as citizen-committee advisors, public meetings, workshops and many others, which align with the principles of participatory planning. It also implemented them early, allowing them to utilise local knowledge at the beginning of the development process of these interventions, which maximises its potential to enhance urban resilience.

Nevertheless, the Valladolid case also faced limitations. Similar to Liverpool, COVID-19 had a significant impact on its ability to implement participatory actions. When adopted, participation was reduced, especially among older citizens. This means citizen engagement can still be affected even when the fundamentals of participatory planning theory are properly applied.

6.3. Answering the Research Question

Based on the information gathered through the research project, it's important to organise the findings by answering the main research question, which is the following:

How is citizen involvement considered urban green infrastructure projects, and what recommendations can be formulated to improve public participation in urban green infrastructure practice?

This will be done by responding to the sub-research questions.

6.3.1 To what extent are citizens included in Green Infrastructure planning, implementation and maintenance?

In cases that have successfully implemented green infrastructure in their urban spaces, such as those in Liverpool and Valladolid, citizen engagement is considered to be an important element of the planning practice.

Public participation can have different purposes depending on each project's context. The Liverpool case took a more collaborative approach, engaging citizens' involvement through the implementation phase and creating opportunities for them to contribute to its maintenance. Its planners aim to respond to the community's local needs and concerns through these interventions. This collaboration had certain limitations, primarily due to a lack of time and funding and the impact of COVID-19, which translated into a reliance on external actors and a lack of early consultation.

Meanwhile, in the Valladolid case, the main purpose of public participation was to empower citizens by involving them early in the decision-making process through various participatory techniques such as citizen advisory committees, public meetings and workshops. This early involvement of citizens helped Valladolid to use local knowledge in the early stage of GI planning, enhancing its efficiency. However, it also had setbacks, such as COVID-19, which reduced the participation of certain citizens' in adapted measures. Also, some of the participatory actions had additional costs that the Valladolid City Council had to cover.

Overall, as demonstrated by both cases, citizen involvement is considered an important element of green infrastructure planning. Each one has its own approach and challenges when it comes to this subject. Liverpool has a more collaborative approach, relying more on external contractors and community members to ensure effective citizen involvement. Valladolid empowers its citizens by considering various participatory techniques, albeit with additional costs.

6.3.2 How does policy influence the practice of citizen involvement in the development of urban green infrastructure?

Policy and strategies influence shaping citizen involvement in green infrastructure projects differently in each case. It's also important to consider that, as observed in this project, each city has its history, culture, and politics, which shape how planners engage with citizens in green infrastructure projects or any project. In the Liverpool case, there is a historical context for citizen engagement. Furthermore, their green infrastructure strategy was launched in 2013, which means that planners are familiar with GI planning. As observed from the comparative analysis results, the method proposed in this strategy seemed to have a bigger influence than the one from the URBAN GreenUP project. Both policy and practice have the same purpose and benefits from public participation and consider similar primary factors. Furthermore, its historical involvement in public participation might have created a sense of community and ownership, which might be the reason why community members took it upon themselves to manage some of these interventions.

For example, Valladolid lacked a green infrastructure strategy. This implied that they had to base their practice entirely on the framework established by URBAN GreenUP, which can be observed through a comparative analysis of their approach to citizen involvement as it shares the same purpose, methods and primary factors with methodology. This leads them to do early consultation and provide significant responsibility to citizens in the planning of green infrastructure. On the other hand, the lack of policy support might lead to future GI interventions relying on external projects to establish a concrete framework and funding. Moreover, the Spanish strategy for green infrastructure, launched in 2023, has a similar approach to Valladolid regarding citizen engagement. Even though it's not directly linked, this can suggest that practice might have informed national policy to some extent.

The influence of policy is complex, and there are a lot of factors that determine its influence on practice. Each city's cultural, social, political and economic dynamics shape how citizens engage in green infrastructure projects. In Liverpool, its green infrastructure strategy and history of public participation provide a structured framework that aligns with its citizen participation practice through purpose and methods, which translates to its community being predisposed to involvement. Meanwhile, Valladolid followed the URBAN GreenUP methodology, which, despite its strengths, might compromise its future GI projects due to the lack of a municipal policy framework.

6.3.3 What recommendations can be formulated to improve public participation in urban green infrastructure

- Proper time and funding to engage with citizens- Ensuring proper time and resources for planners to engage with citizens can be extremely valuable, assuring that community members are properly informed, consulted and involved during all the stages of GI planning.

- Variability of public participation techniques- By employing different participatory actions, planners can maximise the potential of public participation by widening the different ways citizens can participate in the planning process.

- Early consultation- Engaging with the citizens earlier in the planning process allows planners to utilise their knowledge better throughout the different stages of the project. Also, it fosters greater social cohesion and ownership for the local communities

- Policy reforms- Reform strategies and policies to ensure that proper citizen involvement is assured by governance structures and less reliant on projects or external actors.

