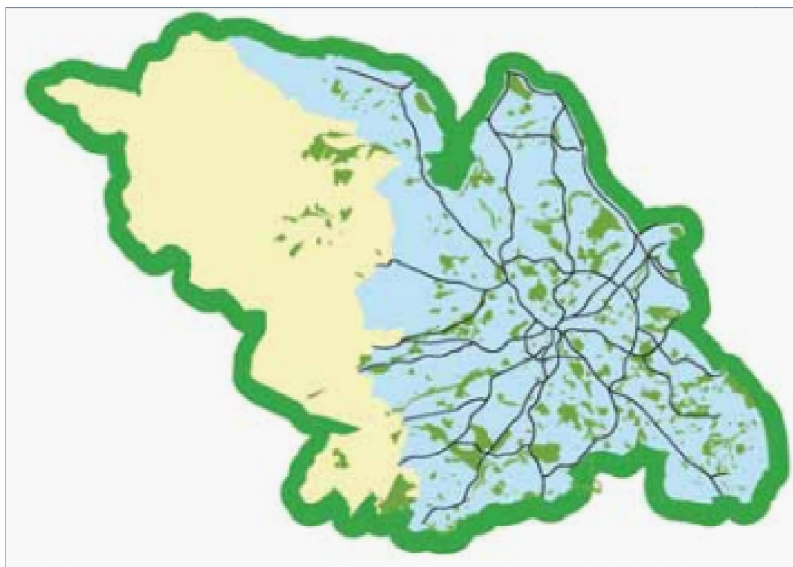


Paving the way towards Urban Green Infrastructure policy maintenance

The case of Sheffield, England



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Summary

The Urban Green Infrastructures (UGIs) have been identified as important measure to enhancing climate resilience and adaptation both in the local and the global scale. Acknowledging that their development and maintenance are related to the functionality of the policy that underpins them, this thesis explores key governance mechanisms which if applied, they could ensure the maintenance of the policy's functionality over time and thereby the good quality of the green areas. However, there is lack of a policy maintenance framework. I suggest that this lack roots in the static way that policy implementation has been seen by scholars to date, who tend to equalize policy implementation with policy establishment, almost assuming that once the policy is established it steadily produces certain outcomes. However, this does not respond to the reality where several factors threaten its functionality and thereby the quality of its outcomes. To cover this gap, I suggested a more evolving form of policy implementation, where the policy is applied constantly and its outcomes can change anytime due to changes in the policy context. Then, policy implementers need to come up always with new ways to offset the external effects in order to maintain the policy. According to this perspective, I first constructed a framework based on two theoretical backgrounds, policy theory and urban transition studies. The two theories were considered relevant to explaining the UGI policy maintenance, since the policy theory denotes key variables for succeeding policy establishment and then the urban transition studies indicate the position of those variables in the transition towards a greener urban environment. The framework indicated as key variables or the so-called here 'supportive elements', the commitment of agencies to implement the policy, and their capacities to mobilize resources, to enforce the guidelines and to build knowledge and awareness. Alongside, supportive element was denoted the commitment of local networks to operate green initiatives and to mobilize resources. Last, the framework suggests that implementation agencies and local networks need to co-design nature-based solutions by producing new knowledge, facilitated by brokerage interventions. Then, the constructed theoretical framework was tested for its validity to explain the policy maintenance in a single case study which accounts a few years of successful application of a related policy. The case study is the Green and Open Space strategy (2010-2030) of Sheffield, England and the aim was to understand how the local governance managed to keep the policy functional during the 10 years of its application despite socio-economic and political effects which have threatened its functionality. This could give lessons to local policy governors of how to maintain a UGI policy over time, whilst allowing a first attempt to create a UGI policy maintenance framework.

In a fieldwork of 3 weeks in Sheffield, where 15 semi-structure interviews have been conducted, 9 of local implementation agencies and 6 of local networks, it was shown that the strategy was mostly affected by limited funding, network changes and social pressures. Agencies and networks have proceeded with a number of scenes to enhance the financial support and the local engagement, mostly focused on participation and cooperation techniques. The theory was only partially valid, since mainly the capacities and the commitment of implementation agencies and networks were important for the maintenance of the local strategy. The co-design has been merely performed between the two groups. Important finding was that whenever co-design was performed, it was totally based on direct links instead of brokerage. Last, the main local governance mechanism, behind all the techniques for overcoming socio-political and economic difficulties, was based on a bottom-up approach of commitment enhancement. In simple words, the implementation agencies enhanced the attachment of the public to the local green areas. This led the public to support the green areas in material and non-material ways. Simultaneously, the public attachment motivated the local agencies to implement the policy and to advance their capacities in order to continue satisfying the public opinion and their own pride for the green areas.

If these mechanisms are to be adopted by different contexts, attention should be given to the special characteristics of the different localities which would also determine the extent of the framework's applicability. Moreover, future studies should research the potential of the much-discussed integration of legal basis in the UGI policies that could change significantly the governance around green infrastructure from the form we currently recognize.

I would like to introduce this research with an apothegm.

The humanity has shown small pieces of mercy on nature and our job is to at least maintain them.

And as the Persian mystic Jalal ad-Din Rumi quoted "The world is a mountain, in which your words are echoed back to you"; Mercy on nature means mercy on us.

1. Introduction

The effects of urbanization and especially the results of the rapid urban population growth are widely recognized as important drivers of climate change (Höjer & Wangel, 2015). Cities and municipalities account more than 50 per cent of the global population, and some of the total 80 percent of the global energy consumption, waste production and Greenhouse Gas (GHG) emissions is associated with urban activities (Zeppel, 2013; Blum, 2017)). More issues caused by urbanization include deforestation, the urban heat island effect and biodiversity loss, with all affecting the urban micro-climates and the global climate stability (Grimmond, 2007; McCarthy, Best & Betts, 2010). However, the urban areas are not only a source of environmental instabilities but they are also impacted by the climate effects. In many cases, extreme climate phenomena strike the cities and they are enhanced when combined with special urban characteristics, such as a large urban extent (McCarthy, Best, & Betts, 2010; Chapman et al., 2017). Moreover, studies have shown that the local issues are not limited regionally but they affect the global scale either through dominos effects that move far from their source or aggregative effects that result from add-on causes (Lambin & Meyfroidt, 2011). Such cases encompass the longer and stronger periods of droughts and heatwaves, which sometimes couple together enhancing the events (AghaKouchak et al., 2018). Additionally, droughts and heatwaves exacerbate conflagrations, rendering the impacted urban areas more vulnerable to potential flooding. They also raise the global temperature leading to more droughts and hurricanes (AghaKouchak et al., 2018).

Due to the occurrence of these events, it became clear that much attention should be given also to local-scale solutions and especially to urban climate resilience and adaptation. Moreover, local governments are recognized as important stakeholders in the climate governance field, due to their control over energy consumption, waste management and land use (Zeppel, 2013). Their importance was widely accepted at 2010 UN Climate Change Conference, though the urban local authorities were called already at the early 1990s to actively engage in climate change policies through the Agenda 21 action plan (Zeppel, 2013; Höjer & Wangel, 2015). Currently cities and large municipal areas are members of volunteer networks, such as the International Council for Local Environmental Initiatives (ICLEI), the Cities Climate Leadership Group (C40) and the European Covenant of Mayors that seek to advance the local climate resilience and adaptation efforts through local engagement, information sharing and knowledge building (Crocì et al., 2017; Zeppel, 2013; Román, 2010)

A key measure that is increasingly promoted as climate response is the development of **urban green infrastructure (UGI)**, such as urban parks, water corridors, green roofs and vegetative buffer zones (Zölch et al., 2019; Demuzere et al., 2014). This is due to their value in climate resilience and adaptation. Specifically, recent studies observed that when the urban areas lack extensive green landscapes and ecosystems, they face longer periods of droughts and blazes (AghaKouchak et al., 2018). The UGIs have been proven effective in reducing adverse climate effects, in balancing water flows and in mitigating the heat stress and the pedestrian thermal comfort by

providing evapotranspirative cooling (Demuzere et al., 2014; Zölch et al., 2016). Alongside, UGIs mitigate the urban air pollution and the GHG emissions and thus they are used as measures to meeting the global climate-change mitigation targets. Lastly, UGIs improve the citizen's health and they benefit their societal behaviors by helping the public reconnect with nature (Demuzere et al., 2014). Thus, urban planners had to not only incorporate the UGIs in their climate agendas but also to ensure their long-term maintenance.

Studies have shown that UGIs can only be effective if they are combined with targeted local governance and coordinated with territorial policies (Pachauri et al., 2014; Leichenko, 2011; Nelson et al., 2009, Blum, 2017). Therefore, the maintenance of UGIs is related to some extent with the maintenance of the policy's functionality. In fact, UGI policies guide the governance of the available material and human capital which are needed to support the green areas. They represent the foundation to control governance needs such as technological, financial support and stakeholder's engagement (AghaKouchak et al., 2018). These policies are either part of the national urban-development policies which incorporate environmental objectives, or separate green infrastructure policies, tailor-made for a specific city (Lafferty & Hovden, 2003). They also connect a wide range of stakeholders, since the UGIs are related to environmental agencies, but also to non-environmental policy sectors such as urban-planning agencies (Mell, 2015). However, to date there is not enough knowledge regarding the factors that affect the functionality of a UGI policy or the variables that help in maintaining it. This gap falls under the wider lack of knowledge in the field of policy implementation (Frantzeskaki et al., 2019; Luque-Ayala, Bulkeley & Marvin, 2018).

2. Knowledge gap

The term "policy implementation" has been conceptualized by many scholars to date, typically converging on a basic chronological and executive meaning which starts with the formulation and application of a statute, and ends right before the routinization of its standards and norms (Sabatier & Mazmanian, 1980; Schneider, 1982; Weible, Heikkila, DeLeon, & Sabatier, 2012; Hamza & Mellouli, 2018). Then the academic research focuses on the conditions that shape the implementation and on the evaluation of the policy impacts (Sabatier & Mazmanian, 1980; Schneider, 1982; Hamza & Mellouli, 2018). However, the period between the implementation and the evaluation remains unnoticed. Particularly for a UGI policy, there is no framework to explain policy maintenance. There are only some attempts that underline a few variables, without explaining their role in keeping the policy functional after its establishment and before the evaluation of its results (Frantzeskaki et al., 2019; Luque-Ayala, Bulkeley & Marvin, 2018). However, the policy faces many effects from the ever-changing socio-political and economic context. Hence, it should be observed how the policy deals with all these effects after its application, something that would probably explain how it can be maintained in the long term.

I suggest that the way that policy implementation is conceptualized, might explain why policy research does not observe the period between policy implementation and evaluation, and thus why it struggles to understand policy maintenance. I argue that the conceptualization of policy implementation is quite static, and prematurely closes off attention to many complexities and dynamics of policy implementation in practice. It assumes that once a policy is established, it steadily produces desired outcomes. However, in order for a policy to produce desired outcomes, it has to offset effects of several socio-economic and political factors and to navigate within an ever-changing environment. This means that policymakers and policy implementers need to continuously adjust and adapt to maintain the policy and its outcomes over time. Therefore, academic research should also focus on the period after the establishment and institutionalization of a policy.

For that reason, I propose to view policy implementation as an ongoing process, where the production of the policy outcomes does not signal the end of implementation. Instead, the term will treat policy implementation as an ongoing process, where the policy is constantly applied and constantly produces outcomes which are shaped according to the changes within the policy context. To this end, this thesis builds on the observation of Schneider (1982), that "the end of implementation does not mean that change no longer occurs; it simply means that the implementation phase has given way to what might be better identified as normal operating procedures" (page 717). Therefore, here the term "*policy implementation*" refers to the *dynamic process of translating statutory*

objectives into regulations and then outcomes, as conceptualized by Sabatier & Mazmanian (1980), though in a continuous form. This approach implies that several factors can still shape the way that the policy functions after the produced outcomes, *shaping accordingly the outcomes themselves*. It will then require constant efforts to produce desired policy outcomes. Thus, policy implementation is then seen as an ongoing process during which the aim is to ensure constantly that the policy will remain function or that it will be maintained in order to give the desired results. This conceptualization could allow the researcher to observe the effects of several factors on the implemented policy during its life and to understand the variables that keep the policy maintained.

Theoretically, the maintenance of the policy's functionality, or in other words, the uninterrupted application of its regulations towards production of the desired outcome, can be affected when important variables that support implementation, get impacted by the policy context. As supportive elements, I conceptualize the governance factors that support the policy implementation. Hence for the current research, these variables that will be depicted later from literature review will represent the supportive elements for a UGI policy. Then, it is important to explore the reasons that in some cases, these elements functioned well leading in UGI policy maintenance despite the occurrence of external effects. Since its locality has different governance characteristics, reviewing the policy in regards with the specific locality can shed light to the reasons that the policy was maintained. *The aim of this thesis will be to understand the role of the local governance in UGI policy maintenance.*

The research addresses the following two key research questions:

1. *Which factors disturb the functionality of the policy?*
2. *Which factors support the functionality of the policy?*

The findings can reveal key mechanisms towards policy maintenance and hence they can contribute in the general lack of knowledge for what concerns UGI policy maintenance. If several factors, such as political disturbances, are proven weakening for the policy's supportive elements, policy makers and implementers will have to take them under consideration and address targeted mechanisms to overcome their effects. Alongside, other variables, such as local initiatives, might be proven strengthening for the functionality of the policy and hence they should be highlighted at future urban development agendas in order to maintain the policy. Overall, the findings can inform policy makers and implementers about important mechanisms that keep an UGI policy maintained, preserving hereby the environmental state of the green areas. Since UGIs are key in urban climate resilience and adaptation, their preservation is expected to improve the urban quality of life and to contribute in the global climate change mitigation.

3. Research approach

In order to answer the aforementioned questions, I first develop a framework of policy maintenance related to UGI policies, addressing the variables that need to exist in order to succeed UGI policy maintenance. Since there is no specific theory to denote these variables, I construct a framework based on two theoretical backgrounds, policy theory and urban transition studies. Policy theory is pivotal to underpinning such a framework, as it provides the basic variables for successful policy establishment. Then I suggest that the key variables which explain policy implementation are also relevant to explain policy maintenance. I use as argument that if those variables were determinant to successfully establish the policy, they must have played a role also in keeping the policy functional at subsequent stages. Here, these variables are referred as supportive elements. Moreover, since the green infrastructures constitute a part of the urban development sector, the urban transition studies were deemed important to address the relation between the supportive elements and the preservation of UGIs.

Then I apply a deductive approach, where the theoretical reality is observed vis a vis with real insights from a case study (Verschuren, Doorewaard & Mellion, 2010). Specifically, the framework will be applied in a single case study and it will be tested in situ to provide a logical deduction regarding the concepts and their relation with the

green infrastructure policy. The new concepts will be shown after their confrontation with the reality. Hence, the findings will test and successively modify or enrich the policy maintenance theory.

Lastly, a single case study was considered most suitable to gather the necessary data, since it can deliver deeper insights within the given time. The selected case is the Sheffield Green & Open Space Strategy (2010-2030) of England which falls under the general guidelines of the overarching National Planning Policy Framework. It was considered appropriate for the current research as it satisfies some basic requirements. First, it has been already implemented for a certain time and it is still in force, allowing thereby the exploration of the reasons that maintain its functionality until today. Second, it was important to select an UGI policy that is considered successful in reaching its sustainability goals and good quality of green areas in the city of application. The case of Sheffield satisfies this precondition, since it represents a former industrial area that now accounts 60 percent of green spaces, including the Peak District national park and 22.1 percent of green spaces at the main urban land alone (The Guardian, 2017; Yorkshire life, 2017). Among the green areas, there are parks, semi-natural areas, gardens and playing fields, which are characterized as well-maintained in a good ecological quality, aesthetically attractive and with high accessibility that significantly contribute in the local quality of life (Irvine et al., 2013; Mell et al., 2016). Thereafter, the case of Sheffield represents a rich field of research and it is expected to provide valuable insights. To note, the reason that this research selects a strategy over a policy is because the former contains a number of sub-policies. Hence the reasons that disturb or sustain the functionality of the strategy are equal to those that affect its sub-policies, giving a broader field of research compared to the observation of a single policy.

3.1 Research framework

The successive research stages are summarized in *figure 1*. First, literature review on policy theory and urban transition studies will denote the supportive elements and thereby they will help in constructing the policy maintenance framework. In continuation, the framework will be applied at the case of UGI policy of Sheffield and the policy process will be analyzed according to it. Finally, the results will be discussed in order to reveal the factors that affect the policy and the role that governance features have in maintaining it by offsetting their effects.

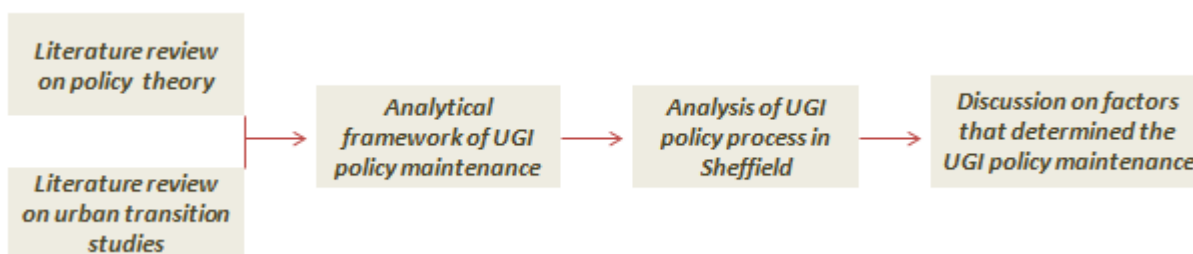


Figure 1. Research framework describing the successive stages of the research.

