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**Putting Urban Resilience into action: A
longitudinal study of resilience thinking
implementation in Thessaloniki, Greece**

by

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degree of

Doctor of Philosophy

University of Warwick, Warwick Institute for the Science of Cities,
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Dedicated to my wife Hara

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Declaration and Inclusion of Material from a Prior Thesis

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree. The work presented (including data generated and data analysis) was carried out primarily by the author. Parts of this thesis have been published as full papers by the author:

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Abstract

Urban resilience has recently become one of the most popular drivers of contemporary urban development. However, embedding resilience thinking into specific policies is a complicated and challenging endeavour, which often leads to maladaptive outcomes and consequently to policy implementation gaps. Through a longitudinal analysis of efforts to implement urban resilience in Thessaloniki, Greece, this study seeks to highlight the capacity of resilience thinking to influence and transform urban governance and to identify actions that facilitate or impede this process. Utilising a case study design strategy and other qualitative and semi-quantitative research techniques, the study focused on Thessaloniki's participation in an international resilience programme, investigating the transformations it induced in local urban governance, its relative focus on natural hazards and urban geological risk and the role and limitations of assessment methods employed throughout the process. Findings from empirical research have revealed that Thessaloniki's resilience journey has propelled the reorganisation of the city's traditional governance apparatus and mobilised local community capacity building. This has subsequently enabled the co-production of a shared vision for the city's future, focussed on the need for enhanced resilience. However, Thessaloniki's resilience journey has not been smooth. Initially there was a lack of prior familiarity with resilience principles which, alongside the inherent obduracy of traditional urban governance in Greece, and over-dependency on pre-defined, top-down assessment frameworks, generated challenges that the city has sought to address as it has attempted to mainstream and institutionalise resilience thinking into the everyday practices of city officials and local communities.

Abbreviations

100RC:	100 Resilient Cities
AUTH:	Aristotle University of Thessaloniki
BGS:	British Geological Survey
CRI:	City Resilience Index
CRF:	City Resilience Framework
CRO:	Chief Resilience Officer
FAR	Floor Area Ratio
GIS:	Geographic Information Systems
IGME	Hellenic Survey of Geology and Mineral Exploration
ITSAK	Institute of Engineering Seismology and Earthquake Engineering of Greece
PRA (model):	Pressure and Release model
PRA:	Preliminary Resilience Assessment
QGIS:	Quantum Geographic Information Systems software
R/C	Reinforced Concrete
RS:	Resilience Strategy
SDGEE:	Soil Dynamics and Geotechnical Earthquake Engineering Research Unit (AUTH)
SDGs:	Sustainable Development Goals
SMR:	Smart Mature Resilience
UNDRR:	United Nations Office for Disaster Risk Reduction
UNISDR:	United Nations International Strategy for Disaster Risk Reduction
VGI:	Volunteer Geographic Information

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Chapter 1 - Introduction

The protection of people and infrastructure against the wrath of ‘Mother Nature’ has always been a significant part of human civilisation. As the world is continuously becoming more urbanised, the complexity of, and risk in, urban environments has correspondingly escalated with cities regularly becoming the confluence point of multiple interlinked disaster events. Notably, global anthropogenic and ‘natural’ phenomena such as globalisation and extreme weather events induced by climate change have showcased how risk has expanded in large cities as a result of an overwhelming concentration of population, economic activity and infrastructure. As a consequence, the vulnerability and exposure of urban systems to disruption of all kinds has multiplied, generating new kinds of vulnerabilities in numerous aspects of urban life. This has stimulated the need to find new directions in urban governance - both at strategic and implementation levels - that deal with this novel and complex new urban reality where risk, crisis and uncertainty abound (Zolli and Healy, 2012; Coaffee and Lee, 2016).

In this context, the concept of urban resilience emerged in the twenty-first century, as an evolved amalgam of previously applied ‘resilience-related’ concepts in various scientific disciplines including ecosystem management and disaster risk management (Alexander, 2013; Meerow, Newell and Stults, 2016; Moser *et al.*, 2019). At the same time, the broader concept of resilience begun to infuse international policy, with many global organisations positioning resilience thinking in the core of their developmental agenda (UNDRR, 2015; Habitat III, 2016). The most characteristic example of this trend derives from the Sustainable Development Goals (SDG’s) (United Nations General Assembly, 2015), where resilience can be identified as a fundamental cross-cutting principle, advocating a holistic, multi-dimensional and dynamic understanding of (urban) development (Bahadur *et al.*, 2015; Ziervogel *et al.*, 2017).

Whilst the concept of resilience can have multiple meaning depending on its field of action, in this study is framed through the ideas of preparedness,

awareness, adaptation and transformation instead of simply risk mitigation and ability to recover. At the city scale, urban resilience constitutes a step forward from previous conservative and developmental approaches, since it aspires to prepare the city for ‘expecting the unexpected’; in other words, to create a favourable milieu for local authorities and other stakeholders to collaborate so as to help the city endure a variety of (un)expected perturbations by remaining functional, evolve through inevitable adaptations, and finally, advance transformative pathway(s) to a more resilient and sustainable future.

The application of resilience thinking in the urban context has proven to be a challenging endeavour, as the concept itself is obscure and has been subjected to different interpretations, as it emerged from multiple conceptual and epistemological interpretations and meta-analyses in different scientific fields (Coaffee and Clarke, 2015; McGreavy, 2016). Urban resilience has been variously perceived as a system’s trait, a continuous process of capacity building or a strategic goal for sustainable development, with conceptualisations often intertwining and contradicting each other (Cote and Nightingale, 2012). This myriad of understandings often renders resilience a ‘boundary object’ (Brand and Jax, 2007; Baggio, Brown and Hellebrandt, 2015) that spans and connects a variety of disciplines from engineering and ecology to psychology and the social sciences, although such approaches are often in tension.

Today, the significance of urban resilience is acknowledged by academics, practitioners and global institutions, and can be observed in the larger number of journal articles on resilience (Olsson *et al.*, 2015), as well as in the emergence of numerous resilience-building projects worldwide (ACCRN, 2008; Rockefeller Foundation, 2018). The establishment of SDG 11, -or the urban SDG as it has been called – further underlines the centrality of resilience in the agenda of sustainable urban development (United Nations, 2018).

However, in practice this ‘resilience frenzy’ has led many scholars to argue that resilience has gradually become a buzzword (Normandin *et al.*, 2019), as its meaning has expanded in such a level that it has already become a very broad concept interpreted in a multiplicity of different ways that renders it extremely

difficult to operationalise and implement (Boin, Comfort and Demchak, 2010; Wagenaar and Wilkinson, 2015; Normandin *et al.*, 2019). At the city scale, resilience is often heralded as a stimulus to a new way of governing complexity, but to date few studies have produced empirical evidence of the actual longer-term impact of governance change through resilience implementation. Most of the current literature is still focused on short term, ad hoc, initiatives that may or may not change the status quo (Coaffee, 2013; Coaffee and Lee, 2016).

In seeking to plug this gap in resilience policy implementation, *this study attempts to analyse the application of resilience thinking as well as the implementation of resilience policies in the urban context, by providing a thorough longitudinal investigation in the city of Thessaloniki, Greece.* Specifically, the study follows Thessaloniki's resilience journey over a number of years from its early inception in 2013, to the efforts to implement resilience-focused policy and the completion of the city's participation in the Rockefeller Foundation's 100 Resilient Cities network, in July 2019.

However, in order to explore the practical application of resilience thinking in an urban environment, a brief exploration of the evolution of the actual term across different temporal periods and disciplines is required to foreground the study. This highlights that urban resilience has not appeared out of nowhere but rather constitutes the final enactment of resilience principles on a much larger and complex cross-scale environment, enveloping and expanding many of the ideas developed in prior conceptualisation approaches.

1.1 The evolution of resilience as a term

“We live in a complex world. Anyone with a stake in managing some aspect of that world will benefit from a richer understanding of resilience and its implications.”

Walker and Salt, 2012: Preface

Resilience is not a new term in the scientific world. It has been widely used in several different disciplines such as engineering, ecology, psychology, business, geography, anthropology, national security and disaster risk management. The

very term resilience has its roots in the Latin word for ‘re-bounce’ (Latin: *resilire, resilio*); thus, the idea of bouncing back is focal for the definition of the term in many disciplines (Manyena, Siambabala *et al.*, 2011). Disaster expert David Alexander (2013) provides a thorough analysis of the term’s evolution since its first use for scientific purposes by Attorney at Law Sir Francis Bacon in 1625 and until its re-emergence during the first half of the 19th century, where it acquired a broader meaning indicating flexibility and inconstancy (or fickleness). In some cases the term has been also used to designate the ability to recover from the impact of a disaster through ‘resourceful’ thinking (Campanella, 2006; Brown, 2014).

Thus, tracking its scientific roots in engineering and material sciences, resilience was initially linked to the strength and ductility of materials, with the term used to describe the ability to recoil or resist stress (Rankine, 1858)¹. Engineering resilience thus, set the conceptual ground for the adoption of the term by many other scientific fields, including ecology. The term’s transition to those fields is also closely connected to a conceptual connection with general system theory (von Bertalanffy, 1950) as resilience ideas moved from describing properties of materials to analysing complex arrangements, and particularly ecological systems. According to Boshier and Dainty (2011), research on the concept of resilience primarily emerged with the work of Errington (1953) and Blum (1968) on the ways ‘*ecological systems cope with stresses or disturbances caused by external factors*’ (Boshier and Dainty, 2011, p.7).

Around the 1970’s, the Canadian ecologist Buzz Holling - often cited as the father of ecological resilience (1973, 1992, 1986, 1996, 2001) - expanded the study of resilience in ecosystems undergoing stress and change, paving the way for the introduction of the term to the social sciences, notably in psychology, anthropology and human geography. The importance of Holling’s work lies not only in the association of the concept with the general systems theory, but also

¹ Hence, it was in engineering and material sciences (and in particular mechanics) that the first scientific reference to resilience was made in an attempt to describe both strength and ductility of solids, using as an example of the resistance properties of steel beams.

on a disengagement from the traditional engineering/mechanistic single equilibrium theory and the introduction of a holistic conceptualisation of multiple-equilibria states. The catalyst of this conceptual shift was the idea of complex adaptive systems and the inception of '*complexity science*' (Walker and Cooper, 2011). Holling, and those he worked with, focused on the inherent ability of ecological systems to absorb disturbance and sustain the same relationships among their populations regarding resilience as the persistence of relationships among system components (Gunderson, 2000; Gunderson *et al.*, 2002).

Subsequent development of Holling's work in ecology led to the evolution of the conceptualisation of resilience from a homeostatic reaction of a system² to its *adaptive capacity*. This was a pivotal shift for the understandings of resilience, since researchers acknowledged the dynamic nature and uncertainty of current ecological environments. Here, instead of seeking a return to a previous optimal state, scholars started proposing continuous adaptation of the system to short stability stages, using feedback from previous perturbations in order to smooth the transition process (Gunderson, 2000; Folke *et al.*, 2010).

Further expansion of ecological resilience clarified some fundamental heuristics, such as the adaptive cycle, focusing on process of collapse, spontaneous reorganisation and system dynamics, and notably, panarchy - a hierarchy of adaptive cycles and nested systems of adaptive cycles (Figure 1.1) (Gunderson and Holling, 2002; Folke, 2006). In such a panarchic system, adaptation and transformability were identified as the most important characteristics of ecological resilience incarnating the basic qualities of a system's conservation within an environment of constant transmutation (Walker *et al.*, 2004; Folke *et al.*, 2010; Walker and Cooper, 2011; Walker and Salt, 2012).

