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**Dealing with conceptual ambiguity on the ground: how practitioners in Europe operationalise the international policy rhetoric on urban climate adaptation.**

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## **ABSTRACT**

In recent decades, adaptation to the impacts of climate change has become a key agenda for cities around the globe. A growing body of literature has already illustrated how cities are a key driver of climate change, its main victim and a promising site for action. Meanwhile, climate change has brought not only new responsibilities but also a new lexicon for urban practitioners. Concepts such as urban climate resilience and the idea of nature's benefits for climate adaptation, embodied in the "green concepts" – nature-based solutions (NbS), ecosystem-based adaptation (EbA) and blue-green infrastructure (BGI) – feature in the major global agreements. Still, they are often seen as vague, ambiguous, and therefore of limited practical value. Despite their prominence both in academia and policy discourses, their actual operationalisation and use on the ground remains understudied.

This thesis aims to widen the existing scholarly knowledge by examining how urban climate resilience and 'green concepts' are used and operationalised at different levels of decision-making in the EU. Several bodies of literature contribute to the conceptual framework of the thesis: climate change adaptation in cities, scholarship specifically on these concepts, and studies on the role of framings and science-policy interface in environmental and climate governance. I use qualitative methods to analyse strategic policy papers and semi-structured interviews with city practitioners across Europe, plus a survey among European academics.

The thesis is composed of three academic papers investigating the uptake of these concepts. Paper 1 compares the perceptions of conceptual tensions surrounding urban resilience among the EU academics and practitioners; Paper 2 looks at how urban resilience is operationalised in three science-policy projects financed by the EU; Paper 3 studies the uptake of NbS, BGI and EbA, which are seen as one of the key ways to enhance urban resilience, in urban green planning and management in four large Polish cities.

This study provides a critical discussion of concepts' operationalisation efforts and challenges and discusses the role of vagueness and uncertainty in their uptake. It contributes to the literature by expanding the geography of research beyond few 'frontrunner' cities as well as outlining some general tendencies in the European context.



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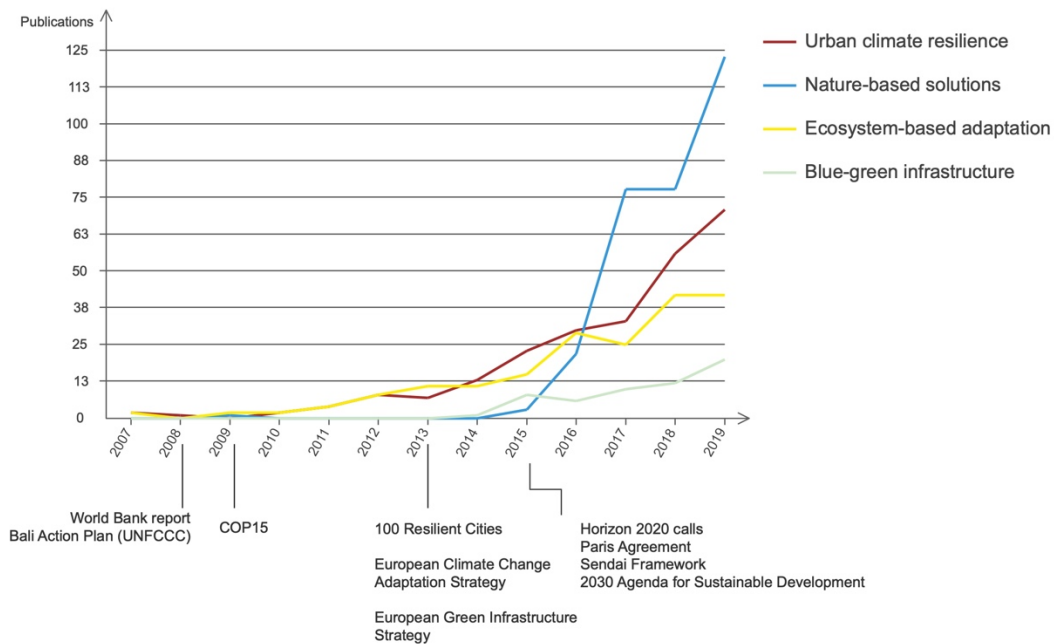
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## INTRODUCTION

### *1. Research motivation and aims: why study operationalisation of new concepts?*

Climate change agenda has brought not only new responsibilities but also a new lexicon for urban practitioners (Brown, 2015; Coaffee & Chandler, 2016). Urban climate resilience and the so-called 'green concepts' (Hanson et al. 2019) – nature-based solutions, blue-green infrastructure and ecosystem-based adaptation – are among the most prominent new concepts. They have been included in the major international agreements such as the UN's New Urban Agenda, 2030 Agenda for Sustainable Development, Sendai Framework for Disaster Risk Reduction or the Paris Agreement on Climate Change (Peters et al., 2016; Faivre et al., 2017), and increasingly attract researchers' interest (Fig.1). They circulate in tandem with other prominent concepts like urban sustainability and climate change adaptation, complementing, overlapping and competing with them, and influence thinking and actions in various fields, from urban planning to climate change adaptation and biodiversity conservation (Leitner et al., 2018).

Fig. 1. The rise of popularity of the concepts in academia and policy-making. (Own elaboration, based on the Web of Science database; policy milestones at the bottom serve as examples and do not represent an exhaustive history).



Nevertheless, the actual use and operationalisation of this new lexicon on the ground remains understudied. Even in the international policy milieu these concepts may be framed in significantly different ways (Donatti et al., 2019; Milman & Jagannathan, 2017). The key intergovernmental documents are "riddled with misconceptions and vague interpretations" regarding these terms, which, according to (Elmqvist et al., 2019, p. 268), partly stems from ambiguity in current scientific discourses. Ambiguity not only describes different opinions but can be understood as "the uncertainty created by the existence of multiple non-equivalent representations of the same issue" (Kovacic & Di Felice, 2019, p. 161). Ambiguity, which emerges from complexity and incommensurability in the knowledge base, can be distinguished from vagueness which refers to the lack of specificity and the difficulty in drawing a line between several similar meanings (Strunz, 2012,)

Are ambiguity and vagueness necessary a problem? One perspective emphasizes their usefulness in the policy process. By acting as boundary objects (Brand & Jax, 2007), ambiguous and vague concepts may generate consensus and limit the conflict, thereby fostering collaboration among different actors. Their flexibility in interpretation depending on a context is particularly relevant for the EU, where ambiguity is an integral part of the policymaking process, as it allows to bypass the wide variety of national and political differences (Kovacic & Di Felice, 2019; Zahariadis, 2008).

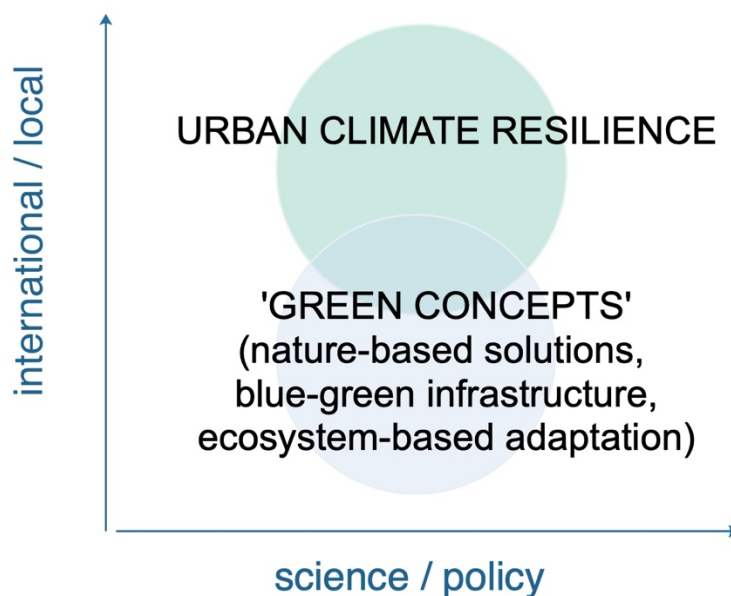
Other perspective sees ambiguity and vagueness as problematic. Conceptual clarity is a precondition for 'normal' science which aims at generating objective knowledge

(Strunz, 2012). In the domain of practice, ambiguity and vagueness may act as obstacles to policy action, leading to inertia, path dependency and legitimizing business as usual actions (Jarzabkowski et al., 2010; Cornwall & Brock, 2005; Reid, 2016). They also constrain the collation of evidence, measuring and monitoring the progress (Tompkins et al., 2018). Furthermore, the above-mentioned conflict-resolving potential of malleability can also have a negative side, hiding important disagreements and "render collaboration possible but between actors who do not necessarily share the same aims" (Borie et al., 2019, p. 204). In case of resilience, numerous concerns were raised about its risk to "become nothing more than a rhetorical device", if ambiguity and vagueness are unresolved (Davidson et al., 2016).

This study contributes to the debates about the role of conceptual ambiguity and vagueness by reflecting on their impact on the use and operationalisation of urban climate resilience (UCR), nature-based solutions (NbS), blue-green infrastructure (BGI) and ecosystem-based adaptation (EbA). So far, ambiguity and vagueness of these concepts have been discussed mostly through the lens of academic debates (Béné et al., 2017; Schiappacasse & Mueller, 2018), while the actual use of these terms and their perception among practitioners received much less attention (see, however, Moser et al. (2019)); there is a potential mismatch between high-level policy rhetoric and its on-the-ground interpretation (van der Heijden, 2019). To address the gap, this thesis project embarks on exploring **how the concepts of UCR, NbS, BGI and EbA, prominent in the international policy arena and academic discourses, are operationalised at different levels of decision-making in the EU**. It analyses the data gathered primarily from the documents (strategic policy papers) and practitioners (city employees in the domains of urban planning, greening and climate adaptation) from across Europe.

Two key dimensions of concepts' formulation, dissemination and uptake were identified: (i) science/policy, and (ii) international/local (Figure 2). First, both policy (major international agreements and organisations) and science have played important roles in these processes (Hanson et al. 2019; Figure 1). However, a serious disconnect between researchers' perspectives and policy-making realities was revealed by the analysis of international documents (Brown, 2011; Felli, 2016) and perceptions of local practitioners (Aldunce et al., 2015; Meerow & Stults, 2016; Oulahen et al., 2019). Second, introducing and translating broad international commitments (such as those about climate change) into national contexts tends to be a difficult undertaking. Because national policy-makers usually don't passively adopt transnational norms and ideas but are actively borrowing and modifying them in ways which resonate with the public in their own country (Acharya, 2004), these transnational norms are often adopted in parts and may be quite different from the guiding conceptual framework (Raum & Potter, 2015; Skogstad & Schmidt, 2011).

*Figure 2. Two dimensions of analysis (own elaboration)*



The intended contribution of this study is threefold. First, it provides a better understanding of the grounded perceptions of these terms, thereby contributing to the ongoing discussion about their conceptualisation and operationalisation in the academic literature. Second, it enriches the debates about the role of conceptual ambiguity and vagueness by describing their specific manifestations and reflecting on their impact on concepts' uptake. Third, these insights can hopefully point the way towards more meaningful integration of new concepts in policy-making and practice.

This introduction is organised as follows. The subsequent section (II) provides basic definitions of the concepts under analysis and then outlines the key points of contestation and ambiguities around them. After the methodology (III) and the structure of the thesis (IV) are explained, Section V presents the key lessons learned and discusses their implications and contributions. Finally, limitations of the study and directions for further research are suggested (VI).

## ***2. Introducing the key concepts and the debates around them***

Numerous interconnections exist between "green concepts" and urban climate resilience. Generally speaking, NbS, EbA and BGI are seen as an instrument to build UCR. Nonetheless, these concepts have different origins and conceptual modes: urban climate resilience characterizes a quality of an urban system, whereas NbS, EbA and BGI describe –specific interventions and actions.

***Urban climate resilience*** is a subset of resilience. This clarification is important because resilience and even urban resilience can be approached from different perspectives, for instance energy or security studies (e.g. Coaffee & Fussey, 2015;



Liévanos & Horne, 2017; Vale & Campanella, 2005). Resilience — broadly understood as the ability of a system to withstand shocks — originated in systems ecology in the 1970s (Folke et al., 2010). It entered the urban policy domain after 9/11 and got a particular focus on climate after Hurricane Sandy in 2012 (Coaffee & Lee, 2016). Today, the major supranational organisations and philanthropies like the Rockefeller Foundation (100 Resilient Cities), UN-Habitat (Making Cities Resilient Campaign, Urban Resilience Hub) and the World Bank (City Resilience Program - CPR), global consulting firms, ITC and finance companies, such as ARUP (City Resilience Index), Siemens or Lloyd play a big role in how the concept is defined and assessed (Leitner et al., 2018).

An often-cited definition of urban resilience comes from 100 Resilient Cities: "the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience" (Resilient Cities, 2019). While urban climate resilience is based both on mitigation and adaptation approaches, here it is considered predominantly from urban climate *adaptation* perspective. Both resilience and adaptation deal with impacts of climate change that are predominantly local, unlike mitigation which is generally seen as an international responsibility (Leichenko, 2011). From a resilience perspective, climate change practitioners are encouraged to consider disruptive events (e.g., storms or heatwaves) but also gradual trends (e.g. rises in sea level or average global temperatures) that can lead to large disturbances if left unchecked, as well as socio-economic sources of stress and vulnerability that contribute to climate risks (Lu & Stead, 2013).

Despite its popularity on the global policy arena and the ongoing efforts to improve its operationalisation and measurement, urban climate resilience remains a fuzzy and contested concept. Main reasons include:

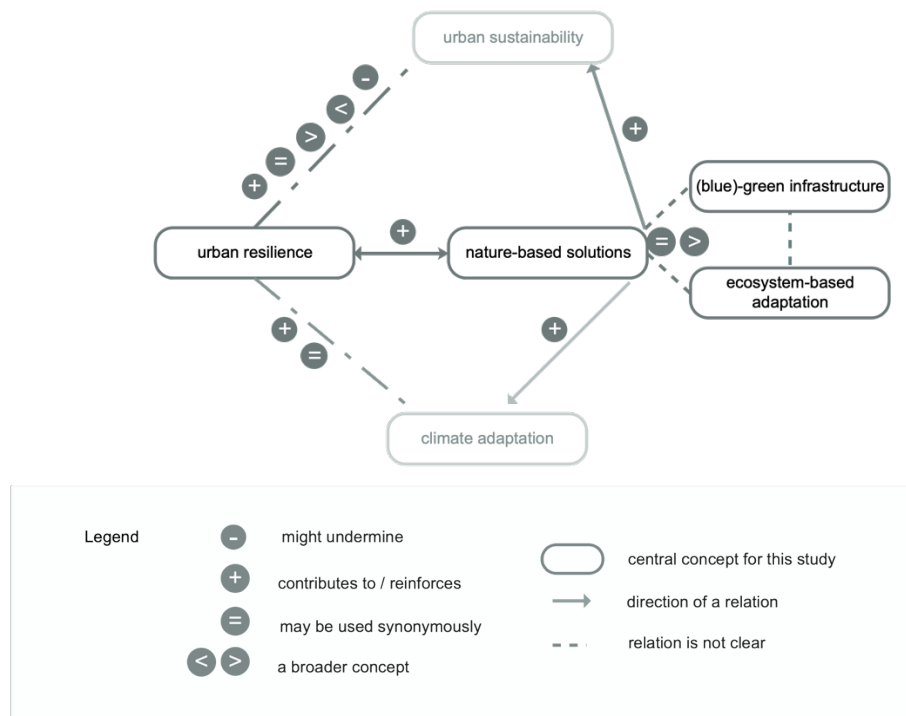
1. as the concept originated in natural sciences, it has been often argued it is ill-equipped to account for the complex social reality, power relations, inequalities and spatial heterogeneity of cities; it is therefore seen as a conservative concept that maintains status quo (Meerow & Newell, 2016);
2. its meaning has recently expanded to include the ability of a system to transform ('bounce forward'), which is quite different from the initial focus on recovery ('bounce back'); however, these two approaches prioritise different properties of a system, and reconciling them is considered in the literature to be a challenging task (Tanner et al., 2017);
3. multilateral agencies and policy frameworks interpret resilience as overlapping with, and almost substituting sustainability; meanwhile, some practices may be very resilient but not at all sustainable, and there are potential tradeoffs between these two concepts. For example, resource efficiency may reduce diversity and redundancy, both of which are key features of resilience (Chelleri et al., 2015; Dodman et al., 2017);

4. UCR is closely linked with and sometimes used synonymously to climate adaptation, which is a vague concept itself. Adaptation fits into a wider continuum of actions taken by societies to address climate variability (e.g., monsoon cycles or El Niño variations) and other environmental stressors, and its embeddedness within other fields makes it difficult to define the boundaries of an adaptation action (Tompkins et al., 2018).

**Nature-based solutions** can be defined as "solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience" (EC, 2016). The term was introduced on the global policy arena by the World Bank report (2008) to highlight the importance of biodiversity conservation for climate change mitigation and adaptation (Potschin et al., 2014). A year later, in 2009, the International Union for Conservation of Nature (IUCN) promoted the use of NBS for climate change adaptation in its position paper for the UNFCCC Conference of Parties (COP 15). The launching of NbS as a major theme within the EU research and innovation program (Horizon 2020) in 2015 has significantly stimulated the uptake of the concept in science (Laforteza et al., 2017).

NbS is similar to and largely based on the concepts of BGI and EbA. **Blue-green infrastructure** - "a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings" (EC, 2013) – builds on the concept of green infrastructure, which has been actively used in academia since the beginning of the 21st century, before it reached the high levels of policy-making (Wright, 2011). Green infrastructure reminds of previous approaches in planning but takes a more holistic perspective by emphasizing connectivity and multifunctionality (Duvall et al., 2018). **Ecosystem-based adaptation** – "the use of ecosystem services and biodiversity as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change" (CBD, 2009) – entered the policy arena as part of the Bali Action Plan in 2008, the same year as NBS, during the UNFCCC Conference. EbA builds on the idea of ecosystem services which gained international attention already in the 1990s (Duvall et al., 2018). EbA was initially applied in relation to the global South, but later also to the global North, including the EU Climate Adaptation Strategy (2013) (Brink et al., 2016; Pauleit et al., 2017).

*Fig. 3. Complex relations between the concepts (own elaboration).*



European Commission (EC) promotes all three "green concepts" as a key way to improve urban resilience, but also adaptation and sustainability (Laforteza et al 2018; Nesshöver et al 2016). The reasons is that interventions associated with them allow to mitigate climate-driven extreme events in human settlements (e.g. flooding, heatwaves, coastal erosion etc), moderate temperatures via evaporative cooling and shading from the sun; improve connectivity of the water cycle, increase water retention and infiltration, manage surface run-off (Frantzeskaki et al 2019). Urban greenery is important for resilience, as it increases diversity, flexibility, redundancy, modularisation, and decentralisation of urban systems, which particularly visible in stormwater management (Meerow & Newell, 2017). Urban ecosystems can reduce social vulnerability and thereby increase community resilience and capacity to deal with environmental hazards (Meerow, Newell 2017; Pasquini & Cowling, 2015). At the same time, though, they are vulnerable to the impacts of climate change themselves (Bush & Doyon, 2019).

The relations among these "green concepts" are ambivalent. While NbS is often seen as an umbrella term (Nesshöver et al., 2017). they can also be used synonymously (Wamsler & Pauleit, 2016). All three are underpinned by the idea about an important role of nature in climate adaptation, its multifunctionality and numerous co-benefits (environmental, social and economic) (Raymond et al., 2017). Some of the differences and peculiarities include: (i) NbS has a more overarching notion of 'nature'; (ii). biodiversity is at the core of NbS but not necessarily in green infrastructure planning; (iii) NbS have a particularly strong focus on transdisciplinarity and citizen engagement. While recent academic research has brought more clarity regarding the relations between these concepts (Pauleit et al.,

2017), in practice – but arguably still in theory – similar interventions (e.g. urban gardens or green roofs) are referred to as either NbS, EbA or BGI (Dorst et al 2019). A schematic illustration of the complex relations between the concepts is represented on Figure 3.

### ***3. Methodology and research design***

#### **3.1 Research design and theoretical background**

This thesis project aims to explore how urban climate resilience and 'green concepts' (BGI, NbS, EbA) are operationalised in policy documents and by practitioners in the EU. It is guided by the following sub-questions:

- i. How are these concepts operationalised and used by the local practitioners and in the strategic policy documents?
- ii. *What constitutes conceptual ambiguity and vagueness in practice, and what are their implications for the concepts' uptake?*

Methodological and theoretical lenses for this study were underpinned by the burgeoning literature on these concepts. It was also influenced by the literature exploring the importance of framings and discourses in climate change and environmental policies (e.g. Dewulf, 2013; McEvoy et al., 2013; O'Brien et al., 2007), broader literature on climate change adaptation in cities (Bulkeley et al., 2013; Chu et al., 2016; Romero-Lankao et al., 2018) and science-policy interface in climate and environmental governance (Wesselink et al., 2013; Preston et al., 2013).

#### **3.2 Qualitative approach: document analysis and interviews**

This study adopts a qualitative methodology, based on interviews and document analysis (Bowen, 2009). The choice of qualitative methodology was influenced by the theoretical background and the exploratory nature of this research, which necessitates asking 'why' and 'how' questions (Creswell, 2007). A qualitative approach is useful to uncover individual perspectives on the concepts and has been a common way to study concepts operationalisation.

The data sources were composed of:

1. semi-structured interviews: respondents were selected via purposive and snowball sampling. Length, language and form varied from paper to paper (details and the lists of questions can be found in the appendices of respective papers). In total, 50 interviews were conducted;
2. policy documents: the list was informed by the desk research; it consisted of predominantly strategic and programming documents (n= 39), but also other documentation (including the websites) related to the projects studied in Paper 2;
3. the survey, conducted from April to June 2018 using the online instrument Qualtrics. It was a part of the submission process for the Reframing Urban

Resilience conference which took place in Barcelona in December 2018; 97 respondents from the EU completed the survey.

4. participant observation at four workshops and conferences for urban greening practitioners during the field trip (September 2018 to May 2019) in Poland.

#### *Data analysis*

Interviews were transcribed verbatim. Then, together with the documents and observation notes, these transcriptions were brought to the NVivo 12 software package for qualitative content analysis. *It involved* both inductive category development (data-driven) and deductive category application (theory-driven), following the recommendations outlined in (Mayring, 2000; Saldaña, 2009). While the preliminary coding scheme was informed by the literature review and desk research, new topics emerged during the analysis.

The survey was analyzed using the in-built functions of the Qualtrics platform. Additionally, frequency analysis of qualitative responses for all three papers was conducted in NVivo as the first step to get acquainted with the data. To ensure credibility, triangulation occurred at different levels of the thesis: analysis, data and methods (Flick, 2004).