4. Analytical base for “UGI policy maintenance”

Policy scholars focus more on policy maintenance in recent years (ex. Lewis, Jenkins & Patashnik, 2012). Policy maintenance has been conceptualized as a dynamic process of applying the policy’s regulative assemblages and achieving its goals despite the constant socio-political changes (Jiao & Boons, 2017). Additionally, Schneider (1982) saw a policy as viable, if the elements that support the attainment of its goals exist and remain functional during the whole period of its application. Since the initial mandate of the UGI policies is materialized in the urban green spaces, the current study is expected to reveal the factors that affect the operation of those elements and thereby the viability of the urban green spaces. Converging all, this thesis uses the concept of UGI policy maintenance as *the maintenance of the elements that support its functioning during the period of implementation, in a way that the end result of the policy, the urban green spaces, will remain in a viable condition*. In that sense, the policy maintains its functioning, if the elements that support it are present and able to ensure a good quality of results.

In order to portrait the elements that support policy maintenance, I follow a literature review on policy theory and urban transition studies. I suggest that their role in policy establishment and routinization denotes, to some extent, also their role in policy maintenance. First, policy scholars stress that the capacities and the commitment of implementation agencies and networks determine the application of the policy and the achievement of its mandate (Berman, 1978; Sabatier & Mazmanian, 1980; Schneider, 1982; Berke et al., 2006; Weible et al., 2012; Hamza & Mellouli, 2018). Then, scholars of urban transition studies indicate that the interplay between these elements and especially the co-design of nature-based solutions is pivotal for the durability of the UGIs (Romero-Lankao et al., 2018; Luque-Ayala., Bulkeley & Marvin, 2018; Frantzeskaki et al., 2019). Thereafter, the aforementioned variables display the supportive elements and their role will be observed within the UGI policy process. Since UGI policy maintenance depends on them, the supportive elements represent here the independent variables and policy maintenance represents the dependent variable. Last, general concepts illustrated by policy scholars, such as political events, societal values and beliefs are seen to influence the operation of implementation agencies and networks, and hence they represent here the policy context. An overview of the framework and the related variables is provided at *figure 2*.

Implementation agencies

Federal programs are not only a set of statutory objectives applied locally, but rather adjustable assemblages that are translated according to the locality they are implemented in (Berman, 1978). This is apparent from the differences they present depending not only on the local socio-political environment per se, but also on the characteristics of the local implementation agencies (Berman, 1978). The policy's environment influences the implementation process and a major role of implementation agencies is to carry out the programs successfully within this ever-changing context. For that reason, the implementation agencies should be committed to apply their responsibilities and capable enough to control the policy process.

Implementing agencies are not only an executive component of the policy but also a supportive compound, where their behavioral compliance determines the achievement of the policy goals. Through a comprehensive framework for successful policy implementation, Sabatier & Mazmanian (1980) have identified that the extent of the agencies' commitment with the statutory objectives represents a main driver for the achievement of these objectives. Specifically, their willingness to implement the guidelines leads them to confront resistant public agencies and target groups that might prohibit successful implementation with their actions. Thereafter, the **commitment** of implementation agencies will represent a supportive element for the policy and the indicator to be used is the **willingness of agencies to implement the guidelines**.

The agencies need also to have the appropriate capacities to support the applied policy. The capacities refer to their ability to mobilize resources and to coordinate policy-related activities (Schneider, 1982). Mobilization of resources refers to monetary-related activities such as financial provisioning and fundraising activities. Financial support for the policy implementation is designated initially by the policy itself, as the latter structures the provision of funds to implementation agencies and to external staff labor for the provisioning of technical support, administration and monitoring services (Sabatier & Mazmanian, 1980). However, external donors are also significant and hence the agencies should attain mechanisms to enable access to them. Similarly crucial for the policy process is the coordination of activities such as application of mechanisms and provision of guidance in order to ensure and facilitate the application of the policy. For that reason, the agencies adopt enforcement mechanisms either with a punitive character as derived by legal limits and or with incentivizing character that impose implementation indirectly, as through technical assistance and information sharing (Berke et al., 2006). Lastly, agencies proceed with knowledge and awareness building in order to provide the staff and the communities with adequate tools to implement the guidelines (Berke et al., 2006). For these reasons, **resources mobilization, enforcement mechanisms** and **knowledge and awareness** building were selected as indicators for the **capacities** of the implementation agencies.

Networks

Networking is used as a strategic mechanism to influence the policy process since it can shape the agenda setting at the primary stages or even provoke policy change during the subsequent stages (Weible et al., 2012). Glückler & Lenz (2016) underlined also, that the guidelines imposed by the national level can be embedded in the sub-national level if the involved actors accept them deeply and thus incline to support it. Consequently, the networks are considered pivotal for both the establishment and continuation of a policy. More specific, the actors tend to collide under similar beliefs and thereby commit in unanimous actions against or in favor of a policy. If they consider the policy beneficial to them, they form supportive coalitions whilst oppose to the reforms that contradict their values and benefits (Hamza & Mellouli, 2018; Sabatier & Weible, 2007). Additionally, if the policy targets an issue which is widely defined as a problem by the public, their commitment to support this policy raises (Hamza & Mellouli, 2018; Weible et al., 2012). This in many cases influences the policy formation and reformation, as their unified actions place pressures to governmental authorities to enact accordingly, with the latter being obliged to place the issue of interest in the policy agendas (Ackrill, Kay & Zahariadis, 2013).

Especially in regards with the UGI policies, the support of citizens and local communities is seen even more important due to their tangible nature. The UGI policies are materialized into urban green spaces which are easily accessible and therefore their natural state is rendered exposed to every individual environmental attitude. Hence, especially if a UGI national policy is to be established in a city, the recipient networks should attain environmental-friendly attitudes. Ostrom (2009) has especially stressed the role of beliefs and values in establishing public support within the climate-change policy arenas. Jones & Baumgartner (2005) add to this, that the human mind is triggered by occurring events and the information derived by them can be encoded into the human belief system via rules, translating it into a long-term memory which determines their behavior (Jones & Baumgartner, 2005). In other words, since climate change is widely accepted as a major issue, the enactment of a related UGI policy can solidify its environmental benefits in the citizens' perception and lead them to engage in policy support.

The networks commitment in UGI policy support is usually demonstrated through mobilization of resources and local operational green initiatives (Sabatier & Mazmanian, 1980; Lewis et al. 2012). Specifically, many efforts to reduce greenhouse gas emissions in the United States and Europe initiated at local units, such as local alliances, communities, households and farmers, and their initiatives included development of green local-projects for the enhancement of the natural based solutions (Ostrom, 2009). Moreover, during political fluctuations such as changes at the elected executive departments, several regulative and procedural aspects are affected, including budget removals (Lewis et al. 2012). Then, local networks are important to cover lack of financing for the support of an UGI policy by providing funding, that they gather through different activities such as fundraising (Leichenko, 2011). Hence, this thesis uses the networks **commitment** as a supportive element for the UGI policy and it will be indicated through **operational green initiatives** and **mobilization of resources**.

Cooperation

Urban transition studies point the finger to the partnership of implementation agencies and networks for the facilitation of a sustainable urban transition. Specifically, a low carbon urban transition should respond to context specific requirements and hence it is not explicitly technology-dependent, but also highly related to the governance structures (Frantzeskaki et al., 2019). Studies underline that the design and maintenance of nature-based solutions demand specialized knowledge to inform the traditional governance structures in order to cover deficiencies of the established institutional settings (Luque-Ayala., Bulkeley & Marvin, 2018). Policies and its related agents are not by themselves sufficient to provide the required advanced knowledge for this kind of transitions (Luque-Ayala., Bulkeley & Marvin, 2018). A multi-level governance structure where key actors cooperate, such as hybrid partnerships between communities, universities and executive departments, is then seen as a main component for the production of qualitative and context-specific knowledge (Romero-Lankao et al., 2018; Frantzeskaki et al., 2019). The generated knowledge should then inform the design and management of the UGIs towards incremental improvements, a process which refers to as co-design of the policy (Frantzeskaki et al., 2019).

Notably, the co-design process demands the existence of mechanisms that facilitate the knowledge coproduction, as transdisciplinary communication which can ensure the common understanding between the

partners (McPhearson, Iwaniec & Bai, 2017). To this end, intermediaries are needed to balance the power inequalities of the multilevel governance structure and to facilitate the communications (Romero-Lankao et al., 2018). Intermediaries represent the brokerage between entities with different goals, capacities, values and skills, and they enable their cooperation towards production of knowledge. Intermediaries can be represented by governmental authorities, community groups, private and public organizations, among others (Luque-Ayala., Bulkeley & Marvin, 2018). However the process of co-design has no meaning without the final integration of this knowledge in the UGI policy. For this reason brokerage interventions are expected to bridge the research and policy field in order to translate the knowledge into policy planning (Thompson et al., 2017). Such brokerage is facilitated through discursive interventions, which targets to cluster consensual support by legitimating a sustainability action through framing techniques and technical approaches as impact-assessment reports (Farrelly, Brown, & Davis, 2009; Sareen, & Grandin, 2019). Hence for the current research, the **knowledge coproduction** and the **brokerage interventions** will be used as indicators for the **co-design** of the UGIs.

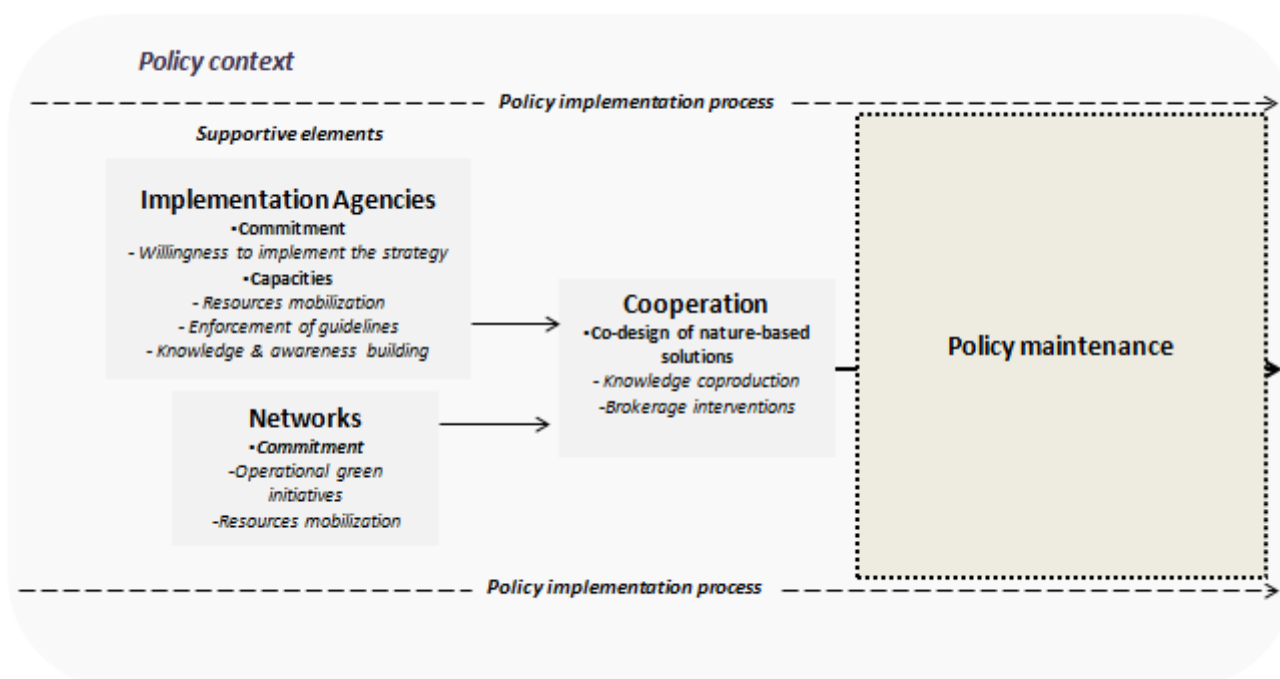


Figure 2. The conceptual framework of the study which illustrates the relation between the supportive elements and the policy maintenance.

5. Methodology

In order to gather the necessary data, this research uses a qualitative method based on interviews of implementation agencies and networks in Sheffield. This method was considered the most appropriate to cover the lack of knowledge regarding UGI policy maintenance due to literature suggestions. In specific, it has been addressed as successful tool to translating empirical knowledge into theoretical insights which can either complement fragmented theoretical backgrounds or deepen existing ones (Kallio et al., 2016). Two types of interviews were conducted, two phone interviews and thirteen in-person interviews during a three-weeks fieldwork in Sheffield. The total number is fifteen interviews of which eight belong to implementation agencies representatives and seven to local network representatives. To be noted, the two out of the eight interviews of implementation agencies belong to national level organizations. This number of interviews was considered sufficient to provide adequate information from each group of stakeholders, allowing simultaneously time to elaborate on the findings.

As first step, I consulted the document of the Green & Open Space Strategy (2010-2030) of Sheffield and I approached the stakeholders that have been listed as key components of the development of this strategy. The same stakeholders could have played an important role in policy maintenance and hence it was considered

appropriate to contact them in order to retrieve information for the current research. Their contact details have been found after a thorough search on the websites of the organizations and in published official documents related to green activities in Sheffield. A project information sheet has been sent to all potential participants with specific information about the research aim and the contact details of the people involved and which explicitly mentioned the privacy and ethical procedures that were followed. A snowballing effect has followed, where several actors enabled direct access to other key stakeholders through their personal contacts. As a result the current spectrum of interviews covers key stakeholders within Sheffield. The first set of interviews, referring to implementation agencies includes representatives of executive departments and it includes 9 interviewees that were coded as Interviewee 1 to 9. The second set of interviews, referring to local networks, includes representatives of the educational sector which have been involved in green initiatives within the city and representatives of local NGOs which have been specialized around green infrastructure development and maintenance, biodiversity enhancement, flood risk mitigation and climate change adaptability. All stakeholders have been involved in joined and separate. This set includes 6 interviewees, which were coded as Interviewee 10 to 15.

As second step, I constructed the interviews under a semi-structure format. This type was considered most appropriate due to its advantage in facilitating reciprocity between the interviewees and the interviewers (Kallio et al., 2016). Specifically, the interview guide is formulated with guiding questions which are only to some extent predetermined, in order to direct the conversation giving though flexibility to the interviewees to discuss issues they consider important (Longhurst, 2003). This enables new concepts to emerge and provides versatility of knowledge on the topic area based on the perspectives of different interviewees (Kallio et al., 2016). In case of ambiguous responses, the guiding questions were followed by pre-designed follow-up questions that narrowed-down the topic of discussion and increased consistency of the subjects that had to be covered (Kallio et al., 2016). Lastly verbal probing was performed when the interviewee remained silent, by repeating his point of view or expressing agreement in order to give a new push at the discussion (Kallio et al., 2016). In total, 7 guiding questions were addressed to implementation agencies and 5 to network agents, as depicted at *table 1*.

The interview questions were formulated according to each variable and indicators of the analytical framework. More specifically, implementation agencies were asked about their willingness to implement the policy in order to depict their level of commitment, and about mobilization of resources, enforcement of regulations and knowledge & awareness building in order to explore their capacities. Similarly, the commitment of networks was explored through questions on their involvement in local green initiatives and mobilization of resources, whilst the co-design will between the stakeholders was depicted through questions on knowledge coproduction and brokerage interventions. An overview of the questions is given at the *table 1*.

Lastly, the answers were analyzed through open-coding. Primarily, the framework variables and indicators represented the main clusters. Then, the data were segmented into new insights about each cluster. Specifically, the data were classified according to sentences or words that delivered a core meaning related to disturbance factors (D.F) or factors that threatened with destabilization the functioning of the framework variables, and to supporting factors (S.F) or factors that offset the destabilization. Following this classification, repeatedly mentioned and core factors were coded under one general category (main codes) and further sub-categories (nodes) were created when one code was divided in more branches. Through this process new information and new relations are revealed in relation to the specific codes (Castleberry, 2014). As an example, according to the theory a factor that contributes in policy maintenance is the “commitment of networks” which is indicated by “operational green initiatives”. Then, three factors were mentioned by interviewees to threaten the “local green initiatives”, the difficulty to get “approval for initiatives” (D.F.1), the “different priorities” of actors (D.F.2) and the “social stress” (D.F.3). Moreover, the network actors use “commitment encouraging activities” (O.F.1) in order to offset these disturbances, enhancing at the end the maintenance of the policy. The same logic is followed for the rest of the factors and indicators. In total, 21 codes and 13 nodes were created for the first set of interviews (Implementation agencies). Then, 9 codes, 20 nodes and 2 sub-nodes were created in total for the set of interviews of local networks. For the combination of the two sets that explored the co-design between them, there were created 11 codes, 6 nodes and 3 sub-nodes. An overview of the coding system for both sets is given the Appendix 3.A and 3.B.