Resilience thinking has also been widely applied in disaster risk management scholarship. Disaster resilience was initially influenced by the engineering

² Homeostatic reactions refer to the self-regulating processes a system employs to maintain a state of equilibrium.

conceptualisation of the term, acquiring a ‘bouncing back’ rather than bouncing forward connotation. However, more recent researchers (Bosher and Dainty, 2011; Manyena, Siambabala *et al.*, 2011) have shifted the attention of resilience research to the underlying vulnerabilities that amplify the impact of natural hazards as well as post-disaster recovery, incorporating a social dimension to traditional disaster risk approaches³.

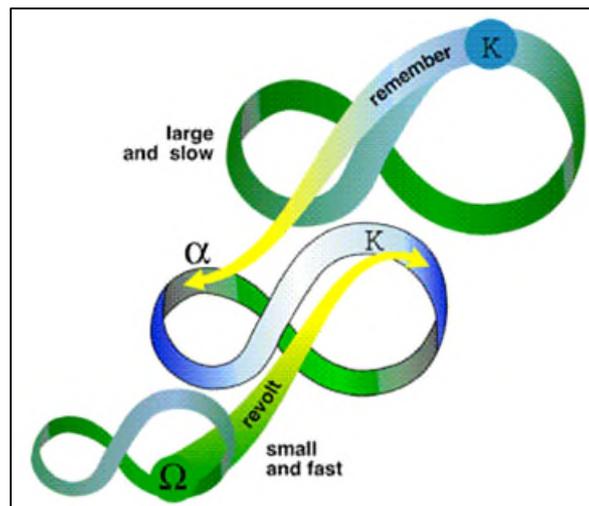


Figure 1.1: The panarchy adaptive cycle model (Source: Gunderson & Holling 2002)

Resilience thinking was further applied in psychology with many arguing that such work facilitated the transition of the term into the social sciences (Alexander, 2013). Although, some researchers argue that it was during the 1950’s that the term was used for the first time in anthropological terms to describe psychosomatic conditions, the work by Norman Garnezy (1973, 1974) is regarded by the academic community as the starting point for *resiliency* (initially as competence) to be employed in contextualising the level of psychological vulnerability of adolescents and children after experiencing a disruptive event (domestic violence, bereavement, etc.)⁴. Garnezy’s work collided with the idea of inherent vulnerability that was very popular in

³ This transition is thoroughly explored in Chapter 3 of this study.

⁴ Garnezy’s work was largely influenced by the study of children raised by schizophrenic mothers, in whom he identified numerous examples of individuals who managed to cultivate robust adaptive patterns of social behaviour, despite being exposed to both a chronic stress (mental condition of the parent) and acute behavioural shocks induced by this mental condition (Rutter, 2012)

psychopathology at this time (see Anthony and Cohler, 1987) and which accepted resilience as a process and not as a static attribute of an individual. This conceptualisation of resilience as a process instead of a systemic property was later adopted by social scientists, with cities often becoming the socio-spatial arena for its application.

1.2 Resilience thinking and urban environments

Understandings of resilience *as a process* are at the core of the concept's utilisation in social and developmental sciences, including urban planning. Cities are today, one of the most promising areas for resilience thinking to flourish. There is a global consensus regarding the importance of urban processes in securing a sustainable future and hence cities have quickly acquired a central position in recent developmental debates (Barnett and Parnell, 2016).

Contemporary cities are vulnerable to a variety of natural, technological, economic and human induced dangers, as a result of their openness and connectivity, partly promoted by the neoliberal developmental agendas from the 1980's onwards (Mouffe, 2006; Swyngedouw, 2009). In the twenty-first city, often heralded as the century of the city, the concept of urban resilience (or city resilience) emerged as a combination of previous resilience discourses and represented the evolution of the term as applied in the timeliest socio-politico-economic complex system of our time (Boyd and Juhola, 2015). Figure 1.2 depicts the evolution for resilience as a term across disciplines as briefly visited in the previous subsection, as well as the holistic nature of urban resilience, assembling its foundations from across a wide scientific spectrum.

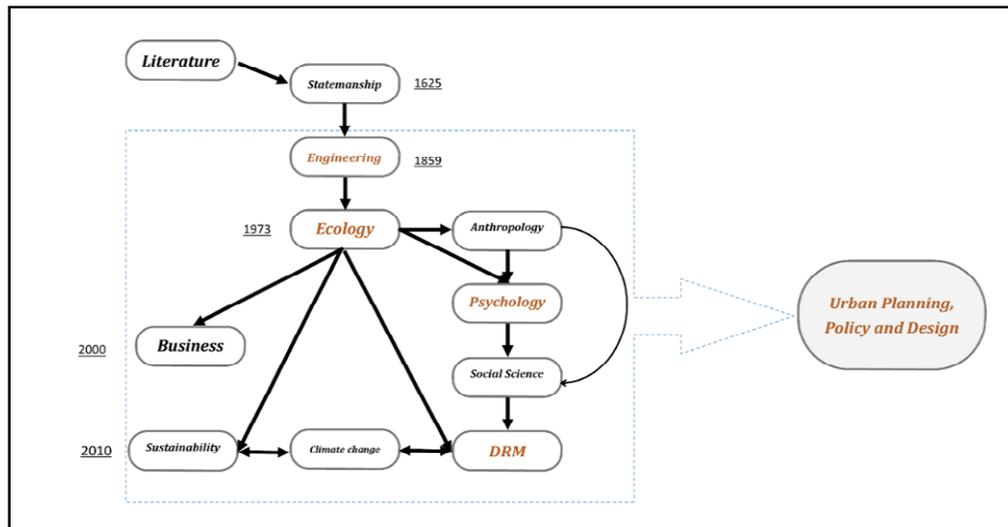


Figure 1.2: The origins of the term resilience across different scientific disciplines throughout time, some of which were explicitly analysed and the formulation of urban resilience (compare with Alexander, 2013)

Importantly, for the purpose of this study, cities are generally appreciated as complex and adaptive systems (or a system of systems), while resilience is conceptualised as a continuous and ever-evolving process (Meerow, Newell and Stults, 2016) echoing concerns for the development of adaptive forms of governance to better manage emerging urban challenges (Healey, 1998; Olsson, Folke and Berkes, 2004). Here, adaptive governance emphasises institutional change through the presence of flexible arrangements which can facilitate co-productive approaches to city management and rely on networks of people and organisations at multiple levels (Coaffee and Healey, 2003)⁵.

Viewed through this lens of resilience as a process, governance change and transformation have emerged as, arguably, the main focus of urban resilience scholarship. Such work has focused upon resilience policies and strategies that seek to enable the transformation process by breaking operational silos within which policy is often trapped, promoting efficient procedural arrangements, as well as encouraging shared motivation and values among a full range of urban stakeholders and civilians (Coaffee *et al.*, 2018). Moreover, work in this area has drawn attention to the requirement for a thorough investigation of contextual

⁵ A more comprehensive analysis of the concept of adaptive governance is provided in Chapter 2.

governance particularities and pre-existing governance models that often reproduce conventional approaches, so as to demonstrate the utility of resilience as a transformative agent of change. Urban resilience scholarship has provided different frameworks for confronting the risks faced by contemporary cities, but experiences from empirical studies so far show that its implementation often leads to business as usual approaches (Coaffee *et al.*, 2018). This phenomenon, also referred to as ‘the resilience implementation gap’ (Coaffee and Clarke, 2015), is observed in resilience strategy implementation and produces a distinction between the ambitious objectives of resilience strategy and the ‘*demonstrated capacity to govern resilience in practice*’ (Wagenaar and Wilkinson, 2015)

Resilience policies, however, should not be characterised *de-facto* as beneficial. They should aim at restructuring urban governance and breaking operational silos in advance of implementing physical planning activities (Stark, 2014); if not, any attempt to impose resilience might result in maladaptation (Barnett and O’Neill, 2010; O’Hare, White and Connelly, 2016; Torabi, Dedekorkut-Howes and Howes, 2018) and inequity in resilience outcomes (Ziervogel *et al.*, 2017). Resilience thinking, whilst challenging the normal operational trajectories of public administrations, often neglects social justice and contextual governance traditions thus leading to the emergence of complex and often underestimated trade-offs across various spatial and temporal scales (Chelleri *et al.*, 2015; Anguelovski *et al.*, 2016).

Addressing resilience from a governance perspective thus generates a set of critiques to the transformative capacity of resilience policy implementation. Therefore, resilience has often been criticised as merely recycling a set of previously applied public administration principles, taking advantage of the attention and access to resources concentrated around the concept, in order to sustain the status quo or even naturalise a set of neoliberal ideas in urban governance (Joseph, 2013; Diprose, 2014; Welsh, 2014). Such ideas include the responsabilisation of individuals to mitigate the impact of natural hazards and other external risks, which according to some scholars reflects a withdrawal of

intervention from local communities and a concurrent development of particular forms of 'governing from distance' that perpetuate conventional urban governance approaches and the associated power relations (Crawshaw, 2012; Chandler, 2014a).

In addition to the devolution of responsibility from the state to the people, resilience has been criticised as largely apolitical and reformist (Reid, 2012; Diprose, 2014; Chandler and Reid, 2016), promoting a mentality of non-critical adaptation to urban realities posed by the neoliberal agenda. Here, resilience has been seen as encouraging individuals to cope with the unfavourable conditions they face and not challenge the root causes that propelled them. Resilience has also been criticised as not fundamentally dealing with ameliorating social inequality and precarity, and consequently instead of becoming "*a sign of defiance [...] become the preferred means of maintaining business as usual*". (Diprose, 2014: p. 44)

Yet, despite such critiques, giving some level of responsibility to individuals and communities is a fundamental prerequisite for successful implementation of resilience policies. For a resilience policy to be truly impactful, local context and community input are vital components. Moreover, this contextual and tacit knowledge, if co-produced in a meaningful manner, can further stimulate the development of trust among all the stakeholders and generate innovative ideas for confronting external shocks and internal stresses. Thus, collaborative partnerships amongst urban stakeholders and community members, are central for the design and successful implementation of urban resilience policies.

Through many discussions about successful implementation of urban resilience, the question that inevitably emerges is *how can we measure this success?* Subsequently, the development of resilience assessment frameworks has emerged as an indispensable part of resilience policy design and implementation. Resilience assessment has been a major concern for academics, NGOs and international organisations, attempting to identify the most appropriate indicators for measuring resilience. In spite of the questionable capacity of such indicators to quantify resilience in an efficient way (Levine, 2014), assessment frameworks

have been recognised as useful tools for local authorities and urban practitioners during the preliminary stages of resilience policy design, when dialogue between a multitude of urban stakeholders is required (Spaans and Waterhout, 2017)⁶. Furthermore, resilience assessment, despite its limitations, is seen to provide a mechanism to monitor governance changes induced by the implementation of a resilience policy and help track the process of institutionalising -or mainstreaming- urban resilience across governments and communities.