### **3.3 Geographical scope and the choice of a case study**

Describing the context of the study is important due to the specificity of administrative traditions and various geographical connotations of adaptation (Biesbroek et al., 2018; McEvoy et al., 2013). This paper examines three different scales of the European Union: (I) EU-wide, (ii) specific projects and (iii) one Member State – Poland.

1. **The European Union** positions itself as a global innovator and leader in climate change. It remains a frontrunner in terms of both targets and outcomes in mitigation, and the increase in climate adaptation actions has been higher than elsewhere (Massey et al., 2014). Many pioneering and leading cities in adaptation and greening are located in Europe (Davies & Laforteza, 2017; Kern, 2019), and almost half of the research on NbS covers the European context (Hanson et al., 2019). Still, prior research on urban resilience has examined practitioners' interpretations mostly in other contexts, e.g. US (Meerow & Stults, 2016), Canada (Oulahen et al., 2019) or Australia (Aldunce et al., 2015). Meanwhile, climate-induced hazards are the key topic for these countries, whereas the EU is more preoccupied with long-term planning for adaptation.

2. **Three science-policy projects** (consortiums of institutions across various EU countries) -- SMR, RAMSES, RESIN – were chosen because examining science-policy interface allows intercepting the operationalisation and negotiation of meanings before the concepts hit the ground. The choice of these particular projects was motivated by their high visibility and prominence (they were often discussed on the official EC website and were regular participants at the key events on urban

resilience). Of course, three projects do not represent an exhaustive picture of urban climate resilience development in the EU context, but a close examination of specific initiatives and linking them with higher policy levels – funding calls and strategic policy documents – allows to identify some tendencies and patterns as well as outline avenues for further investigation.

3. Focusing on **Poland** – a Central and Eastern European (CEE) country – allows addressing the 'frontrunner paradox': currently the vast majority of studies examine frontrunner cities which are not representative of other cities around the globe (van der Heijden, 2019). Poland is a country with less ambitious climate policies, comparing e.g. to UK, Germany or Denmark; nevertheless, its municipalities show signs of developing climate agenda which have not yet been fully examined (Kronenberg et al., 2017). The CEE region is under-represented in both climate adaptation and urban greening research (Kronenberg et al., forthcoming) and may be suffering from 'double exclusion': both from mainstream research focusing on the developed world and from postcolonial stream examining Asian, Latin American and African cities (Ferenčuhová & Gentile, 2016). Including Poland as the CEE country is, therefore, an important step in expanding the geography of research.

#### ***4. Thesis structure and the overview of papers***

The thesis is written in the form of a collection of academic papers investigating the uptake and operationalisation of urban climate resilience, nature-based solutions, ecosystem-based adaptation and blue-green infrastructure at the different levels of EU decision-making. Paper 1 compares the perceptions of conceptual tensions surrounding urban resilience among the EU academics and practitioners; Paper 2 looks at how urban resilience is operationalised in three science-policy projects financed by the EU; Paper 3 studies the uptake of NbS, BGI and EbA, which are seen as one of the key ways to enhance urban resilience, in urban green planning and management in four Polish cities. No paper was dedicated to the links between UCR and the 'green concepts': while some research has already examined their relations on theoretical level (e.g. Laforteza et al., 2017), the empirical investigation was hampered by the largely implicit use of these concepts (Paper 3), which made this examination difficult (but probably also premature). Nevertheless, some observations on this topic are discussed further below ('Key findings'). After this introduction, three papers are presented.

##### **Paper 1. Urban resilience meaning and principles: European perspectives**

In the last decade, many papers explored the challenges of defining and framing urban resilience. As academic literature has recently emphasised how urban resilience differs from urban sustainability, while urban policy agendas use these terms almost interchangeably, this paper explores current European academics' and city practitioners' perspectives around urban resilience meanings and principles. The aim is to contribute to the understanding of this concept evolution while discussing the gap between theories and implementations. We addressed this research question

by gathering around 100 responses to a survey proposed to junior and senior European scholars from different fields and interviewed 24 city practitioners. Both academics' and practitioners' perspectives align with the recent conceptualisations of urban resilience: integrating it with transformative, bouncing forward approaches, and leaving the solely engineering, recovery-oriented ones. However, when asked about implementation and urban resilience characteristics, a variety of inconsistencies emerged. Urban resilience is defined referring to transformative approach but its implementation characteristics are related mainly to bouncing back. While providing an overview of urban resilience meanings and characteristics among European scholars and city practitioners, the paper critically discusses emerging conceptual misalignment and gaps.

*This paper is co-authored with Lorenzo Chelleri and has been accepted with minor revisions at the Cities journal.*

### **Paper 2. Operationalizing urban resilience: insights from the science-policy interface in the European Union**

By examining three policy-oriented research projects funded by the European Union (RAMSES, RESIN, SMR) the paper critically discusses operationalisation efforts of urban resilience as they are designed and produced at the interface between science and policy. By analysing the documents and conducting interviews with the projects' coordinators and participants, three main research questions were addressed concerning how urban resilience is defined across the projects and the actors involved, the role of the tools produced by them in their difficult task to reconcile wider applicability and local specificity and finally how stakeholder engagement and co-creation were framed and implemented. Based on the evidence collected, the authors argue that conceptualisations of urban resilience within operationalisation efforts being produced at the science policy-interface are still quite plural and open, that such openness is largely confirmed by the flexibility of the tools produced by the projects and that while becoming increasingly relevant stakeholder engagement and co-creation strategy are yet to be fully framed and theorised. Finally, they present further research pathways aimed at strengthening our knowledge of operationalisation efforts, the role of practitioners and urban resilience implementation in discreet scientific and political environments.

*The paper is co-authored with Alessandro Coppola and Alberto Terenzi and has been published at the European Planning Studies journal (<https://doi.org/10.1080/09654313.2020.1729346>)*

### **Paper 3. The uptake of innovative concepts in urban greening: insights from Poland**

The idea of nature having multiple benefits for urban management and planning is gaining prominence alongside the rise of climate change awareness. It is expressed through concepts such as nature-based solutions (NbS), ecosystem-based adaptation

(EbA), and blue-green infrastructure (BGI). Despite their popularity in the international arena, relatively little is known about how these concepts are used and interpreted at the local level, which in turn has implications for policy formulation and actions. This paper examined both direct and indirect references to these concepts, as well as the reasons for their potential omission. By analysing policy documents and interviews with practitioners and activists from Poland, it discussed the uneven and ambivalent uptake of concepts in the UGBS governance. While the reluctance to use new terminology was often explained by accessibility and efficiency concerns, it also revealed some conceptual confusion. The contribution of this study is twofold: 1) providing a more nuanced understanding of the conceptual ambiguity surrounding the NbS, EbA and BGI concepts and the gap between international policy rhetoric and local interpretation; 2) expanding the geography of research on urban climate adaptation and urban green spaces which tends to overlook the countries of Central and Eastern Europe.

*This paper has been accepted with minor revisions the Urban Forestry and Urban Greening journal.*

## **5. Contribution and lessons learned**

The particular relevance of this work is that it describes concepts' operationalisation efforts and challenges at an early stage of their development, and these early interpretations are likely to affect "the framing of the concepts' ideational content" (Hanson et al., 2019, p. 2). The critical examination conducted in this thesis is instrumental in interrogating the ideological basis for climate change innovations associated with these concepts and unpacking the "superficial value neutrality" that might suppress and hide the conflicts over values and interpretations of concepts (Borie et al., 2019). This thesis contributes to the literature on urban climate resilience and nature's role in climate adaptation by providing insights about operationalisation and on-the-ground interpretations of the concepts, expanding the geography of research beyond few 'frontrunner' cities as well as outlining some general tendencies in the European context. From a practical point of view, this research provides valuable feedback from local practitioners on the integration of new concepts in their policies, which could and should be considered by decision makers at higher levels of governance when reviewing existing policies and designing new ones. These results could also be of interest for the local practitioners themselves, as many of them were genuinely interested in how other departments and other cities make sense of these new concepts and incorporate them into their practice. These findings could inform deliberative meetings where local experts across Europe would discuss and come up with a joint understanding of these concepts. Below, the key insights from the three papers are presented, together with the discussion of their implications.

### **Key insights**

#### **1. On the extent of vagueness and ambiguity**



Identifying the differences in perspectives on concepts in the policy documents and interviews was difficult because the references to them tended to be vague. Seven years ago Tyler & Moench (2012) observed the term 'resilience' was usually employed in a general and descriptive sense, which hampered deriving operational guidelines or specific characteristics and actions. Today the situation seems to be similar: urban climate resilience and "green concepts" were often not defined or were mentioned implicitly (particularly in Paper 3), and the boundaries between them and other concepts (such as sustainability) were not clear. At the supranational EU level, conceptualisations of urban climate resilience are – on the one hand – specific to discrete institutional contexts, but on the other hand, we can observe how they integrate different perspectives and become increasingly broader, which in turn might be contributing to sustaining conceptual ambiguity and vagueness.

However, the interviews helped to reveal several conceptual tensions. For instance, while the idea of resilience as transformation has been internalised at the discursive level, many characteristics of the engineering perspective are still prevailing among academics and practitioners. Nature-based solutions were often associated with predominantly vertical forms of greening, leading to accessibility and efficiency concerns which were among the reasons explaining the reluctance of practitioners to use the concept.

As mentioned in Section II, "green concepts" describe specific interventions, and perhaps for this reason there was more specificity in their use than in case of urban climate resilience, the most popular characteristics of which were metaphorical and generic, not clearly describing physical or management principles.

## ***2. On conceptual tensions within and beyond academia***

The conceptual tensions considered as important in academia may not be perceived as such in practice. For instance, most city officials did not see reconciling 'bouncing back' and 'bouncing forwards' perspectives on resilience as a significant problem. And while this mismatch can be expected, as science and policy have different tasks and goals (Kovacic & Di Felice, 2019), a substantial part of the scholarship which formed a theoretical background for this study *is aimed* at improving the operationalization and applicability of the concepts in real life. Even though practitioners might be not aware of these conceptual tensions, their different interpretations can have real implications. Oulahen et al. (2019) discuss, for example, how "omitting radical interpretations of vulnerability and resilience [by practitioners] from discussions with residents automatically removes consideration of some adaptation options or at least makes them seem prohibitively difficult."

The situations of co-creation and co-production (Borquez et al., 2017; Frantzeskaki & Kabisch, 2016), where these tensions and challenges in operationalization and implementation can be discussed among scholars and practitioners, are paramount for enabling meaningful engagement with the concepts and might open up new avenues for research. For example, as Paper 2 suggested, the lack of precise

definition may be perceived by practitioners as much less problematic than navigating in the plethora of scientific and policy information. This issue is indeed crucial, given that policy is informed not only by scientific evidence but a whole set of socio-economic factors and power relations (Honey-Rosés & Pendleton, 2013; Saarikoski et al., 2018).

### ***3. On the role of conceptual vagueness***

If the concepts were not so flexible, broad and open, they probably wouldn't get such prominence. While – or precisely because – there is a plurality in their meanings and characteristics, various initiatives around Europe now mention them. However, it is not very clear what is behind the surface of this popularity. For instance, how do we interpret the situation when the concepts feature in documents but are treated with suspicion by practitioners? Or when there is uncertainty as to what activities constitute 'resilience building' and how greening and adaptation activities relate to each other in practice? While "the ambiguity of concepts with strong political background and implications [...] may help to create political momentum" (Salomaa et al., 2017, p. 279), this thesis has illustrated how vagueness and multiplicity of concepts' meanings might have restricted their actual use.

As trade-offs exist between conceptual ambiguity and clarity, and it may be helpful to identify the sources of vagueness and contestations (Strunz, 2012; Connelly, 2007) and acknowledge the variety of perspectives. But should we – and to what extent – attempt to resolve these contestations? Arriving at a singular definition might be neither realistic nor a 'silver bullet' option for improving decision-making (Moser et al., 2019; Connelly, 2007) or, according to some (Albert & Von Haaren, 2017), might even lead to a greater confusion. Adding another layer of complexity, different paradigms and metaphors tend to overlap and can even be sustained by the same person (Raum & Potter, 2015; Jarzabkowski et al., 2010), as was also shown in this research.

***4. Links between urban climate resilience and "green concepts."*** Although exploring the links between these concepts was not the goal of this project, it is nevertheless worth reporting some insights. The participants interviewed for Papers 1 and 2 on urban climate resilience mentioned the 'green concepts' on several occasions, mostly when discussing the characteristics of and strategies for a resilient city, but never elaborated on them. Still, some similarities with the perspectives voiced in Paper 3 (on "the green concepts" in Poland) can be noticed. First, in all cases BGI was the most popular concept and EbA the least popular. Second, somewhat ambivalent attitude to NbS (explained in Paper 3) was also detected in Paper 1, when a city official from Portugal argued NbS has only a limited role in achieving urban resilience ("about a fourth part of what we should do").

In the Polish policy documents (Paper 3) and the interviews with practitioners, urban resilience featured several times concerning natural hazards; the term was not defined but represented a more 'bouncing back' approach. Urban resilience was

particularly elaborated by a city official from Krakow who explicitly talked about the role of NbS in increasing urban resilience. Adding to the debates brought in Paper 1, he mentioned a shift in discourses from urban sustainability to urban resilience (the latter, in his opinion, is more equipped to deal with 'current geopolitical challenges'). These insights suggest the links between these concepts are present but not particularly articulated at this early stage.

## ***6. Study limitations and further research***

Looking at the further research pathways and acknowledging the limitations, it is worth emphasizing the scope of this study was concepts' operationalisation. It means the research remains in the realm of discourses and does not discuss the actual outcomes of the concepts' implementation. Four main limitations are discussed below.

First, this thesis project discussed only some theoretical debates related to these concepts. In particular, it did not cover the issues related to justice (distributive, procedural, recognition) and power relations: for instance, how they manifest in different conceptualizations, who participates in the discussion over the concepts' meanings and whose perspectives have more weight. Urban greening and resilience-building responses to climate change "are not value-neutral and may if adopted uncritically perpetuate or exacerbate existing inequalities" (Mahon & Shih, 2018, p. 225), leading to green or climate gentrification (Anguelovski et al., 2016). Furthermore, the very rationale for adopting these new concepts (which is usually being decided on at the higher levels of decision-making) may be associated with neoliberalisation of urban governance. It has been argued these concepts, which have gained prominence after the 2007/2008 economic crisis, "intensify the focus on the techno-economic and security dimensions of ecological responses while squeezing out concerns about social justice and equity" (Hodson & Marvin, 2017). These questions related to power, justice and neoliberalisation of urban governance are among the most crucial themes for further research. Second, while this research was conducted at different scales – from supranational EU level to specific cities – it does not include a strong comparative element. The rationale was to give a broader picture and discuss various contexts, only briefly touching upon the interplay between these different scales (e.g. the impact of EU on the Member State in Paper 3 and the impact of EU funding calls on specific city-based projects in Paper 2). Because in the European context local climate change policies are embedded in a dense structure of multilevel governance arrangements (Kemmerzell, 2018; Kern, 2019), a future study with an explicitly comparative design could bring interesting insights about the perception and circulation of these concepts through the prism of multi-level governance.

Third, in this research I mostly relied on the content of the documents and participants' statements (with only a brief experience of participant observation at the specialised events) However, the concepts also — and not less importantly —

function in the everyday practice. It may be interesting to examine how the concepts are used and discussed in everyday work, e.g. using ethnographic methods (Campbell et al., 2014; Corson et al., 2014; Kuus, 2015).

Fourth and finally, these papers do not present an exhaustive picture of the European practitioners' perspectives. Nevertheless, I believe the variety of settings represented in this thesis enables us to grasp some of the main tendencies and provides useful insights for further exploration of the topic and comparison with other cases. Besides, while this project mostly focused on the public sector, future research will benefit from including the perspectives from a broader spectrum of actors -- international organisations and consultancies, NGOs and communities -- that play an increasingly significant role in urban and climate governance around the world.

Notwithstanding these limitations, the study produced the insights that may be valuable for researchers, policy-makers and practitioners. Further research should be pursued in the directions listed here and in the concluding sections of each paper.

## PAPER 1

# Understandings of urban resilience meanings and principles across Europe

**Abstract** In the last decade many papers explored the challenges of defining and framing urban resilience. Academic literature has recently emphasised how urban resilience differs from urban sustainability, while urban policy agendas use these terms almost interchangeably. This paper explores European academics' and city practitioners' perspectives around urban resilience meanings and principles. It aims to enhance the understanding of concept's evolution and to discuss the gap between theories and implementation. To do so, we conducted a survey among around 100 junior and senior European scholars from different fields and interviewed 24 city practitioners.

Both academics' and practitioners' perspectives aligned with the recent conceptualisations of urban resilience. The respondents endorsed transformative and "bouncing forward" approaches, leaving aside engineering-driven, recovery-oriented ones. But their responses about urban resilience implementation and characteristics revealed some inconsistencies. Urban resilience was defined through lens of transformation but its implementation and characteristics generally described 'bouncing back' approach. Based on the overview of urban resilience meanings and characteristics in Europe, this paper critically discusses emerging conceptual misalignment and gaps to overcome in future research and practice.

**Keywords:** urban resilience, resilience theory, adaptation, transformation, sustainability, resilient cities, Europe

## 1. Introduction

The concept of resilience is increasingly used as an organising principle framing scientific research, political discourses and cities agenda around urban vulnerabilities and sustainability. Throughout important international urban policy agendas (as the UN New Urban Agenda, the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, among others) and programs supporting their implementation, urban resilience and sustainability have been used almost interchangeably (Elmqvist et al., 2019). Meanwhile, the conceptual development of urban resilience followed different trajectories in different contexts, being rooted in the field of climate change adaptation in Europe and disaster risk reduction in the US or Asian countries (Coaffee, 2013). This over-simplification in linking urban sustainability and resilience contributed to conceptual misalignments, inconsistencies and challenges in urban resilience implementation (Coaffee et al., 2018).

The latest advances in urban resilience research identified a number of tensions and trade-offs. They might arise from co-existence of robustness building or transformation approaches in the definition of resilience (Chelleri et al., 2015, Matyas & Pelling, 2015), or from political contestations over who is made more resilient to what and at whose expense (Vale 2013, Anguelovski et al., 2016). In their review of 25 published definitions of urban resilience, Meerow and colleagues observed that only a few definitions has explicitly addressed any of the above-mentioned issues (Meerow et al., 2016). And there has been little progress regarding this issue. Three years later, Borie and colleagues argued the conflicts over resilience perspectives and values were not resolved but merely suppressed and hidden, warning that “where diversity is not acknowledged, debates over resilience will undermine the potential for more integrated policy and democratic decision-making” (Borie et al., 2019, p. 204).

Such a malleability of the concept is perceived as beneficial by some, and problematic by others. From a theoretical point of view, resilience could be seen as a boundary object which fosters collaboration between disciplines (Brand & Jax, 2007). As Walsh-Dilley & Wolford (2015, p. 173) put, “this lack of ontological coherence unexpectedly makes resilience more productive as an object of inquiry than it would be if it were reduced to a standardised analytical framework or technical object.” At the same time, other scholars condemned urban resilience as a buzzword, attributing its ontological ambiguity to the difficulty of translating the concept from theory into practice (Olsson et al., 2015). The conceptual confusion between resilience and other similar concepts (such as sustainability) reduces their strengths and consistency in application (Anderies et al., 2013) or even leads to exclusionary policies, nullifying alternatives and hindering transformational change (Brown, 2014; Joseph, 2013). In light of these framing and implementation challenges, the paper explores critical gaps between urban resilience research and practice through close examination of urban resilience meanings, principles and relation to similar concepts (i.e. sustainability).

The overarching research question guiding this study was the following: “How is urban resilience conceptualised by urban resilience researchers and practitioners?” Based on the interviews and survey results, the paper: i) investigates conceptual discrepancies around urban resilience in these two communities, ii) provides an in-depth focus on the relation between urban resilience and sustainability, and finally iii) discusses the implications regarding the current state of resilience implementation.

We explore the European context to focus on a specific region and to be able to compare our results to similar studies from other parts of the world with different socio-economic and cultural background. The following sections will introduce: i) theoretical foundations of the above-mentioned tensions which underpin the survey and research design, ii) research design and methods and iii) critical exploration of the gaps between the academic and practitioners’ understanding of resilience,

alongside with comparison of the European perspectives with the international context.

## **2. Theoretical background: Tension embedded within urban resilience**

### **2.1 Urban resilience: aiming at conservative or transformative approaches?**

Academic literature has widely explored two main facets of resilience, metaphorically referring to “bouncing back” or “bouncing forward” approaches. This distinction derives from disciplinary traditions of engineering and ecological (and socio-ecological) fields respectively (Holling, 1996). Engineering perspective invokes bouncing back to previous status after a shock and prioritises robustness, absorb and resist capacities (Alexander, 2013). ‘Bouncing forward’ paradigm relies on innovation, change and transformation (Satterthwaite & Dodman, 2013) to mitigate future shocks and stresses.

Oversimplification of these opposite but coexisting perspectives on resilience has been explored in-depth by academic literature. The shift toward bouncing forward paradigm (Manyena, et al., 2011, Wenger, 2017), or transformative approach (Matyas & Pelling 2015) has contributed to integration of sustainability into disaster resilience, including methodological (Achour, 2015, Rodriguez-Nikl, 2015), community (Cutter, 2013) and specifically urban (Asprone & Manfredi, 2015) perspectives. This conceptual evolution intertwined with the policy discourses labelling those shifting perspectives as a need to “build back better” (Mannakkara & Wilkinson, 2013). Without entering the discussion about what “better” means (Khasalamwa, 2009), a similar conceptual evolution of resilience toward transformative approaches has happened in climate resilience (Pelling, 2011). The recent literature has investigated the linkages between climate adaptation and mitigation (Landauer et al., 2015), pointing out potential synergies but also conflicts among these two different perspectives (McEvoy et al., 2006, Thornton & Comberti 2013) and exploring the ways of linking them in climate planning practice (Grafakos et al., 2019).

The relationship between transformative and conservative perspectives has been recently explored by resilience thinking theories through incremental or disruptive innovation in population development models (Pearson & Pearson, 2012). In development studies, this dichotomy has been reframed as “functional resilience” (aiming to manage change deliberately and defining desired outcomes) and “dynamic resilience” (emphasising uncertainty, evolution and non-linearity) (Tanner et al., 2017). The latter has been referred as “evolutionary resilience” by planners (Davoudi et al., 2013) and regional economic studies (Simmie & Martin 2010, Boschma, 2014). The very fathers of resilience thinking (Walker & Salt, 2012) shift their theories about ecological and socio-ecological resilience (Folke, 2006), increasingly and explicitly integrating transformation into their frameworks (Folke et al., 2010).