5.1 Limitations of the methodology

To note, the number of interviews might have limited to some extent the insights of this research, though given the time restrictions, it was considered that more than 15 interviews could have affected the quality of data analysis. It is also possible that not all of the interviewees provided targeted information on the topics and hence important factors might have been missed out. To cover this gap to the maximum possible, the interviewed actors were those perceived to play an important role in the policy process. Lastly, the credibility of the information is frequently doubted due to the recording procedure and the ethical issues emerging (Kallio et al., 2016). There might be the case that interviewees did not provide all their insights out of fear of exposure. However, in order to ensure credibility, the interviewees were informed about the exact reasons of the study, the privacy policy that was followed and the storage and use of data through a project information sheet.

	Supportive element	Indicator	Guiding Question / follow up
Implementation agencies	Commitment	Willingness to implement the strategy	1. Is the preservation of urban green areas prioritized by the agency if compared to other urban-related topics? a. What do you think affects the attention that this topic receives? b. Does the agency use any mechanism to stipulate attention to this topic?
	Capacities	Resources mobilization	2. Which are the main financial sources of the agency regarding the support of the green areas? a. What do you think affects the financial basis of your agency? b. How do you overcome these issues?
		Enforcement of guidelines	3. Does the agency somehow make sure that the policy guidelines will be implemented by staff and communities? a. What kind of difficulties do you normally face when trying to ensure the application of the guidelines? b. How do you overcome these issues?
		Knowledge & awareness building	4. Does the agency conduct specific educational or awareness-building activities regarding environmental preservation? For example, staff training, seminars, educational activities for citizens? a. What are the main obstacles in realizing these activities? b. How do you ease the realization of these activities, if so?
Networks	Commitment	<i>Operational green initiatives</i>	5. Do you conduct green initiatives in order to support the greenery of the city or to engage citizens with the green areas? a. What kind of difficulties do you find in performing a new activity? b. How do you overcome these issues?
		Resources mobilization	6. Which are the main financial sources of your organization regarding the support of the green areas? a. What are the main difficulties you face in performing fundraising? b. How do you ensure the help of those sources?
Cooperation	Co-design of nature-based solutions	<i>Knowledge coproduction</i>	7. Do you cooperate with executive agencies or other organizations to produce new knowledge regarding the preservation of green-areas? a. Which are the main difficulties that prohibit the production of new knowledge? b. How do you ease knowledge coproduction, if so?

		<p style="text-align: center;"><i>Brokerage interventions</i></p>	<p>8. Is there an individual or an organization that facilitates the cooperation with your partner? <i>a. What affects its intervention, if so?</i> <i>b. What facilitates its intervention, if so?</i></p> <p>9. Is there an individual or organization that helps to incorporate the new knowledge into the policy? <i>a. What affects its intervention, if so?</i> <i>b. What facilitates its intervention, if so?</i></p>
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Table 1. Interview guide. The questions 1- 4 are addressed to implementation agencies, whereas number 5 & 6 to network agents. The numbers 7 - 9 are addressed to both implementation agencies and networks.

6. The case of Sheffield

Sheffield (South Yorkshire) is a city of 36,795 hectares, with a population of 575,424 in 2016 as it was published at the official webpage of Sheffield City Council, the central local authority. The city has a long and narrow shape bounded by hilly areas. Many climbers visit every year to take part in climbing activities at the popular National peak district park (Interviewee 7). The latter has had suffer from intense woodland exploitation and locals have had continuously expressed their concerns for the state of the natural heritage (Interviewee 4). However, a huge part of the local economy is actually depended on climbers and mountaineering activities. Even if woodland has been mitigated significantly, the development of roads within the peak district is an unavoidable activity, since there is the need for touristic development especially to support the visit of climbers (Interviewee 5, 6 & 7). It is definitely a double-edge knife where economy can be hurt if tourism decreases, whilst the protection of the natural heritage is also of crucial importance for the locals. Sheffield has also a strong history on steel production and a huge heritage of art in knives and other metal works (Tweedale, 1995). For years it have been addressed as the “former city of steel” that due to its current green heritage is it has been renamed to “outdoors city” (Interviewee 3 & 7). Currently, the overarching strategy that supports the green heritage is the Green and Open space strategy of Sheffield, which was applied in 2010 and it is due to 2030. The most important stakeholders for the local governance who are also found behind this strategy are depicted in *table 2*.

It is definitely notable that the wealthier part of the society in Sheffield has built their houses at the uphill parts of the city. Historically, that was due to the smoke from the factories. The wealthier houses were built at the uphill areas in order to avoid the smoke that was coming from the factories. Currently the same neighborhoods have the older trees of the city (Interviewee 13). This clear division between the wealthy and poorer part of the city has created obstacles to the development and the maintenance of the green areas (Interviewee 12 & 13). The so called “tree issue” which occurred in 2018 had demonstrated the extent of the societal division but also the power of the public to reform the plans of the local authority (Interviewee 12 & 13). Specifically, the old and large trees are found in the wealthy zone and they were managed by the local landscape service (Interviewee 12). The service was cooperative between the Sheffield City council and the private organization AYME the highway constructor (Interviewee 1, 2 & 12). During that time, some trees had to be cut down either due to diseases or due to strong and large roots that threatened the founding of the neighboring houses. In fact some people claimed that the public service of land protection was not willing to pay for the maintenance of the trees and it was a rather easy solution to cut them down (Interviewee 12). Other, especially the poorer parts of the society expressed that this issue was a wealthy-men issue that should not be given so much attention (Interviewee 13). The situation led to protests, and activists along with locals protected the trees with human chains, freezing this way the operation (Bennett, 2018). This event made clear that the executive departments had to find a compromise with the very strong local civic society in order to proceed with any future operation for the maintenance of the green sides (Interviewee 5). This societal division is even more underlined by the flooding events that occur from the uphill wealthier houses to downhill poorer houses. As it was mentioned before, the wealthier houses are found mostly on the uphill of the city (Interviewee 1, 12 & 13). In 2007 during the intense rainfalls, Sheffield suffered from flooding that mostly hit the downstream parts (Interviewee 1 & 13). The upstream river dam fall apart and the water run catastrophically to the

downhill areas included the city center (Interviewee 1). This added to the large division of the city within the different economic zones. Lastly, the cultural divisions reinforce the societal disproportion, since the public in Sheffield is a mix of different ethnicities, something that provokes a sort of societal stress and it had affected the implementation of the strategy (Interviewee 7, 6 & 15). Especially, at the time where local areas were still in a transformative phase with lack of green spaces or clean areas, the cultural division was another issue that triggered the social distance (Interviewee 15).

Even if locals have expressed that especially the tree issue was not a proud moment for the city, and other express their concerns about the societal asymmetry which is reflected in all types of provisions in infrastructure, such as green or water infrastructure, it is quite apparent that the local stakeholders had managed to abate many of the difficulties and to bridge these asymmetries. The water drainage system nowadays is quite satisfactory even if there is still room for improvement (Interviewee 1). But besides the issues, the local governance network has managed to progress with the green infrastructure and to overcome the impact of the societal division. Local networks and implementation agencies have succeeded to realize several green spaces within the city, name as pocket parks from the locals, due to their small size that are spread across the city (interviewee 5). Other local heritage areas such as the cemetery and the University area add to the biodiversity of the city (Interviewee 3 & 4). With their own efforts, groups of NGOs, charitable organization, university and executive departments have managed to bring the locals together abating the societal stress and engaging them with the protection of the parks. Such activities, concern join events and practical volunteering work on the ground where locals come together to both engage with their environment and their society (Interviewee 3, 4, 5, 6 & 15. It worth mentioning that from a technical perspective the maintenance of parks is due to low-maintenance plants which are placed around the city, whilst the hilling areas are used as a natural watering system (Interviewee 1). In specific the parks are placed in hilly areas, where the water falls from the upper parts to the lower parts and it gathers in artificial blocks which through wholes direct the water to the plants (Interviewee 1). This is almost a natural automatic system of watering without a constant technical support that would be quite costly. Last to mention, the technical design of parks had played a role in re-socializing of the locals. New parks are created in open spaces and in flat fields that allow the visitors to have a face to face contact, facilitating their direct contacts (Interviewee 7). This enhances the attraction to those parks whilst strengthening the societal interactions of locals. Implementation agencies have mentioned that this is a measure that they will keep on using for the new areas.

National level	
Nature England (DEFRA)	Non-departmental public body which advices for the natural environment in England
Forestry commission	Non-ministerial government department responsible for the management and regulation of forestry
Environmental Agency	Non-departmental public body responsible for the protection and enhancement of the environment
Design Council	Independent charity which is responsible for the consultancy of the government on design
Wildlife Trust	Independent charity which protects 2,300 nature reserves
National Trust	Independent charity for environmental heritage conservation
Groundwork Trust	Federation of charities working on grassroots environmental activity
Local level	
Sheffield City Council	Local authority the metropolitan borough of Sheffield in South Yorkshire
Peak District Authority	Authority responsible for the Peak district national park
Woodland Trust	woodland conservation charity
Sheffield Wildlife Trust	Charity responsible for the natural reserves in Sheffield and Yorkshire
Climate Alliance	Alliance of local organisations for collective efforts against climate change

Green Estate Ltd	Nonprofit social enterprise working on environmental preservation
University of Sheffield	Educational sector
Urban institute	Department of the University which researches social, economic and environmental challenges
Friends groups	Civic partnership which works with the city council

Table 2. List of main stakeholders regarding the management and maintenance of the green infrastructure in Sheffield. This table lists the main stakeholders within the local and national level and it should not be confused with the participants of the current research.

7. Results

7.1 Implementation agencies

Interviews of implementation agencies have shown a number of factors that disturb the commitment and the capacities of the implementation agencies and the factors that balance back these elements. The factors are analyzed in the current section and they are depicted in *table 3*. It should be mentioned that in Sheffield, the main body responsible for the implementation of the Green and Open Space strategy is the local City Council and in specific the councilors and cabinet members who are positioned in departments related to urban development and sustainability. Indicatively such positions include landscape architects, the parks and countryside department as well as the environmental well-being department. Other agencies include the National Park Authority and developers such as the highway constructor AYM (Interviewee 1, 2, 3, 4, 5, 6 & 7). The agencies have played an important role in applying and maintaining the local strategy whilst receiving guidelines from national level authorities such as the Environmental Agency, the Design Council, Nature England and the Forestry Commission (Interviewee 2, 8 & 9). A general overview of those agencies was given in *table 2*.

Implementation Agencies					
Supportive elements	Indicators	Disturbance Factors		Supporting Factors	
Commitment	Willingness to implement the strategy	Different priorities		Urban planning interconnectivity	
				Public opinion	Attachment Pride Recognition Property tax
Capacities	Resources mobilization	Limited funding	State of economy	Economic support schemes	
			Different priorities	Project funding	
	Enforcement of guidelines	Limited funding		Progress monitoring	
		Political changes		Cooperative Sub-policies & Schemes	Management & maintenance support Legal-appeal based protection
		Land ownership		National guidance	
		Public reluctance	Antisocial behavior	knowledge and awareness building	
	Cultural barriers		Reinforcement of public opinion through UGI improvements		
	Knowledge & awareness building	Limited funding		Joint events for spreading awareness	
				On the ground educational sessions	
		Public reluctance		Information sharing Staff training sessions	

Table 3. List of factors that disturb and support the commitment and the capacities of the implementation agencies.

7.1.1 Commitment

7.1.1.a *Willingness to implement the strategy*

According to the theory which is used in this research, if implementation agencies are committed to implement the strategy, then the strategy has higher potential to be maintained in the long term. This was confirmed in the case of Sheffield and it will be analyzed in the current section. In addition, the theory has suggested that the commitment is indicated by the willingness to implement the strategy which is shaped by several factors. In Sheffield, it was found that ***different priorities*** disturb the willingness and thereby the commitment, whilst the ***interconnectivity of the urban planning*** and the ***public opinion*** are the main factors that support the commitment in the Green Infrastructure Strategy.

Willingness to implement the strategy: Disturbance factors

In local level, the factor that mainly disturbs the willingness to implement the strategy is the ***different priorities*** of implementation agencies (Interviewee 2). Several issues such as flooding events or bushfires have triggered the attention to flooding prevention and woodland preservation, and hence related projects have been prioritized by the agencies at least for a certain time (Interviewee 2). Also in some cases, economic concerns have prevailed over land maintenance. Such example refers to the government's decision in 2010 to build housing on green belts, as an attempt to expand the accommodation within Sheffield which was though rejected by the local government (Interviewee 7).

Willingness to implement the guidelines: Supporting factors

Urban planning interconnectivity

Whilst the development of specific schemes is prioritized for local issues that have a strong impact on the city, such as the flood events of 2007, many times the schemes contain more side developments. In simple words, ***the urban planning is interconnected*** and developers create green areas in order to support other schemes, such as flood mitigation, drainage, sewage schemes, tourism development, traffic management and biodiversity enhancement schemes (Interviewee 1, 3, 4, 7 & 8). Especially after the flood events of 2007, the waterways and the surrounding green areas have been modified to prevent flooding (Interviewee 7). Simultaneously, some green areas are designed to flood to help in flood alleviation (Interviewee 3). The Cliff park and other parks in the north of the city contain such barriers to keep the water within, whilst flood prevention measures also protect them parks from damage (Interviewee 5 & 6). For this reason, in Sheffield the development of green infrastructure became the norm for the new housing developments, since it contributes in sustainable urban drainage and their maintenance is of crucial importance (Interviewee 3 & 8). In addition, the green infrastructure is interlinked with the urban green drainage schemes for housing and it is especially adopted due to the increasing number of student housing accommodation in the city (Interviewee 3). Similarly, the contribution of the green areas in climate change and carbon mitigation drove the local policy makers to include parks in the sustainable transport and energy schemes (Interviewee 4). This is the reason that in general in the UK and in Sheffield the green areas are connected into a zone that cannot be build on (Interviewee 6). Moreover, the green areas are an element of rise proximity to Sheffield, interlinked with its tourism development and in specific with mountaineering activities in the Peak national park. Thereafter, implementation agencies had to maintain the district park as well as all the green areas, both for their aesthetic contribution to Sheffield and their historical value in order to enhance the economic revenues from tourism (Interviewee 7 & 9). Last, the biodiversity enhancement and parks maintenance are also interwoven, though policy makers have to make sure that the biodiversity does not affect the flood management (Interviewee 8 & 9). Thus, urban development is considered as one and the implementers are incentivized to support the green areas as a part of the holistic try for urban development in Sheffield (Interviewee 3 & 8).

Public opinion

Implementation agents are also mobilized to follow the guidelines due to the **public opinion**. First, the public in Sheffield is **attached to the green areas** because they have become part of their daily lives and they contribute in their health and well-being. To note here, before 2010 and before the application of the Green and Open space strategy, the green spaces suffered from litters and wildlife, creating social stress and leading people to avoid visiting them (interviewee 1). Ever since, the citizens re-engaged with the green areas and turned them into spaces of socialization and relaxation. Several facilities within the parks such as the basketball hoops engage the public with sports in the parks and they consequently enhance the attachment to the parks (Interviewee 1). The attachment gets even stronger at the cases that the houses are neighboring with the urban parks (Interviewee 3 & 7). Moreover, the oppressing housing issue in the city center due to the flows of students and the limited sized houses increase the value of the open green spaces (Interviewee 7). As a result of the attachment, the public exerts pressure to the local agencies to maintain the urban green areas and strengthens their commitment to deliver the strategy guidelines (Interviewee 1). The tree issue of Sheffield, as it is commonly called by locals, is a proof for this statement since the locals were so attached to the trees of their area, that they created strong opposition to the City Council when the latter proceeded with cutting operation, managing at the end to break the falling of the trees (Interviewee 3).

In addition, from a public perception Sheffield is called the biggest village in the world and it is characterized as the greenest city in the UK and in Europe, making locals particularly proud for the reputation of their city and hence the green spaces (Interviewee 4 & 7). The city claims a long history for its de-carbonized economic model and the development of urban parks that helped towards mitigation of the climate impacts (Interviewee 7). Also, Sheffield attains 6 parkruns which place it among the most popular cities in the UK and one of the most well-known in Europe for the parkrun events (Interviewee 3). Overall, the **pride** of citizens constitutes a significant driver of commitment, since local agencies feel obligated to deliver adequately the strategy in order to preserve the reputation of Sheffield (Interviewee 3). Similarly, pride drives directly the implementation agents to commit stronger with the development and management of the green urban places across Sheffield and this is the reason that related positions are occupied by people with high commitment in urban sustainability (Interviewee 4). The pride of implementation agencies is then further enhanced when their activities, schemes and sub-strategies earn rewards, such as the green apple award that was nominated to the Grey to Green strategy or the climate change champion award nominated for innovative green activities (Interviewee 1 & 2).

Last, the way that people see the green spaces is an effect of the **recognition** for their positive impact in public health and physical health over the last decade (Interviewee 4 & 7). Moreover, green areas are widely recognized as multi-benefit in regards not only to health and well-being, but also to climate change (Interviewee 8). Local agencies have proved that the city strives for climate change and this is highly recognized by the public who also understands the importance of urban green infrastructure in this effort (Interviewee 1). Furthermore, since people recognize the value of green areas in flood mitigation, a bad quality of these spaces can become viral reaching the national level through the media. As a result the national attention refocuses back on the preservation of local green areas in order to mollify the public sentiment (Interviewee 3).