6.4 Reflections on the research project- Knowledge gaps

There were some knowledge gaps in this project, which can be covered by future research. Firstly, interviews with Valladolid planners should be conducted to contextualise the project findings, namely the influence of the lack of policy and how the URBAN GreenUP influenced practice. Moreover, the barriers that planners faced throughout the project's implementation could give some further insights into how citizen involvement is considered. Also, having a Valladolid perspective provides an understanding of how public participation is translated and perceived into practice.

Then, a case with a less successful GI implementation should be included. Comparative analysis can bring a new perspective and reveal spaces for improvement. It can also help find the key indicators for success and develop strategies for improving these cases.

Comprehending the potential economic benefits of citizen involvement in green infrastructure planning could also be relevant for future research. This can help further argue for allocating more resources and time to sustain citizen engagement in GI projects.

Research on the effectiveness of each public participation technique could also be relevant. This can help develop a framework or methodology that can be implemented in different contexts, supporting citizens' involvement while maximising the benefits of green infrastructure.

Lastly, developing a long-term study on green infrastructure could recognise the potential long-term benefits and constraints of participatory actions in green infrastructure interventions.

7. Conclusion

This chapter provides the thesis project's conclusion, wrapping the project by presenting the key findings, recommendations and knowledge gaps.

Green infrastructures are Nature-Based solutions designed to improve and solve some current urban problems by enhancing urban resilience and urban ecosystem services. One of the key elements of green infrastructure planning is citizen involvement. Multiple benefits can be derived from citizen involvement: local knowledge, which can increase the effectiveness of GI in addressing local needs and concerns; community building, which increases the social cohesion of local citizens and also potentially leads citizens to be more predisposed to GI, which can increase their political support.

The primary goal of this thesis was to understand how citizen involvement is considered in green infrastructure practice by conducting an in-depth analysis of policies or strategies, case study documents, and interviews. Through these methods, this study provides an understanding of how different successful implementations of green infrastructure address citizen engagement depending on their own individual context.

Liverpool and Valladolid indicate that citizen involvement is important to their GI interventions. However, both cases demonstrated that different approaches to public participation in green infrastructure planning could be taken depending on the context of each urban space.

Liverpool approached it more through a collaboration perspective, focusing its citizens more on the implementation and maintenance phases through different methods such as public meetings and workshops. It relied heavily on community members and external contractors to ensure its effectiveness, which isn’t sustainable when subjected to changes in a community environment. A potential explanation for this is that Liverpool has a history of engaging with citizens, which means that trust and community building are already a part of its urban environment where active participation of citizens is common.

Meanwhile, the Valladolid case followed the URBAN GreenUP methodology, emphasising involving citizens through an empowerment approach. Citizens were responsible for the decision-making process and were involved in the early stages of the development process of green infrastructure interventions. This also extended to considering a variety of public participation techniques as an important part of GI planning and the different methods it employed. However, this also came with additional costs that had to be covered by the Valladolid City Council. Furthermore, the lack of a concrete municipal framework might leave future GI interventions reliant on external projects and funding to be properly implemented.

This research project also identified some challenges hindering public participation in green infrastructure planning. These include practicalities of public participation, such as the COVID-19 pandemic, adopted measures that decreased potential participation, and the fact that some GIs required specialised work. Also, a lack of time and resources also caused planners to rely on external actors for effective citizen engagement.

Despite these challenges, some recommendations can be formulated to improve upon the practice of citizen involvement. From ensuring that enough time and resources are allocated to citizen engagement, doing early consultation to guarantee that citizens can influence in their stages of the decision-making process, using a variety of public participation techniques which diversify the different types of involvement and reform strategies and policies related with green infrastructure as increase the role of citizen involvement in its planning process.

Future research on this should involve Valladolid planners to be able to get further information regarding their perspective on how citizen engagement evolved in practice. Furthermore, it can also provide a further understanding of how policies or lack thereof when it comes to GI have influenced the way citizens are involved in GI planning. Also, having a case of less successfully implemented GI can be extremely valuable to understanding the main spaces of improvement when it comes to the involvement of citizens in these interventions. It could also reveal key indicators that influence the effectiveness of citizen involvement. Comprehending the economic benefits and the effectiveness of public participation techniques can also broaden the understanding of the subject, which can then help develop better methodologies. Research on the long-term effects of public participation could also be useful.

Overall, citizen participation is important in green infrastructure interventions, with policy and practice revealing their importance in planning. By understanding how to engage with citizens, planners can ensure that green infrastructure effectively tackles problems faced by urban spaces, making them more inclusive and resilient.

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Annexe

Interview Guide for Liverpool:

Can you first introduce yourself and explain your involvement in Green Infrastructure projects based in Liverpool?

Based on your experience and perspective, what do you think is the citizens' role in the planning, implementation and maintenance of Green Infrastructure?

Are there any barriers or constraints to public participation?

Considering your experience in a GI project, how do you think the goals in policies/strategies or frameworks for citizen involvement translate to a practical case?

What do you think are the best approaches to promote public participation?

To what level do you think it is the responsibility of the planners to support public participation?