All these theories and disciplines addressing resilience from different perspectives informed, in neither structured nor integrated way, how we conceive urban resilience (Chelleri & Olazabal, 2012). Unluckily, resilience implementation in cities usually follows a more engineering and simplistic perspective, supporting the socio-economic status quo (Tanner et al., 2017) rather than transformation in the face of shocks and stresses. It is more appealing to policymakers because it does not threaten power structures and regimes (Smith & Stirling, 2010, Vale, 2013). Transformation has been integrated in most of the current definitions of urban resilience, from academia (Meerow et al., 2016) and through policy implementation frameworks (The Rockefeller Foundation 2014, CRPP UN Habitat). Nevertheless, the call to frame urban resilience thinking around transformative change (Elmqvist, 2014) is extremely problematic to put into practice. Only a few studies explored the synergies, conflicts and trade-offs between conservative, adaptive and transformative approaches to resilience that emerge in their integration and implementation (Chelleri et al., 2015, Tanner et al., 2017, Coaffee et al., 2018). In some cases it is easy to determine which city characteristic needs to be robust and protected, and which needs to be transformed. But often the co-existence of adaptation and transformation potential results in complex political development and management choices, implying critical spatial and temporal trade-offs (Chelleri et al., 2015). Since the politics of resilience emerges as one of the key factors in urban resilience implementation (Vale, 2013), it is necessary to better understand how to enrich the dichotomy between protection-adaptation or transformation. This necessitates asking questions about which kind of transformation (or adaptation) we want (Meerow & Newell, 2016), who is “we” in community resilience (Mulligan et al., 2016) and how this relates to urban sustainability.

## **2.2 Resilience and sustainability: how these concepts and their principles align or diverge?**

When introducing the limitations of resilience as a useful concept driving urban transformation toward sustainability (Gillard, 2016), it sounds worth deepening the understanding of urban resilience thinking implementation. It requires reframing its initial conceptual normative and positive connotations that are associated with its metaphorical meaning of “being adaptable”. After some decades of inspiring and positive resilience thinking (Walker & Salt, 2006), also in relation to urban disasters (Vale & Campanella, 2005) and climate change (Newman et al., 2009), a criticism from academia started to emerge (Friend & Moench, 2013, Satterthwaite, 2013, Pizzo, 2015, Weichselgartner & Kelman, 2015). It has revealed how urban resilience implementation can sometimes be environmentally unsustainable (i.e. desalination plants adapt to droughts using large amount of fossil fuels) and socially unjust (i.e. green-induced gentrification or expulsions) (Anguelovski et al., 2016). Since the early criticism of urban resilience concept not always driving toward positive (or desirable) outcomes (Derissen et al., 2011, Chelleri & Olazabal, 2012), there has been an increasing exploration of: i) relationship between resilience and



(environmental) sustainability (Redman, 2014, Zhang & Li, 2018) and ii) linkages between resilience and social justice (Doorn et al., 2018; Eakin et al., 2017; Matin et al., 2018; Rodina et al., 2017).

Both these research lines were underpinned by the realisation that neither adaptation nor transformation lead to sustainability per se, despite their metaphorical meaning of bouncing forward (Wolfram & Frantzeskaki, 2016, Elmqvist et al., 2019). This poses an important task of better aligning theories and policy frameworks (and practices). While academic communities agree on conceiving urban resilience as a not always positive or desirable concept, which implies trade-offs (Chelleri et al., 2015, Tanner et al., 2017) and thus differing from sustainability (Elmqvist, 2017), multilateral agencies and policy frameworks interpret resilience as overlapping with, and almost substituting sustainability (Weichselgartner & Kelman, 2015). A recent perspective paper published by Elmqvist and colleagues in *Nature Sustainability* points out how urban resilience and sustainability are poorly understood, narrowly defined and interchangeably used even by UN Habitat New Urban Agenda and the UN Sustainability Development Goals which are supposed to be the global policy guidelines driving urban future (Elmqvist et al., 2019).

Such misinterpretation is due to different factors. Among these, sustainability per se has been simplistically implemented in cities, usually through densification and resources consumption efficiency and technocratic measures (Neuman, 2005, Checker, 2011). Moreover, the unresolved disagreement about characteristics of urban resilience led to various trade-offs among its guiding principles, as illustrated in the following lines. This had indirect implications for how resilience relates to sustainability. The literature is rich in references proposing specific indicators for enhancing the resilience of infrastructures networks (Lhomme et al., 2013), urban energy (Sharifi & Yamagata 2016), addressing flooding resilience through urban design (Liao et al., 2016), operationalising climate resilience (Leichenko, 2011), hazards and disaster mitigation (Godschalk, 2003) through the lens of communities (Cutter et al., 2008) or public investments management and urban development (Jha et al., 2013). These papers propose resilience principles and indicators addressing specific threats or stresses, within cities or urban sub-systems. The “resilience of what to what” (Carpenter et al., 2001) is clearly defined.

This is not anymore the case, however, when we shift from specific resilience to generic resilience measurement frameworks. As Schipper and Langston (2015, p. 21) stated, “despite disagreements over how to define or delineate the concept, it is hoped that there will be some sort of general convergence on the characteristics of resilience” (Schipper & Langston, 2015, p. 21). This scholarly disagreement regarding the characteristics, principles and indicators for urban generic resilience has been further explored by Sharifi et al. (2017). He found that attributes and principles of different facets of urban resilience interact with each other, which results in a complex matrix of potential synergies and conflicts which cannot per se drive urban transformation. Resilience principles therefore do not always function in

isolation (Sharifi, 2016), which would be the case for social-ecological resilience. For example, redundancy is a fundamental characteristic of resilience in social-ecological systems which contributes to adaptive capacity and sustainability of a system (Berkes et al., 2003). It might decrease the competitiveness of a city in socio-economic terms but increase resilience of an infrastructure network or benefit urban ecosystem services provided by green infrastructure. Therefore, the paradox is that while a certain degree of redundancy always benefits resilience of social-ecological systems, in cities it could imply positive, negative and neutral results that might decrease or increase adaptive capacities of each subsystem (Chelleri, 2016).

Another potential trade-off between resilience and sustainability is that resource efficiency may reduce diversity and redundancy, both of which are key features of resilience (Elmqvist, 2017). Dodman et al. (2017, p. 101) also emphasised possible tensions between social resilience and resource efficiency emerging when “mandatory energy efficiency standards might increase the costs of consumer goods so that low-income households struggle to cover the upfront costs of, for example, air conditioners or light bulbs.” At the same time, however, they noted that “some short-term strategies to strengthen economic resilience may increase the pressure on ecosystems and thus lead to inefficient resource use.” Because of this lack of consensus on indicators and approaches, this paper sheds some light on these aspects by providing the current perceptions from scholars and practitioners across Europe.

### **3. Methods**

#### **3.1 Research design**

The research design was inspired by the Meerow and Stults (2016) study which explored practitioners’ understanding of climate resilience and its principles. Our paper responds to that research by discussing the perceptions of practitioners across Europe, complementing them by responses from academics. We designed a similar questionnaire which was sent to junior and senior scholars, experts in resilience coming from different fields, and the participants of the international conference Reframing Urban Resilience Implementation held in Barcelona (December 2018). The survey was conducted from April to June 2018 and we received 97 entries.

The above-mentioned literature review assisted in framing a 12-item survey, divided into two parts. The first aimed to establish respondents’ profile and experience in resilience, and the second part contained questions as to i) whether resilience is more associated with conservative or transformative approaches, ii) how to align these two different approaches; iii) what are the resilience characteristics and principles (to double check the consistency of responses about conservative or transformative approach), and iv) a set of closed questions about the relationship between resilience and sustainability (and other similar concepts such as smart cities).

Closed-ended survey responses were quantitatively analysed using the Qualtrics platform. Open-ended responses were exported to NVivo software, where we

performed a qualitative content while taking into account the words frequency (Saldaña, 2009). The full questionnaire and the details of the coding procedure are available in Appendix A.

### 3.2 Respondents profiles

Before looking into the results, we briefly explored the profile of the questionnaire respondents. As illustrated in Fig. 1A, 82% of the respondents came from academia, while the remaining part is a mix of public sector, industry, activists and NGOs. Overall, 11 different disciplinary fields were represented as could be seen in figure 1B. Urban planning was the most popular (21%) and engineering the less represented (3%). Most of the respondents stated they had at least five years of experience in resilience, while only 20% said their work dealt with resilience but not focused solely on it.

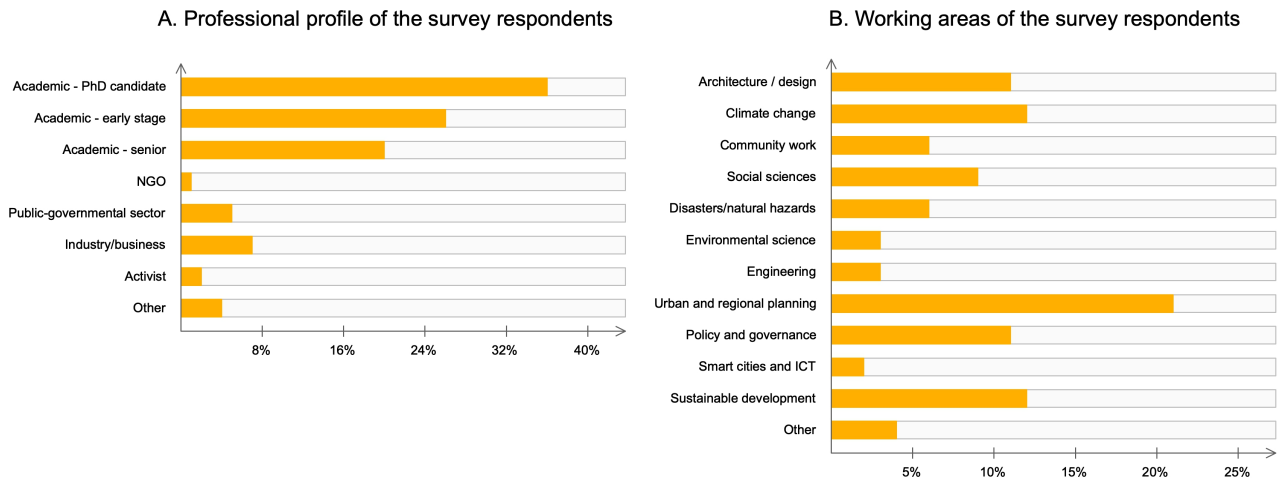


Fig. 1: Survey respondents' profiles

Due to the predominantly academic profile of the survey participants, at the second stage of our research we conducted 24 in-depth semi-structured interviews (questions followed the survey main sections) with key local practitioners working on city resilience (list in Appendix B) and covering quite a consistent part of Europe (Sweden, Finland, Denmark, the Netherlands, UK, Spain, Portugal, Italy, Greece, Belgium, Germany, Slovenia, Poland and Slovakia).

### 3.3 Limitations

Providing regional overviews about concepts is subject to inevitable limitations. The main is related to the representativeness of the sample. We tried to overcome this issue by balancing junior and senior scholars, covering different disciplines and countries of affiliation. Because of the relatively recent inclusion of the concept into the EU policy and practice, we reasonably believe that our 97 responses sample could provide an overview of definitions and perspectives. The same limitation and overcoming strategies apply to the practitioners' sample which consists of 24 different profiles across Europe. Furthermore, in the interviews with practitioners we

aimed not to provide an overview of European resilient cities (which would have been a different research question and thus design) but to compare scholars' and practitioners' perspectives on urban resilience. Last but not least, this method provides only a snapshot of urban resilience perspectives, since perceptions are not static but change and evolve through time, and resilience is a rapidly evolving topic. In particular, the research by Meerow & Stults (2016) which acted as a point of comparison for this study, was conducted in 2015, and this one in 2018.

#### 4. Results: How urban resilience is conceived across Europe?

In this section we present the results of the survey, comparing them with the practitioners' perspectives. They are organised in two subsections, the first focusing on resilience perspectives and the second on characteristics and principles.

##### 4.1 Resilience and transformation: navigating through different although coexisting approaches

###### 4.1.1 Bouncing back, forward or both?

One of the clear results from this research is about positioning the evolution of the resilience concept in reference to its “bouncing back or forward” approach. As illustrated in Fig. 2, 72% of the survey respondents indicated that resilience is both about bouncing back and forward, while the 22% said it is only about bouncing forwards and only the 6% said it's about bouncing back.

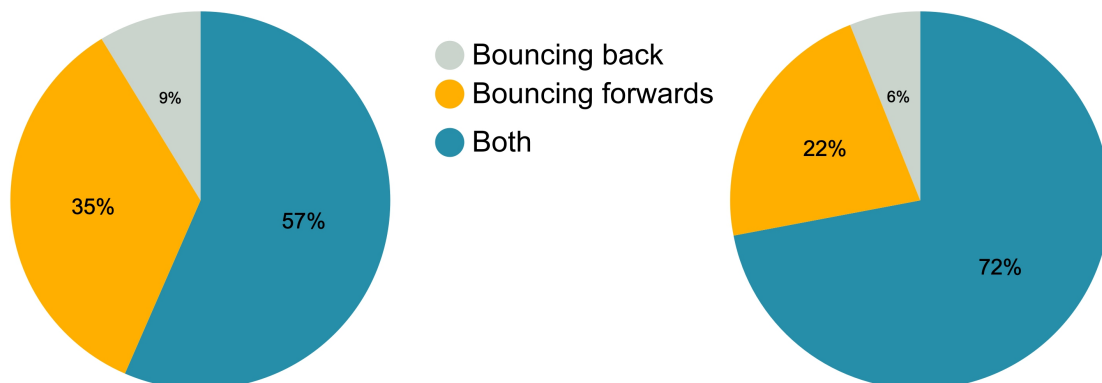


Fig. 2. Answers to the question whether resilience is primarily about bouncing back, forwards or both (Source: authors' elaboration)

This result confirms there is a conceptual evolution of resilience perspectives among European scholars. In line with the recent theory trends discussed in our literature review, they leave behind the old bouncing back approach while embracing more evolutionary perspectives on resilience. Luckily, the practitioners' perspectives also confirmed this shift, as bouncing forward ranked higher than bouncing back (see Fig. 2). “We have the ambition to bounce forward [...] to be prepared to shocks but in the meantime also see how they can improve our city” (city practitioner, the Netherlands 2019). A popular line of reasoning was that crises unfolds opportunities to enhance: “every disaster brings a possibility to transform the city and adapt to new circumstances, and develop in new direction” (city practitioner, Poland, 2019).

However, more than half of the interviewees (13 out of 24) stated resilience was not only about bouncing forward but about both bouncing back and forwards. “As changes are huge, bouncing back alone will probably not be the safer option. You need to bounce back, but while looking how to reduce future risks” (city practitioner, Denmark 2019). Finally, two interviewees said resilience is rather about bouncing back. In the words of a practitioner from Italy, “since the term resilience comes from the materials science and engineering, its very original meaning would be about the ability to bounce back [...] it is in practice only the capacity of a city to cope with its risky situations.” Even though he admitted that “I noticed Rockefeller Foundation introduced the concept of ‘Resilience Dividend’ to promote bounce forward capacities, that could therefore fit into a wider definition of resilience: after all, resilience has become an umbrella concept”. Some initial contradictions emerged among the proponents of the bounce back paradigm: “resilience is about bouncing back because cities need to anticipate and transform themselves to be resilient for eventual shocks, otherwise they will not recover from disasters” (city practitioner, Spain 2019). This sense of inconsistency while defining resilience is probably induced neither by a universally agreed framework of urban resilience nor by a clear set of principles, but a complex set of frameworks, principles and approaches for its implementation (Sharifi et al., 2016, Coaffee et al., 2018).

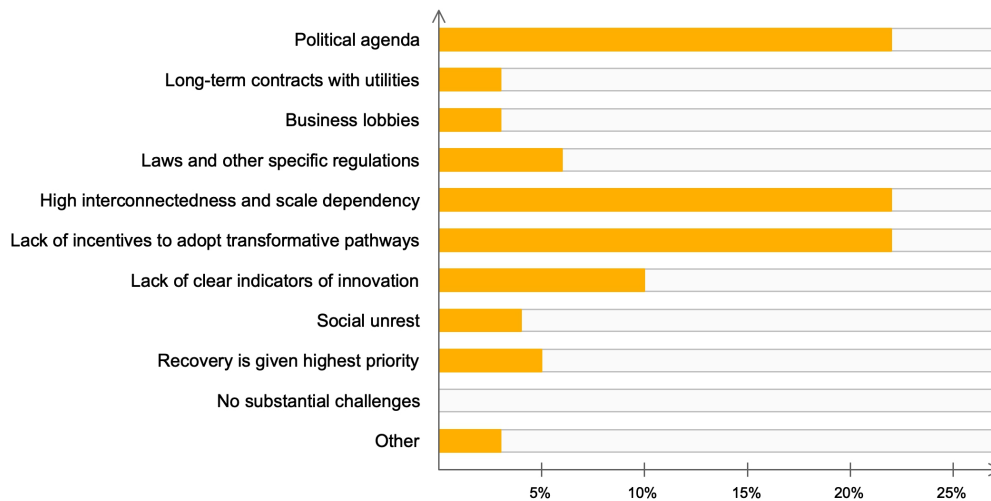
#### ***4.1.2 Concepts alignment in practice: how to implement something with potentially conflicting meanings coexisting within its definition?***

This popularity of combining ‘bounce back’ and ‘bounce forward’ approaches calls for a careful consideration of how this complex concept would be implemented. According to survey respondents, this undertaking is not devoid of challenges. As illustrated in Fig. 3, the challenges and barriers to aligning bouncing back and forward paradigms were mostly related to political agenda being framed around immediate or short-term goals, looking to keep the status quo of infrastructures, services and businesses. Another prominent challenge was the ‘high interconnectedness and scale dependency’ which refers to the feeling of being too dependent from regional or national scales in terms of markets, contracts and also regulatory power that cities lack. Many qualitative survey responses reported that “it’s difficult to innovate and scale-up innovation alone, from the local level.” Also “lack of financial and/or political incentives to adopt transformative pathways” ranked among the top barriers for integrating transformation and robustness (20%).

*Fig. 3. The barriers to reconcile ‘bouncing back’ and ‘forwards’ (based on the survey)*

Other issues (see Fig.3) included a higher priority of recovery and the lack of clear resilience indicators related to innovation. The latter means not distinguishing between incremental innovation and conservation (or enhancing efficiency) and disruptive innovation indicators driving systemic change. Regulations and social unrest were also listed among the obstacles. Long-term contracts with utilities and

### Barriers to reconcile 'bouncing back' and 'forwards' perspectives (according to the survey participants)



business lobbies received only limited attention comparing to more generic issues (both scoring only 2%), which could perhaps be explained by theoretical perceptions of scholars involved in the survey.

Unexpectedly, most of the interviewed practitioners did not see any substantial issues in implementing these divergent perspectives on resilience simultaneously. The few exceptions include a practitioner from Italy who mentioned the issue of “framing innovation” (lack of enhancing skills of individuals and groups for transformative changes upscaling), and a practitioner from Slovakia who described how numerous local constraints (i.e. land regulations and bureaucracy) made transformation difficult to meet resilience implementation. A more common position can be illustrated by the following statements: “if you plan for bouncing forward, then you can expect that you have a very quick response in bouncing back” (city practitioner from Greece, 2019) or “In order to be a transformative city, it means you take good things and make them useful. Meaning that you are also being able to be prepared if something happens. So I don't see a big contradiction” (city practitioner from Sweden, 2018). Interestingly, one respondent linked these two perspectives through the idea of learning capacities: “I think you first need to have a bit experience, understanding what it means to bounce back, to be able then to plan how to advance” (city practitioner from Slovakia, 2019).

One of the key learnings emerging from the interviews was that for most practitioners ‘bouncing forward’ implied the capacity to learn and improve while recovering and enhancing potential responsive capacities. This is a valuable insight for reframing future research on urban resilience. However, in no case ‘bouncing forward’ has been associated with innovations for radical urban transformations, as was often described by academics and the literature.

### 4.1.3 Beyond bouncing back or forward, how these perspectives relate to urban sustainability?

The overall narrative in both surveys and interviews can be summarised as ‘resilience and sustainability do not always share the same goals, but nevertheless they do not contradict each other.’ Indeed, most of the survey respondents (74%) said that resilience does not always have the same goal as sustainability (Fig. 4A); more than a half (60%) believed resilience and sustainability do not contradict each other (Fig. 4B). Nevertheless, it is difficult to establish a clear understanding of the links between these concepts. Among those who don’t see resilience and sustainability as conflicting, about a half (51%) considered resilience as a prerequisite for achieving sustainability, only 15% disagree with that and 34% said that ‘not always’ (Fig. 4C).

Curiously, only 16% of the surveyed European academics agree that resilience is more appealing to policymakers than sustainability, which stands in contrast to the international literature (see, e.g. US perspective in Redman, 2014). Slightly more than a half of our survey respondents (58%) said “not always”, which might suggest the increasing confusing in the perceptions of resilience and sustainability.

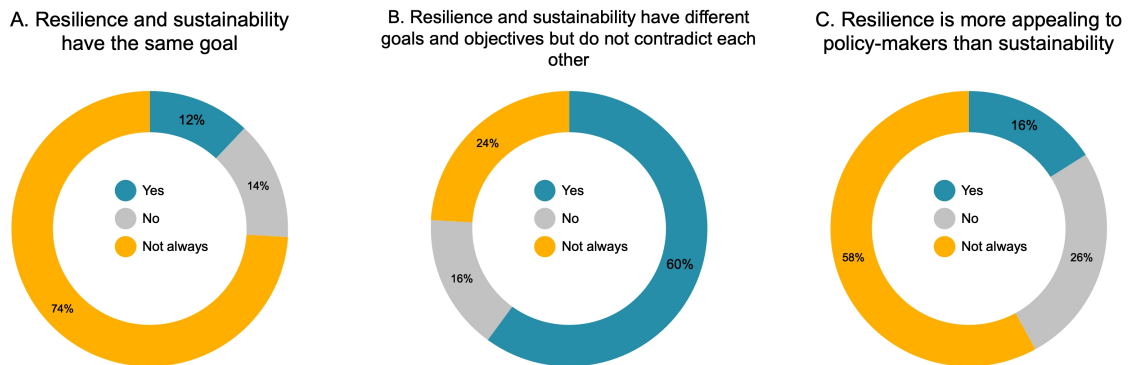


Fig. 4: Relations between resilience and sustainability (based on the survey).

Unfortunately, the interviews with practitioners did not clarify the linkages between these two terms. While about 60% of them considered that resilience and sustainability have aligned goals, the remaining 40% put forward examples explaining how the concepts’ goals significantly differ. Still, some of those who think the concepts’ goals are aligned saw sustainability as an umbrella and broader concept in which resilience is nested. They talked about how these concepts “are very similar, but sustainability goes further [...] making sure future generations can live as well or better as we do” (city practitioner, the Netherlands, 2019), that “resilience is the basis of sustainability” (city practitioner, Slovakia, 2019), or argued that “there are no differences between the two concepts. We use sustainability to define the global long-term goals, and resilience to define our local specific short-term actions” (city practitioner, Italy, 2018).

Others saw *resilience as the broader term*. In the words of a practitioner from Poland, “resilience is the next step in city’s development, following sustainability”.