Today, despite the wide application of urban resilience approaches globally, urban resilience policies have not been thoroughly analysed and monitored over a significant period of time until very recently (Rankin *et al.*, 2017; Spaans and Waterhout, 2017). This has produced an academic and practical void in this area of research. Building resilience is a long-term, time-consuming and iterative process. It requires constant monitoring, refocusing of initial goals and objectives, continuous feedback and learning loops, in order for municipal authorities to comprehensively capture and analyse implementation successes and challenges and avoid maladaptation. Thus, the following research question emerges from this gap in the literature: *Does resilience thinking has the potential of transforming governance configurations and promoting flexible and adaptive governance models in the long term?*

1.3 The current study

This thesis proceeds in the light of the intensified attention urban resilience has accrued in city planning and policy making during the last decade and attempts to fill the academic and practical void identified above in resilience scholarship, by providing a longitudinal study of resilience thinking implementation in the city of Thessaloniki, Greece. In more detail, this study constitutes an attempt to follow the resilience journey of Thessaloniki, Greece, a city without previous exposure to resilience principles, from its inception to its design and ultimately implementation. This longitudinal case study of resilience thinking application

⁶ Chapter 4 of this study investigates in detail the application of different resilience assessment frameworks as well as their limitations.

focuses on three main aspects: governance transformations, the marginalising of natural hazards and geological risk in policy approaches, and the utility resilience assessment and institutionalisation.

Thessaloniki's resilience journey started with the participation of the city to the 100 Resilient Cities Programme pioneered by the Rockefeller Foundation. Thessaloniki was part of the 100 Resilient Cities since 2014, and as such underwent (and is still undergoing) a resilience journey to create a new roadmap for its developmental future. The wider 100RC Network was inaugurated in an attempt to "*help cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century*" (Rockefeller Foundation, 2018). The overall aspiration of the Network was to make citizens and infrastructure more resilient to disruptive events, including chronic stresses (e.g., resource shortages, inefficient public transportation, or unemployment) and acute shocks (e.g., natural hazards, disease outbreaks, or political instability).

The operational process for the cities in the 100RC was divided into three phases. The first phase included the understanding and categorisation of the city's resilience components and the identification of the most pressing shocks and stresses. Its outcome was a Preliminary Resilience Assessment (PRA). The second phase emphasised the preparation of the Resilience Strategy (RS) based on the discoveries of the PRA. Thirdly, the implementation phase operationalises the RS and Action Plan in a specific temporal period.

Prior to its participation in the 100RC network, Thessaloniki's urban governance shared the general complications and inefficiencies of Greek municipal governments (Chlepas, 1994; Paraskevopoulos, 2001; Getimis and Grigoriadou, 2004). These included, among others, the lack of introspection, close financial and administrative connection to the national state, a mistrust by local residents of municipal decision-making due to several incidents of corruption and

misallocation of funds⁷, a lack of horizontal communication among municipal departments and other urban stakeholders, and a general misconnection of goals, objectives and outcomes among different projects undertaken by the city. These obdurate but ineffective governance arrangements, in conjunction with the reduced funding the city received as a result of national austerity measures, motivated the newly elected mayor along with other municipal officials, to seek alternative pathways to confronting the challenges of Greece's co-capital. The proposal for participation in the 100RC network was a central part of this pursuit.

Another key stimulus for engaging with the 100RC was the city's vulnerability to natural hazards, manifested in a long and devastating history of local disasters. In 1978, a major earthquake hit the city resulting in the death of 49 people, the collapse of a nine-storey building and the damage, beyond repair, of 4.5% of the city's building stock (Penelis *et al.*, 1989). The earthquake's impact induced a massive reform of the building codes, especially within the historic centre of the city (Pitilakis *et al.*, 2007) and consolidated earthquakes as an imminent threat for Thessaloniki in its residents' perception. Apart from earthquakes, Thessaloniki is also threatened by other types of natural hazards such as urban flooding and heatwaves; flooding, and flash floods in particular, have increased in frequency and severity during recent years triggering disasters and resulting in the loss of lives, properties and other material resources.

1.4 Objectives and aims of this study

These multiple shocks and stress, both known and unknown, has framed the overarching objective of this study, which is *to examine the potential of resilience-thinking to influence urban governance and to identify explicit actions that facilitate or impede this process*. This objective is unpacked in three distinct aims thoroughly analysed in this study.

⁷ A former mayor, along with two ex-officials, were found guilty for embezzlement of almost 18m euros and were ultimately incarcerated (BBC, 2013).

The first aim is *to investigate how resilience strategies induce the transformation of the traditional pathways of urban policy delivery*. The fulfilling of this aim starts by providing a baseline assessment of Thessaloniki's Municipality governance structure and its inherent chronic pathogeneses. This sets the scene for the study's focus on the governance transformations that the city's participation in the 100 Resilient Cities network stimulated. In essence, this study investigates how urban resilience in Thessaloniki functioned both as a conceptual framework or a boundary object and as an incentive for urban stakeholders to reorganise the traditional governance apparatus and break operational silos.

The second aim of the study is *to highlight the implementation challenges for urban resilience policies deriving from the inattention to urban geological risk*. Natural hazards, and geohazards in particular, have played a vital role in the framing of resilience's concept in the past, but in contemporary urban resilience policies their role tends to be rather diminished, in favour of more urgent c issues, such as socioeconomic. Thessaloniki incarnates an example of this tendency; thus, an aspiration of this research is to highlight this problematic integration of geological risk into the city's resilience strategy by analysing the potential dangers it creates and concurrently propose potential directives for better dealing with geo-hazards, not only for Thessaloniki, but for other cities facing similar perturbations.

The third aim of this study is *to explore the utility and/or the potentialities of resilience assessment methods to track governance change and mainstreaming resilience practices*. This study establishes that although assessment methods, are very convenient for tracking changes as well as monitoring development progress, they are based on context-specific assumptions, rendering their transferability from one context to another considerably problematic. In exploring the methods and data used in this process - which is referred to as assessment but resembles more evaluation - and illuminating its advantages and disadvantages, it is possible to propose suggestions for how the city might better

track the next phase of its resilience strategy that seeks to institutionalise resilience thinking.

The three aims are inherently intertwined. Therefore, the transformations in Thessaloniki's urban governance analysed include governance arrangements and policies related to urban geohazards. Similarly, assessment/evaluation of resilience policy implementation incorporates governance transformations actualised as an outcome of the 100RC project participation, as well as objectives and actions planned to tackle urban geohazards' impact. The relationship between the three aims of this study is schematically represented in Figure 1.3.

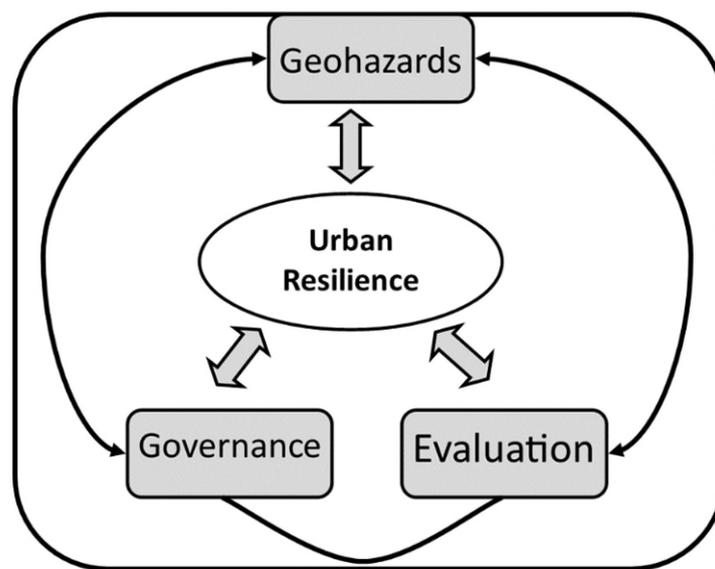


Figure 1.3 Thesis aims and their interrelations

The approach chosen for this study focuses on research methods associated with studies of urban governance and policy making. Drawing specifically on the conceptual work on governance transformations (Coaffee and Healey, 2003; Healey, 2006), this study seeks to find the practices that need to be reformed in order to induce systemic governance change. Even though it follows the implementation of Thessaloniki's Resilience Strategy, it extracts experiences from other cities of the 100RC network and presents different approaches adopted in similar to Thessaloniki's situations.

The ultimate goal, and simultaneously the greatest challenge for local authorities in Thessaloniki, is the institutionalisation of these governance transformations. Institutionalisation of urban resilience is a very delicate and time consuming objective, with this study illuminating that resilience thinking seems to have the potential to transform the current way urban governance is delivered by disrupting traditional governance procedures and establishing inter- and trans-municipal collaboration as an overarching norm (Coaffee and Clarke, 2015; Brandtner *et al.*, 2017; Coaffee *et al.*, 2018). This cultural shift could prove to be the most vital resilience dividend in the case of Thessaloniki.

1.5 Methodology and data collection

A detailed case study approach was undertaken, which attempted to track the governance changes that occurred as outcomes of urban resilience policy implementation (this is explained in detail in Chapter 5). Being involved from the beginning in the process of designing the resilience strategy of Thessaloniki, I was able to work within an action research tradition. Throughout my involvement with the Resilience Office of Thessaloniki, and after building strong relations with the Resilience officers and other municipal departments, I participated in numerous meetings of the resilience team both in person and remotely, expressing my ideas about the design of the Resilience Strategy, while simultaneously attempting to identify transformative changes in governance culture stimulated by resilience principles.

To corroborate such insights documentary analysis was also undertaken. This involved both documents (such as planning and development documents) released by the municipality of Thessaloniki as well as Resilience Strategies published by all other cities participating in 100RC network. Additionally, primary data collection was based on a series of approximately 30 semi-structured interviews with city officials, including Thessaloniki's Chief Resilience Officer(s), the members of the Municipality's Resilience Office and other municipal departments as well as other decision makers and community members related to the 100RC project implementation. Further data was

collected through several informal discussions at city-run resilience meetings or via teleconference with municipal officials and other stakeholders.

To address the second geo-hazard-related aim, spatial, seismological, geological, geomorphological and other types of physical data for the city was also collected and analysed through several different sources including the Hellenic Survey of Geology and Mineral Exploration, the British Geological Survey, the open GIS platform of the Municipality of Thessaloniki and the SDGEE Research Unit of the Aristotle University of Thessaloniki.

1.6 Contributions of the study

This study contributes to the field of resilience scholarship in different ways. It constitutes a relatively unique longitudinal analysis of resilience strategy design and implementation, providing evidence of the impact of the introduction of resilience thinking into city affairs over a long period of time. Moreover, it contributes to the field of urban resilience from methodological, conceptual and practical standpoints as well.

Methodologically, this study presents an analytical framework for tracking governance changes inspired by urban resilience principles and based on Rockefeller's City Resilience Index (CRI)⁸ for an extended period of time. Such approaches are lately becoming more common in studying urban resilience implementation policies, acknowledging that the road to resilience is a long and never-ending process and not a fixed destination.

From a conceptual perspective, this study provides empirical evidence of governance transformation induced by the implementation of resilience thinking, in the city of Thessaloniki. Such evidence and insights could be used to inform future research on the application of adaptive governance in other city-members of the 100RC network or other cities experiencing similar challenges to Thessaloniki's. The study also illustrates that focus on socio-economic problems

⁸ Extensive presentation of the CRI is presented in Chapter 4.

in contemporary resilience strategies can lead to a lack of emphasis on environmental concerns and specifically on the potential impact of natural hazards.

Finally, from a practitioner and policy viewpoint, this study shows a wide range of factors that create policy implementation gaps and the challenges involved in consolidating and embedding a culture of resilience. Such factors include the breaking of cross-departmental and cross-sectoral silos, the raising of awareness around the transition from reactive risk management towards proactive resilience and the building of trust among urban stakeholders and local authorities.