7.1.2 Capacities

7.1.2.a Resources mobilization

Mobilization of resources is a crucial capacity of the implementation agencies especially if the latter face economic restrictions that limit subsequently their capacity to deliver the strategy. Hence, mobilization of resources is not the target per se. The target is the agencies to have the financial basis to support the application of the guidelines, to provide technical support for the maintenance of the parks and to be able to realize knowledge and awareness building to further support the sustainability momentum. Then, the mobilization of resources is not only a branch of the agencies' capacities but also an important mechanism to support the other two important capacities as

suggested by the theory, the enforcement of guidelines and the knowledge and awareness building. In Sheffield, the main difficulty that agencies face is the **limited funding**, whilst the main mechanisms that were found to support the resources mobilizations are **economic support schemes, project funding and lobbying**.

Resources mobilization: Disturbance factors

Limited funding

An important source of funding for the green infrastructure in Sheffield is the European funding (Interviewee 1). However, the last 10 years the funding has been cut significantly due to the austerity period and the budgets that were available to sustain the good quality of the green spaces have declined, whilst the running costs for their maintenance are high (Interviewee 3 & 5). Sheffield like all cities in the UK is much dependent on the national government for funding and thus any fluctuation in the national economy affects directly the local economy. Local authorities have limited ability to raise money and to determine where they will be spent on (Interviewee 9). Mainly, the economic system is based on income tax which goes to the government and then it gets redistributed among the cities and a local tax system, the council tax, which is received and managed only by the City Council. Alongside, the business rates are distributed locally and nationally (Interviewee 4). The economic crisis and austerity period of the last 10 years have affected the **economic state** in national and local level and led in massive cuts which reach 35-50% in funding, around a billion pounds (Interviewee 3). As a result the available funding was restricted and distributed to specific projects which were prioritized by the national or local government, delaying the progress of green infrastructure development and maintenance. Only recently, the city council has moved forward with the projects that have been stopped during the austerity period (Interviewee 7). Specifically, as aforementioned, in certain periods the **priorities are different**, such as during flood risks and other natural disasters. During these times the limited funding is also prioritized to support related schemes, disturbing the delivery of other projects included green infrastructure (Interviewee 3, 4, 6 & 8). On top of that, from the amount of money available to the Council, the agencies were mandated to prioritize social care, contracting with the governments expectations and eliminating the amount available for local infrastructure. Then, despite the local pressure for green space maintenance or development of extra services in the parks, such as accessibility to the disable, the council provides the funding to specific public services and there is a subsequent squeeze in parks maintenance (Interviewee 5 & 6). Alongside, local finances try to reach 0 tax budgets for green infrastructure and to sustain their maintenance exclusively from property tax. In these occasions, local policy plays a significant role in keeping a viable budget for green infrastructure and Sheffield has succeeded to keep revenue tax and secure money from the global markets and investors for the urban green spaces (Interviewee 3 & 7). This is proven by the increase in accessible sides in Sheffield from 30 to 67 percent during the last decade despite the austerity (Interviewee 3).

Resources mobilization: Supporting factors

Economic support schemes

In order to gather the necessary resources for the implementation of the strategy, the agencies in Sheffield have developed a number of **economic support schemes**. First, economic resources are based on **property tax**. Property taxation refers to taxes of housing attached to rents, such as council housing which fund the intervening green spaces. To note, the City Council owns 37 thousand properties but only half of them are occupied with tenants, and council estates with intervening green areas which are paid by the property taxes (Interviewee 7). The idea behind this scheme is that the property tax is paid by houses connected to local parks for the privilege of neighboring with the green areas (Interviewee 3). It also refers to business taxes, of businesses like cafes built right next to parks which pay the maintenance and running cost of the corresponded side (Interviewee 4 & 7). Additionally, the **landfill tax** credits which are paid by local operators for the waste disposal lines and the **community infrastructure levy** which is paid for any new developments in the city, provide extra funding to support improvements of green urban spaces (Interviewee 1). Last, there is a housing development scheme, where houses nearby the parks are placed a subsystem which transfers water into the park and there is a charging fee for the subsystem. The money gathered by

this scheme is provided directly for the maintenance of the parks or for the payment of third parties responsible for their maintenance, such as the Green Estate (Interviewee 1). Such schemes are supported by the environmental agency which partners with the local authorities towards green enhancement of green urban spaces (Interviewee 8).

Project funding

Another mechanism for resources mobilization is the **project funding**. A new project can be funded by applying for grants from an organization (Interviewee 2). There are various funding bodies and the application to fund a specific project steps on the categorization of the side that the project will be delivered on. Specifically, when a side belongs to a specific category, such as the public cemetery of Sheffield which belongs to the category of heritage, then the corresponded projects are eligible to apply for heritage lottery fund and in general for funding for the preservation of its historic significance (Interviewee 3 & 4). Similar, there is funding for recreational investment of play grounds, skate parks or public health funding which can be applied for the recreation of green spaces, since the latter are widely recognized for their contribution in public health and well-being (Interviewee 3 & 7). Thus, the protection of those sides as natural and historical heritage or health enhancement sides can lead to funding applications to restore or sustain their quality, giving them a legal-appeal monetary protection (Interviewee 4). Other types of project funding contain infrastructure transformation grants focused in urban development such as widening of roads (Interviewee 7). Some of these grants are also part of the general regeneration program of Sheffield which is partially based on a business model that aims to attract new business and new developers in the city (Interviewee 7). Lastly, another minor source is the friends group which is a civic volunteer organization that performs fundraising activities to fund projects for facilities improvements included sports facilities in parks (Interviewee 5).

7.1.2.b Enforcement of guidelines

The enforcement of the strategy's guidelines is disturbed mainly due to four reasons, **the limited funding** as it has been discussed at the section above, the **political changes**, the **land ownership** and the **reluctance of the public** to engage with the strategy. However, **progress monitoring**, **cooperative Sub-policies and schemes**, **national guidelines**, **knowledge and awareness building** and **reinforcement of public opinion by UGI improvements** are the basic ways that the implementation agencies impose the application of the strategy internally among their staff but also externally to the local stakeholders.

Enforcement of guidelines: Disturbance factors

Limited funding

The lack of legislation regarding the green infrastructure strategy has as a result to leave the urban green areas exposed to economic fluctuations. In specific, the funding provision to green areas is not mandatory whilst sometimes urban developers deny investing in the maintenance of urban green areas especially after the economic crisis of 2010 (Interviewee 1 & 7). In certain cases developers might be reluctant to spent money to a new scheme which does not comply with their own standards and ideas for developments. But the most frequent case is the high cost of project delivery and maintenance during a period that the agencies do not have the necessary resources to proceed with any operation (Interviewee 1). Thus, because urban developers and agencies responsible for the maintenance of the green infrastructures are **poorly funded**, they had to cope with the economic difficulties by performing a number of reductions (interviewee 9). As a result, they decreased the number of staff and officials and they have limited the number of training sessions for new employees, whilst reducing the expenses on the necessary equipment (Interviewee 7 & 9). Naturally, these reductions mitigated the capacities of the implementation agencies to deal with the enforcement of the strategy guidelines (interviewee 7). Lastly, operations that concern new developments within the green areas such as the provision of access to disable people require investments. Though, the limited funding provided for the maintenance of the green areas places a barrier to the implementation agencies which cannot fully cover all developments and they have to cut expenses from other operations within the parks if

they have to deliver urgently a new project (Interviewee 6). This naturally, mitigates the maintenance of the parks holistically since it directs work to a specific side.

Political changes

Since 2010 and the development of the Green and Open space strategy lots of ***political changes*** had occurred which affected the approaches of local agencies and they have altered subsequently the local policies. This disturbed the application of the strategy and it shown the need of a more stable basis for the delivery of the strategy (Interviewee 4). Some recent changes happening in the UK towards this direction, concern the new Environmental Bill which is about bounding green infrastructure with legislation (Interviewee 2 & 8). The bill which was published in October 2019, includes measures around environmental and biodiversity net gain and it will force a 10% increase in biodiversity (Interviewee 8). That will also allow the local implementation agencies to force the application of the strategy guidelines and to place sufficient emphasis on the preservation and maintenance of the green areas, whilst until now the green infrastructure strategies had not legal basis and their protection was left to the individual and collective will (Interviewee 2). However, the bill is now frozen due to the political changes happening within the UK and more specific Brexit had canceled the process of launching and applying the new Bill (Interviewee 2 & 8). Whilst, the bill slowly starts again, it is anticipated that the new legislation will take a long period before it will finally be enforced, delaying thereby the stricter application of the local environmental policies and strategies (Interviewee 8).

Land ownership

A permanent obstacle for the enforcement of the strategy's mandate is the land owners who refuse to comply with the implementation of the strategy at their sides. However, despite ***land ownership***, implementation agencies have to apply the strategy whoever owns or manages the land (Interviewee 3). Some parks and council owned lands are neighboring with national public land such as the peak District Park or with private land. Thus any operation for maintenance or any new development within the council areas might be considered deleterious form the owners of the neighboring lands. Moreover, when the land that needs maintenance is externally owned, the owners might place barriers to the operations of the local agencies especially if the cost of the operations is high (Interviewee 5). This is a barrier that the local agencies have not found yet a solution and it seems impossible to do any time soon since the ownership and management of the green spaces is not fully council owned (Interviewee 7).

Public reluctance

In Sheffield, public reluctance to following the strategy is quite high and it shapes the application of new schemes and policies related to the strategy. To begin with, almost 90% of the city's population uses the parks and they tend to be protective with the green areas. However, there is also a 10% which does not engage with the green areas and they misuse them. ***Antisocial behavior*** such as vandalism, misuse and graffiti were frequent phenomena at the first years of the strategy, through there is still a persistent amount of 10% that make the implementation of guidelines difficult (Interviewee 3). These types of behavior push citizens away from parks and raise the fear of socialization (Interviewee 7). Second, Sheffield gathers different ethnicities and the different cultures is a challenge for the implementation agencies. ***Different ethnicities*** do not easily support a European Western society including the use of bins within the parks that protect their natural state (Interviewee 7). Each culture has a different understanding of the social behavior and the respect and use of the common public places adhere to the individual, hence agencies need to find a way to unleash the barriers of those differences and converge the behavior of all residents (interviewee 3). Last local communities pressure the local implementation agencies to construct new infrastructures and housing around and within the green areas and green zones of Sheffield as the National district park. In fact, local communities oppose to the decision of the national park authority to protect the natural heritage of the park by not developing new housing. Locals claim that housing is needed for the new generation or to serve new comers (Interviewee 2). ***Community pressures*** for the new establishments, sport infrastructure, special infrastructure for

access to disable, lead the decision making of local agencies and eventually they redirect the attention of the agents, interrupting the implementation of their initial plans (Interviewee 3). Similarly, the increasing demand of bus rides next to parks and parking due to the traffic problems are common demands expressed by the community which pressure and lead the new developments, However, this might be in expense of the green areas since these new developments might demand exploitation and cutting of parts of the park (Interviewee 5). Especially due to the power that civic society has in Sheffield, such as the friends groups who are involved for many years with the parks maintenance, they intervene in the implementation of the strategy and they respond negatively if a project does not satisfy the community needs (Interviewee 5). A very vocal minority might object even to small operations such as wildlife cutting within parks or the planting of trees that add to biodiversity, because they prefer other type of trees that satisfy better their aesthetics (Interviewee 5 & 7). To note, some of those groups that object to the strategy guidelines are either climate change deniers who do not understand the importance of climate resilience and their relation to urban green areas or groups of people who are emotionally motivated towards their lands such as houses of their grandparents who they consider as legacy and they do not want to provide for green initiatives (Interviewee 6).

Enforcement of guidelines: Supporting factors

Progress monitoring

The compliance with the guidelines of the strategy is conducted through outcome indicators and annual aims which monitor the performance of the strategy as implemented by the different agencies (Interviewee 2). There is a continuous **monitoring** of insight assessments to increase the target number of sides to be maintained and meet the standards (Interviewee 3). Moreover, the local authorities report to the environmental agency by a scheme of compensation habitat which is re-consulted and approved by the agency. They former have to be apply for any new development and then through planning enforcement teams local authorities make sure that the application and the realization of a new project goes ahead (Interviewee 8). Usually, there is a 5 year basis to determine the strategic priorities, though the strategy has not been reviewed yet as a whole (interviewee 2 & 4). Until now the agencies have been only reviewing the way that strategy will be implemented on the ground by altering the strategic action plan (Interviewee 4). However, since the strategy has completed 10 years of implementation it is discussed to review the whole process and update the strategy in the next 5 years that the strategy will be halfway to its end (Interviewee 3 & 4). The aim is that all standards will be met by 2030 (Interviewee 4).

Cooperative Sub-policies & Schemes

In order to deliver adequately the strategy, implementation agencies had promoted the **cooperative sub-policies and schemes** which support the overarching Green and Open space strategy whilst the strategy dictates how policies and schemes change (Interviewee 4). Such schemes refer for instance to transport planning, where the development and maintenance of the green areas are combined with cycle schemes for cycle routes that add an extra value to the maintenance of parks (Interviewee 1). At the moment, a tennis operator has taken the management of certain parks, releasing the burden of management from the City Council. Towards the same direction, the whole city is leading to a football foundation model where the **management and maintenance** of the park that hosts the facilities will adhere to a football foundation Trust (Interviewee 4). Similarly, the friends groups support partnerships that help in the management and maintenance of the green areas (Interviewee 3, 4 & 5). Therefore, the City Council which is the main authority responsible for the implementation of the strategy shares the burden of management with partners and third sector delivery parties included the University of Sheffield and the Green estate which manages a number of public spaces at the east of the city (Interviewee 3, 7 & 8). This is why sub-policies and extra schemes are needed to articulate in more details the delivery of the overarching strategy making clear the responsibilities of the stakeholders involved (Interviewee 4 & 6). Last, in Sheffield a number of sides belong to the charity commission, to historical heritage or sport facilities organizations such as Sport England. This gives also a number of legal

requirements to landowners and provides them with a **legal-appeal based protection** since they are protected by statutory consultancy of the corresponded body (Interviewee 4). More recently, some sides took legal appeal in Trust spaces which provides them with an extra protection as heritage landscapes (Interviewee 4).

National guidance

As it has been mentioned already, the local Green and Open space strategy informs the local policies, but this overarching policy is also directed by governmental decisions and consultancy of national level government bodies (Interviewee 2). The governmental decisions can modify the way that the strategy is applied, rather than the strategy itself, by feeding the decisions to the plans for the individual green areas (2). The central government is not able to enforce new guidelines on the local green infrastructure strategy, but it encourages the local authority planners to realize the changes and re-adjust their local plan (Interviewee 8). The key mechanism currently is by planning requirement that imposes to a certain extent the revision of the conditions under which a new local development starts and by submitting requirements to the local authorities (Interviewee 9). Hence, the **national guidance** is realized in the form of a framework of recommendations of in practice guidance which is given to the local authorities and the organizations involved with the green infrastructure in order to support their processes (interviewee 9). Another more general form of guidance was given through the so called white paper which was published in 2012 and it was the outcome of consultation of different sectors regarding urban sustainability (Interviewee 2). This condition though is anticipated to change once the national environmental bill will be applied in the form of a legal act, where the national government will be able to impose potential changes (Interviewee 2).

Knowledge and awareness building

In order to make sure that the guidelines will be implemented, local authorities proceed with **knowledge and awareness building** of the local communities. The authorities conduct regular meetings with the local communities to inform them and educate them (Interviewee 2). Information flows also from the representatives of the national authorities to individuals that report back to the local communities with guidelines (Interviewee 2). Authorities also make sure that the local communities will be aware of the ongoing operations so that they will accept any changes with better understanding. For example, when there is a tree cutting operation, the responsible agencies meet and discuss with the citizens about the reason of this action and the benefits for the community (Interviewee 7). Thus education to the community level is an important measure to enforcing the strategy and any subsequent changes. In Sheffield this is mainly done through demonstration of its value that encourages citizens to follow this strategy (interviewee 9). The ways of knowledge and awareness building will be analyzed at the following section.

Reinforcement of public opinion by UGI improvements

The last mechanism that local agencies use to make the citizens follow the strategy and preserve its outcomes is through **reinforcement of the public opinion**. In specific local authorities found out that by improving the urban green sides and parks, the citizens become more attached to them and they tend to protect them more, whilst they are more absorbent to the guidelines that concern the maintenance of their beloved areas (Interviewee 3). Thus the agencies make sure that there will be an annual investment for the maintenance of the green spaces to ensure their good quality which also led the people to socialize more within them (Interviewee 3). Furthermore, the new developments include changes of the structural building of the new parks from the traditional uphill areas to flat areas so that the visitors of parks will be able to look directly at the people's faces to strengthen their social behavior (Interviewee 7). These tactics reengage citizens with the green sides who not only will to follow more the guidelines but they invest, clean and guard the green areas by punishing any type of vandalism against them (Interviewee 3 & 7). Thus it is about reinforcing the circle and making communities more committed to the green infrastructures of their neighbors (Interviewee 7). For that reason, only in 2016 the local agencies invested around 30 million pounds to renew parks which contributed massively to offsetting the antisocial behaviors (Interviewee 7).