Those who thought resilience and sustainability have different goals also suggested that "working in resilience is a consequence of not having worked enough on sustainability" (city practitioner, Spain, 2019), or described how unsustainable issues can be very resilient: "a sustainable place should be resilient, but you don't need to be sustainable to be resilient. An unsustainable solution like heavily engineered flood defenses can enable a community to be more resilient" (city practitioner, UK, 2019). According to the city practitioner from Italy (2019), "there are cases where a policy can be environmentally unsustainable yet that measure is definitely increasing resilience. As an example, if we want to safeguard some low-lying cities from an increasing sea level, we cannot limit the actions to soft and environmentally friendly solutions, but intervene with huge engineering. There are no other options in these cases, and as a result, resilience and sustainability are sometimes even in conflict." And more about maintaining the unsustainable status-quo while promoting resilience: "In Thessaloniki we are not sustainable in term of mobility, but we are building resilience for emergency cases if something happens. In this case we are building resilience for an unsustainable system to persist and maintain its functions" (city practitioner, Greece, 2018).

Interestingly enough, a number of interview respondents saw resilience as a more dynamic and socially-oriented concept: "Sustainability has some kind of physical, technical aspect to it, while resilience has much more social context to it" (city practitioner, the Netherlands, 2019). They also felt that resilience provides a more clear guidance: "sustainable development can and should have concrete goals and actions in addition to the important more general goals, but often that is not the case (yet). Resilience, on the other hand, at least as adaptation planning, has nowadays concrete actions in some sectors in addition to the more general goals or strategies (city practitioner, Finland, 2018).

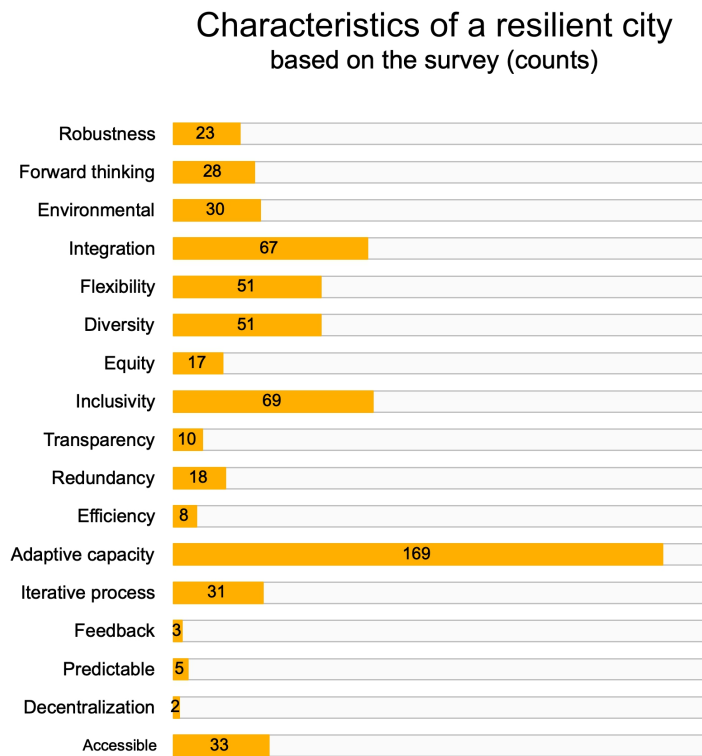
#### **4.2 Urban resilience characteristics: which principles are driving implementation?**

To test the consistency of the above-mentioned responses, we looked into how the urban resilience principles and characteristics brought up in the survey and interviews relate to the generic definitions of resilience. When asked to list urban resilience characteristics, survey respondents provided various types of answers, ranging from a strict list of principles to sentences explaining them. The results of the coding and content analysis of their answers are summarized in Figure 5. Overall, socially-oriented and soft characteristics (i.e., capacities) turned out to be more popular than technology and hard ones (i.e., referred to infrastructures and buildings).

The answer 'adaptive' won by a huge margin, perhaps due to its metaphorical meaning that avoids a specific definition of the characteristic. It was followed by "inclusivity", "integration", "flexibility" and similar characteristics which were mentioned more than "robustness". Results therefore reflect the idea that resilience



measures and implementation should be based on open processes focusing on social justice. Similar answers were given to the open-ended questions about the strategies and characteristics of urban resilience. However, “flexibility” and “diversity” were also mentioned in relation to “enhancing across scales and sectors collaborations”. For some, “diversity” meant “good social mix”, while for others it was about land use and urban planning. Among the least popular characteristics turned out to be “decentralisation” (maybe because it sounds too engineering, although in fact it linked to most ranked characteristics), “predictable” (seeing resilience as a command and control practice) and “feedback” (more in line with social-ecological literature than urban studies one which usually refers to participation, inclusivity, process and learning, rather than feedbacks among subsystems).



*Fig. 5. Number of characteristics of a resilient city based on coding (among survey participants)*

In the interviews, most of the practitioners named the characteristics that are in line with a socially-centred perspective on resilience (equity, empowering, inclusive); the second big group of responses referred to risk preparedness-related characteristics. Among the most popular concepts in the first group were “social justice”, “inclusive city”, “small income differences, equal opportunities”, “little segregation”, “participation in planning processes”, “cooperation among stakeholders.” A practitioner from Italy put it like that: “without sufficient awareness and

participation by citizens, no resilience policy is seen as acceptable. Awareness is the foundation of the resilient city”. Similarly, in the words of a practitioner from UK, “resilience is about the empowerment of communities to deal with the shocks and changing circumstances that hit them on a regular basis.” Reflecting on the role of communities, one of the city practitioners from the UK (2019) said it is necessary to “enforce and build resilient communities, risk aware and not risk adverse, and prepared to work in a collaborative way to help themselves”. In addition, “to have a resilient city you require empowered, knowledgeable citizens, trusting officials and key understandings on who is delivering what. Less resilient communities rely on “others” to solve problems for them, feel that things happen to them and that that they have limited control over actions” (city practitioner, UK, 2019).

The second group of responses was about disaster preparedness, featuring characteristics such as “risk governance”, “anticipatory capacity”, “well-prepared” or “understanding future risks”. Most of them are key resilient characteristics and capacities necessary to maintain “functioning, well maintained infrastructure” (city practitioner, Finland, 2019), or “robust critical infrastructure” (city practitioner, Sweden 2018). According to a city practitioner from Slovakia, you need to have “a very good knowledge base of what is vulnerability, which areas, who is vulnerable, what is the risk and where is the risk. You have the data based on which you can move forward and do the planning”. Importantly, all the practitioners mentioned characteristics from both groups, what differed was the extent of elaboration each group received.

Comparing the results from the survey and practitioners’ interview responses, both groups listed and built discourses to explain characteristics by using again quite metaphorical, or generic concepts, rather than clear physical or management characteristics (i.e. decentralised infrastructure networks, or integrating nature in cities, or more adaptive regulations, or co-management strategies for urban services, etc. In a way, we could say that when asked to address the core aspects of urban resilience, both groups rather illustrated which are the linkages to other concepts, for instance by listing the notions of inclusivity, equity and empowerment that can be associated with distributive, procedural and recognition aspects of justice.

## **5 Discussion and conclusion**

### **Gaps between theory and practice, and emerging questions for urban resilience research**

Quite a confusing landscape of understanding emerged from the survey and interview results, especially with regard to practitioners’ perspectives and implementation consistency between definitions and characteristics of urban resilience. We could start by comparing our results to the previous research conducted by Meerow & Stults (2016) about the US practitioners’ perspectives on climate resilience. Before embarking on the comparison, it is worth mentioning that in Europe mobilisation of the urban resilience concept developed in the context of

climate change adaptation (Coaffee, 2013) and was therefore linked to broader environmental and sustainability concerns. On the contrary, in the US (similarly to Asia) it emerged in relation to disaster risk reduction and security. This background is in line with the Meerow & Stults (2016) study indicating the preference to ‘bouncing back’ approach and emphasis on robustness as a key characteristic. Our results suggest a significant difference between the EU and US perspectives, since both researchers and practitioners across the EU tended to define urban resilience as linked to bouncing forward or a concept integrating bouncing forward and back approaches.

Whereas both the US and EU practitioners mentioned ‘adaptive capacity’ among the most popular characteristics of urban resilience, the difference is that across the EU it was on the first place, while in the US on the second after robustness. However, it is not very clear yet how the popularity of ‘adaptive capacity’ as a main resilience characteristic is translated into practices toward ‘bouncing back’ or ‘bouncing forwards’ approaches. Indeed, the metaphorical strength of adaptive capacity – a vague and inconsistently defined notion in itself (Hinkel, 2011) – contributes to drive its implementation challenges, since it spans over different levels of decision-making (Eakin et al., 2014), being a highly scale and context-dependent (Siders, 2019). Furthermore, its perceptions are also subjective (Ziervogel et al., 2016), meaning that adaptive capacity should be considered not as an abstract and metaphorical criterium, but as situated within a particular social and cultural context (Cote & Nightingale, 2011).

On the first glance, there is a clear difference between the US and EU perspectives: while the former is rooted in engineering, the second is in sustainability. However, upon a closer look the difference looks smoother. We noticed an interesting mismatch when it comes to ‘bouncing back’ and ‘forwards’ approaches. When asked straightforwardly, more people chose ‘bouncing forwards’ rather than ‘bouncing back’. However, when we scrutinized the characteristics and strategies listed through the answers (to open-ended questions), it curiously turned out that the ones associated with bouncing back (e.g. withstand, resist, counter, absorb) were far more mentioned than those related to bouncing forwards (e.g. derivatives of the words transition, transformation, change, improve). This suggests that while the definition of urban resilience related to ‘bouncing forwards’ metaphors has become more popular, different actors might still have different ideas about what it entails, thus implementing urban resilience strategies related to ‘bouncing back.’

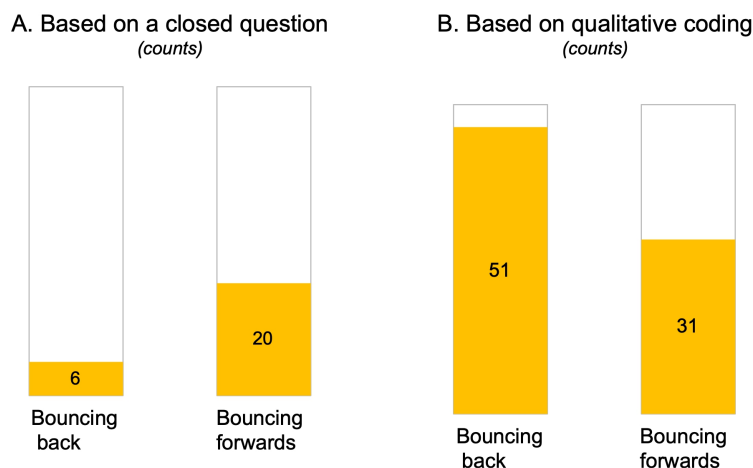


Fig. 6. Comparing the results from closed-ended and open-ended questions

From this mismatch various considerations could emerge:

1. *Lack of consistency among European practitioners regarding the implementation of transformational resilience approach.* While practitioners have grasped the trend of linking resilience to transformation and change (rather than robustness only), there is an emerging inconsistency about how this new paradigm relates to practice. This deduction comes from the above-mentioned misalignment between the perspectives and characteristics and can be illustrated by the quotation from a Spanish practitioner: “resilience is about bouncing back because cities need to anticipate and transform themselves to be resilient for eventual shocks.” Indeed, while papers linking resilience and transformations call for systemic transitions toward sustainability (Elmqvist, 2014, Matyas & Pelling, 2015), practitioners’ perspectives are far from this framing, relating transformation to improvement, learning and change for better disaster resilience preparation and reaction (see section 4.2).

2. *Urban resilience theory fails to properly guide implementation through resilience characteristics and principles.* Recent literature has stated that while defining urban resilience is easy, the consensus over a clear set of characteristics is still a challenge (Sharifi et al., 2016, Coaffee et al., 2018). There are limits of applicability of social-ecological resilience principles in urban systems (Chelleri, 2016): while redundancy and connectedness are key characteristics of resilient social-ecological systems, they are not always good indicators for resilience of the sub-urban system (Olazabal et al., 2018). Critically looking into the paper results, it seems clear that most of the urban resilience characteristics do not further describe resilience features, thus failing to guide the implementation of different approaches. Instead, most of the characteristics mentioned reflect attributes linking resilience and social justice, participatory planning, inclusive urban development and others (see Fig. 5).

A vivid example of this tendency is the lack of weight and strength that the concept of “decentralisation” received throughout our study. Decentralisation has indeed the metaphorical and practical potential for precisely driving the implementation of a specific urban resilience (transformative) approach toward empowerment. It does so by shifting the control over urban infrastructure and resources from a central institution to the local level, by promoting redistribution of benefits as well as local involvement in planning and decision making (Sharifi et al., 2017). However, it was barely mentioned among the characteristics of a resilient city in our questionnaire responses and interviews. This confirms our main deduction that while urban resilience characteristics are still not mature to consistently drive resilience implementation, they are instrumental in establishing bridges among disciplines or goals.

3. *“Bouncing forward” (or transformational resilience) most of the time is not aligned with sustainability.* As introduced through the literature review (section 2.2),

urban transformations are not only related to sustainability (Wolfram & Frantzeskaki, 2016) but also to theoretical discourses around evolutionary (or dynamic and transformational) resilience (Chelleri & Olazabal 2012, Davoudi et al., 2013, Elmqvist, 2014, Pelling et al., 2014). Our results confirmed the perspective raised by Wolfram and Frantzeskaki (2016) about transformational aspects are not always sustainable. Indeed, when asked about how to bounce forward, practitioners gave answers mostly related to enhancing preparedness to future shocks. Notwithstanding some recent papers addressing and problematizing the linkages between urban resilience and sustainability (Zhang & Li, 2018, Romero-Lankao et al. 2016), our survey results highlighted two different perspectives among the respondents. On the one hand, resilience and sustainability have different goals but not necessarily contradict each other (section 4.1.3). On the other, lack of incentives and political agendas were listed among the barriers for aligning urban resilience to bouncing forward implementation. This is a clear evidence about the gap between what is aligning resilience and sustainability in theory versus what it implies in practical terms. Our results suggest that while international policy agendas use urban resilience and sustainability almost interchangeably (Elmqvist et al., 2019), on-the-ground perceptions are far from sustainability transformations or transitions, as even references to transformative resilience approaches boil down to bouncing back and performance enhancement.

## **5.2 Emerging questions for urban resilience research**

The overall result of this paper is that across Europe the understanding of urban resilience has been evolving toward integrating its different perspectives. However, when it comes to the details about how to do it or listing the specific characteristics, both academics and practitioners provide different (and sometimes confusing) responses. Some critical literature suggests the very idea of resilience should be abandoned as it relies on technocratic fixes, economic growth and green consumption (Bonds, 2018; Kaika, 2017; MacKinnon & Derickson, 2012; Neocleous, 2013). Throughout our interviews, on the contrary, resilience was perceived as having more social and process-oriented flavours than sustainability, which in turn sounded more technocratic. In light of these results, we suggest a few research lines that address the above-mentioned gaps within the definitions and principles of urban resilience in Europe:

*1. Assessing the policy coherence of urban resilience.* There is a need to further explore regional and local policy discourses, in particular their evolution and linkages with specific implementation and practice, in order to test the consistency of urban resilience definitions, approaches and implementation.

*2. Deepening the understanding of relationship between urban resilience and sustainability.* Under what conditions urban resilience and sustainability have the same goal? When do they contradict each other? To what extent this

contradiction could be overcome with help of technological solutions, and when it is a matter of political, ethical and cultural behaviour? Before linking resilience to sustainability in a normative way, we need to understand which specific resilience needs to be decreased in order to allow urban sustainability transformation, and get clearer insights about to whom and which resilience is desirable and why.

*3. Defining and agreeing on the urban resilience principles and characteristics.* As described above, social-ecological system resilience principles cannot serve as guiding principles for urban resilience. This realisation necessitates further refinement, exploration and agreement among scholars and practitioners. Urban resilience implementation is still guided by principles linking resilience to other goals rather than to its consistent implementation (Section 5.1). Which characteristics and principles should guarantee implementations consistent with the given definitions?

Finally, as proposed recently by Harris et al (2017), *the process of decision-making should become itself the target for research, innovation and transformation.* Having a rich set of case studies examining decision-making process about urban resilience mainstreaming, which actions are put in place, how these relate to theories, and how theory could guide urban agenda and implementation are the key steps to follow in the future of urban resilience research.

**Acknowledgements:**

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## **APPENDICES**

### **Appendix A: Questionnaire**

#### **I. Identification of the participant**

This questionnaire is part of a study which explores how urban resilience is framed by researchers and practitioners in different fields. The questions in the first section will help us to understand how resilience is related to your work. In the second section you will be asked to share your opinion about characteristics of and strategies for resilience. It will take you about 15 minutes to complete the survey. We greatly appreciate your participation and express enormous gratitude for your collaboration.

The results of the survey will be processed anonymously. Should you have any questions about the study, please get in touch: [baravikova.a@gmail.com](mailto:baravikova.a@gmail.com)

Q1 What is your current professional profile?

- Academic - student/PhD candidate
- Academic - early stage researcher
- Academic - senior
- NGO
- Public-governmental sector
- Industry/ business
- Grassroots / community activist
- Other (please specify)

Q2 Please select up to three areas that your work fits into best.

- Architecture / design
- Climate change adaptation and mitigation
- Community work
- Social sciences
- Disasters/natural hazards
- Environmental protection / natural resources management
- Engineering
- Urban and regional planning
- Policy and Governance
- Smart cities and ICT
- Sustainable development

•Other (please specify)

Q3 What is the country of your current affiliation?

Q4 If there are other countries that have been significantly related to your work over the last 5 years, please indicate.

Q5 How central is resilience to your work?

- It is a primary focus of my activities (please specify)
- A great deal of my work is related to resilience (please specify)
- Some part of my work is related to resilience (please specify)
- My work has nothing to do with resilience

Q6 For how long have you been working on resilience?

- Less than a year
- From 1 to 5 years
- from 6 to 10 years
- more than 10 years

Q7 Is the word 'resilience' explicitly mentioned in your work?

- Yes
- No (please specify what are the terms used instead of it?)

## **II. Questions about resilience perspectives**

Q8 Resilience is primarily about:

- The ability to bounce back
- The ability to bounce forward
- Both bouncing back and bouncing forwards

(Display this Question: If answer is "Both bouncing back and bouncing forwards")

Q9 What are the key challenges to combine 'bouncing back' and 'bouncing forward' visions of resilience? (select up to three)?

- Political agenda
- Long-term contracts with utilities
- Business lobbies
- Laws and other specific regulations
- High interconnectedness and scale dependency (it is difficult to innovate alone)
- Lack of financial and/or political incentives to adopt transformative pathways
- Lack of clear indicators of innovation (it is difficult to draw a boundary between bouncing back and forward)
- Social unrest
- Recovery is given highest priority



- There are no substantial challenges
- Other (please specify)

Q10 Could you please list up to 10 characteristics of a resilient city?

Q11 Could you please list up to five most important strategies to achieve city resilience?

Q12 Do you agree or disagree with the following statements on relations between resilience and other concepts?

	Yes	No	Not always
Resilience and sustainability have the same goal			
Resilience is a prerequisite for achieving sustainability			
Resilience and sustainability have distinct different goals and objectives but do not contradict each other			
Resilience is more appealing to policy-makers than sustainability			
Resilience is better defined and more measurable than sustainability			
The concept of smart cities is more relevant for resilience than for sustainability			
All of these are unhelpful buzzwords			

The answers about characteristics and strategies were compiled together, as in many cases they were similar or overlapping (e.g. when asked about strategies respondents named characteristics — and the other way around.) Even though word frequency does not necessary suggests significance, it has been automatically calculated because it may reveal “any emergent but as yet undetected patterns” (Saldaña, 2009). Totals include stemmed versions of the words (e.g. both ‘sustainability’ and ‘sustainable’). In addition, a number of other, more focused word frequency queries were run. For instance, to examine the first tension ('bouncing back / forward'), the query contained synonymous and associated words, because terms ‘bounce back’ or ‘bounce forward’ are not used that much.

Then, during an iterative reading of the data, thematic codes were identified and elaborated using a combination of inductive and deductive coding. Some preliminary categories were established with the help of literature review; in particular, the list of potential characteristics comes from Meerow et al (2016) paper). The same unit of text could be included in more than one category. As a way

to explore data, some codes and themes (when appropriate) were assigned to the five dimensions for assessments of urban resilience suggested by Sharifi & Yamagata (2016): materials and environmental resources, society and well-being, economy, built environment and infrastructure, and governance and institution. These categories, however, were used as an analytical exercise to get a better understanding of the topics popularity. They did not directly correspond to the research questions and therefore were not discussed in this paper.

## Annex B.

**Table 1. The list of the interviewees**

	City	Country	Affiliation
1	Bologna	Italy	Sustainable development office
2	Glasgow	UK	Resilience office
3	Antwerp	Belgium	Climate adaptation office
4	Copenhagen	Denmark	Resilience office
5	Cascais	Portugal	Innovation department
6	Växjö	Sweden	Strategic planning office
7	Santiago de Compostela	Spain	City council
8	Germany	Germany	Consultancy
9	Helsinki	Finland	climate and environmental office
10	Thessaloniki	Greece	Resilience office
11	Wroclaw	Poland	Sustainable development office
12	Bratislava	Slovakia	Architecture office
13	Barcelona	Spain	Resilience office
14	Bologna	Italy	Innovation office
15	Rome	Italy	Innovation office
16	Rotterdam	Netherlands	Resilience office
17	Dordrecht	Netherlands	City council
18	Glasgow	UK	Spatial planning office
19	Ljubljana	Slovenia	City council
20	London	UK	Private company
21	Bratislava	Slovakia	Ministry of Environment
22	Bologna	Italy	City council

23	Cascais	Portugal	City council
24	Stockholm	Sweden	City council

## **PAPER 2**

# **Operationalising urban resilience: insights from the science-policy interface in the European Union**

**Abstract** By examining three policy-oriented research projects funded by the European Union (RAMSES, RESIN, SMR) the paper critically discusses operationalisation efforts of urban resilience as they are designed and produced at the interface between science and policy. By analysing the documents and conducting interviews with the projects' coordinators and participants, three main research questions were addressed concerning how urban resilience is defined across the projects and the actors involved, the role of the tools produced by them in their difficult task to reconcile wider applicability and local specificity and finally how stakeholder engagement and co-creation were framed and implemented. Based on the evidence collected, the authors argue that conceptualisations of urban resilience within operationalisation efforts being produced at the science policy-interface are still quite plural and open, that such openness is largely confirmed by the flexibility of the tools produced by the projects and that while becoming increasingly relevant stakeholder engagement and co-creation strategy are yet to be fully framed and theorised. Finally, they present further research pathways aimed at strengthening our knowledge of operationalisation efforts, the role of practitioners and of urban resilience implementation in discreet scientific and political environments.