1.7 Thesis structure

The study consists of nine chapters divided into two distinct parts. This introduction is followed by part one (chapters 2-4), which presents the foundations of the conceptual ideas upon which the empirical study - part two - is constructed.

Chapter 2, *Resilience thinking and Urban Governance*, discusses the evolution of resilience from an engineering-dominated term denoting resistance and stability, to the current understanding of urban resilience as a tool to revisit and restructure urban governance configurations and processes. It illuminates the ways urban resilience principles challenge traditional top-down governance by opposing silo-mentality both horizontally, among different urban stakeholders, and vertically within the local authorities. Additionally, it showcases the concept of adaptive governance and the role of the community in designing and implementing urban resilience policies and concludes by identifying a series of implementation challenges and gaps.

Chapter 3, *Urban resilience and natural hazards*, follows the narrative adopted by emerging policy discourses on resilience that moves from mitigating the expected to dealing with the unexpected. In particular, it explores the differences between traditional disaster risk reduction methods and urban resilience approaches in geohazard management and emphasises the shift from reactive environmental policies to preparedness and proactive thinking. Further, it

reviews the absence of geological input and engagement of geological organisations from the designing of resilience strategies in favour of more pressing urban priorities, often driven by socio-political aspirations.

Chapter 4, *Resilience Assessment, Monitoring and Evaluation*, initially presents the current state-of-the-art methods and techniques used for assessing urban resilience levels and evaluating urban resilience policies. This chapter further emphasises the limitations of resilience assessment methods, especially when referring to intangible indicators of urban life, such as social and political issues. 100RC's approach for assessment monitoring and evaluation is also scrutinised.

Chapter 5, *Research Approach and Methods* sets out the overall project design and the research methods that were employed, as well as the analytical approach followed for each of the empirical chapters.

Chapter 6, *Resilience Thinking and the Transformation of Thessaloniki's Urban Governance*, is the first empirical chapter of this thesis. It analyses the city's Resilience Strategy and its implementation, focusing on the role of the Resilience Office and transformations it has generated in the city's *modus operandi*, by a) reorganising the traditional governance apparatus, b) mobilising adaptive governance capacity and, c) co-producing a shared vision for medium and long-term urban development.

Chapter 7, *Investigating the influence of Urban Geological Risk in Thessaloniki*, articulates the inattention towards geohazard management identified in the Resilience Strategy, which contradicts with the identification of earthquakes and surface flooding as the city's most eminent threats. In particular, urban geological risk is initially defined and analysed in two different areas of the city, each one having suffered from the devastating impact of geohazards in the past. The emerging policy implementation gaps are extracted and directions for future developmental policies are proposed.

Chapter 8, *Monitoring and Assessment of Urban Resilience in Thessaloniki* starts from the earliest risk and resilience assessment undertaken at the start of the project, and tracks the assessment process and methods adopted by the local

authorities throughout the implementation of the Resilience Strategy and the establishment of the Urban Resilience Observatory in July 2019. A critical reflection on these methods will be followed by a discussion on how to devise indicators for tracking the institutionalisation or mainstreaming of resilience practices in the best way.

Chapter 9 concludes the thesis by connecting the lessons learned from Thessaloniki and the ways resilience strategy implementation at the international scale can be better understood in light of this study. Finally, considerations and directions for future research on this field will be proposed.

Figure 1.4 summarises the structure of this thesis and depicts how the different resilience concepts presented in each theoretical chapter operate as the ‘glue’ to connect to the different resilience practices that were implanted in Thessaloniki

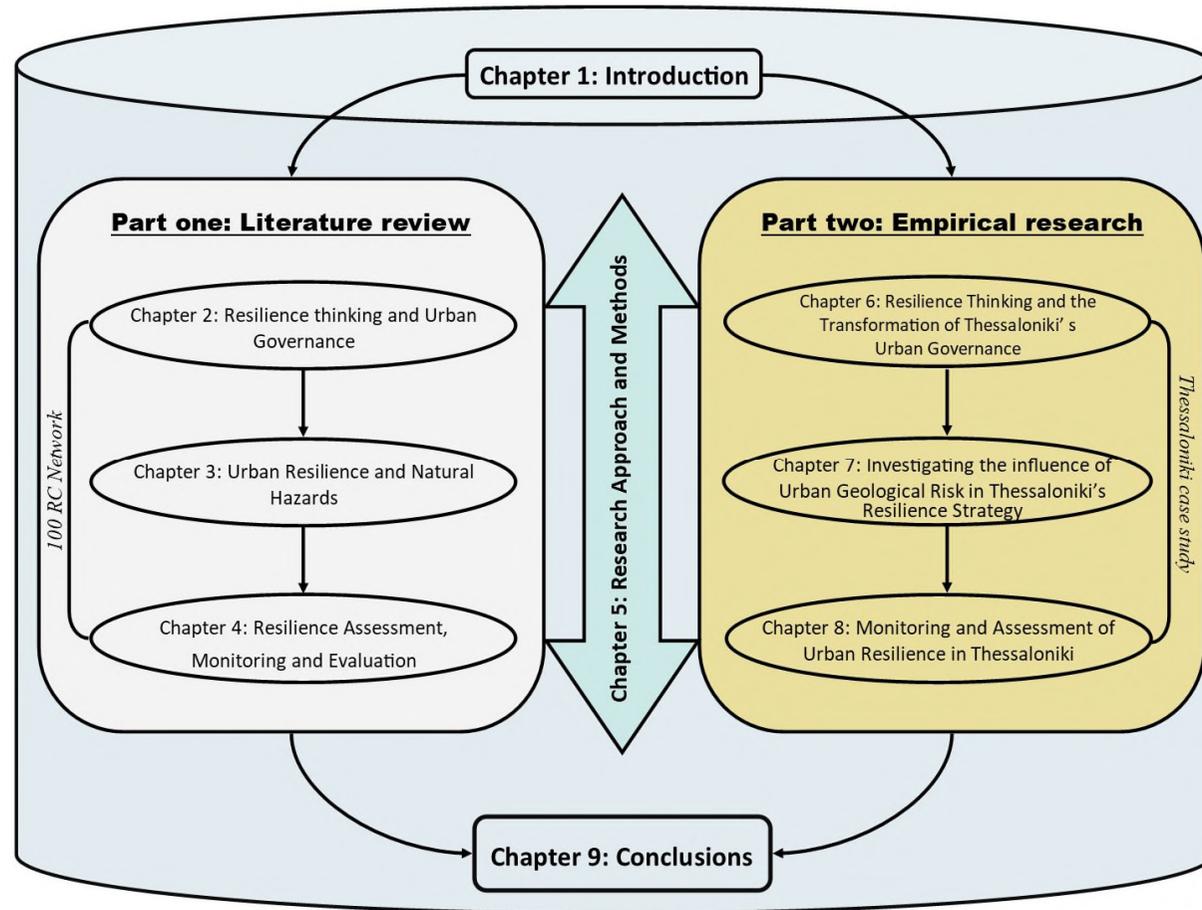


Figure 1.4: Graphical representation of the thesis structure

Chapter 2 - Resilience thinking and Urban Governance

2.1 Introduction

Chapter 1 of this thesis provided a general introduction to the notion of urban resilience through its journey across different disciplines and presented the major aims of this study. In the following three chapters, which constitute part one, the theoretical background of such aims is unpacked, while in the corresponding empirical chapters (part two of the thesis) the outcomes of primary research are portrayed. Specifically, this chapter explores the relationship between resilience thinking and urban governance with a particular focus on its capacity to induce transformations in governance structures and relations.

The importance of urban governance in city affairs is reflected in the key role it plays shaping the physical and social character of urban regions, affecting the quantity and quality of local services and efficiency of delivery, determining the sharing of costs and distribution of resources among different groups as well as shaping residents' ability to access local governments and engage in decision-making processes, eventually influencing the accountability and responsiveness of local governments to citizen demands (Slack and Côté, 2014).

The increasing pressures on modern cities to sustain continuous provision of basic services in moments of disruption, has forced urban policymakers to seek for a holistic approach to manage both endogenous (internal) and exogenous (external) threats. This, in combination with the increased interdependence between urban stakeholders and governance structures has given birth to the emergence of innovative forms of urban governance tasked with reducing risk and preparing for a future of crisis and uncertainty. In this context, the notion of city or urban resilience has emerged, seeking to address the amplified risk that contemporary urban environments face; a risk stemming from economic, environmental and socio-political uncertainty, volatility and rapid change (Pike, Dawley and Tomaney, 2010). The multiple forms of urban resilience that have now arisen offer a variety of frameworks for reducing such risks, focusing on

preparedness, capacity building and adaptability. The vast majority of such schemas centrally acknowledge the important role of ‘institutions’ in city-building and draw attention to institutionalist modes of analysis to understand how city governance might be changed to reflect resilience ideas.

From an institutionalist point of view, the term governance describes all the processes for the regulation and mobilisation of social action (Giddens, 1984; Harvey, 1989; Healey, 1998, 2006). By extending this understanding to the urban realm, urban governance can be conceptualised as pertaining to different forms of operational action, within city limits, from those orchestrated by formal government agencies, to lobby groups, self-regulated groups, social campaigns and movements challenging dominant governance relations. Urban governance is typically delivered through a set of structures, the complexity of which varies across different temporalities and places and is highly influenced by culture, tradition and political relations (Stone, 1993). In essence, it refers to the processes through which urban stakeholders along with elected officials plan, manage and finance urban areas (Slack and Côté, 2014). In practice, it normally involves a constant negotiation and contestation over the allocation of social and material resources and political influence, and at the same time mediation of a host of economic and social forces, institutions and relationships (Avis, 2016; da Cruz, Rode and McQuarrie, 2019). Moreover, urban governance operates at multiple scales, as local governments do not exist in vacuum but instead they are continuously negotiating their way through the process of policymaking while being subjected to the influence of other governance levels (da Cruz, Rode and McQuarrie, 2019).

Contemporary regimes of urban governance are often characterised as obdurate and trapped in bureaucratic routines and rigid organisational practices (Kjaer, 2009; Brandtner *et al.*, 2017). Combined with the increased complexity of the modern world, developing new modes of governing has become an imperative for contemporary local authorities. Resilience thinking provides an interesting contemporary agenda for governing this emergent complexity by challenging the existing neoliberal and bureaucratic mode of city operation. As Chandler (2014, p.48) eloquently argues: *‘resilience-thinking is a radical critique of the*

knowledge claims of actually existing neoliberalism, suggesting that the hierarchical causal structure and assumptions of socially determined interactive outcomes still clings too much to a liberal modernist ontology.'

Emerging frameworks of urban resilience are fundamentally challenging the traditional pathways of top-down urban governance delivery, by promoting the idea of *adaptive capacity* that allows for new forms of innovative practice to be integrated in governing complex and interdependent systems. Adaptive capacity can be considered as a quality of urban systems that '*denotes its ability to adjust, modify or change its characteristics or actions to moderate potential damage, take advantage of opportunities or cope with consequences of shocks or stresses*' (Jones, Ludi and Levine, 2010). The concept of adaptive capacity is distinct from early equilibrium models of resilience, which theorised resilience as a fixed state and focused on 'bouncing back' to a pre-existing condition following a perturbation. Adaptive capacity is a key characteristic of more recent evolutionary approaches, which acknowledge the dynamic nature of socio-ecological systems and emphasise longer term transformations and 'bouncing forwards', presupposing the ability of a resilient system to adapt, change and transform (Folke *et al.*, 2010; Davoudi *et al.*, 2012; Hollnagel, 2014). More evolutionary readings further see urban resilience depicted as the process of developing adaptive capacity to deal with complexity and uncertainty (Beilin and Wilkinson, 2015), instead of merely the ability to increase the capacity for learning and adaptation (Berkes, Colding and Folke, 2003).