7.1.2.c Knowledge & awareness building

The building of knowledge and awareness has been signified by the theory as key capacity of the implementation agencies to acquire adequate knowledge basis and enhance the capacities of local communities to carry out their responsibilities in policy implementation. In Sheffield it has been seen that **knowledge and awareness building** is also used as a mechanisms to stimulate community commitment for the purpose of supporting the delivery of the strategy. The interviewees identified that this capacity is affected from the **lack of funding** and the **public reluctance**. They have also underlined a number of mechanisms that sustain the building of knowledge and awareness and particularly the conduction of **joint events for spreading awareness, on the ground educational sessions, information sharing** and **staff training sessions**.

Knowledge & awareness building: Disturbance factors

Limited funding

The biggest obstacle for the conduction of staff training and education activities for citizens is the **limited funding** since the implementation agencies do not have the monetary resources to support the conduction of the activities (interviewee 1 & 2). Moreover, the lack of funding has as a result to lack of important positions within the education centers of the local authorities (Interviewee 4). Normally, local authorities outreach professionals to work with the communities and educate them to engage better with the collective efforts towards protection of green infrastructure. However, the austerity period had blocked the provision of those individuals, interrupting thereby the building of knowledge and awareness (interviewee 3). Despite that Sheffield has a long history of environmental awareness, the austerity period of 2010 led in core reductions of important employees positioned in environmental awareness (Interview 7). Hence, they cannot re-enhance the provision of more environmental awareness this way (interviewee 7). Also internally within the authorities, the staff like park officers and volunteers who want to have training sessions and to upgrade their knowledge, are not able to take part in education sessions because the authorities lack economic capacity (Interviewee 6).

Public reluctance

The efforts towards education of the public in Sheffield stumble on the **public reluctance** to accept the importance of climate change and the contribution of the green areas in the fight against it (Interviewee 5 & 7). Environmental issues deal more with the emotions of people and it is quite hard to persuade people for their occurrence since they don't have frequent practical effects on their daily life (Interviewee 7). Hence, there is a minority that still objects to anything related to environmental progression included education on urban sustainability (Interviewee 5). Most of this reluctance is coming from people that do not engage with the parks and hence neither with any educational activity which is organized by the implementation agencies (Interviewee 3). It is then very difficult to engage with this minority and attract them to participate in collective efforts for environmental education (Interviewee 7). Though, the need for building of knowledge and awareness around the parks and in general the green spaces is important in reengaging people with those areas and thereby to strengthen their socialization. This is very well described by the quote " by investing at our parks we are investing at our communities" (Interviewee 7).

Knowledge & awareness building: Supporting factors

Joint events for spreading awareness

In order to build on knowledge and awareness in Sheffield, the local authorities work with external partners such as the university to carry out conferences and lectures (Interviewee 1). In this case, the university provides them with support in the intellectual level in terms of lectures and seminars (Interviewee 3 & 7). Other **joint events for spreading awareness** concern workshops, where the members of the authority invite local communities to listen to their ideas and to raise awareness around preservation of the landscapes (Interviewee 2). Indicatively, several

community engagement activities have been conducted between 2016 and 2019 that focused on the wellbeing in urban nature and the benefits of green areas in public health and well-being (Interviewee 3). In these activities, professionals present factors on the benefits of the urban green sides and the impact of public manner on them (Interviewee 6). Moreover, there is still a number of individual professionals who go and work directly with the communities by running training sessions (Interviewee 3 & 8). However due to the economic crisis this type of sessions have been minimized (Interviewee 3). All these activities make sure that the public will engage in a respectful manner and they are crucial to help the public absorb and sank the policies (Interviewee 5 & 6).

On the ground educational sessions

On the ground educational sessions concern tours around the city, within the park areas and the public sides where the visitors have the change to engage directly with the places and learn from specialists about their functionality and their contribution in the urban environment (Interviewee 1 & 5). For the same reason there a few discourse centers at green parks where people learn the plants and their history, whilst providing educational activities to cultivate skills. Educational centers are found across the city where people can engage with the wildlife and there are also special activities from forest groups for primary skill level and children (Interviewee 3). These activities form the attitude and the perception of citizens in a more active way compared to less practical activities such as lectures and it has shown positive results regarding the commitment of networks to following and maintaining the strategy (Interviewee 5).

Information sharing

Another supportive mechanism towards knowledge and awareness building is the production of publications, leaflets and the ***sharing of information*** through websites and newspapers which are distributed for free (Interviewee 2 & 7). Online information sharing might include practical information and insights about the reasons that a green activity should be conducted (Interviewee 3). An indicative example is the tree clearing process on a park which finds opponents, though detailed explanation of the reasons behind this action and its contribution in the wildlife of Sheffield can offset the public reaction (interviewee 4). Similarly, information about vandalism on parks and the related impact on green infrastructure can mitigate such activities (Interviewee 7). The information steps on the evidence base which is made in consultation with various stakeholders and the environmental agency with upper goal to support the policies on the ground (Interviewee 8).

Staff training sessions

A major role of each authority is to train its staff in order to update its internal expertise. It is the responsibility to provide regular ***training sessions*** throughout the year that concern various aspects and mechanisms of dealing with their landscapes and raising assessment (interviewee 2, 7 & 9). Moreover, agencies do not always conduct those sessions completely on their own but with the help of their partners which are third sector delivery partners and universities that organize training in several centers around Sheffield (Interviewee 3). Especially, whenever there is a new scheme, there is a number of running training sessions in terms of environmental preservation and local engagement (Interviewee 8).

7.2 Networks

7.2.1 Commitment

The local network that works around urban sustainability and green infrastructure in Sheffield contains charitable organizations, local Trusts, environmental NGOs, the educational sector and local community groups. The *table 2* shows some of the actors that play an important role in maintaining the functionality of the local green infrastructure policy. By following the guidelines of the Green and Open Space Strategy or sometimes by doing

parallel work, the local network has managed to support the development and the maintenance of the urban green areas. As the theory has suggested, the commitment of the local network is an important element that supports the strategy. Their commitment is indicated through their involvement in operational green initiatives and mobilization of resources. At the following sections, I explore the factors that disturb the implementation of green initiatives and mobilization of resources as well as the factors that offset the disturbances. An overview of the factors is given in table 4.

Local Networks						
Supportive elements	Indicators	Disturbance Factors		Supporting Factors		
Commitment	Operational green initiatives	Approval for initiatives	Inappropriateness of activity	Commitment encouraging activities	Rewarding activities	
			Limited land availability		Celebration of Achievements	
		Different priorities	Political changes		Joint events for spreading awareness	
			Attention sifts		On the ground initiatives	Volunteering practical work
			Different objectives			Educational sessions
		Social stress	Unappealing outdoors environment		Communication of activities	
			Difficulty in social interaction			
	Resources mobilization	Limited funding	Uncertainty for intangible projects	Collaboration	Channeling of material-resources	
			Political changes		Fundraise through collaborators	
			Different priorities		Financial agreements with collaborators	
			Long bureaucratic process	Participation	Funding from participants in joint activities	
			Membership fees			
			Reaching out motivated groups			
			Social enterprise model			

Table 4. List of factors that disturb and support the commitment of the local networks respectively.

7.2.1.a Operational green initiatives

Whilst Local networks have had played a major role in enhancing the greenery of Sheffield, there are several factors that prohibit or place obstacles on their road. The most important factor is undoubtedly the provision of funding which will be analyzed in the following separate section “mobilization of resources” due to its magnitude that deserves special attention. At this section, the green initiatives will be observed more from a bureaucratic and from a societal aspect which were repeatedly underlined by the interviewees.

Green initiatives: Disturbance factors

Approval for initiatives

Officially, green initiatives should comply with specific requirements in order to move forward with realization. There are many times that getting **approval for initiatives** is a long and difficult bureaucratic process mainly due to the level of inappropriateness of the new activity and due to limited land availability (Interviewee 10 & 11). Firstly, one of the main requirements is to sustain the level of biodiversity, if not to enrich it, when proceeding with new planting next to old plants (Interviewee 10). A new planting activity can be characterized as **inappropriate** in regards with the biodiversity of the area if for instance the new species threaten the existence of old ones or if they decrease the population of insects (Interviewee 10). Moreover, new planting and green area expansion demands new land available, which if not owned by the organization that proceeds with the initiative, the latter has to ask permission from the city council to proceed (Interviewee 10 & 11). Naturally, there is **limited land availability** within the city and hence it is a restriction that local networks need to overcome whenever it is possible or they just have to work with the piece of land they already obtain (Interviewee 10).

Different priorities

Simultaneously getting stakeholders together is a challenge for the organization that initiates a green activity due to their **different priorities** (Interviewee 12, 13 & 15). Local organizations which are called to join an activity or to help with its implementation tend to have different priorities for three reasons.

Firstly, the **political changes** within the local council and the national government result in different priorities since each elected member or authority pay attention mostly at one sector (Interviewee 12). Changes within the structure and especially when members that prioritize a specific sector retire or are not re-elected, re-orientate the whole balance of attention between different urban issues (Interviewee 12). From a holistic perspective, it has been mentioned that for years within Sheffield the priority was given to transportation, whilst recently they have been looking more to a combined solution between energy and environment (Interviewee 12). Hence, the political priorities direct the attention of the organizations to a specific sector, either as a political guideline that the organizations should follow or as a societal demand which they have to satisfy.

Similarly, **attention shifts** direct the attention to different subjects each time (Interviewee 12 & 13). In Sheffield, the main reasons that the attention has shifted from green spaces were the flooding events, the bushfires and the tree issue (Interviewee 12 & 13). During the 2007 and 2008 flooding events that occurred in the city and have impacted the most vulnerable parts of it, drove the attention to flood risk mitigation measures over green infrastructure (Interviewee 12). Similarly, bushfires that impacted the surrounding fields resulted in driving the attention to defensive mechanisms against fire expansion (Interviewee 12). Additionally, the tree cutting issue that disturb the balances between the wealthier part of the society which obtained the old trees and the poorer part of the city which claimed that this was more of a wealthy-men issue, resulted in fragmented attention to the problem and led the organizations to freeze their work towards maintenance of trees on the roads (Interviewee 13). However, the last years the green infrastructure has been seen as important measure to enhance the defense against natural hazards (Interviewee 12). In the meantime climate change has been recognized from the wider British audience as a tangible threat which can be mitigated through green infrastructure, creating thereby a more positively constructed audience towards environmental preservation and pushing the organizations to prioritize the green-spaces maintenance (Interviewee 12).

Lastly, each organization advocates to **different objectives** by nature (Interviewee 15). The different organizations stand for different objectives because of their different fields of specialization (Interviewee 15). This includes organizations of the groundwater sector, agricultural sector, water sector etc which need to cooperate for the green infrastructure maintenance that is initially not their priority field (Interviewee 15). In the end, those priorities guide the extent that local organizations work for the evolution of green spaces. This finds each organization offering working time for a specific subject and being less available for a cooperative green activity or meetings with other stakeholders when it comes to subjects that diverge from their priorities (Interviewee 15). It then becomes clear that initiators of a green activity should combine the different local networks in order to cooperate under the same scope and push for common solutions.

Social stress

The last important factor that local networks have to defeat when trying to start a green initiative is to overcome the **social stress** that occurs between locals, either due to an **unappealing outdoors environment** or due to **difficulty in social interaction** (Interviewee 15). Mostly the very first stages of green spaces development and partially at the subsequent stages, the local networks had to attract citizens to come outdoors and engage in social activities at the parks (Interviewee 15). Especially at the urban areas where the green spaces were not yet developed or suffered from litters, the local networks had to pay a lot of effort to attract the citizens (Interviewee 15). Simultaneously, the networks had to help citizens to overcome their fear for socialization, since the lack of interaction many times resulted in lack of trust into others and hereby difficulty in socialization (Interviewee 15).

Green initiatives: Supporting factors

Commitment encouraging activities

In order to mitigate the effects of the aforementioned factors, local networks in Sheffield proceed with **commitment encouraging activities** in order to facilitate both the development of new urban green spaces and to support the maintenance of the existing ones. In specific local NGOs and the educational sector encourage the citizens to commit in new developments and maintenance by carrying out **rewarding activities, celebration of achievements, join events for spreading awareness, on the ground initiatives (volunteering practical work, educational sessions) and communication of activities** (Interviewee 10, 11, 12, 14 & 15).

Firstly, rewarding activities concern events where participants are rewarded for achieving an initially-set target and mostly in symbolic ways, such as getting rewards made by recycled materials which emphasize sustainability (Interviewee 10). To a similar direction, participants that have been involved in biodiversity enhancement or tree planting are called to celebrate together their joint efforts to protect the local urban environment again through symbolic ways, such as by planting of a tree (Interviewee 10). In addition, interviewees underlined that they organize events where they invite representatives from different sectors and organizations to give talks about urban sustainability issues (Interviewee 10, 11, 12 & 15). Through these events, participants have the chance to understand the benefits of the green spaces from the perspectives of the different representatives that cover a whole range of sectors including groundwater, flood management and urban development sector (Interviewee 11). Local networks and especially NGOs are also performing on the ground initiatives, where citizens participate either in practical works by helping in tree planting and litter picking or in educational sessions where representatives of the organizations group people and walk together with them around the green areas, informing them about their biodiversity and historical value for Sheffield (Interviewee 11, 12, 14 & 15). Lastly, it was considered important not only to perform those activities, but also to communicate them through websites, articles in newspapers, blogs and through leaflets (Interviewee 10 & 14). This last activity composes the last part of a reinforcement loop which gives push to new initiatives, by calling more citizens to engage in those activities. Most important, the advertisement and communication of the initiatives stems them with clarity and transparency, a very important measure to gain the trust of the citizens that already participate and to create trust for the potential new comers (Interviewee 10 & 14).

The idea behind these activities is to raise the enthusiasm of the participants and to keep their determination to support the urban green environments. They work as remedy to the factors that disturb the commitment of the locals, since finding obstacles in the realization of green initiatives can definitely disturb the common morale. However, local networks have been seen to raise the local morale which in turn helps in keeping a momentum towards urban sustainability. This approach works as bottom-up support to the implementation of the overarching strategy, which could not stand alone without the local momentum to push for change and for sustenance of what has been already done on the ground.

7.2.1.b Resources mobilization

Sheffield, as all European cities has been struggling financially the last years due to the economic crisis and the subsequent cuts in government funds for green activities. However, the Green and Open Space Strategy and the maintenance of its outcomes demand the implementation of on the ground initiatives as a bottom-up and parallel support to the efforts of the local public sector to expand and maintain the green areas. Therefore, local networks in Sheffield had to proceed with several mechanisms in order to obtain the required financial basis for the realization of these activities.

Resources mobilization: Disturbance factors

Limited funding

A main disturbance factor is going back to the government cuts and the **limited funding** provided by the city council to the local networks (Interviewee 10, 11, 12, 13, 15). It is very significant to mention that there has been a cut of 50% to the funding provided to the Sheffield City Council compared to what it would get in 2010 (Interviewee 12). As a result, funding became scarce and organizations had to find potential funders to support their work. However, in many cases that the green initiatives include intangible actions, such as events and join activities, that their value is not practically seen on the ground, funders do not feel secure that their financial help will be wisely used (Interviewee 11). Thereafter, the **uncertainly for intangible projects** sometimes disturbs the trust of the funder to the receiver and becomes an obstacle to the funding provisioning (Interviewee 11).

At the same time, **political changes** affect the funding (Interviewee 12). The different elected members and parties are differently motivated towards the green infrastructure maintenance and climate change measures in general. Hence, funding is not always prioritized for the support to the green activities (Interviewee 12). Indicatively, it has been mentioned that in 2010 when the labor national government was on run, the green infrastructure development flourished in Sheffield since British politicians have shown special sensitivity in climate change mitigation and adaptability (Interviewee 12). Since regional financial politics are very much depended on the Westminster power politics, a change at the latter determines the support to each regional system, such as Sheffield. However, climate change is such an up-to-date issue that all recent parties, included the current conservative government, could not neglect the financial support to green infrastructure maintenance.

Whilst funding has been cut, the available funding is also restricted to certain projects depending on the **priorities** at the time. The local city council has to distribute as fairly as possible the available fund to the different projects and between the different organizations (Interviewee 11, 13 & 14). Therefore, each time an organization is willing to start a green initiative, it either has to apply for financial support from the city council or use from the funding that has already received (Interviewee 11, 13). Obviously, both the city council and the organizations themselves have a certain amount available only for specific projects and hence many new projects have to freeze or their realization is restrained until funding comes (Interviewee 11, 13 & 14).

Lastly, in many cases funding is restricted time-wise. In more details, local networks need to overcome the **long bureaucratic process** to get the funding which leads to time restrictions for the realization of a project (Interviewee 15). Specifically, when the process to apply, approve and get the funding exceeds the time limitations for the realization of the project, local networks need to find the necessary monetary support in order to finalize the project on time (Interviewee 15).

Resources mobilization: Supporting factors

Collaboration

In order to find the necessary resources for their initiatives, local networks have come up with several mechanisms which are mainly founded on ties with local organizations and with citizens. The ties range from friendship and trust to official arrangements that bond together the different organizations. "We would never have done what we did on our own ever... It s absolutely impossible I would say..." one of the participants said when I asked about their ways to

overcome economic difficulties (Interviewee 15). This quote shows clearly the power behind the ties and their importance in keeping the local green initiatives active.