**Keywords:** urban resilience, science-policy interface, EU, co-creation, operationalisation

## 1 Introduction

During the last decade, urban resilience has sprawled across policy frameworks and discourses from the local to the global scales, becoming a defining term for many debates around urban issues. It has been seen as an appealing and intuitively graspable concept which can serve as a bridge between different disciplines and policy areas. The actual operationalisation of the concept, however, remains a largely unresolved issue, despite growing efforts of scholars and international practitioners to define, measure, evaluate and test it by identifying both qualitative dimensions and quantitative measures to analyse the performance of specific urban systems (Allen et al., 2018; Bahadur & Tanner, 2014; Kirbyshire et al., 2017; Quinlan et al., 2016; Sharifi & Yamagata, 2016).

The way urban resilience is conceptualised and operationalised determines whether it is integrated into urban planning and policy-making processes, through which specific measures, who benefits from them and who does not (Chelleri et al., 2015; Meerow & Newell, 2016). The lack of operationalisation is argued to hinder the actual use of the concept on the ground, and therefore concerns have been raised regarding the risk for it to become an “empty signifier” (Weichselgartner & Kelman, 2015, p. 1) or “nothing more than a rhetorical device” (Davidson et al., 2016, p. 27). Calls for more conceptual clarity and better operationalisation of urban resilience date back to almost two decades ago (Carpenter et al., 2001) and have been restated also in the recent publications (Coaffee et al., 2018). While it seems there is no consensus over the exact meaning of the concept yet, resilience features in

increasingly numerous policies and projects around the world. This pushes scholars to ask key critical questions: what visions of urban resilience emerge in its rapidly developing policy domain? How — if at all — the challenge of operationalisation has been approached in policy-making arenas and processes?

These questions are at the heart of our research. We examine them in the context of the European Union (hereafter EU). EU policy-making realms and tools are of great relevance for this discussion, as urban resilience is now prominent in many of its programs and initiatives related to urban governance and adaptation to climate change in cities (Section 2.2). So far, however, little research has been conducted into the actual conceptualisation and operationalisation of this concept in the EU policies and projects (with some notable exceptions, e.g., a study on the EU FP7 TURAS project by Collier et al. (2016) or Coaffee & Davis (2015) on HARMONISED.)

To address this gap, it is critical to look at boundary spaces at the interface of science and policy (Wessenlink et al., 2013) that allow to intercept operationalisation efforts in their production before they reach actual policy-making situations. In this perspective, the paper focuses on three EU-funded research projects aimed at designing operationalisation models of urban resilience – RAMSES, RESIN and SMR – which represent networks of scientific institutions, local governments and companies.

Critical analysis of these cases allows us to make a meaningful contribution to the operationalisation debates, bringing much-needed empirical evidence in theoretical discussions. We believe these insights will help to better understand the gaps between urban resilience theories and practices, as well as how the concept is mainstreamed at the EU level.

The paper is structured as follows. We start by highlighting key challenges and existing approaches in the operationalisation of urban resilience. Then we trace the emergence of the concept in the EU policy landscape (Section 2), which allows us to contextualise the three projects that are introduced, alongside with our research methods, in Section 3. We proceed by discussing the definitions of urban resilience and the strategies of its operationalisation employed by the projects examined. In particular, we investigate the potential tension between wider applicability and local specificity, as well as the impact of stakeholder engagement and co-creation. These questions are examined in detail in Section 4 (Results), while Section 5 (Discussion) provides a more synthetic perspective and links the results to the previous insights from the literature on urban resilience in Europe and other contexts. We conclude by critically discussing how RAMSES, RESIN and SMR contribute to our understanding of operationalisation of urban resilience and its challenges.

## **2. On operationalising urban resilience and its development in the EU**

## 2.1 Unpacking the problem of operationalisation

While flexibility and potential for metaphorical uses may make resilience an inspiring ‘boundary object’ (Meerow et al., 2016), they also imply the term is interpreted differently across disciplines and policy communities. Broadly speaking, two major approaches to resilience are distinguished: engineering (or ‘bouncing back’) and evolutionary (or transformative, dynamic resilience, “bouncing forward”). A comprehensive comparison between them and a discussion on resilience across different disciplines can be found elsewhere (Bahadur and Tanner, 2014; Chelleri & Olazabal, 2012). This subsection reflects on the current state of operationalisation efforts.

In recent years, within academic and policy literatures, a shift from the engineering approach that focuses on “what can be done now and what can be achieved within the existing governance context” (Tanner et al., 2017, p. 8) to the evolutionary one, which embraces uncertainty and transformation, has become increasingly evident (Biermann et al., 2015; Coaffee & Lee, 2016). The key elements of the evolutionary (transformational) view of resilience include its emphasis on the need to look across sectors and consider cascading impacts (Chelleri et al., 2015) as well as interdependencies between human behaviour and infrastructures (Doorn, 2017) and, more at large, between socio-ecological and socio-technical systems. Transformational resilience is also seen as a way to address criticism of an engineering, “bouncing back” approach, which disguises or inadequately addresses political dimensions. Transformational resilience, by contrast, entails challenging the status quo and the existing neoliberal order, asking the question “resilience for whom and to what?”. It scrutinises the role of local constraints and unbalances emerging from sociodemographic factors, socio-spatial inequalities and power relations in real-life contexts. These constraints and unbalances may have a significant effect on which planning choices and investments are prioritised, thus we cannot successfully operationalise resilience without understanding the political and decision-making contexts (Davoudi, 2018; Matin et al., 2018; Meerow & Mitchell, 2017; Romero-Lankao et al., 2016; Ziervogel et al., 2017).

However, this shift to an evolutionary or transformative approach is not unproblematic. Some recent research has demonstrated that, while the idea of transformation has been widely accepted at the discursive level, many characteristics of engineering perspective still prevail among academics and practitioners (Chelleri & Baravikova, forthcoming). The challenge is that aligning ‘bouncing back’ and ‘bouncing forward’ visions on resilience implies inevitable trade-offs across spatial and temporal scales. Chelleri & Olazabal (2012) illustrate this argument showing that when the goal is building resilience to short-term disruptions, the objective is system persistence, whereas a long-term perspective would necessitate some degree of transition or transformation. Potential tensions exist “between maximising specified resilience to existing threats and general capacity to adapt to unanticipated disruptions” (Meerow & Newell, 2016, p. 16). It is also unclear whether resilience

should be understood - and therefore operationalised - as a final desirable state to be achieved (as an engineering approach suggests), as a process with multiple equilibria or as a quality necessary to achieve sustainability (Elmqvist, 2017; Redman, 2014).

Furthermore, considering its complexity, the operationalisation of transformational resilience is particularly difficult. First, challenging the status quo and the existing neoliberal order is not an easy undertaking; second, since it involves more uncertainty and “targets, strategies and goals are continuously adjusted across scales, sectors, and multiple potential arenas of action”, transformational approaches to resilience are more difficult to translate into implementation than engineering approaches (Tanner et al., 2017, p. 8). Finally, while dealing with interdependencies is inherent to resilience theory (Yamagata & Sharifi, 2018), how to frame and understand them remains a great challenges for operationalisation (Kirbyshire et al., 2017; Doorn, 2017).

Besides the problems arising from different definitions of resilience, there are issues with the operationalisation attempts themselves. First, “many of the existing frameworks for measuring resilience are too data-demanding, too academic or too time-sensitive to meet practitioners’ needs for rigorous monitoring and evaluating of resilience interventions” (Kirbyshire et al., 2017, p. 37). Secondly, existing operationalisation approaches are usually context-specific and have limited replication value (Ghimire et al, in Yamagata & Sharifi 2018), indicating a potential tension between local specificity and wider applicability. Furthermore, they often serve not as a tool to elaborate a strategy through specific actions but as a mechanism to diagnose issues (Tanner et al., 2017).

Engaging stakeholders is increasingly seen as a way to address the challenges outlined above. It allows to include different stakeholders’ perspectives (Meerow & Mitchell, 2017), makes the knowledge more relevant and accessible for them, as well as to deal with siloed thinking by stepping away from sector-based planning and recognising interconnectedness (Yamagata & Sharifi, 2018). Bottom-up negotiation not only allows to clarify the meaning of resilience and its characteristics, but also addresses the questions of “for whom, to what, where, when and why” and may serve as a source for innovation (Crowe et al., 2015). Theoretically, this approach is underpinned by seeing resilience as a process, a negotiation which inevitably entails contestation and considers the likelihood of inherent trade-offs (Harris et al, 2017). In practice, it is realised through the mobilisation of a wide array of stakeholder involvement technologies such as participative processes, collaboration, co-design, co-creation and urban laboratories (Wardekker et al. (2010); Coppola (2016), Chelleri (2018)).

To sum up, the underlying factors that impede operationalisation are related to different rationales of engineering and evolutionary approaches to resilience, complex nature of interdependencies, local political constraints and power

imbalances, as well as limited applicability of general frameworks across different contexts.

## **2.2 The rise and spread of urban resilience in the EU policy-making.**

The spread of the urban resilience discourse in Europe is to be understood in the context of the wider development of urban resilience-focused projects, partnerships and networks at the global level and, more in general, of the broadening role of cities in sustainability and climate change governance (Bulkeley & Betsill, 2013). Differently from the US and Asia (Coaffee, 2013; Coaffee & Lee, 2016), the mobilisation of the concept in the realm of EU policy-making mostly developed not in relation to disaster risk reduction and security but, instead, in relation to climate change adaptation (ibid), which in turn emerged from broader environmental and sustainability concerns.

A series of steps led to the adoption of the EU adaptation strategy (EC, 2013), such as the 2009 white paper 'Adapting to climate change: towards a European framework for action' (EC, 2009) where resilience was mentioned in relation to health and infrastructure, the launch of the EU Cities Adapt Project (2011-2012) which has also informed the strategy, the opening of the Climate-ADAPT platform in 2012 and the launch of the Mayors Adapt Initiative set up by the European Commission (EC) in 2014 and then merged into the Global Covenant of Mayors for Climate and Energy in 2017 (Haupt and Coppola, 2019; Kemmerzell, 2018).

The launch of the Adaptation strategy coincided with the rise of nature-based solutions (NbS) as EU's "best practice" in adapting territories to climate change (Maes & Jacobs, 2017). Due to the efforts of DG Research and Innovation, together with the European Investment Bank (EIB) which promotes natural capital financing and consultancy for cities, NbS have become a key policy line and a strong agenda within the resilience discourse in Europe (Faivre et al., 2017).

Moving closer to the science-policy interface, the reports produced by the European Environmental Agency (EEA) inform policies and calls for applications and financing projects within specific frameworks such as FP7, Horizon 2020 and Life.

## **3. Methods**

### **3.1 Research design**

Previous research on operationalisation has focused on developing typologies and principles of urban resilience (e.g., six principles by Wardekker et al., 2010, or three ideal types by Davidson et al., 2016). This study, in contrast, does not suggest new ways of operationalisation: instead, it examines existing efforts in the EU policies and research projects.

It is guided by an overarching question: How is urban resilience being operationalised in the science-policy interfaces of the EU? This overarching question is addressed through three sub-questions:



### 1. How is urban resilience defined?

*We examined whether and how urban resilience is defined across the projects, looking into whether any shared understanding emerges, what are the eventual differences and whether it is framed as “bouncing back”, “forward” or both.*

### 2. How were the tools designed and tested during the projects used by cities within and beyond their duration, and what were the challenges and limitations in such a process?

*We investigated the role of tools in operationalising urban resilience and looked at the strategies to reconcile wider applicability and local specificity. We also inquired whether the tools continue to be used after the project is over.*

### 3. What is the role of co-creation and stakeholder engagement in operationalising urban resilience?

*We looked into the kind of actors involved, based on which principles and through which participative practices. This subquestion was underpinned by theoretical assumptions that stakeholder engagement might play an important role in operationalising urban resilience.*

## **3.2 Data sources and analysis**

We started by examining the relevant EU policies that were selected based on the overview presented in Section 2.2. In total, 13 documents were consulted, including strategic policy papers and policy reports in the field of climate adaptation (see the list of documents in Appendix). In our analysis we marked down the definitions of urban resilience (or lack of), the context in which they appear, the mentions of stakeholder engagement and co-creation and suggested interventions to enhance resilience.

In the second stage, to enable a more focused examination, we chose three prominent EU-funded research projects which aimed at creating tools for supporting cities' decision-making on resilience: SMR, RAMSES and RESIN (see projects profiles below). We thoroughly analysed the materials related to the projects (dissemination materials, funding calls, handbooks for tools and peer-reviewed articles) and conducted seven interviews with the project coordinators and managers in the partner cities: Antwerp (RAMSES), Bratislava (RESIN), Donostia and Rome (SMR). Interviews were conducted by Skype, their average duration was 40 minutes. They were subsequently transcribed and analysed using a combination of inductive and deductive coding (Saldaña, 2009). (The respondents are anonymised here using numerical codes from 1 to 7, e.g., R1.)

## **3.3 Case introduction**

The choice of these particular projects was motivated by their explicit focus on urban resilience operationalisation and their high visibility on the EU policy-making arena. Of course, they do not represent an exhaustive picture of urban climate

resilience development in the EU context, but a close examination of specific initiatives and linking them with higher policy levels – funding calls and strategic policy documents – allows to identify some tendencies and patterns as well as outline avenues for further investigation.

The first project was *RAMSES* — Reconciling Adaptation, Mitigation and Sustainable Development for Cities (2011-2017), funded under the 7th Framework Research Programme. Its main goal was to assess how much information is needed to build climate change models. It provided “quantified evidence of the impacts of climate change and the costs and benefits of a wide range of adaptation measures”<sup>1</sup>, allowing to compare top-down (simplified) and bottom-up (more detailed) approaches.

The second project was *RESIN* — Climate resilient cities and infrastructures (2015-2018), funded under Horizon 2020 programme (hereafter H2020), aimed to develop “standardised approaches to increase the resilience of Europe’s cities and urban areas to extreme weather and climate change”<sup>2</sup>. Its particular focus was ensuring a better integration of critical infrastructure and providing infrastructure managers with operational tools.

The third project was *SMR* — Smart Mature Resilience (2015-2018), also funded under H2020. Its major goal was to develop the European Resilience Management Guidelines. Beyond this, SMR aimed to create a network of resilient cities and provide operational tools to them.

All three projects consortiums included partners from various cities, representing both academics (research institutes, universities) and practitioners (city authorities, consultancies, industry etc). The details about funding and focal cities are presented in Table 1.

*Table 1. Key information about the projects*

<b>Project name</b>	<b>Focal cities</b>	<b>Funding</b>
RAMSES	London, Bilbao, <b>Antwerp</b>	Call: <b>FP7-ENVIRONMENT</b> <b>topic:</b> ENV.2012.6.1-3 - Strategies, costs and impacts of adaptation to climate change

<sup>1</sup> <http://www.ramses-cities.eu/home/>

<sup>2</sup> <https://cordis.europa.eu/project/rcn/196890/en>

RESIN	Bilbao, <b>Bratislava</b> , Manchester, Paris	<b>Calls:</b> H2020-EU.3.5. - Societal Challenges <b>topic:</b> DRS-09-2014 - Disaster Resilience & Climate Change topic 1: Science and innovation for adaptation to climate change: from assessing costs, risks and opportunities to demonstration of options and practices
SMR	Glasgow, <b>Donostia</b> , Kristiansand (tier-2: Riga, <b>Rome</b> , Bristol, Vejle)	<b>Call:</b> H2020-EU.3.7. - Secure Societies <b>topic:</b> DRS-07-2014 - Crisis management topic 7: Crises and disaster resilience – operationalising resilience concepts

Before joining the projects, cities’ practitioners had different degrees of familiarity with resilience. Some were already working with the concept (e.g., in Rome the 100 Resilient Cities initiative ran almost simultaneously with SMR); others were concerned about the issues related to resilience but weren’t using the concept.

## 4. Results

### 4.1 Definitions and characteristics

In the high-profile policy documents and project calls, urban resilience was usually not defined. If it was, then the definition revolved around a more engineering perspective (“... maintaining the current form and function of that area” — Adaptation Strategies for European Cities, 2013). Similarly, an ability to resist, absorb, accommodate to and recover from the effects of a hazard constituted a definition of resilience in the call under which SMR was funded. While the report ‘Urban adaptation to climate change in Europe (2016) elaborated on transformative approaches to adaptation, the basic definition of resilience provided was in ‘bouncing back terms’: “the ability of cities to withstand crisis” (p. 32).

In the same vein, there was no coherency of definitions neither among the projects nor within them. Notwithstanding the basic definition adopted in SMR was the same as in the project call (engineering vision), the project coordinator emphasised they took a holistic perspective on resilience which encompasses both ‘bouncing back’ and ‘bouncing forward’: “otherwise this is not resilience, this is something partial... even if [these perspectives] are contradictory, resilience is about integrating them.” In RESIN, the definition given in the glossary was taken from IPCC (2014) and included transformation (“... maintaining the capacity for adaptation, learning, and transformation.”) In the course of the project, however, they used mostly the

concept of adaptation; in the words of our respondent, resilience “is far wider concept than the one we actually used” and comprises not only risk management perspective and climate-induced disasters, but also social resilience and other natural events [R2]. The focus areas of RAMSES were adaptation and mitigation, but the term resilience was mentioned in the project description (“need to strengthen urban resilience”) and featured in some of its tools and materials, where the ability of a system to reorganise and multi-equilibrium understanding of resilience were brought forward<sup>3</sup>). But, similar to RESIN, in the course of the project they used the term adaptation and not resilience.

However, the issue of definition and operationalisation of urban resilience did not appear to be perceived as particularly relevant within the projects. It was not discussed in the strategic policy papers and was explicitly mentioned only in SMR and the project call it was funded under (the topic “Crises and disaster resilience – operationalising resilience concepts”). Similarly, in the interviews the task of operationalisation was brought up only by the participants and coordinator of the SMR project. One of them emphasised resilience “is still a developing science, there is not yet a clear framework of knowledge... while the resilience of critical infrastructure is well-known and clear, it gets more complicated at the city level, where different sorts of social problems appear” [R7]. Two other projects mentioned the challenges in its operationalisation only briefly.

*Table 2. Methodological frameworks used in the projects.*

<b>project</b>	<b>methodological frameworks</b>	<b>characteristics</b>
RAMSES	<b>Transition Model</b> grounded in the adaptation pathway approach	Methodology is cyclical, suggesting an incremental and iterative pathway for city planning
RESIN	<b>RESIN Decision Framework</b> , embedded into an online platform (‘E-Guide’)	Methodology moves from identification of risks to development of an implementation plan; composed of four steps with a series of reiterated sub-steps
SMR	<b>Resilience Maturity Model</b> , understood as both a methodological framework and a self-assessment tool for cities	Five stages describing the maturity of a city with regard to resilience: Starting, Mature, Advanced, Robust, Vertebrate

All three projects put emphasis not so much on resilience or adaptation as an outcome but on the incremental process supposedly leading to them. The

<sup>3</sup> For the former, read on 10 main dimensions of resilient systems in Kallaos et al. (2014). For the latter, see a film with Adriana Galdersi <http://on-urban-resilience.eu/>

methodological frameworks they have produced (see Table 2) defined a pathway for cities to incrementally build capacity and ways of functioning able to ensure resilience of the urban system as a whole. We can therefore say resilience was framed as a process here. Also, the need to see resilience in a holistic way – and therefore also to consider social dynamics – was posited by the respondents even if in the course of their project they did not use the term explicitly or the definition was coming from an engineering approach. To reiterate, in many instances resilience was not explicitly defined and/or used interchangeably with other terms, such as adaptation.

## **4.2 Tools to strengthen urban resilience**

### **4.2.1 Local specificity vs wider applicability**

Although the tools differed quite substantially given the scope of the projects (see an overview in Table 3), some patterns in how they dealt with local specificity / wider applicability tension can be distinguished. All the projects started with an assessment phase and identification of risks which later informed strategy development. Therefore, contrary to some criticism raised in the literature, they did not suggest ‘ready-made’ tools for diagnosis of risks and indicators to be fulfilled (Leitner et al., 2018) but assisted in developing the actionable tools and strategies. Because each city faces different challenges, making single case studies would have been too time and resource-demanding. Therefore the projects aimed to create tools “not hard-wired but which could be connected by way of user consultations, local expert involvements of doing the steps” [R1].

We may deduct three strategies employed by the projects, often in a complementary way. Firstly, they attempted to bring more standardisation in the processes, tools and information. For instance, RESIN in collaboration with the Standardisation Institute of the Netherlands conducted an inventory of the standards in the fields of climate change adaptation/resilience and initiated standardisation activities themselves. Secondly, they left enough room for stakeholder engagement. As the project coordinators put it: “models can never explain everything... Even the climate models are very simple in comparison with what happens in the atmosphere in reality” [R2]; “you don’t need to know everything in order to act” (see more in Subsection 4.3). The third strategy was to create communication tools and repositories which included practical adaptation policy examples from European cities and could be consulted by other cities. Interestingly, all three projects’ coordinators acknowledged that reconciling wider applicability and local specificity was challenging for them. According to one of them, “you have to think of something like a generic European city, which is nothing in fact” [R1]. The cities’ representatives, by contrast, did not perceive this tension as a problem. Instead, they talked more about how using the packages and cases developed in other cities exceeded their expectations. As one of the respondents pointed out, the issue of applicability was not only about geography but also about different themes: “if it can

be used in my city in other thematic issues, then I can imagine that it can be easily transferred to other cities” [R4].

#### ***4.2.2 The use of tools and its challenges***

Some cities’ practitioners continued to use the tools after the end of their participation in the projects, either directly or indirectly. Several city representatives discussed how the project outcomes were applied in the design of adaptation strategy and how local emergency plans were created by the stakeholders who took part in their workshops. Two other cities, however, used the tools only to a limited degree. They also pointed to the differences within the municipality, where some departments were using the insights and tools, while others didn’t.

Not using the tools can at least partly be conditioned by the following impeding factors. First, local politics may preclude from putting the project’s results into practice. The respondents described how they found themselves in a “political vacuum in between two political cycles” [R6] and the reluctance of political administration to use the insights from such projects that are technically clear and discussed together with representatives of all the sectors of the society... It is not very easy to let them [politicians ] understand, because you know how politics functions.” [R7]

Second, language is an important, albeit rarely discussed issue when we talk about policy diffusion. This point was brought up by several city representatives. When no equivalent existed in the local language (as it happened for the term ‘resilience’), the new word required additional explanation and discussion. But this task was much less problematic than the need to translate the tools: as not everyone was comfortable using English, translating the tools slowed down the process.