Viewed through a resilience thinking lens, transforming the ways of governing the city should encourage co-productive decision-making with different networks of stakeholders and more holistic conceptualisations of problems/solutions that are adaptable, flexible and learning-based. Here, as early work on urban resilience argued, '*the building of resilience will be most effective when it involves a mutual and accountable network of civic institutions, agencies and individual citizens working in partnership towards common goals within a common strategy*' (Coaffee, et al, 2008, p.3).

The presentation of different conceptualisations of resilience, foregrounded in Chapter 1, has a clear targeting. It illuminates the malleability of the term while

presenting the multiplicity of the - often contrasting - connotations it encompasses. This has led many researchers and practitioners to argue that '*resilience is in danger of becoming a vacuous buzzword from overuse and ambiguity*' (Rose, 2007, p.384). Moreover, looking at different resilience concepts across disciplines assists in both understanding the origins of the different themes apparent in current resilience scholarship and in justifying the resilience approach adopted in this study; namely as a strategic, organising concept for managing complexity and uncertainty between interconnected dynamic systems (see for example, Moser *et al.*, 2019). More specifically, three prevalent categorical distinctions in resilience literature are identified in this study. The first one treats resilience as a *quality of a system* with different characteristics and functions, while in the second more evolutionary approach, resilience is conceptualised as a continuous *process* of capacity building. In the third one, resilience is seen as a *strategic direction for confronting complexity* and is highly related to the urban context.

Following the unpacking of resilience concepts, the chapter continues with a review of resilience as a strategic initiative, directed through various global projects and directives, and the implementation challenges and gaps resilience tend to generate. Here, one of the most ambitious resilience projects with global reach is presented, the Rockefeller Foundation's 100 Resilient Cities programme (100RC), along with its conceptualisation and understanding of urban resilience. The ultimate aim of this chapter, combined with the outcomes of its empirical corresponding chapter (Chapter 6), is to analyse how the understanding and implementation of resilience can facilitate the adoption of new governance models that challenge traditional bureaucratic governance habits, allow new ideas to be mainstreamed, and avoid or fill gaps between resilience theory and practice.

2.2 Resilience as a systemic quality

2.2.1 Engineering and ecological resilience

From analysing singular objects to dealing with complicated systems, resilience has been broadly encountered in literature as a singular systemic features. The most iconic testbed for systemic resilience thinking application, has been in Social Ecological Systems (SES) and their depiction as Complex Adaptive Systems (CAS). In essence, CAS are self-organising systems which practically means that changing some of their specific parts/components would not alter the way they are behaving; in other words, it will not cause a modification of their identity (Walker and Salt, 2012). A disturbance or change in a CAS's component may induce changes in other component(s) but the system as a whole has the ability to absorb the perturbation and self-organise around it in order to maintain its function (Biggs *et al.*, 2012). The system's response may be partly anticipated or totally unexpected, depending on the magnitude of the perturbation and the level of the system's internal cohesion, but a return to the original state is desired.

Being involved in an endless process reinvention in terms of their components and their interrelationships, CAS are in a constant dynamic disequilibrium state. Ultimately, there are no easy ways of predicting their behaviour in times of disturbance. Despite the systemic tendency to adapt when a larger number of independent variables interact in unpredictable ways, complexity emerges and prevents them from consolidating and returning to normal conditions (Sanders, 2008; Batty and Marshall, 2012).

SES scholars Walker and Salt (2006, 2012) argue that a system should fulfil three requirements in order to be considered as CAS, while Sanders (2008) identifies ten distinct characteristics of CAS. From a combination of the two categorisations one can conclude that every CAS should have the following features:

1. Independence and diversity of components: Its components should be dynamic, independent and interacting in a non-linear way. Non-linear relationships are extremely hard (or even impossible) to predict since

there is no proportional increase and/or decrease between the interacting variables/components. Given a change in one component, changes in other variables are extremely difficult to determine in advance.

2. Selection process: Complex adaptive systems include some kind of selection process for their components.
3. Variation and novelty: Components can be modified, removed or added in the system.
4. Adaptation and disequilibrium: The system is always open to changes of its environment and is also responsive towards them by constantly adapting, thus there is no optimal state for it to return to.
5. Multi and cross scale organisation: The system consists of subsystems which operate in different scales, as mentioned previously. Vertical and horizontal organisation among them is required in order for it to maintain its function.
6. Universal identity: Although the system is composed of independent components and subsystems it behaves and should be approached with as an integrated unit.

When CAS thinking is applied to techno-rational engineering systems, resilience is seen as fundamental system property, and a determinant of its endurance, robustness or its capacity for absorption of stress in cases of disturbance (Lorenz 2013). Resilience in this case is seen as resistance to external pressures and the goal of its implementation is the ultimate return of the system to a pre-defined former state.

Cities have been widely theorised as highly interconnected and complex systems using the underpinning ideas of CAS and the application of ecology-inspired systemic resilience. By contrast to engineering perspectives, ecological framings of system resilience accept transformation to a *different* equilibrium state, achieved through the so-called adaptive cycle. The adaptive cycle consists of four different stages of change in structures and functions from which the system passes through, namely growth or exploitation, conservation, release and reorganisation, paying significant attention to feedback processes that operate at multiple scales and timeframes within the system. Despite the fact that this

conceptualisation of resilience consists the best articulation of evolutionary resilience approaches (explained later in this chapter), planning scholar Simin Davoudi has argued that this approach fails to account adequately for crucial social factors and that *'the adaptive cycle seems overly deterministic, not allowing for human intervention to break cycles through their ingenuity, technology and foresight'* (Davoudi *et al.*, 2012, p.305).

As will be highlighted as the thesis progresses, such systemic thinking was adopted by the Rockefeller Foundation in establishing its city resilience framework that drew its influences from different disciplinary fields.

Using CAS thinking contemporary cities can be envisaged as a wide – and often chaotic- spectrum of interconnected institutions, infrastructure and information which:

- a) are selected through various processes (i.e. urban trends, technological evolution, etc.),
- b) are constantly reshaped and changed (i.e. smart infrastructure and technologies)
- c) organise themselves in various subsystems that operate independently of the overarching system, but still serve to affect its overall functioning (i.e. human communities, urban ecosystems etc.).

As one commentator noted,

Through the lens of complexity we see that cities and communities are not linear cause-and-effect systems, but rather dynamic systems where the variables (people, businesses, governments, etc.) are constantly interacting and changing—for better or worse—in response to each other, creating nonlinear feedback loops that either promote or deplete the life energy upon which their futures depend. As complex adaptive systems, communities are organised in coherent entities in which physical conditions, decisions, perceptions, and the social order are constantly changing.

Sanders 2008,p. 276

In this context, resilience has become a useful byword for systemic urban thinking. Initially it serves to nurture a proactive spirit among urban institutions and policy makers, while constituting both a macroscopic approach able to guarantee the seamless operation of the city as an urban system and a regulatory framework for controlling the urban subsystems and their interrelations at the lower scales.

Using ideas of ecological and engineering inspired systemic resilience to frame holistic and integrated city operations is a relatively contemporary trend, which uses the building blocks of CAS to analyse all aspects of urban life – from the built environment to the community and from economic transactions to environmental protection. However, although emerging urban resilience discourse is theorised on the appreciation of the city as a system, its social dimensions are frequently underplayed (Few, 2003; Reid and Botterill, 2013). When more dynamic social and organisational factors are in place, such equilibrist framings struggle to account for underlying factors that impede the system to return to equilibrium. Therefore, exhaustive attention should not be paid when transposing such models to complex social systems, such as cities.

2.2.2 Limitations of equilibrist approaches

Engineering and ecology have largely dominated the resilience discourse for many years. Scholars from other disciplines have borrowed their conceptualisations of resilience to analyse economic, organisational and technical phenomena, considering resilience as a system's quality representing the level of its flexibility to accommodate changes and remain functional in times of disturbance (Johnson and Blackburn, 2014; Ross and Berkes, 2014). However, the behaviour of systems involving complex social dynamics, is not easily captured with theoretical models such as, SES or equilibrium-based resilience (Coaffee and Lee, 2016). A return to a former state of equilibrium or moving from one state to another is underestimating social complexity of human systems and their abilities to adaptively evolve (Lorenz, 2013).

Another challenge when migrating ecological resilience thinking to social sciences is the analysing resilience of what to what (Vale, 2014; White and

O'Hare, 2014; Cutter, 2016). In ecological systems, focusing on one or a limited number of the system's components usually entails a disregard to other components, and hence, overall system resilience is jeopardised. This can also lead to unintended or knock-on consequences at a spatial scale where attempts to improve resilience in one area undermines resilience in another. This is known in the literature as a resilience trade-off (Chelleri *et al.*, 2015) and has been shown to have significant implications for equitable resilience (Anguelovski *et al.*, 2016; Ziervogel *et al.*, 2017).

This fundamental question of 'resilience for whom?' further reflects the political implications of resilience in the social realm. While in ecology and engineering resilience is a depoliticised pragmatic term (Carpenter *et al.*, 2001) almost immune to systemic power relations, newer conceptions of urban resilience seen such factors as paramount to understanding who benefits, and who does not, from resilience efforts. Consequently, when studying urban systems, resilience should be approached through a lens of social and spatial justice both in terms of the decision-making processes and in terms of allocation of benefits and duties. This limitation is especially important when dealing with urban governance; a deeply political process that involves cross-sectoral collaboration, engagement of the local community and strong political will.

2.3 Evolutionary approaches and resilience as a process

Viewing resilience as a process was initially utilised in the field of psychology (see Chapter 1). In direct disparity to ecology, psychological resilience was posited as a non-systemic process, often mistakenly understood as an inherent trait of the individual (Masten, 1994). From the 1970s psychological researchers started viewing resilience a descriptor of a particular process, or journey, an individual or group goes through, triggering the adoption of procedural approaches to resilience by the social sciences (Alexander, 2013).

The adoption of resilience in the wider social sciences grew during the 1980's, focused on the ability of human communities to not only withstand external perturbations but also recover from the shocks they may inflict (Timmermann,

1981). Nonetheless, the term only became popular more than a decade later when it started regularly appearing alongside ‘sustainability’ and ‘sustainable development’, by the late 1990’s (Adger, 1997; Perrings, 1998; Tobin, 1999). Here social resilience was commonly depicted as a process, or sometimes even as a precondition, for sustainable development, the desirable end-state (Cote and Nightingale, 2012).

The continuous accentuation of community’s pivotal role in securing social resilience bequeathed the concept a more inclusive character, in terms of the need for people to actively engage in adapting to a constantly disruptive world. Moreover, from a policy-making perspective, the variety of stakeholders needed to be included in system management to enhance resilience outcomes encouraged the wide integration of diverse participants, community members, institutions and ideas (Bahadur and Tanner, 2014). This comes as an innovation in resilience scholarship, as initial approaches from ecology and psychology emphasised the ability to ‘*bounce back*’ and focused on the management of endogenous stresses instead of ‘*bouncing forward*’ and dealing with both internal and external stressors.