Local organizations rely a lot on their **collaboration** with other organizations within Sheffield (Interviewee 10, 11, 12, 13, 14 & 15). This by no means implies that the local level organizations do not receive support from national level organizations. In several cases, NGOs and local Trusts are related to their national level hybrids and hence they have been economically supported to some extent, however others are founded within the local level and hence the collaboration between those two types is of crucial importance due to circulation of resources within Sheffield (Interviewee 11 & 15). First, the collaborators are able to **channel material resources** from one organization to another, including plants and equipment for the planting activities or even leaflets for spreading awareness (Interviewee 10 & 14). Even though these material resources seem to demand a small budget, they still constitute a substantive support that minimizes the expenses of an organization. Second, **fundraise through collaborators** is frequently used as a mechanism to abate the funding limitations and restrictions (Interviewee 10, 12, 13 & 15). This type of fundraising was mostly seen in ad hoc settings, where one organization would approach others for a temporary collaboration rather than a long-term agreement (Interviewee 10, & 12). Then, the organization either fundraises directly from its collaborators or asks them to fundraise from its behalf by using their links and contacts (Interviewee 10 & 12). The third type is based on **official financial agreements with collaborators**, where the different organizations agree to share the financial burden for a project facilitating its realization (Interviewee 11 & 14). To note, in all cases the representatives had to keep transparency for their work and protect the trust between the collaborating parties, enabling this way future official and unofficial collaborations (Interviewee 11).

Participation

Another mechanism is based on **participation** of individuals in the green projects implemented by local networks (Interviewee 10, 11 & 13). Among this type of funding provision, the most temporary one is **funding from participants in join activities**. In specific, local networks plan join events, such as music events, planting activities, lectures etc where they place an entrance fee (Interviewee 10, 11 & 13). However, there are several unwanted externalities by such events, especially by individuals that are not feeling secure of where this revenue is finally going to (Interviewee 13). Additionally, in some cases people express their concerns about the morality of those events and especially for the fact that the green parks are turning into private fields for the time they occur. Bounded by fences during the realization of the events, citizens are worried that the activities within will affect the environmental state of the green parks or they see it as exploitation of a public good for private needs that limit access to other citizens (Interviewee 13). Taking those concerns under consideration is of crucial importance for the organizers that need to keep the credibility and trust of their participants in order to secure their long term support, whilst attracting new participants. Lastly, a more long-term mechanism refers to **membership fees**, where individuals are called to participate in the activities of the organization as members by providing a monthly financial support (Interviewee 11). Sometimes the fees are fixed, whilst in other occasions the members can provide the amount they can depending on their will. This extra fund even if not significant, it has helped the realization of green initiatives when the public fund stumbled on bureaucratic or budget restrictions. It has worked as a back-up solution which not only has helped to continue with the implementation of running projects but also with the initiation of new ones (Interviewee 11).

Reaching out motivated groups

Further, when organizations work on their own to find financial support, then they tend to look for special funder types and in specific individuals or organizations that are already motivated towards environmental preservation. **Reaching out motivated groups** gives them higher chances to retrieve funding (Interviewee 11, 12 & 13). Firstly the organizations observe with which organizations their priorities and their interests overlap since finding a common ground enables a better understanding for their work and motivates the potential funders to provide the fund (Interviewee 12). Additionally, potential funders that perform climate activism and they have shown consistent

interest in environmental preservation are more likely to help financially the local networks that work under the same scope (Interviewee 11). Historically, charitable donations have supported the development of green areas within the city, whilst local networks place the names of funders at the work as symbolic recognition for their financial support (Interviewee 13).

Social enterprise model

Last, organizations have soon recognized that the support from the public sector would be threatened, whilst they could not be depended exclusively on collaborators, participants or charitable donations. A more proactive way should be adopted and hence they developed a **social enterprise model** (Interviewee 15). In specific, some organizations attain their own businesses, they deliver special landscape services, produce and sell their own compost and flower water, and they run cafés nearby the green areas they oversee. The revenues go back to the organization and support both the functioning of the organization and the projects it develops around the parks of interest (Interviewee 15). Lastly, the social enterprise model does not exist only in the local scale, but in some cases it expands through national hybrid organizations within the UK level. The revenues from the national level hybrids are then distributed and support the branch-organization in the local scales (Interviewee 15). Certainly, this model provides independency to the local networks and flexibility to proceed with their activities, besides the monetary fluctuations and economic difficulties that occur.

7.3 Implementation agencies & Networks

7.3.1 Co-design of nature based solutions

According to theory, the maintenance of the strategy’s functionality is supported when all stakeholders cooperate to produce new knowledge which then they feed back into the strategy. The cooperation is further supported when there is a broker that facilitates their connectivity and eases the update of the strategy with the new findings. This was addressed as co-design of nature based solutions and for the current research I observe whether implementation agencies and local networks cooperate with each other to find new solutions to support the strategy. Both sets of interviewees, with the representatives of implementation agencies and the local networks, have been analyzed to observe the co-design in Sheffield and the factors that disturb and support it respectively. At the *table 5* is given an overview of those factors.

Implementation Agencies					
Supportive elements	Indicators	Disturbance Factors	Supporting Factors		
Co-design of nature based solutions	Knowledge coproduction	Time restrictions	Connectivity	Channeling of knowledge and expertise	
		Limited funding		Joint events for sharing of knowledge & expertise	
		Network changes			
		Insulated borders			
		Different priorities		Advertisement of joint events	
	Brokerage interventions No Intermediators (scarce ad-hoc)	Limited funding	Direct links	Individual willingness	
		Network changes		Key contacts	Strategic positions
					Common

		<i>Insulated borders</i>			<i>interests</i>
					<i>Specialized expertise</i>
		<i>Political changes</i>			<i>Partnership agreements</i>

Table 5. The table demonstrates the main factors that disturb and those that support the co-design between the stakeholders. The factors depicted in bold letters are those indicated by implementation agencies as important factors and they also converge with the factors indicated by local networks.

7.3.1.a Knowledge coproduction

Implementation agencies and local networks in Sheffield address that knowledge coproduction does not take place in a consistent way but it is rather ad-hoc. It is especially observed when a new project demands specialized expertise that requires different organizations to come together. Despite the several difficulties that restrain knowledge coproduction, local Trusts, charitable organizations and the educational sector engage in knowledge circulation within the local networks, whilst also trying to bridge their work with the work of implementation agencies.

Knowledge coproduction: Disturbance factors

Time restrictions

One of the main issues that disturb the consistency in knowledge coproduction within Sheffield is the **time restrictions** of the stakeholders involved (Interviewee 3, 10, 13 & 15). The Green and Open Space Strategy is about nature, culture, heritage, sports, waterways and therefore stakeholders from a whole different range of sectors should converge in order to produce new maintenance mechanisms (Interviewee 15). However, since their contribution is not included in their scheduled working hours or there is no officially predetermined time-space for knowledge coproduction, actors need to provide from their working time (Interviewee 13 & 15). Subsequently, it becomes difficult to gather them, even if the coproduction of knowledge concerns an update that requires the involvement of all different sectors or only a few of them (Interviewee 3). Especially, when it comes to certain actors such as representatives of the city council that their responsibilities are very intense, it is rather difficult to combine their schedules and bring them together for a meeting (Interviewee 5 & 13). At the same time, there is no guarantee that the meeting will lead to an outcome. This uncertainty demotivates several actors to contribute volunteering their time for something which is not secure and that it might need a significant higher number of meetings to succeed (Interviewee 13).

Limited funding

Moreover, knowledge coproduction requires resources and monetary support. Therefore, the already **limited funding** provided to organizations restricts their capacities to involve in any type of knowledge production (Interviewee 2, 10 & 13). The City Council has a core role in shaping the agenda and it has to start conversations with responsible agents, however the limited finding restricts the procedures (Interviewee 2). Implementation agencies lack of officers and staff which obliges the officials to carry more managerial responsibilities than normal (Interviewee 7 & 8). Thereafter, due to the lack of officials and staff it becomes more a more difficult to gather different stakeholders and to create cooperative partnerships (Interviewee 9). Even, when an organization lacks of expertise on a specific subject and needs the service of external specialists, the payment for these specialists is an obstacle when the organization suffers from limited funding (Interviewee 13). Additionally, sometimes the funding is provided to district projects and only for a certain period of time, leading the organizations to withdraw from combined projects once the funding stops (Interviewee 13). This mitigates the will for cooperation and coproduction. In some cases, when an organization does not have the capacity to continue with a cooperative project, it just

restricts its work and carries out the project on its own with whatever sources are available for the organization (Interviewee 10).

Network changes

In addition, the knowledge coproduction between local stakeholders is disturbed due to ***network changes*** (Interviewee 11 & 13). Knowledge coproduction demands people to be embedded in a long term process in order to create a stable and consistent cooperative environment, but this does not happen since changes happen regularly (Interviewee 13). In fact, changes within the local network include replacement of positions due retirement and politics or even changes of a whole agency. Agents and agencies come and go, and the former cooperative structure breaks, interrupting the production of knowledge between the former cooperators (Interviewee 11). Hence, the cooperators might not have the time to complete their project and this demands a new panel to cover the loss which is a time-consuming process (interviewee 13).

Insulated borders

Furthermore, local organizations and agencies tend to have ***insulated borders*** in regards to their own expertise (Interviewee 13). They would only look for an external cooperator when a new project demanded expertise that they would not attain. However, this is not a common phenomenon especially within implementation agencies. For instance, the local City Council, the main executive agency of the urban green infrastructure strategy, it has an in-house urban design team which for many years was funded by the European Union. As a result, the City Council was independent and there was no need for external support which made them proud and thereby quite protective of their own expertise (Interviewee 13). Moreover, there are concerns about the load of work and its distribution between the cooperators. That was pretty obvious in the collaboration between the City Council and the University of Sheffield, where there were concerns whether the university shouldered core functions of the City Council, leading the former to create more insulated borders in order to protect their teams from potential exploitation (Interviewee 13).

Different priorities

Last, the ***different priorities*** of cooperators and potential cooperators determine whether they would be able to commonly produce knowledge (Interviewee 13 & 14). In some occasions, organizations would have similar priorities and they would work under the same scope, which became the main reason to bind them together in a long-term cooperation (interviewee 14). However, this is more likely to happen between executive organizations, whilst educational organizations are more theory and research-oriented and they do not easily fit with the practical priorities of the local executive agencies (Interviewee 13).

Knowledge coproduction: Supporting factors

Connectivity

Despite the factors that disturb the knowledge coproduction in Sheffield, local networks and implementation agencies perform several activities in order to support the cooperation between the different actors. Mainly, their activities root in their ***connectivity*** to other stakeholders which can be official through agreements or unofficial through their personal connections.

First, through their connections local networks and implementation agencies perform ***channeling of knowledge and expertise*** which is taking place both within an organization and between an organization and its external cooperators (Interviewee 10, 11 & 13). The former is observed for example within the educational sector, from teams that implement green activities and retrieve new insights through them. In continuation, the teams share the information they have retrieved with researchers of the University, in order to support their work towards the development of new mechanisms to green infrastructure maintenance (Interviewee 1, & 10). Moreover,

executive departments and the local Trusts have been cooperating under a project, sharing expertise when needed. Cross-agency working is performed in order to enhance all green areas within the city (Interviewee 5 & 6). Under this type of cooperation designs are exchanged between implementation agencies in order to learn from each other (Interviewee 1). Strategic planning and GIS work between different executive departments has been performed for the development of nature corridors that connect the natural reserves around the city (Interviewee 11). Additionally, the City council receives information from a whole range of bodies, one of which is the Urban Institute and which had undertaken studies on green infrastructure and future sustainable cities. Then their results are channeled to the City Council to enrich its knowledge base (Interviewee 13). However, collaborations between different bodies such as NGOs, executive agencies and industry bodies are not often and they do not occur in a systematic way. They rather adhere to specific projects of which development and realization needs different experts to come together (Interviewee 13). Thus, knowledge coproduction is not clearly occurring, but channeling of knowledge and expertise becomes the foundation for occasional coproduction (Interviewee 15). Lastly, local NGOs are especially collaborating with the national department, with local authorities for road infrastructure and housing land, along with smaller local groups and volunteers (Interviewee 15). To note there is a consistent consultation from the national to the local level, especially from the environmental agency and the consultancy body Design Council. Further, the Design council organizes meeting where specialists demonstrate process through visualization process, the so-called double diamond where the stakeholder exchange ideas and solutions on the problem under investigation (Interviewee 9).

Another mechanism that local stakeholders follow is the conduction of *joint events for sharing knowledge and expertise* (Interviewee 10, 12 & 13). In this category, there are nation-wide conferences, meeting workshops and seminars where stakeholders exchange expertise and techniques, such as between the parks of north England (Interviewee 2). Similarly in the local level, joint events refer mainly to meetings, lectures and interactive workshops of stakeholders who are not necessarily linked through their work since they belong to different sectors such as energy and transport, groundwater, agriculture, climate change and green infrastructure (Interviewee 10, 12 & 13). In these events, that have reached up to 19 representatives, participants learn from each other by exchanging scientific evidences and they come up with new plans and new ideas regarding local urban development (Interviewee 4 & 12). These events are open to the public, though attendants are only able to ask questions at the end of it. For that reason, organizations such as the Climate Alliance have helped to make them more participatory (Interviewee 12).

From these events, several publications have come out such as the report of the green commission workshop and some boards have been set up such as the green city partnership board, though the latter has only met 4 times since then (Interviewee 12). Such publications include the white paper targeted the local urban sustainability from the holistic approach of transport, climate change, groundwater etc. (Interviewee 2). At the end, participants of the events make sure that the reports and information about the events will be published in blogs, articles and local newspapers in order to attract more stakeholders for upcoming events (Interviewee 12). *Advertisement of the joint events* leads to higher participation and hence the published reports gain momentum which pushes them higher in the local urban agenda (Interviewee 12). Then, executive agencies are more likely to use the information of the reports and to take them under consideration when updating the existing overarching strategy.

7.3.1.b Brokerage interventions

The theory has suggested that brokerage interventions are important to supporting knowledge coproduction, since the existence of a broker facilitates the connectivity between the different bodies and the update of the strategy with the new insights. However, in Sheffield there was found no broker. The very scarce occasions are rather ad hoc but in a common basis the connectivity between local agencies and organizations is based on direct links.

Brokerage interventions: Disturbance factors

Limited funding

One of the main reasons that prohibit the existence of Intermediators and brokers in Sheffield is the *limited funded* provided. Mostly strategic partnerships that had worked as brokers in the past, they have been abolished or they are low functioning because there is no government funding to support their work (Interviewee 7 & 11). Such example is the local nature partnership which does not have the financial resources to function (Interviewee 2). That happened especially after the austerity period of 2010 when the funding suffered the severe cut of 50% (Interviewee 12). Some partnerships, such as the South Yorkshire forest partnership which have developed a lot of the green infrastructure are still quite under functioning, meaning that they have to meet rarely since they have no budget to cover the costs of such meetings (Interviewee 11). Similarly, the local strategic partnership which was focused on local environmental issues had to be abolished due to the austerity policies that followed the year 2010. The participants had to work volunteering contributing from their working hours or personal time, something that created many obstacles and led to the final abolishment around 2011 (Interviewee 12).

Network changes

Simultaneously, since direct links replace the lack of Intermediators in Sheffield, *network changes* can create problems for the connections that already exist between the different bodies (Interviewee 13 & 15). When already established links are threatened with changes such as change of leadership, retirement or job change of the specific individuals that represent the links, then a whole new balance should be found by creating new links (Interviewee 13 & 15). This is a very time-consuming process since it requires common ground to be found between the different actors (Interviewee 13). It also requires building new friendships and trust with the new potential links, a task which is also time consuming and leaves room for fragmented relations for the time in between the change and the creation of the new link (Interviewee 15). In this period, the people involved in a project can easily quit since they do not have the external help they need and the whole project can collapse (Interviewee 15).

Insulated borders

Another reason due to which the links between the different bodies are seen weak is the already mentioned *insulated borders* of the organizations and agencies. Since, those bodies protect their own expertise and they tend to work with their own working force, it becomes difficult to create links that connect them. This especially applies for organizations and executive agencies that they have different orientations, such as the theoretically oriented urban institute and the City Council which demands practical insights and hence they prefer to work with their own workers (Interviewee 13). In limited occasions, within the Council there are some councilors and cabinet members that enable meetings with external agents and in this sense they can perform as brokers (Interviewee 11). However, the thickness of Council in regards with its expertise makes it difficult to bridge connectivity in a permanent basis (Interviewee 11). Even within the Council itself, reciprocity is quite hard and the members are not well connected between each other. This is shown by their responsibilities that might exclude completely cooperation with other members within and the members do not share information about the works they are responsible for (interviewee 5).

Additionally, *political changes* and especially government changes create obstacles to the formation and continuation of brokers. For instance, the local strategic partnerships which were performing as brokers were abolished when the conservative and liberal democrat coalition government came in, in 2010 (Interviewee 12). The national political changes such as Brexit and governmental changes within the national level have affected the connectivity of stakeholders (Interviewee 7). Even changes within the regional level, such as mayor changes, have been seen to hammer the established balances and connection between the councilors and the other related stakeholders (Interviewee 7). Furthermore in a wider level, the lack of a local and regional independent leadership in the UK, such as a local parliament, is seen as problematic when it comes to regional connectivity. In specific, Sheffield, South Yorkshire and Leeds present fragmented perspectives on whether they should work together and without having a strong leadership it leaves the cities vulnerable to political changes. In a scenario where they would

attain regional power they would be able to sustain local partnerships in the long term despite political fluctuations, facilitating thereby the local connectivity (Interviewee 12).