Several city participants highlighted that while the tools were useful and facilitated the discussion, learning how to use them and the actual implementation of the project results (“digesting the learning” [R5]) took time beyond the project span. Often you can measure the impact of the project only after its completion, one of the respondents pointed out. Both city representatives and coordinators felt there should be more follow-up monitoring of projects’ success, otherwise “there is a risk that it [research] ends at the end of the project and it’s not brought further” [R1]. Some of the projects’ goals listed implications for the EU policy-making, but overall there was a lack of understanding the subsequent use of the developed tools. It should be underlined, though, that despite these limitations both project coordinators and city representatives expressed fairly high levels of appreciation concerning the overall effectiveness while sharing positive impressions about the projects.

*Table 3. Key tools produced by the projects*

<b>project</b>	<b>tools</b>
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RAMSES	<p><i>Transition Handbook and Training Package</i>: provides a methodology for developing a climate resilience strategy</p> <p><i>Communication tools</i>: audio-visual guidance “On urban resilience” <i>Ramses Slidedeck</i>: presents the main scientific findings of the project.</p>
RESIN	<p><i>E-Guide</i>: online platform that embeds project tools into a step-by-step methodology (‘RESIN Decision Framework’)</p> <p><i>Climate Risk Typology</i>: allows cities to compare their risks with those of other cities, visualise and assess them spatially</p> <p><i>Impact and Vulnerability Analysis of Vital Infrastructures and built-up Areas (IVAVIA)</i>: illustrates cause-effect relationships of climate change hazards and enables the identification of geographical hotspots of vulnerability</p> <p><i>RESIN Adaptation Options Library</i> (draws together ca. 300 relevant papers and 700 scenario cases related to climate change adaptation measures)</p>
SMR	<p><i>Risk Sistemicity Questionnaire</i>: a qualitative risk assessment tool based on a group interaction</p> <p><i>City Resilience Dynamics</i>: allows simulating the adoption of different resilience policies</p> <p><i>Resilience Building Policies tool</i>: a collection of case studies as a reference for cities</p> <p><i>Resilience Information Portal</i>: a communication tool for cities.</p>

### 4.3 The role of co-creation and stakeholder engagement

#### 4.3.1 General perceptions about stakeholder engagement

While stakeholder engagement and co-creation were not specifically discussed in the EU strategic papers, all three projects involved a significant amount of stakeholder engagement (SE) that was generally understood as a central component in the design and testing of the solutions that the projects intended to deliver. Co-creation was only briefly mentioned in the footnote on the call for RESIN (p. 19), but the interviewees said co-creation *was* used in the course of the project. To include SE as a methodological element, all three projects have conducted activities first-hand to develop resources and trained cities on how to map and involve stakeholders locally through a set of workshops and webinars. The core of stakeholders was formed by the representatives of the relevant departments in the participant cities (mostly environmental, climate-related and urban planning offices). They, in turn, sometimes invited people from other departments, representatives of NGOs and other civil society actors.

The degree of SE was ultimately stipulated by the conditions of the project calls and funding programs. RAMSES was launched before co-creation became popular on the policy scene, and it was realised within FP7 which envisaged fewer opportunities for SE comparing to the H2020 projects (SMR and RESIN). This tendency could be observed in the documents and was corroborated by the

interviewees. Unlike RAMSES, where “you could be a user without doing anything, just giving them data, if you don’t have a real interest in the results ” [R4], in the H2020 projects the tools themselves were designed in a participatory way: “they advise you to invite your stakeholders, establish workshops, consult them, use whatever method of participation” [R6]. One of the respondents explained this shift by the fact that “now when everybody has an impact study.... the necessity to work and co-create with other different partners is much higher”. [R4] According to the interviewees, the key element of co-creation was that scientists and stakeholders should develop the ideas and questions from the very beginning together, and that all the steps were done in cooperation with end-users rather than supervised by scientists. This not only enhanced communication between scientists and policy-makers (also among different departments), but allowed to overcome siloed thinking and ensured the participants’ interest in the project outcomes.

None of the city representatives felt communication with scientists or understanding the scientific results was difficult. Many of them had scientific background themselves and appreciated they could bring a meaningful contribution, not only in terms of data but also in framing the questions, giving practical recommendations and developing user case scenarios — participating in “a dialogue, not Q&A” [R6]. As one of the respondents summed it up, “now they understood in H2020 that we are not dummies.” [R4]

#### **4.3.2 Co-creation as a pathway to operationalisation: examples**

Below are some examples of how increased SE and co-creation might be influencing framing and operationalisation of urban resilience. Firstly, by bringing together engineering and social perspectives on it. Stakeholders’ meetings became the venues for collaboration, enabling a dialogue between public and private entities and between different departments. As was put by a city representative, “an engineer working on electrical grid knows very little about social problems in the city” [R7]. Mutual learning allowed to create new knowledge and more comprehensive and clear understanding of risks.

Co-creation was explicitly used to understand resilience in both SMR focal cities, Donostia and Rome. As the Donostia representative explained, different stakeholders had diverging perspectives on the concept, but eventually they overcame this challenge with the help of discussions. In Rome, one of the challenges in defining resilience was the spatial understanding of the city, because of the peculiarity of its very broad administrative boundaries. So during the meetings the stakeholders had to come up with a new definition, which was then put in the operational guidance to the project. Secondly, as discussed in the previous subsection, while the tools aimed to improve standardisation, they were also supposed to be “not hard-wired”. It means the users themselves could have an impact on how resilience was framed, for instance by deciding what types of risk and interdependencies to include into the model. In RESIN, IVAVIA and the tools



behind it were based on a step-wise approach, allowing practitioners who execute vulnerability assessments to put in local knowledge and decide, for example, whether or not to include cascading effects.

The respondent from SMR described how during the stakeholder meetings they worked on three types of risks related to climate change, social dynamics (e.g., elderly population) and critical infrastructure: first independently and then tried to integrate them. To assure a balanced perspective, they attempted to have representatives of all three types of risks as well as participants with more strategic knowledge and more complete overview of the city problems (e.g., chief resilience officer, if possible.) These examples illustrate how stakeholders can have an impact on the meaning of resilience by deciding on terms' definitions and considering which risks and interdependencies to include.

#### **4.3.3 Limitations and challenges to co-creation in practice**

There were, however, some challenges and limitations in applying co-creation in practice. While all three coordinators emphasised strong cooperation with and between the cities within their projects, some of them admitted co-creation had been realised only to a certain extent. Mostly because of the novelty of the term, both for cities and researchers: it took time “to get into a real mode of co-creating” [R1]. In the words of one of them, “we were using the metaphor of building a ship and using it at the same time. (...) We didn't have the tools in the beginning, so the end-users need some patience.” [R2].

This novelty contributed to the occasional mismatch between the project's aims and stakeholders' expectations, mentioned both by coordinators and city representatives. This is how a city representative described the first meeting with their stakeholders: “I am not saying they were disappointed but they were expecting nice pages with nice solutions, saying what you have to do. And it wasn't like that. We were saying to them: no-no, first of all we want to understand which is our situation, and then we want to build up with you, together, the possible solutions” [R5]. At the same time, one of the project coordinators emphasised, researchers should acknowledge they have to provide some practical value to the end-users, “you cannot only work only on very philosophical or academic issues” [R2]. Co-creation, therefore, requires efforts and behavioural change from both sides. It also necessitates good time planning and being specific about the intended contribution of stakeholders, as there is a difference between just informing the participants about this concept (“which is already an asset”) and their actual involvement in the development of models and planning approaches [R2].

### **5. Discussion. A concept up for grabs: urban resilience in the EU science-policy interface**

Similar to previous research (Coaffee & Davis, 2015), this study argues there is no shared understanding of urban resilience in Europe, as its current conceptualisations

are highly specific to discreet institutional contexts. In the strategic policy documents, reports and funding calls the notion of resilience, albeit increasingly present, is usually not elaborated and defined, and we may find differences in how resilience is defined or described between or sometimes even within the projects. In some cases the idea of the transformative capacity of resilience is embraced, elsewhere an engineering perspective is promoted. Based on the interviews, we can assume a tendency among practitioners to adopt a more holistic view on urban resilience which comprises both ‘bouncing back’ and ‘bouncing forward’ perspectives, as well as to underline the social dimension. The projects have explicitly addressed some of the key challenges to the operationalisation of urban resilience, such as interdependencies of risks, the need to overcome siloed practices and improve the applicability of the frameworks and tools across the contexts.

However, this has not led to a new and formalised understanding of the term nor to an overarching operationalisation model. Instead, it appears there is a sort of pluralisation and broadening of conceptualisations of resilience. This may partly be underpinned by the scope of the funding calls: the concept seems to be defined and used contextually and situationally within particular projects and policy papers, sometimes interchangeably with other concepts (e.g., climate adaptation). While SMR, RAMSES and RESIN have conducted impressive work to improve the standardisation of certain aspects that are relevant for urban climate resilience, the overall understanding of the term remains open and malleable. This conceptual openness is supported by seeing resilience as a process rather than an outcome, which is in line with the critical scholarship on urban resilience (Harris et al., 2017), as well as by the openness and flexibility of the produced tools: while introducing some standards and guidelines, the projects aimed for the tools to be appropriated and employed discretionary by other potential users, therefore they left enough space for stakeholder engagement and co-creation. Thus, the solutions produced by the projects are less codified than assessment schemes like 100RC and ARUP: they are rather negotiated and adapted to a particular context and seem to suggest more a general pathway to proceed by appropriating the right resources than a formalised, closed procedure for analysis and action.

While the extent of SE and co-creation varied between the projects and had some limitations due to the novelty of co-creation and practical challenges in its implementation, they were seen as valuable instruments to address siloed thinking, improve collaboration, clarify and develop new ideas. Examples provided in subsection 4.3 have confirmed theoretical assumptions about the role of co-creation practices in operationalising urban resilience. However, we have not found pronounced evidence of co-creation deep interrogation of ‘resilience for whom’ and explicitly addressing contestations and trade-offs. This may be explained by the the relative lack of innovation in the strategies of identifying stakeholders, which have seldom gone beyond fairly established public governance, business and civil

society arenas and actors, as well as the weak presence of social sciences in the projects' consortiums.

## **6. Conclusion and further research**

The main goal of this study was to provide insights about the actual functioning of urban resilience in the EU science-policy interface and thereby to contribute to the scholarship of concept's operationalisation. Up to now, very little research has examined how urban resilience is used in policies and by practitioners (Oulahen et al., 2019), focusing instead on theoretical debates around its meaning and genealogy. By investigating the differences in how urban resilience is understood and operationalised in three projects located at the EU science-policy interface, this paper addressed an existing void in the literature. As shown in the discussion, the definition of urban resilience continues to be very open and discreetly adapted *to* and negotiated by particular contexts. Furthermore, this openness is supported and reproduced by the tools created within the projects examined.

However, this lack of a strict definition seems not to be perceived as a relevant problem or a source of conflicts. In the context of the examined projects, the concept of resilience mostly acts as a facilitator of a variety of operations binding different actors that are not particularly interested in establishing clear-cut and definitive theoretical understandings of what they are doing. We might argue instead that, as noted in previous contributions (Stigt et al., 2015; Urban Agenda for the EU, 2018), practitioners perceive navigating among the existing tools and information as a much more important challenge. In this context, what emerges is the complex and challenging position – and therefore positionality – of practitioners who have to both actively participate to the production of knowledge at the interface between science and policy and access and use the growing abundance and plurality of its results.

Based on these results, it seems relevant to inquire both more at large and in depth into the key factors and conditions that influence resilience operationalisation efforts in particular contexts and in situations ranging from the science-policy interface to policy implementation. Issues such as the role of the EU apparatuses and funding calls in spreading certain conceptual understandings and ways of doing, of variations in local and multi-level institutional and governance arrangements in orienting co-creational processes and of entrenched local ways to conceive what is the relevant knowledge and to appropriate it appear to be all of great importance in this conversation. To tackle these issues, further research might engage with a more extensive use of ethnographic methods (Corson et al., 2014) as it might yield new insights also about the production of knowledge and politics in boundary spaces at the interface of science and policy (Wesselink et al., 2013). For instance, besides the questions that were already addressed in this paper, scholars should also enquire more in depth into cities' elites motivations to join the projects in the first place, as well as what are the scientific communities that are involved and how the relations between them – e.g., hard and soft sciences – are actually shaped. And how the

mundane and often overlooked circumstances of projects functioning – i.e. the need to agree a common lexicon made of continuous translations of foundational concepts and taxonomies – affect their deployment and the implementation of their results.

As we have demonstrated above, addressing the political dimension remains a challenging aspect of operationalisation. Future analysis should also address how the projects fit – or not – into the local institutional and political context. This is crucial, because, as previous research has argued, challenges in shifting traditional governance approaches lie at the heart of the implementation gap, because “resilience implementation in public administrations is, in most cases, in conflict with bureaucratic values such as efficiency and procedural rationality, which are difficult to balance with adaptability, redundancy, and innovation” (Coaffee et al., 2018, p. 405). We believe that further addressing these issues might help to narrow the gap between theory and practice.

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### **Appendix. Policy documents reviewed**

European Commission (2009) White paper: adapting to climate change: towards a European framework for action. COM (2009) 147 final. Brussels: Commission of the European Communities. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52009DC0147>

European Commission (2013) Adaptation Strategies for European Cities: Final Report

European Commission (2013) An EU strategy on adaptation to climate change. COM (2013) 216 final. Brussels: The European Commission. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0216>.

European Commission (2013) Appendix 12: A toolkit for cities (Adaptation Strategies for European Cities: Final Report)

European Commission (2013) Climate change, environmental degradation, and migration (Commission staff working document accompanying the document 'Communication from the commission to the European Parliament, the council, the European economic and social committee and the committee of the regions. An EU Strategy on adaptation to climate change')

European Commission: Directorate-General for Research and Innovation (2015) Towards an EU Research and Innovation policy agenda for Nature-Based Solutions & Re-Naturing Cities. Retrieved from

European Environmental Agency (2012) Urban adaptation to climate change in Europe - Challenges and opportunities for cities together with supportive national and European policies. Retrieved from <https://www.eea.europa.eu/publications/urban-adaptation-to-climate-change>

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European Union (2011) Climate-friendly cities. A handbook on the tasks and possibilities of European Cities in Relation to Climate Change.

European Union (2013) Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (7th Environment Action Programme)

FP7 Cooperation Work Programme 2012: Environment (including climate change).

Horizon 2020 Work program 2014-2015. Climate action, environment, resource efficiency and raw materials (European Commission Decision C (2015)7154 of 23 October 2015)

Horizon 2020 Work program 2014-2015. Secure societies – Protecting freedom and security of Europe and its citizens (Consolidated version following (European Commission Decision C (2015)2453 of 17 April 2015)

## PAPER 3

# The uptake of new concepts in urban greening: insights from Poland

**Abstract** The idea of nature having multiple benefits for urban management and planning is gaining prominence alongside the rise of climate change awareness. It is expressed through concepts such as nature-based solutions (NbS), ecosystem-based adaptation (EbA), and blue-green infrastructure (BGI). Despite their popularity in the international arena, relatively little is known about how these concepts are used and interpreted at the local level, which has implications for policy formulation and actions. This paper examined both direct and indirect references to these concepts, as well as the reasons for their potential omission. By analysing policy documents and interviews with practitioners and activists from four Polish cities (Gdansk, Krakow, Warsaw, Wroclaw), it discussed the uneven and ambivalent uptake of concepts in the urban green and blue space (UGBS) governance. While the reluctance to use new terminology was often explained by accessibility and efficiency concerns, it also revealed some conceptual confusion. The contribution of this study is twofold: 1) providing a more nuanced understanding of the conceptual ambiguity surrounding the NbS, EbA and BGI concepts and the gap between international policy rhetorics and local interpretation; 2) expanding the geography of research on urban climate adaptation and urban green spaces which tends to overlook the countries of Central and Eastern Europe.

**Keywords:** nature-based solutions, blue-green infrastructure, ecosystem-based adaptation, Poland, Central and Eastern Europe, concepts' uptake

### 1. Introduction

The idea of nature's benefits for climate adaptation is becoming increasingly widespread in both academic and policy circles (Frantzeskaki et al., 2019; McPhearson et al., 2014). While nature as a planning-based response to the growing pollution and congestion in cities emerged already in the 19th century (Duvall et al., 2018), new approaches that emphasise its multi-functionality, multiple benefits and cost-effectiveness comparing to conventional engineering solutions have recently

been packaged into distinctive concepts. This study focuses on some of the most prominent of these new "green concepts" (as was put by Hanson et al., 2019): nature-based solutions (NbS), ecosystem-based adaptation (EbA) and blue-green infrastructure (BGI). EbA and NbS build on the concept of ecosystem services (ES), generally defined as the benefits people obtain from ecosystems (MEA, 2005), with key adaptation-related benefits including protection of communities from climate extremes and variability (Wamsler et al., 2016a).

Globally, these concepts are promoted by international organisations and agreements, such as the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2014), Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR), UN Convention on Biological Diversity (CBD, 2016), the UN New Urban Agenda (Article 157) and the Paris Agreement (Article 7). In the European Union (EU), which positions itself as a global leader in climate adaptation, they feature in the key policy agendas, examples include Green Infrastructure Strategy report (2013), EU Biodiversity Strategy (2013), the EU Adaptation Strategy (2013), Urban Water Agenda 2030 and EU action plan for disaster-risk reduction EC (2016). Additionally, NbS is a priority area for investment under the Horizon 2020 research program, and an interdisciplinary Expert Group was commissioned to define and operationalize the concept and identify its research priorities (Faivre et al., 2017; Raymond et al., 2016).

Despite the rise and active promotion of "green concepts" in the international rhetorics, relatively little is known about what activities and practices constitute these concepts on the ground (Hansen et al., 2019; Milman & Jagannathan, 2017). Practitioners' interpretations and framings affect the choice of policy solutions (O'Brien et al., 2007; Oulahen et al., 2019) but also play an important role in the institutionalisation of new policy concepts (Lennon, 2015); the impact of conceptualisations used in documents is even more straightforward as they determine what policy steps are taken. Although some research has been carried out on structural obstacles for mainstreaming the policies associated with these concepts, e.g. lack of institutional and financial capacity (Brink et al., 2016; Kabisch et al., 2016), less has been published on how these concepts are "being interpreted, assessed, acted upon and integrated in actual decision making" at different governance levels in the EU Member States (Blicharska & Hilding-Rydevik, 2018, p.181).

This lack of knowledge is problematic both theoretically and practically. The few existing studies comparing practitioners' and academics' perspectives on new concepts in urban greening (e.g. di Marino & Lapintie, 2018) as well as related research on concepts' uptake in climate adaptation (Meerow & Stults, 2016; Vogel et al., 2007) indicate a frequent mismatch in conceptualisations between these two groups. Thus, theoretical inquiry in concepts' operationalisation may be moving even further away from the on-the-ground reality.

Being conceptually vague from a theoretical perspective, the concepts acquire a further degree of confusion when they move from academic discussion to policy documents and then to implementation. Some argue conceptual vagueness is an integral part of the EU policy-making and is necessary for collective action (Kovacic & Di Felice, 2019). Still, because concepts are often used inconsistently and loosely in policy documents, it is difficult to identify, assess and monitor the performance enacted by them (Milman & Jagannathan, 2017; Albert et al., 2019). Unclear articulation precludes them from appearing at the operating level in executive regulations which therefore impedes their employment (Stepniewska et al., 2018b). All-encompassing vision and different understandings among different actors risk undermining the possibility of meaningful implementation and might instead discredit the concepts, legitimising business as usual approach and contributing to path-dependency (Matthews et al., 2015; Reid, 2016).

This qualitative exploratory (Creswell, 2007) study sets out to explore how the new "green concepts" (BGI, EbA, NbS) have been used in policy documents and interpreted by practitioners in the field of urban green space planning and management in four major Polish cities: Gdansk, Krakow, Warsaw and Wroclaw. The analysis was organized around two main topics: (i) direct and indirect references to the concepts, and (ii) reasons for their potential omission. The study aimed not only to assess the extent of uptake but also to provide a more in-depth understanding of the variety of concepts' interpretations and use.

Several factors influenced the choice of Poland. First, addressing a geographical research gap: much of the literature on urban greening and climate adaptation overlooks Central and Eastern Europe (CEE) countries (Kronenberg et al., 2017). Second, whereas the impact of the EU on policy uptake on its Member States is considered to be high (Massey et al., 2014), especially in the New Member States (Börzel & Buzogány, 2010), Poland is one of the most vocal climate sceptics, boycotting many EU climate and environmental policies and strategies (Marcinkiewicz & Tosun, 2015). It is simultaneously the largest coal producer and the largest beneficiary of the EU structural funds, a substantial part of which is dedicated to climate-related goals (Benzie et al., 2019). Previous research has emphasised the crucial impact of the EU on climate adaptation policies development in Poland (Swianewicz et al., 2018; Szmigiel-Rawska, 2017). Still, some commentators are wary (Kuchler & Bridge, 2018; Skjærseth, 2018) or even sceptical (Bankwatch, 2016; Szulecka & Szulecki, 2017) about country's progress in climate adaptation and the positive impact of these investments. This conjunction of climate scepticism and generous EU funding makes Poland a compelling setting for examining the dissemination and operationalisation of new concepts pertaining to the EU-wide environmental policies and climate change agenda.

In the following section, I present the analytical and theoretical framework guiding this study. Section 3 introduces case cities and describes how data was gathered and analysed. After presenting the key results (Section 4), I move on to compare them



with observations from other contexts (Section 5) and then discuss their implications for further studies of concepts' uptake (Section 6).

## 2. Analytical and theoretical framework

The examination of "green concepts" uptake in the practice of decision-making regarding urban green and blue space (UGBS) governance is guided by two questions: a) how these concepts are used explicitly and implicitly and b) if the concepts are not used, what are the reasons for their omission? To address these questions, the following analytical framework (Figure 1) was developed based on the previous scholarship on concepts' uptake.

Question	Method of analysis
<b>direct references</b>	deductive coding: <ul style="list-style-type: none"> <li>• (blue)-green infrastructure (GI/BGI)</li> <li>• nature-based solutions (NBS)</li> <li>• ecosystem-based adaptation (EBA)</li> </ul> <ul style="list-style-type: none"> <li>• ecosystem services &amp; adaptation</li> </ul>
<b>indirect references</b>	deductive coding: benefits (moderating temperatures, water retention) inductive coding: relations between UGS & climate change
<b>reasons for not using</b>	inductive coding

Figure 1. The analytical framework for the study.

Crucially, this paper departs from similar studies by focusing on more than one concept simultaneously: nature-based solutions, ecosystem-based adaptation, blue-green infrastructure as well as ecosystem services in the context of climate adaptation. This decision was based on two considerations. First, while recent publications have contributed to delineating the boundaries between these concepts (Dorst et al., 2019), they are still closely interrelated and share such central characteristics as multifunctionality and multiple co-benefits — not only climate adaptation and mitigation but also broader environmental, social, environmental and economic; thus, they tend to overlap and complement each other (Pauleit et al., 2017), as old and new paradigms often do (Raum & Potter, 2015). For instance, NbS are considered either as an umbrella term (Derkzen et al., 2017; Nesshöver et al., 2017) or may be used interchangeably with BGI or EbA (Fink, 2016; Wamsler & Pauleit, 2016). Second, I assumed the differences between these concepts were even less straightforward in practice than in academic debates, and conceptual differences were probably not the most urgent issue for practitioners. Indeed, in practice similar interventions – urban gardens, waterways, or green roofs – are referred to as either NbS, EbA or BGI (Dorst et al., 2019). Considering these concepts simultaneously might better account for these peculiarities.