The limitations of ecological resilience approaches to address such urban social complexity, longer-term impacts and exogenous risk of complex systems has, in more recent years, led to the birth of evolutionary resilience approaches. Accordingly, ‘*evolutionary resilience promotes the understanding of places not as units of analysis or neutral containers, but as complex, interconnected socio-spatial systems with extensive and unpredictable feedback processes which operate at multiple scales and timeframes*’ (Davoudi *et al.*, 2012, p.304). Evolutionary resilience focuses on adaptability, instead of adaptation and ‘bouncing forwards’ instead of ‘bouncing back’ (Coaffee, 2019). It promotes proactive thinking and transformation of governance practices with a particular emphasis towards institutionalising transformative practices to policy.

The relationship between adaptation and adaptability is key to understanding the ontological distinction between evolutionary resilience and equilibrist concepts. While adaptation is understood as the ability of a system to swiftly return to a previous state following a designed path backwards, adaptability is characterised

by weak couplings between systemic components and an enhanced capacity of the system to respond to uncertainty and unpredictable changes (Coaffee and Lee, 2016). From a governance standpoint adaptability mostly refers to the capacity of system components and actors in place to influence the overall resilience of the system and bring about transformation as opposed to maintaining a 'business as usual' approach (Pike, Dawley and Tomaney, 2010).

In this sense, evolutionary resilience can be depicted as the process of developing *adaptive capacity* to deal with complexity and uncertainty (Beilin and Wilkinson, 2015), instead of merely the ability to increase the capacity for learning and adaptation (Berkes, Colding and Folke, 2003). The notion of adaptive capacity is inherently embedded in the understanding of resilience as a process since it connects the idea of 'bouncing forwards' following a disturbance to the mobilisation of resources to prepare for confronting a range of known and unknown future risks and challenges. Thus, urban governance for resilience needs to focus on processes of adaptation and learning- with adaptation here conceptualised as a long-term ability to mobilise resources to adequately confront the impact of both endogenous and exogenous risks and disruptive challenges - through the employment of multiple forms of knowledge and inclusive, participatory decision-making processes (Matyas and Pelling, 2015; Moser *et al.*, 2019). In the urban context, the analytical framework of adaptive governance has been developed as a framework to operationalise the process of building adaptive capacity in order to facilitate transformative change (Healey, 1998, 2006; Coaffee and Healey, 2003). According to Coaffee & Lee (2016, p. 80):

Adaptive governance focuses on institutional change by highlighting the need to engage in co-productive efforts and decision-making with different networks of formal and informal institutions and which through approaches that are collaborative, flexible and learning-based and rely on networks of people and organisations at multiple levels.

Adaptive governance from this perspective provides an institutionalist approach to social system management. The focus lies on a flexible institutional environment which allows fair access to key governance assets and facilitates

the establishment of new governing arrangements. Therefore, an adaptive system is able to not only respond to changes but also anticipate them and react aptly with regards to its governance structures (Jones, Ludi and Levine, 2010). Focusing on institutions and governing arrangements further highlights the important role of building appropriate relations and trust among urban stakeholders and officials at different administrative levels (Boyd and Juhola, 2015; Amin and Thrift, 2017)¹.

Many scholars have also referred to the concept of adaptive resilience as a fundamental quality of sustainable social systems. Duit (2016) defines adaptive resilience as *'the extent to which a society or an organization is able to learn from past lessons and implement changes to increase its chances of withstanding future crises'*. Others have extended this understanding to urban environments by underlining the contribution of community planning in the revitalisation of communities affected by destabilising shocks (Goldstein *et al.*, 2012; Berkes and Ross, 2013). Furthermore, in the context of environmental risk and disaster recovery, the potential of communities and individuals to mobilise and create social networks and reframe the traditional pathways of local governance delivery from a top-down to a bottom up process, has been extensively emphasised by several researchers (Aldrich, 2012; Wagner, Chhetri and Sturm, 2014; Paidakaki, 2017; Liu *et al.*, 2018). Civil society has played a key role in post-disaster recovery in several occasions, especially when efforts focused on the local community scale.

Accordingly, in many cases the introduction of resilience to urban governance has been inextricably related to changes in local emergency planning arrangements and sought to embrace more community-focused efforts. According to Coaffee, Murakami Wood and Rogers (2008, p.190) local emergency planning has been traditionally associated with *'social, political and*

¹ Adaptive governance has also been utilised in the analysis of SES inspired by the principles of co-management, applied though in multiple scales and levels (Olsson, Folke and Berkes, 2004; Boyd and Folke, 2012). Adaptive governance for SES was introduced by Dietz *et al.* 2003. For SES, adaptive governance also echoes the ability of social agents and system actors and institutions at multiple levels of organization to empower *'ecosystem stewardship'* in times of uncertainty and disruption.

cultural inertia tied to a series of questions raised by particular geopolitical circumstances, and grounded in both historical context and the requirements of civil defence and protection at different points in time'. In more recent times, emerging governance principles such as subsidiarity or 'new localism', that encouraged decentralisation of responsibility to the local community levels, emerged. In this way, establishing and strengthening collaborations between local communities, private sector and local governments, paved the way for the introduction of a wider framework for resilience implementation at the local scale (Pratchett, 2004; Stoker, 2004).

Embracing adaptive thinking in urban governance implies the ability of urban systems to accommodate transformations of their operational arrangements. The speed of such transformations in cities is rarely linear and it could be described as a succession of swift and gradual changes, with resilience concentrating not only on these transformation processes, but also on the adaptation of societies in the new realities (Hassler and Kohler, 2014). Yet, this transformational aspect of resilience usually challenges traditional bureaucratic values and processes of public administration that lead to incremental changes instead of radical transformations, in favour of developing of adaptive capacities (Coaffee, Murakami Wood and Rogers, 2008; Brown, 2014; Pizzo, 2015; Coaffee and Lee, 2016)

In summary, resilience among social scientists, and especially in contemporary cities, is understood as a continuous non-linear process. It is driven by the appreciation of the dynamic and fluctuating nature of social systems while embracing the need to adapt. It also pays significant attention to the role of formal and informal institutions in assisting the resilience building process by galvanising flexible governance arrangements and encouraging wide participation of stakeholders in the decision-making process. This is a key ingredient for successful implementation of resilience thinking in social systems, which is highly dependent on their ability to accommodate and embrace change and transformations.

2.4 Resilience as a strategic direction for facing urban complexity and uncertainty

The rapid expansion of resilience's utilisation has resulted into the extension of its functionality as a strategic goal or outcome. Increasingly, resilience is portrayed as an overall holistic praxis to manage complexity and uncertainty of dynamic, interconnected systems (Moser *et al.*, 2019). For cities particularly, urban resilience became a prominent idea for driving urban transformations, as it espouses constant risk as a norm and provides a framework for reducing vulnerability and exposure of both communities and the built environment, through process-driven and physical interventions *'to mitigate, prepare for, respond to and recover from a range of shocks and stresses'* (Coaffee and Lee, 2016; Coaffee *et al.*, 2018). Therefore, with resilience increasingly being treated both as a holistic approach to confronting risk and as a boundary object for dealing with complexity (Brand and Jax, 2007), its meaning has evolved to an operational concept frequently adopted by the managers of contemporary cities. Here, viewing city operations through a strategic urban resilience framework is seen as suitable vehicle for bridging ecology and urban planning and design, so as to monitor and measure how social changes influence the environment and how environmental changes shape society (Ahern, 2011; Amin and Thrift, 2017).

As a result, many global organisations and philanthropic institutions have promoted projects and frameworks to advance urban resilience. Milestone documents such as the 2030 Agenda for Sustainable Development (United Nations General Assembly, 2015), the New Urban Agenda (New Urban Agenda, 2016), the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNDRR², 2015), render urban resilience as one of the most important ingredients of future urban policies. Notably, one of the UN's Sustainable Development Goals (SDGs), Goal 11, is specifically dedicated to *'making cities inclusive, safe, resilient and sustainable'* (United Nations General Assembly, 2015). With SDGs continuously becoming the core developmental directive

² UNDRR was formerly known as UNISDR (explanation provided in the Abbreviations list).

agenda for global action, and undergoing constant and sustained monitoring (see Ulbrich, Porto de Albuquerque and Coaffee, 2019), urban resilience possesses a central place in driving transformations to sustainability and resilience.

One of the first dedicated urban resilience global initiative was launched in 2012 by the United Nations Office for Disaster Risk Reduction (UNDRR) and was entitled '*How To Make Cities More Resilient*'. The project was directed towards city officials operating at different administrative scales and aimed at providing a generic framework for risk reduction by designating at examples of good practices already implemented in a number of cities worldwide (Molin Valdes, 2012). Its theoretical understanding of resilience was very technocratic and disaster risk-oriented, whilst paying attention to underlying long-term socioeconomic stresses or to horizontal and vertical governance arrangements. Nevertheless, it greatly assisted in the incorporation of resilience into debates on global sustainable development.

During the same year, the World Bank published the report '*Building Urban Resilience in East Asia*' in the aftermath of the 9.0 Richter magnitude earthquake that hit Japan in 2011. The report was an attempt to guide urban planning and policy towards confronting climate change and natural hazards in one a very disaster-prone area by analysing hazard probability, vulnerability and exposure of Asian cities from a disaster risk management perspective, emphasising however on the importance of awareness and preparedness in providing buoyancy for confronting multiple urban disruptions (Jha and Brecht, 2012). Other similar initiatives focusing on disaster risk reduction and directed primarily to practitioners and local governments have been inaugurated worldwide, with the ICLEI's *Annual Global Forum on Urban Resilience and Adaptation* having a central place among them.

2.4.1 The 100 Resilient Cities Network

The most ambitious urban resilience project worldwide was launched in 2013 by the philanthropic institution Rockefeller Foundation under the title 100 Resilient Cities. The project built on the Foundation's urban resilience legacy and experience through the Asian Cities Climate Change Resilience Network

(ACCCRN), an Asia-focused programme that attempted to boost urban resilience as a responsive measure to confront climate change, looking at four core countries, namely India, Indonesia, Thailand and Vietnam and engaging cities and communities from six Asian countries in total (ACCRN, 2008). Although this programme officially ended in 2016, the level of its success stimulated a larger scale urban resilience endeavour within the Rockefeller Foundation.

The establishment of a wide network of collaborating institutions and practitioners through ACCRN in conjunction with the increasing interest for integrated strategic planning policies for facing uncertainty inspired by awareness, adaptability, transformability and community engagement, the fundamental pillars of resilience, gave birth to the 100 Resilient Cities Network (100RC) in 2013. The programme was extensively advertised and quickly became Rockefeller's flagship project, accruing significant amounts of funding. In essence, 100RC was *'dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century'* (Rockefeller Foundation, 2018). Unlike the previous initiatives, 100RC did not merely focus on natural hazards and disaster risk management but also on long-term stresses - or slow-burn events such as intractable poverty or the impacts of economic austerity - that weaken the urban fabric on and everyday urban life on a cyclical basis (Coaffee and Lee, 2016; Spaans and Waterhout, 2017). Challenges or disruptions that framed the 100RC programme were divided into acute shocks, which were the traditional preserves of disaster management (i.e. earthquakes, fires, floods, etc.) and chronic stresses (economic decay, social inequity, etc.). The initiative thus defined urban resilience as *'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'* (Da Silva and Moench, 2014). Concurrently, 100RC recognised the need for multi-stakeholder mobilisation and coordination at a wide array of spatial scales, so as to inform the decision-making process. This explicitly sought to overcome operational silo-mentality within the municipalities, and facilitate the adoption of a horizontal management approach that sought linkages with external partners.