Brokerage interventions: Supporting factors

Individual willingness

The direct links are based mainly on *individual willingness* to create and maintain these connections. People are very persistent find the correct links and make agreements with them (Interviewee 6 & 9). Usually, the initiators of a project have strong willingness to realize it and that leads them to find the appropriate links for its support (Interviewee 10). Thus, the connections of one organization or implementation agency to others mainly emerge as an outcome of the individual decisions to work together, to invite people, to give talks and lectures for the achievement of a collective work (Interviewee 15). Then people becomes collaborators when they decide to progress with sustainability and green activities and they have a common understanding of what they are going to achieve together (Interviewee 14). Thus, in the cases that the connections cut, the representatives of the organization who are involved with the specific project have to start a new round of meetings with people that potentially can become their new connections in order to re-establish the lost bridges (Interviewee 11 & 13). But the connectivity is not only an one-side matter but rather bidirectional as both sides need to think of a common ground and find ways to facilitate their connectivity (Interviewee 12 & 13). Hence it depends largely on the individual and specifically of how much they are willing to connect, but it is equally important to underpin the relations with projects that contain specific outputs and outcomes in order to sustain these relationships (Interviewee 13).

Key contacts

As of local governance mechanisms to support connectivity and direct links, one is to find *key contacts* and more specific people with *strategic positions, common interests and specialized expertise* who can be useful for the development and continuation of a project (Interviewee 5 & 11). For different sort of activities and projects, a certain contact is more appropriate. For this reason stakeholders develop and keep key contacts, such as the local Trusts that maintain specific links between them and with certain individuals within the City Council. For instance, for a woodland joint project, the woodland manager of the City Council is a key contact to deliver the project (Interviewee 11). Another example would be experts of the landscape department of the University who are specialized in green planting and low maintenance planting and represent also important connections for the City Council which do not attain the same expertise and they need to work close with them for specific urban development projects (Interviewee 13). The importance of such key contacts is due to their strategic position which can help the project to moving forward and due to their specialized expertise which is of key importance for the realization of the project (Interviewee 11). Strategic positions include individuals that attain more than one position, such as within an organization and in a partnership which allows the whole partnership to have access to the specific organization (Interviewee 2 & 4). And there should be other individuals with the knowledge and the diplomacy to target those links and bring stakeholders together (Interviewee 6 & 7). A chair of the health service, education, city region is definitely a key position to keep contact with, especially for the field of green infrastructure development and maintenance which by includes and connects all the aforementioned fields (Interviewee 12). Hence strategic positioning is any position which allows accessibility to different parts of the local authorities for different needs and projects and which should be used by local stakeholders when needed (Interviewee 11). Additionally, key contacts refer to individual or organizations that have common interests and they are more likely to support the delivering of the project. Such cases are organizations that work around green infrastructure or they have common interests to work on an issue that collectively impacts the city, such as the flooding (Interviewee 1 & 12). Hence, it is necessary to contact and bring together people who are inspired so that they will be more dedicated to environmental preservation, people with collective ideas but also specialized skills (Interviewee 15). To note most of those contacts are maintained on a friendship base and personal contacts rather than official arrangements (Interviewee 15).

Agreements for partnerships

In very special occasions the direct links are underpinned with professional ***agreements for partnerships*** (Interviewee 9). These type of partnerships are characterized by short term lasting and they are valid for specific projects. They also contain different sectors, such as health service, councilors, university and more rarely big companies (Interviewee 12 & 13). Such agreements refer to joint projects between the City Council and local environmental Trusts or the City council and the landscape department regarding low maintenance planting (Interviewee 11 & 13). A similar work has been done by the Sheffield first for the environment partnership and catchment partnerships which was supported by governmental fund, through it has been abolished after 2010 due to economic and political changes (Interviewee 8 & 12). These type of partnerships are important for the compliance register of all partners regarding their work with special equipment, land field and safety measures, which allows them to keep track of the extent that they follow the policy guidelines and endeavor policy procedures (Interviewee 14). The partners are also able to learn from each other and take on board what it is best for their part of work whilst getting access to resources (Interviewee 14 & 15). Lastly, the scale of partnership can be limited in the neighborhood level, where organizations can work with communities in order to plan a strategy for green infrastructure following the overarching guidelines (Interviewee 15).

8. Result analysis

The case of Sheffield has shown a number of factors that disturb the capacities and the commitment of local stakeholders and a number of factors that disturb the co-design for the strategy. Since, the commitment, the capacities of stakeholders and the co-design between the stakeholders are considered supportive elements for the strategy then the same factors are considered to disturb the functionality of the strategy and its subsequent policies. Similarly, the local governance proceeds with a number of factors that support all the aforementioned elements and hence these factors are also considered supportive elements for the functionality of the strategy.

Capacities and commitment of implementation agencies: Disturbance factors

At the *table 3*, it is clearly demonstrated that the factor which mostly affects the indicators is the limited funding. The European economic crisis had an impact at the UK's economy and this resulted in limited provision of financial support from the national to the local level. The financial restrictions impacted the capacities of the agencies to carry on with the strategy's guidelines, because the restrictions resulted in limitations on the number of staff and officials. The limited funded has also mitigated the investments in knowledge and awareness building activities. Political changes have been also seen to affect the capacities of agencies and especially Brexit, which restructured the balances between the stakeholders and froze the plans towards green infrastructure maintenance. Other important factors include the different priorities and the reluctance of the public to follow the guidelines. These external factors which are related to the socio-economic and political background of the country have threatened the functionality of the strategy during the 10 years of its application.

Though, it is observed that all factors are interrelated in a complex way. Firstly, the different priorities and the public reluctance are interrelated because the public represents different priorities and it can be reluctant to follow specific guidelines that do not comply with their priorities. Moreover, the priorities are also driven by the political conditions since the last direct attention to a problem and orientate the public opinion as well. The funding is also affected by the priorities and the public opinion. Naturally, when an urban issue such as flooding is prioritized over another, then the funding is also available for measures targeted to this specific issue. These complex relations make it rather difficult to separate the factors and make clear distinctions between them. However, simplifying their interrelations, the direct relations the factors are shown at *table 3* as they were depicted from interviews Sheffield.

Capacities and commitment of implementation agencies: Supporting factors

In order to offset the impacts of the disturbance factors, the local implementation agencies use mechanisms which are based on societal support such as reinforcement of public opinion, knowledge and awareness building and managerial and economic support through cooperative sub-policies and schemes. It is becoming apparent that the local agencies have focused on civic engagement due to the fact that civil society is especially strong in Sheffield. Hence, by bringing more people close to green areas and by helping them understand the work around green infrastructure, the public gave a bottom up support to the strategy. Specifically, the public engaged in providing financial support but also in following and protecting the green spaces. This gave a fertile ground for the strategy to flourish and to be better digested on the ground. For instance, the citizens that have direct access to public green areas are more willing to pay taxes for the management of the areas and especially when the areas are well maintained. This is because the results are tangible and they are able to go and enjoy what they pay for. Hence they recognize that the cost of maintenance worth the taxes and they are willing to continue with the support of green infrastructure maintenance. Similarly, they accept easier changes within the green areas when they are aware about the benefits of these changes for their community. Lastly, they tend to protect the green areas by observing and offsetting vandalism, which saves the local agencies from restoration costs. It is a sort of a reinforcing circle, where the support towards community engagement brings further bottom up support.

Other observations concern also the complexity of relations between the factors. The mobilization of resources was observed to be directly linked to the enforcement of the guidelines and the knowledge and awareness building, since resources are needed in order to realize any related activities. Moreover, the building of knowledge and awareness which was indicated by the theory as a supportive element for the agencies' capacities, it is also used as a mechanism to stimulate the enforcement of the strategy. Last, the national governance is only seen to take place at the enforcement of the regulations and specifically with a guidance principle from national to local level, since there is still no legal protection for the green infrastructure strategy. Overall, it is clearly seen that the local governance alone stipulates the support of green infrastructure by interconnecting all different factors and using them as a tight net to protect the strategy, where one factor reinforces the other in a bottom-up governance model.

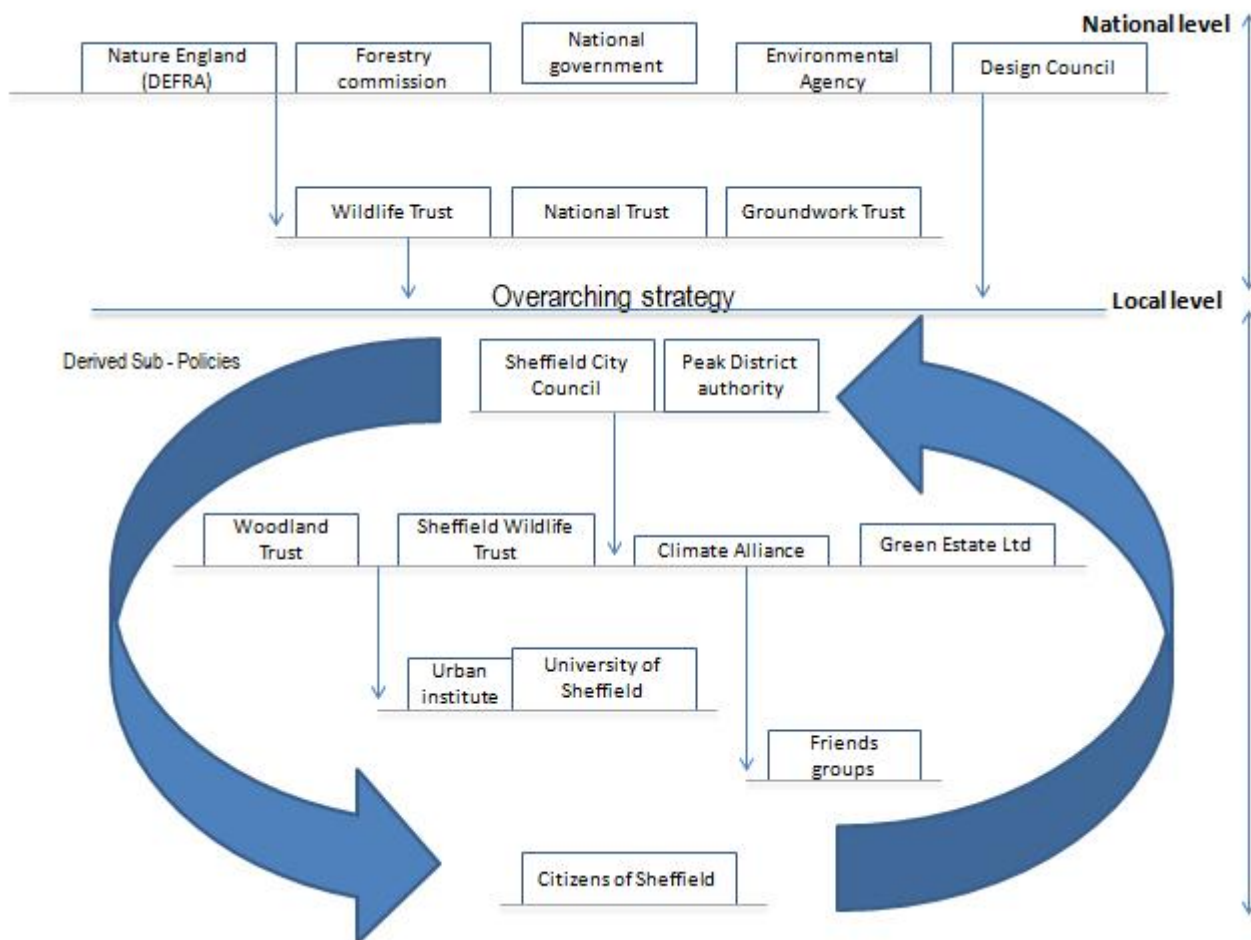
Commitment of networks: Disturbance factors

Similar to implementation agencies, the commitment of local networks is especially impacted by the limited funding and societal issues such as different priorities and social stress. The disturbance factors are also interwoven to each other and one factor seems to give push to another disturbance factor. This is apparent from the links between the political and societal factors. For instance, political changes and natural disasters direct attention prioritizing the attention of the public to certain areas, prioritizing thereby infrastructure development to the specific areas. Naturally, the different priorities direct the funding to the development of the related infrastructure. Hence the networks have to deal with major cuts in government fund which is further disturbed due to societal and political fluctuations.

Commitment of networks: Supporting factors

Local networks again focus on commitment encouraging activities so that the public will be reengaged to the green infrastructure, reinforcing the circle of bottom up support. In specific commitment encouraging activities that include among others education and volunteering work, enhance the commitment of citizens, who then support practically with monetary help or ideologically with individual protection the operation of green initiatives of networks. Thus the same approach of encouraging locals to commit with the strategy results in support of the resources mobilization, since locals are more willing to pay fees for the support of the green areas due to their attachment to them. Though, local networks do not simply rely on the financial support of locals. It was seen that only a small part of resources is coming from events and other forms of public support. The financial provision is mainly based on collaboration and participation, where other organizations provide access to resources and fundraising prospects. Local networks also target specific groups which are highly motivated towards environmental preservation. However, all these organizations and individuals that take part in resources mobilization are also motivated towards environmental preservation, which proves that commitment encouraging activities reinforce

their motivation and hence their willingness to support the strategy. Hence, it can be deduced that in all types of commitment the bottom-up approach and the reinforcement of public commitment towards environmental preservation is the A line for Sheffield's governance approach. An overview of the governance approach is depicted in the *picture 1*.



Picture 1. The picture demonstrates the flow of hierarchy (blue thin arrows) from the national UK layers to the local layers of Sheffield. The blue big arrows demonstrate the reinforcing circle of public commitment which returns to the higher governance layers translated in support to the strategy. The overarching Green and Open Space strategy stands on the top, guiding the local governance and the derived sub-policies.

Co-design of nature based solutions: Disturbance factors

The co-design between different stakeholders is rather ad-hoc in Sheffield and it occurs only in special occasions when there is need for exchanging knowledge and expertise on a specific project. The main reasons that prohibit knowledge coproduction and brokerage interventions root in political issues and financial difficulties. The local networks have to cope with extra disturbances, since they have more restricted governmental funding or they completely lack of government funding. On the other hand, interviewees of implementation agencies have indicated that the issues they face have national roots such as Brexit and the austerity period that started during 2010. Instead, local networks focus more on local level political changes and local economic fluctuations, without that meaning that they do not relate national and local conditions. Local networks indicate as disturbance factors the network changes, the insulated borders of organizations and the different priorities which though have not been addressed by the implementation agencies. This might be due to the more local-wise focus of networks. However, from another perspective the local networks have less power compared to implementation agencies which favor of government support. The local networks have much less economic or strategic power and therefore they are much more dependent on other stakeholders' resources and connections to be able to survive and deliver their work. Hence, this is why they seem to pay more effort to reach out and connect with more stakeholders in order to gain

access to resources and be able to realize their projects. Therefore, the local networks face more difficulties to cooperate with other bodies since they are left more vulnerable to the changing conditions.

Co-design of nature based solutions: Supporting factors

A very crucial finding of the research is that there was found no broker to facilitate the process of knowledge coproduction neither a broker to feed back new findings into the strategy. In the majority of the cases, the knowledge coproduction was more about wide meetings for exchanging of information and expertise on a specific problem that needed a collective solution. In the occasions that the coproduction was about production of new knowledge then it normally concerned limited number of cooperators working on a specific project, rather than collective update of the whole strategy. Moreover, all type of cooperative activities related to knowledge production are conducted by direct links. The links are, most of the times, personal whilst in special occasions where it was needed a long-term cooperation the interested party would look for official agreements in order to secure the cooperation. The links are mainly based on key contacts that attain strategic positions, they have common interests with the potential cooperator or they have special expertise which is needed by the cooperator. Those links have been proven crucial for Sheffield and they have been the reason that despite the lack of an official broker, the strategy is still functional.

9. Limitations

This research might stumble, to some extent, at the constructed policy maintenance framework. The important variables for policy implementation and sustainable urban transitions, here addressed as supportive elements, were used to explain also UGI policy maintenance. However, there might be more variables, not indicated by literature review, that if included they could cover more aspects regarding the reasons that keep a UGI policy maintained. Although this research explores maintenance only through these variables, it still remains a valuable source of information upon UGI policy maintenance, as an attempt to bridge the scientific gap. Additionally, the revealed findings are locally-specific and they should not be treated as general rules for policy maintenance. Each locality presents its own characteristics and the reasons that ensure UGI policy maintenance might differ significantly according to the specific locality. Therefore, the findings can inform the current lack of knowledge, but it should be cross-checked with more cases to confirm their applicability in a wider context of different socio-political and economic backgrounds. Lastly, time restrictions did not allow analysis of more variables, neither gathering of more data. Though a combination of both could bring up more qualitative and quantitative data.