Analysing both direct and indirect (explicit and implicit) references offers an opportunity to get a more comprehensive insight about concepts' integration into

practice (Zölch et al., 2018). Direct references are "an obvious but nonetheless relevant indicator" for the entry of concepts in the policy discourses, whereas indirect references, even though not always signify a conscious uptake of concepts, may nevertheless indicate the presence of ideas associated with them (Hansen et al., 2015). Previous studies illustrated that even though local policy documents and practitioners seldom use novel concepts *explicitly*, their underlying principles may be included indirectly: see Zölch et al. (2018) and Albert & Von Haaren (2017) on Germany; Beery et al., (2016); Blicharska & Hilding-Rydevik (2018); Wamsler et al. (2016); Nordin et al. (2017) on Sweden; Pasquini & Cowling (2015) on South Africa; La Rosa (2019) for Italy; Mascarenhas et al. (2015) on Portugal; Hansen et al. (2015) and Rall et al. (2015) for the comparison between US and European cities.

Unlike a relatively straightforward analysis of explicit and implicit references to a single concept (e.g. Hauck et al., 2013; Zölch et al., 2018), the principles for examining implicit references to several concepts simultaneously require clarification. I adopt a broader perspective by discussing not only the benefits of UGBS to climate adaptation (e.g. moderating temperatures and increasing water infiltration – Derkzen et al., 2017) but elucidating other potential framings of their relation, such as vulnerability of ecosystems themselves (Bush & Doyon, 2019; Green et al., 2016; McPhearson et al., 2014). And since climate change is a novel theme in Polish policymaking, it is worth examining how its relations with UGBS are conceptualised, and whether discussing them correlates with using the 'green concepts' elsewhere in the documents or interviews.

Exploring the reasons for not using the concepts (hereinafter 'potential omission') is a less common strategy which can, nevertheless, illuminate important concerns. For instance, about the limited heuristic or operational value of a new concept (Mascarenhas et al., 2015; Stępniewska et al., 2018a), its inadequacy to describe the reality (De Vreese et al., 2019), or a general confusion around the content of a new approach (Raum & Potter, 2015). Concepts' dissemination is also influenced by incentives to adopt them (Sitas et al., 2014) and linguistic preferences of practitioners from non-English speaking countries (Cortinovis & Geneletti, 2018; Niemelä et al., 2010). More generally, competing interests and political agendas determine the success of ideas and knowledge claims in policymaking (Saarikoski et al., 2018).

Noticing implicit use and reasons for the potential omission is particularly relevant for the case of Poland, where the uptake of new concepts in urban greening was described as limited and slow (Kronenberg et al., 2017; Swianewicz et al., 2018). Main reasons include political disregard to urban green space and lack of awareness about its needs and benefits, its narrow and rigid classification (Feltynowski et al., 2018) and poor institutional collaboration (Kronenberg et al., 2015). When the concepts are used, then mostly indirectly (Maczka et al., 2016; Piwowarczyk et al., 2013; Stępniewska et al., 2018; Zwierzchowska et al., 2019). Local authorities generally demonstrate low awareness about climate change and perceive

environmental hazards as a traditional effect of humans' activity (Szmigielska-Rawska, 2017).

### 3. Methods

#### 3.1 Case studies introduction

This paper focuses on four major cities in Poland: Gdansk, Krakow, Warsaw and Wroclaw (Figure 2). The main selection criterion was the presence of innovations in the UGBS field: I assumed, based on the previous observations (Pauleit et al., 2019), the concepts were more likely to be used in these cases. These innovations were identified through desk research (Table 1 in Appendix A contains some prominent examples.) As other large cities in Poland are similar to these cases in terms of urban greening innovations and exposure to new concepts (see e.g. Raszeja & Gałeczka-Drozda, 2015; Zwierzchowska et al. 2019 on Poznan, Kronenberg et al., 2017; Wagner et al., 2013 on Lodz), the findings from this study may be relevant for other cities.

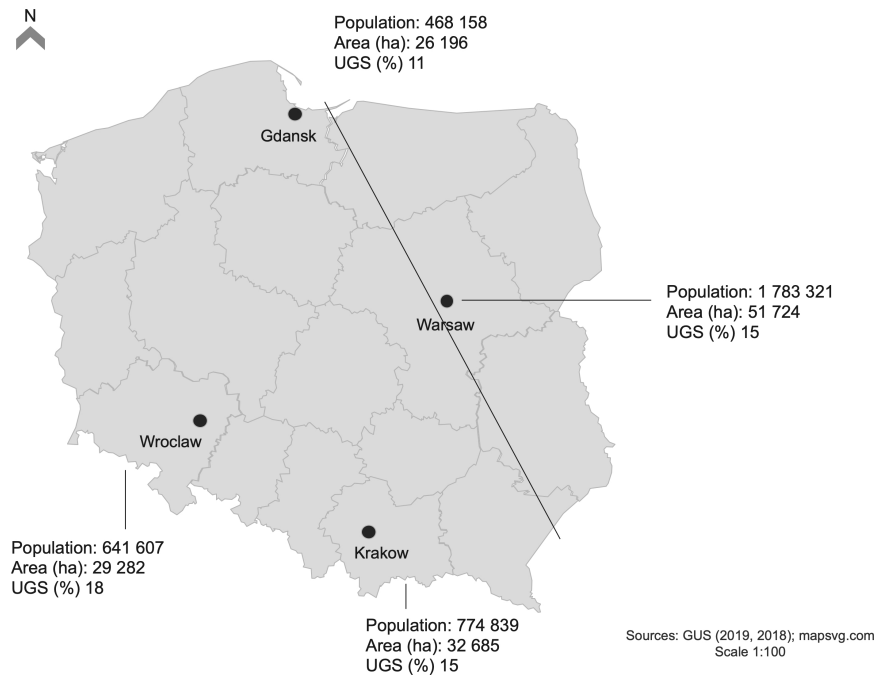


Figure 2. Map of Poland showing the case study cities.

Even though this was not intended as a comparison study, I remained sensitive to the potentially emerging differences in the concepts' use across the four case study cities. To be able to draw some general conclusions, I selected cities that represent a wider variety of contexts in terms of climate risks, built form, organisation of UGBS management and focus of their activities (see Appendix A for more details).

#### 3.2 Data sources

Data sources consisted of two types: strategic policy documents related to urban greening and climate adaptation at the local and national level (n=21) and in-depth semi-structured interviews with practitioners and activists (n=19). The documents were selected based on the reports by governmental and non-governmental institutions (Bergier & Kronenberg, 2018; Biejat, 2017; NIK, 2017). There were four documents per city (exception is Krakow, n=5) and four documents representing the national level, see Appendix C for a full list.

At the city level, I considered the following types of documents (adapted from Zwierzchowska et al., 2019):

1. municipal development strategy (*Strategia rozwoju miasta*);
2. Study of conditions and directions of spatial development (*Studium uwarunkowań i kierunków zagospodarowania miasta*) – a planning document defining the spatial policy of a city;
3. Environmental Protection Program (*Program ochrony środowiska*) – an executive document for implementing the environmental policy (hereafter 'EPP');
4. climate adaptation plans created within the Urban Adaptation Plan project (Miejskie Plany Adaptacji, hereinafter 'MPA44') initiated by the Ministry of the Environment for the 44 biggest cities in Poland.

Additionally, I included the Urban greening strategy for Krakow, the only document of this kind in the country, and the separate strategy for climate adaptation of Warsaw. The core set of data consisted of the documents referring to the policies currently in place, but their previous versions were also screened to get familiar with earlier references to climate change adaptation.

Key relevant national documents were incorporated as well given the importance of high-level policies for concepts' operationalisation and implementation (Rall et al., 2015; Gorgoń 2018). These include the summary publication of the above-mentioned MPA44 project (2019), National Urban Strategy (2015); Strategy for Energy Security and Environment (2014); and Strategic Adaptation Plan for Sectors and Areas Sensitive to Climate Change in Poland (2013).

The respondents were selected by purposive and snowball sampling (see the full list and the questionnaire in Appendix D). They represented key official institutions in planning and managing urban greenery, such as the Municipal Greenery Authority (Zarząd Zieleni Miejskiej, hereinafter 'ZZM'), Municipal Road Authority (Zarząd Dróg Miejskich) responsible for greenery along the streets, Environmental Protection Office and others. I also interviewed some activists and representatives of non-governmental organizations to learn about a bottom-up perspective on UGBS. The interviews were conducted from January to May 2019, mostly face-to-face, with length ranging from 30 to 70 minutes, and in several cases by email. The questions

revolved around respondents' attitude to the concepts and the relations between climate change and UGBS.

Participant observation at workshops and conferences (n=4) helped to triangulate preliminary observations, obtain additional contacts, learn about prevailing discourses and key legislation and documents (see a list in Appendix E.)

### **3.3 Data analysis**

To analyse the documents and interview transcripts, a combination of quantitative and qualitative coding was conducted in the NVivo 12 software package. When assessing the *direct* references to concepts, I looked for the keywords related to NbS, EbA, BGI (see Appendix C). I also included the ecosystem services concept, which is relatively more established in the Polish context (Stępniewska et al., 2018a), focusing on its usage in relation to climate adaptation. While it is not fully equivalent to EbA or other concepts under analysis, ES is often used in similar ways and contexts.

First, I counted the instances of explicit use, noting whether the concepts were defined. Second, to assess the extent of elaboration, I developed a scoring protocol, giving 0 for no reference, 1 for a brief mentioning, 2 for a more elaborated reference. Third, to test the overall consistency of concepts' use within a document, I noted their location following the protocol suggested by Cortinovis & Geneletti (2018) who identify three main components: information base (background knowledge supporting planning decisions); vision and objectives (longterm vision and targets) and actions (strategies, policies and other actions envisioned to achieve the objectives). The summary of the analysis is presented in Table 1, Appendix C.

To assess the *indirect reference* to concepts, I applied a combination of inductive (data-driven) and deductive (theory-driven) coding. The key way to identify indirect references was to see whether UGBS was mentioned in the context of climate change adaptation. The preliminary list of codes was informed by the literature and contained the benefits of UGBS to climate adaptation; simultaneously, new themes describing the relations between UGBS and climate emerged through the process of inductive coding. A similar open coding strategy was used in the analysis of transcripts to understand the reasons for the *potential omission* of concepts. To mitigate an interpretative bias associated with coding by a single researcher and to enhance the reliability of the study, I provide a detailed description of the process and the coding scheme in Appendix B.

## **4. Results**

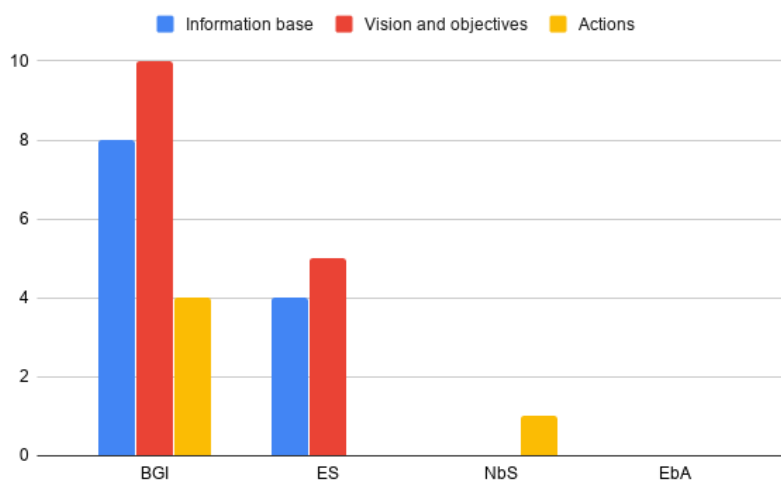
### **4.1 Direct references**

#### **4.1.1 Documents**

No big difference between cities, city and national level and types of documents was identified (see Table 1, Appendix C). The only pattern that became apparent was

time: the concepts are likely to occur in the more recent documents. The most frequent and elaborated concept was BGI, appearing in 13 out of 21 documents at both national and city levels. It was generally associated with such adaptation-related benefits as water retention and risk reduction from storms. However, several documents (Warsaw and Wroclaw development strategies, Study of the conditions... for Warsaw) deliberated instead on biodiversity conservation, community cohesion and increase in property prices. In about a third of documents (8 out of 21), BGI was mentioned repeatedly but was seldom (5 out of 21) defined. In the descriptions of BGI, an emphasis was put on connectivity and integration of green, blue and non-natural areas, as well as using water elements (e.g. 'turning cities to rivers' – National Urban Strategy; drainage channels – Warsaw Adaptation Strategy) and vertical greening (e.g. EPP for Wroclaw used the examples of green walls and roofs to explain what green infrastructure is).

The concept of NbS was only briefly mentioned in relation to the Horizon2020 project "Grown Green" funded under the call "Demonstrating innovative nature-based solutions in cities" ('activities' section of the EPP for Wroclaw). ES were four times, albeit briefly mentioned in the context of climate adaptation and natural



h a z a r d s  
p r o t e c t i o n ,  
w h e r e a s n o  
r e f e r e n c e s t o  
E b A  
w e r e i d e n t i f i e d .

Figure 3. The number of references to concepts in different parts of the documents.

Both BGI and climate-related examples of ES mostly appeared in the 'Visions and objectives' part of the documents but were usually presented in quite abstract terms, such as the need to promote green infrastructure. Slightly less popular was the 'Information base' part where the concepts were defined and explained. As Figure 3 illustrates, few specific actions were mentioned in relation to BGI and none about ES, while EbA was never used.

**4.1.2 Interviews** Direct references in the interviews were more rare and sporadic than in the documents: only 8 out of 19 respondents mentioned the concepts explicitly. Apart from this, similar patterns of use were revealed, again with no substantial differences across cities. Similarly to the documents, the most popular term was BGI (mentioned 5 times). Connectivity, integration, water elements and vertical greening

("introducing greenery wherever possible" – city official, Gdansk) were brought up as its key characteristics.

No direct references to EbA were identified, and ES were not explicitly linked to climate adaptation. Curiously, NbS was mentioned four times, which is more often than in the documents. Two city officials (from Wroclaw and Krakow) saw NbS as an alternative to costly grey infrastructure and a way to deal with floods, alleviate heat and as a source of co-benefits such as recreation. In contrast, two other respondents (from Gdansk and Warsaw) were rather sceptical about NbS, even though their attitude to BGI was positive (see Section 4.3).

## **4.2 Indirect references**

### **4.2.1 Documents**

Most strategic documents contained references to climate change adaptation. At the *city level*, all environmental protection and strategic development documents (also Studies of the conditions... apart from those for Warsaw and Krakow, which were adopted earlier) at least briefly mention adaptation among their key goals. At the *national level*, the National Urban Strategy puts responsibility for climate adaptation on local governments, emphasising that climate risks should be considered in spatial and investment planning (p. 82). Nevertheless, it does not necessarily imply the recognition of UGBS in this respect: instead, the need for risk assessments and improvement of urban infrastructure were usually mentioned.

Explicit use of the concepts generally correlated with UGBS and climate change being discussed elsewhere in the document (see Table 1, Appendix C). But there were exceptions: BGI was not always explicitly linked to climate, and several documents (EPP for Warsaw and Krakow, Study of the conditions... for Wroclaw) discussed water retention and heat alleviation potential of UGBS without mentioning the concepts.

Two key framings of the relations between UGBS and climate were identified. The most popular one described the benefits of UGBS in addressing the negative impacts of climate change through heat alleviation and water retention. It was particularly elaborated in the Urban Adaptation Plans (UAP) but could also be found in other national and city-level documents:

"... [green spaces] help to improve hydrological conditions of soil in a city by water retention [...] and prevent the lowering of water table." (Urban greening strategy for Krakow)

The second framing described UGBS as a victim of climate-induced heat waves in summer: "...[droughts] cause the soil to dry out and result in a deterioration of vegetation and poor quality of urban green areas." (EPP for Warsaw)

### **4.2.2 Interviews**

A common view amongst interviewees was that climate change awareness had increased and become mainstream over recent years. They linked it with a higher occurrence of extreme weather events and perceived weather changes.

Even though the respondents couldn't come up with the examples of activities primarily motivated by climate adaptation, they often felt climate change concerns justified investing in urban greening and protected UGBS from being built upon. According to them, climate change adaptation was one of the key ideas behind spatial planning, even if it was not stated directly. Interestingly, the lack of specificity as to what climate adaptation actions should be taken received mixed perceptions among activists and city officials. The former saw it as a factor undermining the efficacy of the Urban Adaptation Plans, the latter didn't think it was a problem: "[in our activity] we don't follow these guidelines but know for sure that even one planted tree or a rain garden do make a change" (official, Warsaw).

Similarly to the documents, the benefits of UGBS to climate adaptation constituted the most popular framing. The respondents from all four cities often mentioned the role of green space in water retention, which might be attributed to the changes in responsibility of water management envisaged by the water regulation, modified in 2018 in accordance with the EU Water Directive Framework. Water retention was particularly relevant for Gdansk due to its prior experience of severe flooding in 2001. As a local official said, "for us, urban greening is first and foremost about water retention."

The framing of UGBS as a victim of climate-related heatwaves received particular elaboration from the activists who described the challenges of watering trees in summer. Two additional framings mentioned by several interviewees include UGBS as a threat (e.g. falling trees during storms) and the adjustments in greening management associated with longer vegetation periods (e.g. selection of species and prolonged working season.)

#### **4.3 Reasons for potential omission**

To better understand why the concepts might be used implicitly but not explicitly, I examined the overall attitude to them and the reasons for their potential omission. Generally speaking, three types of attitude towards the "green concepts" could be identified, but attributing them to individual respondents is not clear-cut: a person may express different views throughout the interview (see more on that below).

*Type 1:* attitude is positive, the concepts are actively used (however, only in one interview the respondent indeed mentioned them frequently). *Type 2:* attitude is positive but the concepts guide the activities implicitly. For example, city officials from Krakow and Warsaw said they used the concepts explicitly only in the context of conferences and projects but not in their everyday practice. *Type 3:* attitude is suspicious. Both officials and activists reported to consider the concepts as gobbledegook: "I have never heard anyone using these terms in their everyday practice. It sounds nice for marketing, but when it comes down to practice the main



thing is to have trees, shrubs, ponds and so on" (activist, Warsaw). In terms of proportions, only 5 instances were coded to Type 1, whereas Type 2 and 3 had 9 and 7 codes respectively.

While the concept of BGI was widely used (Section 4.1) and had positive connotations, the attitude to NbS was more ambivalent. Despite its potential benefit of "harmonizing the way of thinking about a given solution and therefore facilitating its introduction" (official, Warsaw), the added value of NbS was often perceived as low due to its vagueness and little novelty: similar solutions have already been used in the past, and the ideas behind NbS "come as no surprise" (official, Wroclaw).

Other reasons explaining a wary attitude towards NbS (and new concepts more generally) included concerns about maintenance costs of green roofs and walls (e.g. watering them and providing electricity), which made them less attractive than traditional forms of greening, and also concerns about their accessibility. Participants from all cities, especially Krakow and Gdansk, emphasized that while green roofs are beneficial for water retention and temperature regulation, they can only be used by inhabitants of a given building. Thus, they have no social value, unlike the greening around housing planted in the previous decades. Another drawback stems from the fact that green roofs can be counted as a half of the minimum green area required for new developments: "we should not allow for a situation when all greening is at the top floor, and all we have on the ground is a single tree pushing through a pavement" (official, Krakow).

NbS was sometimes seen as less effective comparing to engineering solutions ("When you get 120 ml of rain in one hour, no forest, moss and fern can absorb this" – official, Gdansk). However, according to a city official from Krakow (NbS supporter himself), the problem was not only in the engineers' preference for hard solutions. The adoption of NbS faces some practical obstacles, such as lack of data (necessary e.g. to launch a project exploring the benefits of NbS) and inability of current legislation to enforce these solutions: "There is no guarantee that at a certain point someone will not decide to build a terrace on this place, and the system will stop functioning." A similar concern about inadequate legislation was voiced by a city official from Warsaw: if a sewage system is available, water should be treated there and cannot be retained in a rain garden, which indicates a mismatch between the scale of BGI promotion and the legal realities.

## **5. Discussion**

Before discussing the results, several limitations should be acknowledged. The number of interviews was unequal across the cities (varying from 3 to 7 respondents), and the depth of the interviews varied depending on the form in which they were conducted (while most were face-to-face, some were done via email). While these limitations should be kept in mind, I believe the data collected nevertheless provides a valuable resource to explore the uptake of "green concepts" in four Polish cities.

## **5.1 On direct references**

Prior research has established that the concepts are seldom used directly but often referred to implicitly (Section 2). This study only partly corroborated this tendency to limited direct use. Indeed, the interview respondents (both city officials and activists, who overall expressed similar views) were generally reluctant to use the concepts even if they welcomed the ideas associated with them. In the documents, however, direct references appeared to be relatively common: almost two-thirds of publications explicitly mentioned one of the concepts at least once. This is more than could be assumed based on previous investigations (Section 2). Still, these references tended to be of little elaboration and without definitions. Similar to previous studies (Beery et al., 2016; Cortinovis & Geneletti, 2018; Geneletti & Zardo, 2016), the concepts were mostly absent from strategic parts of the documents, describing a general vision rather than specific goals, tasks and objectives. Despite the increased occurrence, the concepts were still used rather vaguely and inconsistently. And while it is difficult at this stage to deliberate on their meanings, discussing the reasons for potential omission (below) offers some thought-provoking insights in this respect.

A different degree of concepts' popularity (many occurrences of BGI, few of NbS and none of EbA) may be partly explained by the impact of the EU-wide policies on their dissemination. BGI has featured in the key regulations at least since 2013 (Section 1). NbS were mentioned by the respondents whose cities participated in the recently launched NbS-related projects funded by the EU, while the term was absent from the documents that were generally published several years ago. EbA, even though mentioned in the EU Biodiversity and in Green Infrastructure Strategies, has been arguably less promoted than NbS or BGI. In terms of future work, it would be interesting to investigate more closely the process of concepts' dissemination and the role of the EU in it, using e.g. the lenses of urban policy mobility studies (McCann, 2017).

## **5.2 Making sense of indirect references**

Similar to prior research (Honey-Rosés & Pendleton, 2013; Hauck et al., 2013; Wilkinson et al., 2013), even though the practitioners seldom used the concepts, they still showed interest in the information related to them and were aware of the complex relations between UGBS and climate. This propensity to use the concepts implicitly has been explained by the fact that practitioners felt the concepts were underpinning their policies for a long time (Beery et al., 2016; Rall et al., 2015), that the concepts are too easy to grasp and have little novelty (Piwowarczyk et al., 2013), but also that it is hard for practitioners to link familiar issues (e.g. recreation) to the newly introduced concepts (Mascarenhas et al., 2014).