The 100RC campaign had two main pillars of implementation. The first one was the appointment of a Chief Resilience Officer (CRO). According to the Rockefeller Foundation, which exclusively funded the innovative position of the CRO for two years, a CRO should act as a point of reference and coordinate all the resilience activities taking place within the city limits (Rockefeller Foundation, 2018). As Michael Berkowitz, the former CEO of the Rockefeller Foundation's 100RC initiative has noted, an effective CRO is a person able to... *'work across the sectors and silos to coordinate, to connect the dots, to advocate, to keep the resilience issues and resilience perspective in all the decisions that the city is making'* (cited in Clancy, 2014). In terms of measuring success, each city was encouraged to use an assessment framework and methodology advanced by Rockefeller in collaboration with Arup - the City Resilience Framework (CRF). Among the main responsibilities of the CRO has been to work across different administrative scales and local government departments and break ongoing-siloed processes through assisting internal communication networks and promoting synergies between ongoing projects and plans. Another key facet of the role has been the mobilisation of a wide array of urban stakeholders, including government officials, non-profit organisation, the private sector and the civic community, both by providing municipal support to local initiatives and by engaging them in the process of planning and resilience building. The success of a CRO essentially laid on his/her ability to maximise the benefits from the implementation of a resilience policy by integrating lessons from other cities facing similar urban problems and simultaneously keeping a resilience perspective in the majority of decisions made by a city (Coaffee and Lee, 2016).

The second pillar of the 100RC campaign was the design and implementation of a Resilience Strategy (RS) for each of the participating cities. The process of developing the RS was to be coordinated by the CRO and was divided into three different phases. During the first phase that had to last for approximately a year, participating cities produced a Preliminary Resilience Assessment (PRA) - a baseline assessment of their strengths, weaknesses, opportunities and threats. In this document the main 'Discovery Areas' to be further explored were also designated. The second phase ran for a further six to nine months and was

focused upon the design and formulation of the RS; in principle the RS should strongly rely on the findings of the PRA. Finally, the city's participation concluded with the implementation phase, where the RS is put into action and the resilience building process proposed is tested. This phase initially had to last for one to two years.

Aside from its procedural aspects, the 100RC campaign is constructed upon a robust, decontextualised theorisation of urban resilience. The former Rockefeller Foundation's CEO, who strongly supported and foregrounded the project, Judith Rodin, defined resilience in her book *The Resilience Dividend* as '*the capacity of any entity (individual, community, organisation or natural system) to prepare for disruptions, to recover from shocks and stresses and to adapt and grow from a disruptive experience*' (Rodin 2014, p.3). This definition, which was aligned to the 100RC Network definition, is very closely connected to the understanding of urban resilience as a holistic process that encourages proactive and adaptable approaches to solving complex problems.

This conceptual approach was further enriched in 2014, when the Rockefeller Foundation along with the Design Engineering firm Arup devised the '*City Resilience Framework*³' (CRF) (Da Silva and Moench, 2014); a detailed analytical tool, in which they pinpoint seven qualities urban systems should possess in order to be considered as resilient. More specifically, the CRF is a complex scheme of qualitative features which breaks urban resilience down into four categories (people, place, organisation and knowledge), 12 goals and associated key indicators, 48-54 sub-indicators and 130–150 variables and became the spinal cord of 100RC theoretical approach. Its utility was premised upon the disaggregation of urban complexity to scalable and concurrently measurable features that could be easily generalised and applied to heterogeneous urban environments. Thus, the indicator sets utilised are arguably key component around which the entire framework was built. More information on the way these indicators have been used to evaluate the performance of urban resilience is presented in Chapter 4 of this study. From the CRF, Rockefeller

³ Also found as City Resilience Index (CRI).

drew out a set of the qualities that ‘*distinguish a resilient city from one that is simply liveable, sustainable or prosperous*’ (Rodin, 2014, p.25). These are briefly explored below, since they manifest the transition of resilience from systemic quality to a developmental goal comprising of different qualities and traits. Here, qualities of resilient systems may be inherent, partially exist or be completely absent as cities with different characteristics are being examined. Seven qualities were identified:

1) Reflectiveness

Reflectiveness refers to the ability of a system to accept the inherent uncertainty and instability of the world and possess mechanisms to use previous experiences and quickly adapt to the new status. People and institutions are responsible for disseminating knowledge from the past.

2) Resourcefulness

Resourcefulness implies that people and institutions are capable of finding different ways to achieve their goals during times of disruption. Investment in the capacity to predict future conditions, prioritisation of response measures or mobilisation of appropriate human, financial and physical and geological resources are among its key characteristics. Resourcefulness is pivotal for restoring the functionality of critical systems under pressure.

3) Robustness

Robustness is the capacity of possessing well-conceived, constructed and managed physical assets which can withstand the severity of hazard events without significant damage or loss of function. Potential failures are anticipated, and the ability to predict them and plan for the mitigation of their impact may prove to be invaluable in avoiding cascading failure and collapse.

4) Redundancy

Redundancy can be contextualised as the spare capacity within systems created on purpose in order to decongest one or more of the system’s components in extreme pressure situations. It incorporates the notion of diversity, since it presupposes the existence of multiple different ways of

achieving a specific goal of fulfilling a need (i.e. resource reserves). Redundancy in a system should be intentional, well organised and effective.

5) Flexibility

Flexibility implies that systems can change, evolve and adapt in response to changing circumstances. This may favour decentralised and modular approaches to infrastructure or ecosystem management and can be achieved through the introduction of new knowledge and technologies. Traditional knowledge and practices should also be taken into account, potentially combined in new ways.

6) Integration

Integration of a system means that there is a high level of consistency and coordination in decision-making among the city-components and all of the stakeholders are mutually benefited by the final outcome of the implemented resilience policies. Coordination between different scales is a very difficult task which, if achieved, leads to quick exchange of information between subsystems, shorter feedback loops and collective response.

7) Inclusiveness

Inclusiveness underlines the necessity for extensive engagement of communities in planning resilience strategies, including the most vulnerable groups, which are often neglected. Inclusiveness contributes in the nurturing of collective citizenship and a logic of common ownership and vision in building urban resilience.

These qualities can be further grouped into three distinct groups based on their function in securing the resilience of a system. Figure 2.1 summarises this grouping taking into account that different qualities may apply to more different components of the city:

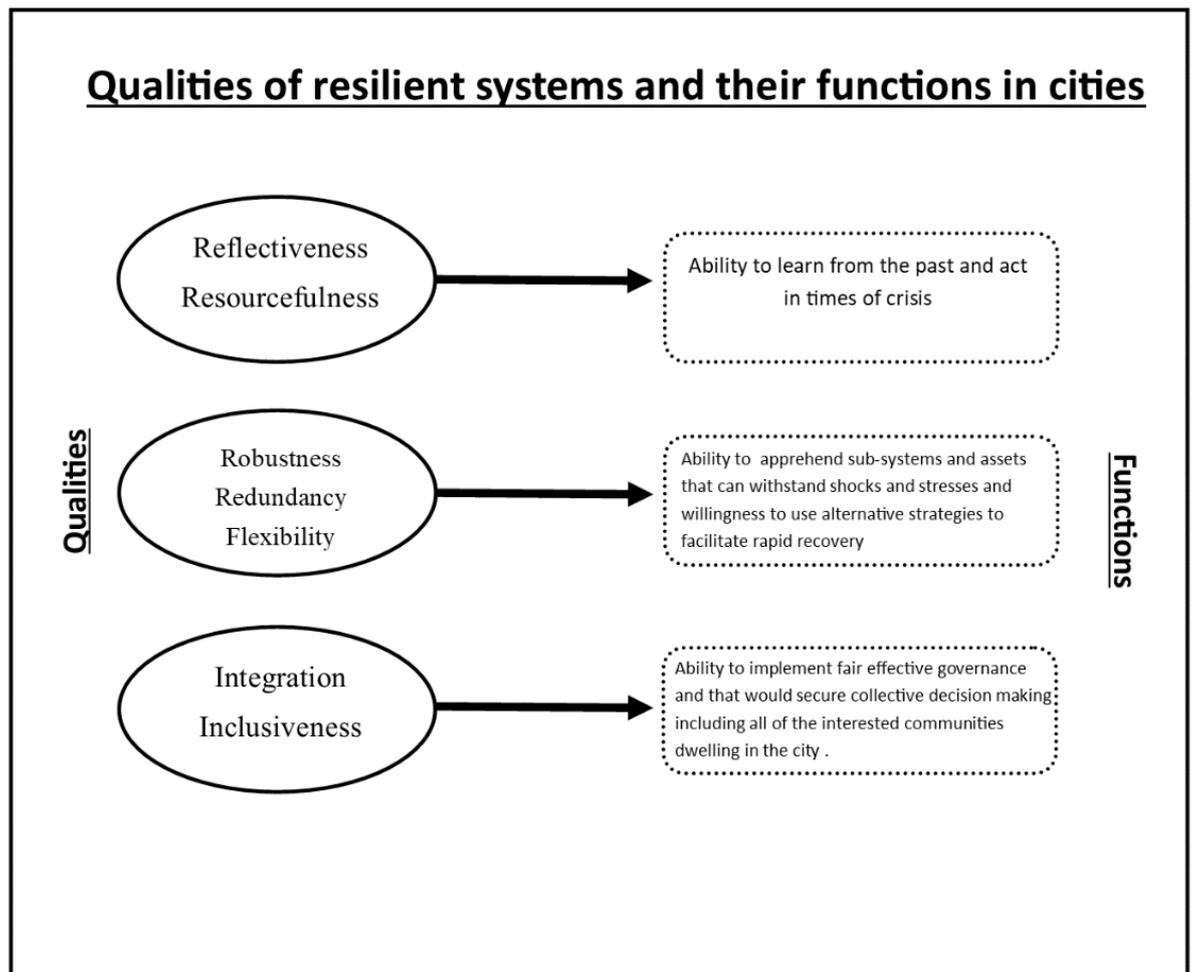


Figure 2.1: Qualities of resilient systems and their functions (adapted from Arup and The Rockefeller Foundation 2014, Personal elaboration)

2.5 Urban governance in the resilience era

2.5.1 Implementation gaps and challenges for urban resilience strategies and governance

As one of the first global urban initiatives with the explicit objective to build resilience at the city level, 100RC operators identified from the first years of the project's implementation the imminent need to transform urban governance functions and operations for urban resilience to be effectively operationalised. Thus, by employing a consistent set of tools, often reflecting the aspirations and expertise of private stakeholders collaborating with the network, 100RC aimed at promoting the qualities of urban resilience as described above through transforming public institutions, functions and operations in city governance. Particular emphasis was given in consensus-building among different urban

stakeholders and promotion of cross-sector collaboration to induce systemic change in urban governance practices.

Acknowledging the fact that resilience is '*most effective when it involves a mutual and accountable network of civic institutions, agencies and individual citizens working in partnership towards common goals within a common strategy*', (Coaffee, Murakami Wood and Rogers, 2008), priority was given in convincing stakeholders from a wide array of urban-related institutions to commit time and resources in contributing to a holistic strategy for confronting emerging and chronic urban disruptions.