10. Discussion

The research in Sheffield showed that in order for a green infrastructure strategy to succeed and to last for years, the local governance is of crucial importance. Whilst many political and socio-economic changes have occurred in England during the last 10 years that the Strategy is on run, the local governance in Sheffield was able to offset the effects by mobilizing a local reinforcement loop based on the commitment of the citizens. As the picture 1 showed in an oversimplifying way, the higher hierarchical levels feed the commitment of the lower levels which with their turn engage more in respecting the green infrastructure and in following the guidelines of the strategy. As a result, besides the fact that the national level does not guide or engage with the local strategy directly, the local governance played a major role in filling the gap of the lack of national interference.

Specifically, the same reinforcing circle seems to sustain the direct links of the stakeholders. Specifically, as it has been observed the local authorities and organizations connect with each other based on direct links, besides the suggestions of the theory that the brokerage interventions are important to sustain the strategy. However, there was found no official broker and the co-design is mainly based on the personal willingness of each representative to find and connect with the right people. It could be depicted as a net of personal links, and more rarely official arrangements, that mobilize one another, share information and enable connectivity between the organizations.

And this willingness it could be claimed that it roots at the same reinforcing circle of commitment encouragement, since local stakeholders are attached to the green areas. Then the public willingness reinforces in a way the will of officials to maintain the functionality of the strategy.

Last, it became clear that in a local level the strategy was not always the guidance rule behind all the actions. Many stakeholders were proceeding with initiatives around operational green activities, resources mobilization and connectivity due to the mandate of their organization, without being guided or obliged by the strategy. In other words, many stakeholders were seen to implement a parallel work that even if it was not directly connected to the strategy, it became a main support for it. Hence, in Sheffield there were two supporting grounds operating for the strategy, one which is directly linked to the strategy and the stakeholders that follow its guidelines according to which they proceed with several activities, and a parallel work of stakeholders that are not directly guided by the strategy but they have contributed significantly to the implementation of the strategy. Indicative example of the first ground is the City Council which steps on the strategy for every new activity, whilst indicative example of the second ground is an environmental NGO that works around green infrastructure and public engagement, supporting the implementation of the strategy in a parallel way.

Overall, the theory has proven quite valid for the case of UGI policy maintenance. The elements of commitment and capacities, which have been theorized as important to maintaining the functionality of a policy, were found to actually support the implementation of the Green and Open Space strategy in Sheffield during the 10 years of its application. Exception to this is the co-design between the stakeholders which in Sheffield it does not occur regularly. In the scarce occasions it took place, there was found no broker to facilitate the process. The local governance has replaced this gap with direct links, which until now it shows that it is working. Thus the case did not leave room to test the theoretical background of the co-design between different stakeholders. For this reason, it remains unclear whether the existence of an official broker and the update of the strategy would add an actual value to policy maintenance or if it would upgrade the effects of the strategy. It is also not predictable whether the existence of a broker and frequent updates of the strategy would bring new balances in the connectivity of stakeholders, leading thereby to a whole new governance model. It is also quite interesting to see whether the upcoming legalization of the environmental bill would change the governance balances and in what ways.

11. Conclusion

The local governance has shown a crucial role in supporting the local strategy when the national governance was absent or limited. Additionally, the lack of legal basis for the green infrastructure leaves the strategy and the policies around it vulnerable to the many political and socioeconomic externalities. However, the local reinforcing circle of commitment encouragement has shown to work quite well in the absence of legalization, filling also the gaps of the limited funding and of the socio-political changes. It could definitely be a rolling model for many counties across Europe and around the world, though always taking into account the local specialties that might affect the model. For instance, culturally there might be difficulties to engage citizens and make them follow specific rules around green infrastructure. Especially in occasions where other socio-political issues occur or much stronger than in England, it is anticipated that the local governance would give priority to offset these effects rather than focusing in green infrastructure. It could be claimed that the green infrastructure maintenance is more of a benefit of counties that already have a basis, economic and political, to support it. In any case, more research should be done within the frame of the same country in order to reveal whether those observations have an element of chance. Comparison between more cities within the country would show if specific circumstances converged and led in the development of this supportive bottom-up model in Sheffield, or whether the model follows a similar pattern with other cities within the UK, proving that maybe the roots are somehow in the wider cultural and socio-political background of the country. If Sheffield would be an exception to the national pattern, then that could possibly mean that the local governance is able to be completely independent of the national level and that the success of a strategy is a local matter. The results would be then encouraging for other cities around the world since the model would show that it works without the support of the national background and hence it could be possible it different localities. In any

case, research in more cities and from different national backgrounds would actually prove whether this model is applicable to any locality and under which conditions.

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Appendices

Appendix 1

1.A Project information Sheet



Utrecht University

Master Thesis Project Information Sheet

Paving the way to Urban Green Infrastructure policy maintenance

The case of Sheffield, England

Overview

This research aims to understand the factors influencing the maintenance of an Urban Green Infrastructure policy over time, by exploring the role of implementation agencies and local networks in policy implementation. In particular, it focuses on the Green & Open Space Strategy of Sheffield and the role that governance characteristics of agencies and networks play in keeping the policy functional. This is important for improving our understanding of how a local governance structure can balance political, social and economic perturbations that might affect the policy. Since Urban Green Infrastructures are important measures to mitigate and adapt to climate change, this research is also expected to enrich our knowledge on ways to strengthen urban climate change adaptability.

Approach

The thesis addresses two key research questions:

1. Which factors affect the implementation of an UGI policy?
2. Which factors contribute in offsetting the external effects?

To answer these questions, **I will be conducting semi-structured interviews with key actors in Sheffield**, such as agency officials, representatives of local NGOs and local communities among others. Some particular subjects I will explore include mechanisms that agents use to stipulate commitment, to gather financial resources, to ensure the application of the policy guidelines and the knowledge coproduction between agency officials and local networks. **The interviews will be conducted in person during a fieldwork in Sheffield from 24 January to 13 February 2020** and before this period via Skype.

Your participation in this research

Participation in this research will involve **an interview of approximately 30 minutes**, which can be shortened or extended according to your preference. The interview will be recorded to facilitate analysis, if you consent to this. Participation is entirely voluntary and you can withdraw from the interview and the research at any time with no consequences. The information you will provide will be treated confidentially and securely. All data from interviews will be fully anonymous and no data will be attributed to any participant's name. The data will be solely used as insights for the current research and at the end of the research they will be deleted. **Benefits of participating in this**

research include contributing to research into success factors and barriers in the maintenance of urban green infrastructures, which could strengthen the implementation of nature-based solutions internationally. A copy of the final thesis can be provided upon request.

For further information please contact:

Master thesis researcher:

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This research is conducted as an MSc thesis project under the requirements of the Master Sustainable Development of Utrecht University. The research adheres to all ethical procedures related to participation of interviewees and storage and use of provided data. You are free to discuss your participation with the Master researcher (Chara Maria Avgoustatou) and her Supervisor (Dr. James Patterson), contactable as above. In case of further questions, you are welcome to discuss with Dr. Frank van Laerhoven, member of the Ethics Review Committee – Faculty of Geosciences of the Utrecht University. You may contact him on +31 30 253 1036 or via email: F.S.J.vanLaerhoven@uu.nl.

1.B Interview consent form

Interview Participation Consent Form

Master thesis project

Paving the way to Urban Green Infrastructure policy maintenance

The case of Sheffield, England

Master Researcher: Chara Maria Avgoustatou
Sustainable Development, Earth System Governance
University of Utrecht

Supervisor: Dr. James Patterson
Faculty of Geosciences
University of Utrecht

I agree to take part in this interview.

Voice recording: Yes

 No

- I have read the Master Thesis Project Information Sheet
- I understand that my participation is totally volunteer and I am free to withdraw from the study at any moment with no consequences, and
- I understand the privacy, confidentiality and security of the information I will provide

Name: _____

Date: _____

Appendix 2

2.A Interview questions: Implementation agencies

Interview introduction

My research aims to understand Urban Green Infrastructure (UGI) policy maintenance and I focus on Sheffield. I am particularly interested in the role that implementation agencies and local networks play in keeping the policy functional. I would like to discuss with you some questions regarding the role of your organization in policy implementation. Before we start, I have to inform you about some procedural and privacy aspects. The interview will take an average of 30 minutes, which can be shorten or extended depending on your preference. Your participation is by no means obligatory and you can withdraw from this interview and the research anytime. Your interview will be kept anonymous and no data will be attributed to your name. The data will be solely used as insights for the current research and not for any other purposes. If you consent, I would also like to record our interview. If we continue, could you please fill in this form?

Interview questions

Could you briefly introduce your position within the organization and its role regarding Sheffield’s Green Infrastructure?

Guiding Question / follow up
<p>1. Is the preservation of urban green areas prioritized by the agency if compared to other urban-related topics?</p> <p>a. <i>What do you think affects the attention that this topic receives?</i></p> <p>b. <i>Does the agency use any mechanism to stipulate attention to this topic?</i></p>
<p>2. Which are the main financial sources of the agency regarding the support of the green areas?</p> <p>a. <i>What do you think affects the financial basis of your agency?</i></p> <p>b. <i>How do you overcome these issues?</i></p>
<p>3. Does the agency somehow make sure that the policy guidelines will be implemented by staff and communities?</p> <p>a. <i>What kind of difficulties do you normally face when trying to ensure the application of the guidelines?</i></p> <p>b. <i>How do you overcome these issues?</i></p>
<p>4. Does the agency conduct specific educational or awareness-building activities regarding environmental preservation? For example, staff training, seminars, educational activities for citizens?</p> <p>a. <i>What are the main obstacles in realizing these activities?</i></p> <p>b. <i>How do you ease the realization of these activities, if so?</i></p>
<p>5. Do you cooperate with executive agencies or other organizations to produce new knowledge regarding the preservation of green-areas?</p> <p>a. <i>Which are the main difficulties that prohibit the production of new knowledge?</i></p> <p>b. <i>How do you ease knowledge coproduction, if so?</i></p>
<p>6. Is there an individual or an organization that facilitates the cooperation with your partner?</p> <p>a. <i>What affects its intervention, if so?</i></p> <p>b. <i>What facilitates its intervention, if so?</i></p>
<p>7. Is there an individual or organization that helps to incorporate the new knowledge into the policy?</p> <p>a. <i>What affects its intervention, if so?</i></p> <p>b. <i>What facilitates its intervention, if so?</i></p>

Would you like to discuss anything further that you consider important for my research? Do you have any suggestions regarding individuals or organizations that I should contact to enrich my research?

2.B Interview questions: Local networks

Interview introduction

My research aims to understand Urban Green Infrastructure (UGI) policy maintenance and I focus on Sheffield. I am particularly interested in the role that implementation agencies and local networks play in keeping the policy functional. I would like to discuss with you some questions regarding the role of your organization in policy implementation. Before we start, I have to inform you about some procedural and privacy aspects. The interview will take an average of 30 minutes, which can be shortened or extended depending on your preference. Your participation is by no means obligatory and you can withdraw from this interview and the research anytime. Your interview will be kept anonymous and no data will be attributed to your name. The data will be solely used as insights for the current research and not for any other purposes. If you consent, I would also like to record our interview. If we continue, could you please fill in this form?

Interview questions

Could you briefly introduce your position within the organization and its role regarding Sheffield's Green Infrastructure?

Guiding Question / follow up
<p>1. Do you conduct green initiatives in order to support the greenery of the city or to engage citizens with the green areas?</p> <p>a. <i>What kind of difficulties do you find in performing a new activity?</i></p> <p>b. <i>How do you overcome these issues?</i></p>
<p>2. Which are the main financial sources of your organization regarding the support of the green areas?</p> <p>a. <i>What are the main difficulties you face in performing fundraising?</i></p> <p>b. <i>How do you ensure the help of those sources?</i></p>
<p>3. Do you cooperate with executive agencies or other organizations to produce new knowledge regarding the preservation of green-areas?</p> <p>a. <i>Which are the main difficulties that prohibit the production of new knowledge?</i></p> <p>b. <i>How do you ease knowledge coproduction, if so?</i></p>
<p>4. Is there an individual or an organization that facilitates the cooperation with your partner?</p> <p>a. <i>What affects its intervention, if so?</i></p> <p>b. <i>What facilitates its intervention, if so?</i></p>
<p>5. Is there an individual or organization that helps to incorporate the new knowledge into the policy?</p> <p>a. <i>What affects its intervention, if so?</i></p> <p>b. <i>What facilitates its intervention, if so?</i></p>

Would you like to discuss anything further that you consider important for my research? Do you have any suggestions regarding individuals or organizations that I should contact to enrich my research?

Appendix 3

3.A Coding – Interview set: Implementation agencies

Implementation Agencies						
Supportive Elements	Indicators	Disturbance Factors (D.F)		Supporting Factors (S.F)		
Commitment	Willingness to implement the strategy	(W)D.F.1 Different priorities		(W)S.F.1 Urban planning interconnectivity		
				(W)S.F.2 Public opinion	(W)S.F.2.1 Attachment (W)S.F.2.2 Pride (W)S.F.2.3 Recognition	
Capacities	Resources mobilization	(R)D.F.1 Limited funding	(R)D.F.1.1 State of economy	(R)S.F.1 Economic support schemes		
			(R)D.F.1.2 Different priorities	(R)S.F.1.1 Property tax (R)S.F.1.2 Landfill tax (R)S.F.1.3 Community infrastructure levy (R)S.F.1.4 Subsystem charging		
	Enforcement of guidelines	(E)D.F.1 Limited funding		(E)S.F.1 Progress monitoring		
		(E)D.F.2 Political changes		(E)S.F.2 Cooperative Sub-policies & Schemes	(E)S.F.2.1 Management & maintenance support (E)S.F.2.2 Legal-appeal based protection	
		(E)D.F.3 Land ownership		(E)S.F.3 National guidance		
		(E)D.F.4 Public reluctance	(E)D.F.4.1 Antisocial behavior (E)D.F.4.2 Cultural barriers	(E)S.F.4 knowledge and awareness building (E)S.F.5 Reinforcement of public opinion through UGI improvements		
	Knowledge & awareness building	(K)D.F.1 Limited funding		(K)S.F.1 Joint events for spreading awareness (K)S.F.2 On the ground educational sessions		
		(K)D.F.2 Public reluctance		(K)S.F.3 Information sharing (K)S.F.4 Staff training sessions		
	Co-design of nature based solutions	Knowledge coproduction	D.F.1 Time restrictions		S.F.1 Connectivity	S.F.1.1 Channeling of knowledge and expertise
			D.F.2 Limited funding			
D.F.3 Network changes			S.F.1.2 Joint events for sharing of knowledge & expertise			
D.F.4 Insulated borders			S.F.1.3 Advertisement of joint events			
D.F.5 Different priorities						
Brokerage interventions No Intermediators (scarce ad-hoc)		D.F.1 Limited funding		S.F.1 Direct links	S.F.1.1 Individual willingness	
		D.F.2 Network changes			S.F.1.2 Key contacts	S.F.1.2.a Strategic positions
		D.F.3 Insulated borders				S.F.1.2.b Common interests
D.F.4 Political changes		S.F.1.2.c Specialized expertise				
				S.F.1.3 Partnership agreements		

3.B Coding – Interview set: Local networks

Local Networks						
Supportive elements	Indicators	Disturbance Factors (D.F)		Supporting Factors (S.F)		
Commitment	Operational green initiatives	D.F.1 Approval for initiatives	D.F.1.1 Inappropriateness of activity	S.F.1 Commitment encouraging activities	S.F.1.1 Rewarding activities	
			D.F.1.2 Limited land availability		S.F.1.2 Celebration of Achievements	
		D.F.2 Different priorities	D.F.2.1 Political changes		S.F.1.3 Joint events for spreading awareness	
			D.F.2.2 Attention sifts		S.F.1.4 On the ground initiatives	S.F.1.4.a Volunteering practical work
			D.F.2.3 Different objectives			S.F.1.4.b Educational sessions
	D.F.3 Social stress	D.F.3.1 Unappealing outdoors environment	S.F.1.5 Communication of activities			
		D.F.3.2 Difficulty in social interaction				
	Resources mobilization	D.F.1 Limited funding	D.F.1.1 Uncertainty for intangible projects	S.F.1 Collaboration	S.F.1.1 Channeling of material resources	
			D.F.1.2 Political changes		S.F.1.2 Fundraise through collaborators	
			D.F.1.3 Different priorities		S.F.1.3 Financial agreements with collaborators	
D.F.1.4 Long bureaucratic process			S.F.2 Participation	S.F.2.1 Funding from participants in joint activities		
		S.F.2.2 Membership fees				
		S.F.3 Reaching out motivated groups		S.F.4 Social enterprise model		
Co-design of nature based solutions	Knowledge coproduction	D.F.1 Time restrictions		S.F.1 Connectivity	S.F.1.1 Channeling of knowledge and expertise	
		D.F.2 Limited funding			S.F.1.2 Joint events for knowledge sharing	
		D.F.3 Network changes				
		D.F.4 Insulated borders				
		D.F.5 Different priorities			S.F.1.3 Advertisement of joint events	
	Brokerage interventions No Intermediators (scarce ad-hoc)	D.F.1 Limited funding		S.F.1 Direct links	S.F.1.1 Individual willingness	
		D.F.2 Network changes			S.F.1.2 Key contacts	S.F.1.2.a Strategic positions
		D.F.3 Insulated borders				S.F.1.2.b Common interests
		D.F.4 Political changes				S.F.1.2.c Specialized expertise
					S.F.1.3 Partnership agreements	