Climate change adaptation, however, is a relatively recent policy agenda, especially in CEE countries, which might suggest the novelty of 'green concepts' and therefore the absence of above-mentioned barriers to their explicit use. Importantly, though,

the notion of climate change adaptation is vague in itself. While climate adaptation was clearly an important issue both in the documents and interviews, it was not always clear what activities constitute it and how they differ from previous actions. Based on their analysis of the projects in the UNFCCC database, Milman & Jagannathan (2017) noted that "some projects not initially labelled as EbA have been reclassified as EbA and some projects labelled as EbA are primarily aimed at conservation, rather than climate change"; furthermore, the projects identified as climate change adaptation not always articulate their contribution to responding to climate change (ibid.) Szmigiel-Rawska (2017) observed a similar tendency in her study of local climate change adaptation in Poland, where both adaptation and mitigation activities were often re-labelled in terms of their benefits in other domains (e.g. efficiency and attracting more funding) and portrayed as not directly motivated by climate concerns but as traditional activities of local governments.

The results gained from this study present a similar picture: it is indeed difficult to point out the activities in UGBS field that have been specifically designed and aimed at climate adaptation. Both documents and respondents often acknowledged the role of UGBS in reducing flood risks and heatwaves, but these concerns were usually about the current issues and not explicitly linked to climate change. Uncertainty, which is intrinsic to the discussion on climate change (Matthews et al., 2015), was not mentioned, except for the section outlining general climate risks for cities (similarly to Milman & Jagannathan, 2017). The potential implications of this vagueness around climate change adaptation for the concepts' use are discussed further below.

### **5.3 Reasons for potential omission**

Practitioners' reluctance to use the concepts explicitly may be driven by accessibility, efficiency and maintenance concerns, but also by the confusion around what constitutes climate change adaptation. Efficiency considerations mirror the arguments about preference for hard infrastructure over UGBS, voiced in the literature on Poland (Kronenberg et al., 2017) and elsewhere (O'Donnell et al., 2017), whereas concerns about everyday maintenance and management, as well as public accessibility of green roofs were seldom articulated in previous studies on concepts' uptake (see, however, the literature on climate gentrification, e.g. Anguelovski et al., 2016).

Curiously, efficiency and equity concerns partially stem from associating the "green concepts" with predominantly vertical forms of greening (e.g. green roofs and walls) which were often opposed to more traditional greening (e.g. trees). This association was found in both documents and interviews. Although these concerns undoubtedly deserve further investigation, they also reveal a certain confusion over the meanings of these concepts: NbS and other "green concepts" are not limited to vertical greening but instead "encompass existing ideas and require the inclusion of lessons from the past... local and traditional knowledge" (Eggermont et al., 2015, p. 245).

Meanwhile, if the novelty of a new approach is not clear, practitioners may be sceptical about the added heuristic and operational value of new concepts: the results of this study corroborated the observation by Kronenberg et al. (2017) that NbS in Poland were not seen as an innovation and were therefore not attractive for mainstreaming.

In line with previous literature (Mascarenhas et al., 2015; Matthews et al., 2015), this study suggests ambiguity around the "green concepts", coupled with the vagueness of climate adaptation, are among the main reasons behind practitioners' reluctance to use the new terminology. There is an underlying assumption that "if a project builds or restores ecosystems services, it also contributes to climate change adaptation" (Milman & Jagannathan, 2017, p. 125). In practice, though, climate adaptation measures are often framed in terms of infrastructural solutions and not UGBS, while UGBS planning is not always driven primarily by climate adaptation concerns. While approaches associated with "green concepts" are grounded in both ecosystem service and climate change adaptation research, these activities are mainly implemented independently, which in turn has not only theoretical but also practical implications (Wamsler et al., 2014; 2016). This problematic assumption about inextricable links between two different domains might be another source of confusion for practitioners, adding up to the reasons for the potential concepts' omission.

## **6. Implications and conclusion**

The concepts of blue-green infrastructure, nature-based solutions and ecosystem-based adaptation have penetrated the practice of decision-making in UGBS governance in Poland, but their uptake has so far been uneven and ambivalent. It can, on the one hand, be described as selective (the aspects embraced are usually the ones that are in line with broader policy priorities, e.g. requirements of the new water law) and somewhat superficial (when mentioned, the concepts often lack specificity and elaboration, and take a relatively marginal place in the documents). On the other hand, direct references to the concepts played a noticeable role in introducing the agenda on UGBS in climate adaptation to the policy documents. Even though the impact of climate awareness on UGBS management and planning was often unclear, its rise seemed to support the importance of urban greening.

To interpret a situation when the concepts were mostly used implicitly and considered as gobbledegook with negative impacts to efficiency and accessibility of green spaces, it is useful to recognise that knowledge can have multiple pathways in policy processes and can be used at different stages (Saarikoski et al., 2018). The examination of new "green concepts" uptake illustrated "both visible, short term responses as well as more subtle and diffuse changes in policy frames that are time-lagged but traceable—and in some case also untraceable but nevertheless existing" (ibid., p. 581). It also showed how new concepts do not simply displace the old ones but interact with them in various ways, competing and overlapping with

them, as practitioners tend to load the new agendas into existing planning frameworks (Matthews et al., 2015; Albert & Von Haaren, 2017). One possible implication for further research is thus investigating the apparent paradoxes and inconsistencies in concepts' use, which may reveal hidden drivers and obstacles to their dissemination and uptake.

The second implication for future analysis stems from acknowledging that cities are embedded in and dependent on higher levels of governance (Hughes et al., 2018). Furthermore, within cities the application of concepts is determined by wider systems — not only practitioners' perceptions but also infrastructure and institutions (Andersson et al., 2019). This study elaborated on how discrepancies might exist not only between the EU and Member States' policies but also between national and city levels. Despite Poland's climate scepticism (Section 1), in big cities new approaches associated with "green concepts" are often embraced. Their implementation, however, might be hampered by the lack of precise guidelines and requirements, poor environmental legislation and spatial planning. All these barriers need to be dealt with predominantly at the national level, and therefore a higher level of governance may affect concepts' uptake locally in various, not immediately evident ways.

Despite these limitations, learning about the peculiarities of practitioners' perceptions and the actual use of concepts in policy documents provides a more nuanced understanding of the relations between the international policy rhetoric, academic discussions and local decision-making. While some scholars questioned transferability of the internationally-grounded policies and concepts (Mell et al., 2017), this study demonstrated that patterns of and obstacles in their use can be relatively similar across various contexts. These findings can therefore be relevant for practitioners in other cities in Poland and elsewhere, facilitating further discussion and development of a joint understanding of the concepts. Finally, while a certain degree of conceptual vagueness helps to accommodate for different interests, the evidence from this study suggests too much ambiguity and vagueness can lead to reluctance to use the concepts. Clarifying how greening and climate adaptation activities are linked in practice, accentuating the core principles of the concepts and including them into the operational elements of policy documents are among the key steps that might not only enrich theoretical discussion but also help to avoid path dependency in concepts' integration.

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## Appendices

### Appendix A. Case studies

**Table 1. Examples of urban greening innovations in the selected cities; columns represent the areas of action.**

	<b>New green spaces</b>	<b>Water retention</b>	<b>Social</b>	<b>Management &amp; governance</b>
<b>Gdansk</b>	pocket parks; 'Common yard' project (Wspólne podwórko)	incentive program for small retention; rain gardens; citizens' assembly on flood protection (2017)		
<b>Krakow</b>	Reforestation program; 'Park Krakowian'; pocket parks; meadows		opening up family gardens; "Krakow w Zieleni" project; RU:RBAN (EU project)	Urban greening strategy; R3 trees (efficient management of urban green space project); LIFE URBAN GREEN project
<b>Warsaw</b>	A Million Trees & Green Streets programs	educational program on water retention and rain gardens	Bujna Warszawa (a network of community gardens)	Introducing tree root barriers (a way to plant trees along the streets avoiding the conflicts with infrastructure networks)
<b>Wroclaw</b>	pocket parks	Grow Green (H2020 project)		Information cards on tree protection standards for developers; Climate and Nature Protection Office at the Sustainability department (since 2017)

These four cities differ in terms of climate risks, built form and organisation of UGBS management. For example, having experienced a devastating flood in 2001,

Gdansk since then has become a nationwide leader and pioneer in flood protection and stormwater management (Majewski 2016). Its core solutions are engineering ones but the retention potential of UGBS has been recognized in a number of initiatives (see the table above; also the website of the Gdansk Water Management office <http://www.gdmel.pl>). While flood is listed among the risks for all four cities under analysis, Krakow, Warsaw and Wroclaw seem to prioritise heat alleviation benefits of urban green space, which in turn is less articulated in Gdansk.

Pocket parks are actively promoted in cities of Krakow, Gdansk and Wroclaw because of their extensive old town where introducing new green space is extremely challenging. This, however, is less topical for Warsaw which was substantially rebuilt after World War II, and where modernist planning put a big emphasis on creating new green spaces (Szynkarczuk 2015, Guranowska-Gruszecka 2017).

Three out of four cities have a special unit responsible for managing urban green spaces – Municipal Greenery Authority (Zarząd Zieleni Miejskiej, 'ZZM'); it was founded in Wroclaw already in 1990 and only 27 years later (in 2017) in Krakow and Warsaw, while in Gdansk there is no such unit. Of course, this brief description does not provide a thorough comparison but it gives some idea about the different challenges these cities face.

## **Appendix B – Coding scheme**

To enhance reliability of qualitative research, it is usually advised that coding is conducted by at least two researchers, and the results are cross-validated and evaluated through inter-rater reliability (Syed & Nelson, 2015). In attempt to mitigate the interpretative biases associated with individual coding in this study and to ensure its consistency and replicability, the process was conducted stage-wise, following the recommendations in academic literature on qualitative research.

I employed the so-called 'hybrid coding' (Feredey & Muir-Cochrane 2006) which combines inductive category development and deductive category application. The process was highly iterative. I started by developing the list of initial codes based on the literature and then applied it to a few pages of documents and interview transcripts. After this pilot test, I revised the scheme and then employed a combination of 'generic' coding methods, including structural (when data is organized around specific research questions), descriptive and inVivo coding (when direct language of participants is used as codes) (Saldana 2009).

After several iterations, which included rereading the texts, revising the coding scheme and revisiting my analytical memos, the codes were merged into broader, analytical categories. Before proceeding to the interpretative phase, I scrutinized the results to ensure these categories adequately represented the codes and the data. (The list of benefits includes not only those directly related to climate change adaptation but also broader socio-economic and environmental benefits that are often attributed to nature-based solutions, see e.g. Nesshöver et al. 2017.)

Following Ruth Wodak's advice on 'retroductable' research' (in Elliott, 2018) by making the analysis as transparent as possible, I kept the record of major changes I made in the coding scheme: the new codes and subcategories which were not included in the list of initial codes are marked with an asterisk (\*), and the codes from my initial list that were not assigned any piece of data in the process of analysis are marked with '(-)' sign. Anonymised interview transcripts available upon request. This way, my individual analysis "[lends] itself to be re-captured by another individual who is reasonably familiar with the research question and procedure" (Syed & Nelson, 2015).

### **Category 1: Relations between UGBS and climate change**

#### **Subcategory 1: Benefits of UGBS**

Code: Water retention  
Code: Temperature regulation  
Code: Storm risk reduction  
Code: Biodiversity  
Code: Air quality  
Code: Health  
Code: Increased quality of life  
\*Code: Increased property prices  
\* Security  
Community building  
\*Aesthetics and attractiveness

#### **Subcategory 2: UGBS as a victim to climate change**

\* Code: watering trees in summer  
\* Code: planting trees will be more difficult in the future

#### **(\*) Subcategory 3: Danger from UGBS**

\* Code: falling trees during storms

#### **(\*) Subcategory 4: Changes in UGBS management**

\* Code: Prolonged vegetation season - more work  
\* Code: Choice of new species

### **Category 2: Current role of UGBS**

#### **\*Subcategory: Increased awareness**

\*Code: Perceived weather changes and frequent extreme events  
\*Code: 'Now when the first needs are met, people can care about the greenery'  
\*Code: Social movements as drivers for change  
\*Code: Interest from business  
\*Code: Authorities open up  
\*Code: More funding  
\*Code: More control and protection of greenery

#### **\*Subcategory: Rhetorics vs reality**

\*Code: Rise in green discourse but vague outcomes  
\*Code: Amount of green coverage decreases  
\*Code: Developers' interests go first  
\*Code: Lack of spatial plans  
\*Code: Gaps between big and small cities



### **Subcategory: Climate-driven actions in UGS**

(-) Code: Primarily driven by climate change

(-) Code: Climate change is among key stated goals

*nothing was coded to these preliminary subcategories*

\*Code: Climate change as the implicit idea behind planning

\*Sub-code: Implicit is not fine: no specific commitments

\*Sub-code: Implicit is fine as it's already a sign of climate change importance

\*Sub-code: Implicit is fine as no guidelines from above are needed

\*Code: Climate as a rationale to get more funding for greening

\*Code: Impact of the new water law

\*Code: greening actions of local authorities

### **Category 3: Attitude to and use of concepts**

#### **Subcategory 1: Explicit use**

\* Code: 'we have been using them for a long time'

#### **Subcategory 2: Implicit use**

\*Code: Concepts not clearly recognized but guide the actions

\*Code: Used in the international and academic contexts

#### **\*Subcategory 3: Attitude is suspicious**

\*Code: More useful for marketing than for real actions

\*Code: No one really uses them in everyday practice

\*Code: Have little novelty

\*Code: High maintenance costs

\*Code: Accessibility concerns

\*Sub-code: Counting green roofs as biologically active areas > less greenery on the ground

\*Sub-code: Green roofs have no social and biodiversity value

\*Code: Low efficiency comparing to trees

\*Code: Inadequate legislation

### **Appendix C. Document analysis**

#### **Search terms for inquiry:**

- Nature Based Solutions (NbS): rozwiązania oparte na przyrodzie, rozwiązania oparte na naturze

- blue-green infrastructure (BGI), green infrastructure (GI): błękitno-zielona infrastruktura; zielono-niebieska infrastruktura, zielona infrastruktura

- ecosystem-based adaptation (EbA): adaptacja oparta na podejściu ekosystemowym

- ecosystem-services (ES): usługi ekosystemowe, usługi ekosystemów

**Table 1. Explicit and implicit references to the concepts in the documents**

Legend

no reference
general reference, little elaboration
more elaborated reference
* - definition given

Document name	year	explicit				implicit
		EbA	ES	BGI	NbS	Climate / UGBS
<b>National level</b>						
Adaptation plans for 44 Polish cities (Plany adaptacji do zmian klimatu 44 miast Polski. Publikacja podsumowująca)	2018					
National Urban Strategy 2023 (Krajowa polityka miejska 2023)	2015					
Strategy for Energy Security and Environment (Strategia „Bezpieczeństwo Energetyczne i Środowisko – perspektywa do 2020 r.)	2014					
Strategic Adaptation Plan for sectors and areas sensitive to climate change (Strategiczny plan adaptacji dla sektorów i obszarów wrażliwych na zmiany klimatu do roku 2020 z perspektywą do roku 2030)	2013					
<b>City level</b>						
<b>Krakow</b>						
Adaptation plan - project (Plan adaptacji Miasta Kraków do zmian klimatu do roku 2030. Projekt)	2018					
Urban development strategy (Strategia rozwoju Krakowa. Tu chcę żyć. Kraków 2030).	2018					

Urban greening strategy (Kierunki rozwoju i zarządzania terenami zieleni w Krakowie na lata 2017-2030)	2017								
Study of the conditions and directions (Studium uwarunkowań i kierunków zagospodarowania przestrzennego Miasta Krakowa)	2014								
Environmental Protection Program (Program Ochrony Środowiska dla miasta Krakowa na lata 2012-2015 z perspektywą na lata 2016-2019)	2012								
<b>Wroclaw</b>									
Adaptation plan (project) (Plan adaptacji Miasta Wrocław do zmian klimatu do roku 2030. Projekt)	2018								
Urban development strategy (Strategia. Wrocław 2030)	2015								
Study of the conditions and directions (Studium uwarunkowań i kierunków zagospodarowania przestrzennego Wrocławia)	2018								
Environmental Protection Program (Program ochrony środowiska dla miasta Wrocławia na lata 2016-2020 z perspektywą do roku 2025)	2017								
<b>Warsaw</b>									
Adaptation strategy (project) (Strategia adaptacji do zmian klimatu dla m.st. Warszawy do roku 2030 z perspektywą do roku 2050. Założenia do konsultacji)	2017		*						
Urban development strategy (Warszawa 2030. Strategia Rozwoju Miasta)	2018								
Study of the conditions and directions (Studium uwarunkowań i kierunków zagospodarowania m.st. Warszawa)	2018								
Environmental Protection Program (Program ochrony środowiska dla m.st. Warszawy na lata 2017-2020 z perspektywą do 2023 r.)	2016								
<b>Gdansk</b>									

Adaptation plan (project) (Plan adaptacji Miasta Gdańska do zmian klimatu do roku 2030. Projekt)	2018					
Urban development strategy (Gdansk 2030+. Strategia Rozwoju Miasta)	2014					
Study of the conditions and directions (Studium uwarunkowań i kierunków zagospodarowania miasta Gdańska)	2018					
Environmental Protection Program (Program ochrony środowiska dla miasta Gdańska na lata 2015-2018 z perspektywą do roku 2020)	2016					

### Examples:

*General reference, little elaboration:* “Rozwińmy nowoczesną Zieloną Infrastrukturę, szczególnie na obszarach zwartej zabudowy śródmiejskiej” (Wrocław 2030 development strategy)

*More elaborated reference:* “Zielona infrastruktura – sieć wzajemnie połączonych terenów

naturalnych, półnaturalnych i obszarów zieleni, które chronią walory ekosystemów oraz dostarczają szerokiego wachlarza korzyści dla ludzi i przyrody. Pełni funkcję środowiskową (zachowanie różnorodności biologicznej), społeczną (organizacja terenów zielonych) oraz gospodarczą (zwiększanie rynkowej wartości nieruchomości)” (Warszaw 2030 development strategy)

### Appendix D. Interviews

When several respondents were affiliated with the same institution, they represented different working groups and departments. For anonymity concerns, the groups are not named. While I aimed for the consistent coverage of organisations across the cities, the ultimate list of respondents depended on their responsiveness.

**Table 2. List of the respondents**

Affiliation	City
Municipal Greenery Authority (Zarząd Zieleni Miejskiej)	Krakow
City Office, Environmental Protection Department (Urząd Miasta, Wydział środowiska)	Krakow
City Development Office, Environmental Planning department (Biuro Rozwoju Gdańska, zespół środowiska)	Gdansk

City Development Office, Environmental Planning department (Biuro Rozwoju Gdańska, zespół środowiska)	Gdansk
City Office, Environmental Protection Department (Urząd Miasta, wydział środowiska)	Gdansk
City Office, Environmental Protection Department (Urząd Miasta, wydział środowiska)	Gdansk
Municipal Road and Greening Authority, greening department (Zarząd Dróg i Zieleni, dział zieleni)	Gdansk
Akcja Miasto association (Stowarzyszenie Akcja Miasto)	Wroclaw
Municipal Greenery Authority (Zarząd Zieleni Miejskiej)	Wroclaw
City office, Sustainable development department (Urząd Miasta, Departament Zrównoważonego Rozwoju)	Wroclaw
Municipal Greenery Authority (Zarząd Zieleni Miejskiej)	Wroclaw
Municipal Greenery Authority (Zarząd Zieleni Miejskiej)	Warsaw
Urban Adaptation Plans project (Miejskie Plany Adaptacji)	Warsaw
Alter-Eko foundation (Fundacja Alter Eko)	Warsaw
Green Mazovia association (stowarzyszenie Zielone Mazowsze)	Warsaw
Municipal Road Authority (Zarząd Dróg Miejskich)	Warsaw
Municipal Road Authority (Zarząd Dróg Miejskich)	Warsaw
The City is Ours, non- profit civic association (stowarzyszenie Miasto Jest Nasze)	Warsaw
Municipal Greenery Authority (Zarząd Zieleni Miejskiej)	Krakow

### List of questions (English version)

1. Please briefly describe your role in your organisation (or, if is not the official green management department, also the role of organisation / aims of the initiative in green space management)

2. Why should cities care about green?

3. How would you describe the role of urban green space in the Polish policies? Is it getting enough attention or not really?

4. In your opinion, do people, business and authorities care about urban green more or less than some years ago? Why?
5. Climate change is now a big issue. Poland has adopted adaptation strategies for its cities. How does it affect your activity?
6. Do you think climate change is an issue for your city? Can you think of any climate change effects that are already visible or may be the biggest risk in the future?
7. Do you have any examples of greenery projects that have been created with this in mind?
8. Urban green in cases of hazards — do they mitigate or a source of danger?
9. It's getting increasingly common to say urban green space can also address economic and societal problems? What is your opinion on this?
10. Do you think accessibility and availability is an issue in your city? Maybe you could point out to the areas or social groups that are most vulnerable?
11. Societal benefits of green space are rather difficult to measure. How do you / would you approach this issue?
12. What are the key barriers you face in your everyday activity?
13. What are the main strategies for future development of urban greenery that you envision? Do you see any new opportunities for innovation?
14. What are the forms of urban greening that work the best and the worst for your city?
15. What are the tendencies / changes in relation to urban green you have noticed throughout your career?
16. Do you work with scientists? If yes, could you please describe your collaboration.
17. Do you implement any novel policy concepts — such as nature-based solutions, green infrastructure, ecosystem-based adaptation (or any other)— in your activity? Do they make any difference or rather just buzzwords?
18. In which ways — if — the situation of urban greenery in your city is different from other cities in Poland?
19. Which other institutions or specific urban green experts in your city (or other cities in Poland) would you recommend to further discuss these questions with?
20. Which reports or documents would you recommend to read to learn more about urban green policies in Poland?
21. Is there any other information that you think is useful for us to know in the context of our research that I have not asked you about?

#### **Appendix E. Participant observation at the workshops and conferences**

1. The conference on cross-sectorial collaboration in urban greening („Zieleń w miastach – krajobraz po bitwie czy bitwa o krajobraz?” 28-29.03.2019), organized by the Sendzimir Foundation.
2. The workshop on green spaces in, around and on the multi-apartment units ( 'Roślinność na, wokół i w budynku wielorodzinnym', 11.02.2019), organized by the Instytut na rzecz ekorozwoju.
3. Public consultation for the Climate adaptation plan in Warsaw (March 15, 2019).
4. Conference on Urban Agenda for the EU and its impact on European and national urban policy in Poland' (8.05.2018).

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