In practice though, this call for consensus building has proven difficult to achieve, especially in cities with high institutional inertia, stemming from traditions of mistrust, clientelist politics and siloed operational practices⁴ (Coaffee *et al.*, 2018). As such this call for collaboration in resilience building is not always as inclusive as evangelised and often not widely embraced by the stakeholders, hence leading to gaps in the implementation of resilience strategies. Furthermore, in cities with limited experience in resilience building processes, the inclusion of resilience ideas in local governance often requires a paradigm shift from bureaucratic values and procedural efficiency to resilience qualities such as adaptability, redundancy, flexibility and integration (Stark, 2014). Consequently, increased attention is required to help cities familiarise themselves with the concept and principles of urban resilience as well as its meaning for urban governance.

Lessons from the 100RC and other city-based resilience initiatives and approaches showcase that implementation requires an in-depth understanding of existing governance arrangements along with prudent leadership and strong willingness to acknowledge the unpredictable nature of urban life and promote anticipatory planning models. Therefore, resilience strategies should foreground effective identification and mapping of urban strengths and weaknesses and highlighting of urban vulnerabilities so as to tackle a full range of disruptive

⁴ The case of Thessaloniki presented in the empirical chapters of this study provide a characteristic example of such institutional inertia and rigid governance configurations.

challenges. However, operationalising and implementing urban resilience so that it is truly transformative and ‘sticks’ is a complex venture, highly localised, and inextricably depended on delicate political manoeuvring (Pitidis and Coaffee, 2018). Early evidence from empirical studies, show that the transition from resilience as an ambitious strategic objective, to a demonstrated transformational concept for urban governance, is frequently derailed (Martin and McTarnaghan, 2018; Fitzgibbons and Mitchell, 2019; Meerow, Pajouhesh and Miller, 2019). This ‘implementation gap’ between theory and practice (Coaffee and Clarke, 2015) is to be expected as new resilience approaches challenge the traditional bureaucratic models of public administrations (Bourgon, 2009; Wagenaar and Wilkinson, 2015). Such occurrences, however further focus attention on the inability to institutionalise resilience as a mainstream governance practice and have caused the emergence of a complex set of trade-offs across spatial and temporal scales (Chelleri *et al.*, 2015; Coaffee *et al.*, 2018). In short, achieving such urban governance transformation through adopting resilience approaches is difficult, with many attempts to implement resilience thinking inevitably leading to short-term, ad hoc and incremental changes instead of radical transformations, thus fostering ‘business as usual’ practices and echoing critical voices among the resilience community.

2.5.2 Urban resilience critiques

Despite the fact that urban resilience has been acknowledged as a key feature of contemporary urban development, it has also been widely criticised as maintaining ‘business as usual’ instead of genuinely promoting urban transformation. For several urban scholars and practitioners, the concept of resilience has been employed by local governments and political authorities to indoctrinate local citizens and communities in uncritically neoliberal ways of urban governing (Reid, 2012; Joseph, 2013; Diprose, 2014; Welsh, 2014; Chandler and Reid, 2016; Kaika, 2017). According to Reid (2012), the concept of resilience is increasingly utilised to legitimise neoliberal urban agendas as the shift of attention in urban political ecology turned from ‘*security*’ to ‘*adaptation*’ and responsabilisation.

'Resilient peoples do not look to states to secure their wellbeing because they have been disciplined into believing in the necessity to secure it for themselves.'

Reid, 2012, p.69

Responsibilisation of local citizens for confronting urban disruptions as a method to devolve responsibility from the state to civil society is among the most common critiques of resilience. In this context, resilience is used as '*a vehicle for devolution of risks*' (Diprose, 2014, p.51) in an attempt to relocate responsibility not only for disaster response but for the citizens' wellbeing in general. This promise for 'more power to the people', however, often focuses on devolution of responsibilities and not rights. With resilience urging wider mobilisation of citizens and urban stakeholders, risk management and allocation of responsibilities do not fall solely on the shoulders of states and local authorities but spread across numerous urban stakeholders, partly sheltering the state from focusing on providing security from endogenous and exogenous threats (Reid, 2012).

Another critical view of the concept of resilience emphasises its inability to induce real change and transformation that challenges the current status quo. Views of resilience through this lens highlights the disproportionate focus on superficially dealing with the consequences of crises and the subsequent recovery without meaningfully dealing with the underlying factors that produced them. In other words, especially with its earlier engineering and ecological connotations, resilience simply leads to survival and not thriving, as its rhetoric does not actively impugn social inequalities or the precarity of urban life (Diprose, 2014). Thus, with resilience simply reassuring people that the most important thing is to 'surviving to fight another day', demands for resistance, change and transformation of current governance practices are silenced and sacrificed at the altar of preservation (Reid, 2012; Kaika, 2017). The concept of resilience in this case is depoliticised fitting the neoliberal political agenda, reinforcing the development politically subtle individuals. In the words of Reid (2012, p.76) '*the human is conceived as resilient insofar as it adapts to rather than resists the conditions of its suffering world*'.

2.5.3 Future challenges and the way forward

Therefore, in order to avoid practices that would lead to the mere preservation of the status quo and the debasement of resilience into a neoliberal doctrine the processes of de-siloing and responsabilisation need to be carefully designed and implemented. After all, ‘mainstreaming’ resilience approaches requires the deployment of a transformational process in which mobilisation by and through an enlarged array of stakeholders including community groups, individuals and other related organisations, is integral. This process of empowering a wider network of such institutions and citizens, and encouraging the collaboration among them, along with the breaking of silos within and across the municipal governance apparatus and facilitating greater horizontal management, are situated in the core of urban resilience discourse, but are often blocked and impeded by institutional practices that fail to foster collaboration, or focus on necessary capacity building (Coaffee *et al.*, 2018; Normandin *et al.*, 2019). This requirement reflects the fundamental distinction between equilibrist and evolutionary resilience approaches in terms of aim, focus and planning approaches to achieve transformations through the application of resilience principles (Table 2.1).

Table 2.1: Aims and foci of equilibrist and evolutionary resilience and the differing planning processes they demand (adapted by White & O’Hare 2014)

	Equilibrist resilience	Evolutionary resilience
Aim	equilibrist existing normality preserve stability	adaptive new normality transform flexibility
Focus	endogenous short term reactive atomised	exogenous medium to long term proactive abstract
Planning approaches	techno-rational vertical integration building focus homogeneity	socio-cultural horizontal integration societal focus heterogeneity

Evolutionary approaches emphasise the transformational capacity of resilience thinking, conceptualising resilience both as a process and as a strategic goal. From this perspective, they are the most appropriate to adopt when applying the concept to urban systems. Particularly when referring to changing the traditional pathways of urban governance delivery, evolutionary resilience concepts are essential as they focus on medium to long term transformation and awareness raising instead of a techno-rational, reactive form of confronting urban shocks and stresses. In other words, the resilience turn in urban governance (Brunetta and Caldarice, 2019a; Normandin *et al.*, 2019) provides an opportunity for local authorities to rearticulate their operational handbooks and accommodate a preventive, holistic approach towards confronting increasing uncertainty and complexity of contemporary urban life.

Another challenge for resilience strategy implementation is related to its equitable nature that frequently overlook issues of social and spatial justice (Anguelovski *et al.*, 2016; Ziervogel *et al.*, 2017; Fitzgibbons and Mitchell, 2019; Meerow, Pajouhesh and Miller, 2019). Previous research has indicated that resilience strategy implementation is neither neutral nor equitable (Fitzgibbons and Mitchell, 2019; Meerow, Pajouhesh and Miller, 2019). This echoes the fundamental question of *whose resilience* is addressed in such strategies, as different beneficiaries and instigators are involved in their delivery (Vale, 2014; White and O'Hare, 2014). Increasingly, with talk of resilience offering the potential for radical and transformative social change, there are coinciding calls to reflect upon issues of social justice and to ask how we can ensure that the rolling out of resilience is even-handed and produces outcomes that are more equitable. Thus, existing systems of governance should be critically questioned from a vantage point of practical incorporation of marginalised voices in decision-making and the designing of resilient futures. Whilst there is much discussion regarding the capacity of resilience to promote safer development, concern has been expressed that the techno-managerial frameworks that measure and monitor development operate according to rigid, quantitatively defined parameters which do not consider local variation and intra-urban inequalities, and, in effect hardwire such inequitable processes into future decision making (Ulbrich, De Albuquerque and Coaffee, 2019). This has

stimulated calls for approaches to recalibrate conventional methodologies to account for this differential socio-spatially determined vulnerability to natural hazards, especially in the global south, and to embrace more collaborative and co-produced ways of working and assessing (see also Chapter 4).

Thus, it is becoming obvious that the establishment and empowerment of formal and informal institutions is fundamental for enabling resilience principles to transform governance configurations and mainstream a resilience approach to decision making. The process of empowering such institutions and encourage the collaboration among them is situated in the core of urban resilience discourse, along with the breaking of silos within and across the municipal governance apparatus and the application of horizontal management.

In conclusion, building on the inheritance of different disciplinary understandings, urban resilience has transformed the way resilience is conceptualised, expanding its application from natural hazard amelioration to management of dynamic social systems and complex socio-political crises. In the context of this study, the implementation of resilience strategies through the transformation of traditional pathways of urban governance delivery is pivotal. However, current urban resilience scholarship lacks longitudinal studies of resilience strategy, design and implementation (Coaffee *et al.*, 2018). Therefore, this study addresses this gap as a way of illuminating the potential of resilience-thinking to transform the way in which cities function across a range of different risk contexts. Notably, Chapter 6 of this study follows the implementation of such a resilience strategy in Thessaloniki Greece, illuminating the transformations in urban governance induced by the introduction of resilience thinking as an overarching strategic and organising concept.

The following chapter takes a step back in the resilience discourse by exploring the relationship between resilience and natural hazards which has actively shaped the overall resilience discourse for many years and emphasise challenges and gaps related to the absence of geological and geo-hazard data in resilience considerations.

Chapter 3 - Urban Resilience and natural hazards

3.1 Introduction

The previous chapter explored the three prevalent categorical distinctions in resilience literature and investigated the relationship between resilience thinking and urban governance. This analysis gave prominence to the transformative potential of resilience strategies, whilst presenting the challenges and gaps emerging from the implementation of such strategies. Following this transformational narrative, this chapter analyses the shift in conceptualising disasters stimulated by the introduction of social vulnerability and resilience thinking in disaster scholarship; and introduction that has reframed how society copes with natural (geo)hazards.

Natural hazards have been a frequent experience throughout the history of urban civilisation. In more recent times, particularly as global climate change intensifies, the frequency, unpredictability and impact of natural hazards has progressively increased. The growing levels of global urbanisation have pushed cities to the frontline of these challenges. Rapid and continuous urbanisation over many decades has led to concentration of both physical and social assets in contemporary cities increasing the catastrophic impact of natural hazards and turning many them to disasters.

According to Boshier & Chmutina (2017), natural hazards can be divided into two major categories: geohazards and hydro-meteorological hazards. Geohazards include earthquakes, landslides, tsunamis etc., while hydro-meteorological hazards include floods, hurricanes, cyclones, storm surges and other (Table 2). Local factors such as topography, *geology*, hydrology and meteorology affect the magnitude of natural hazards while their impact upon the built environment could be devastating, resulting in deaths, building collapses, fatal disruptions and financial losses; what people normally perceive as disasters (ibid).

Table 3.1: Typology of natural hazards (adapted from Boshier and Chmutina, 2017)

Natural hazards	
<i>Geohazards</i>	Earthquakes Landslides Volcanic eruptions Ground subsidence
<i>Hydro-meteorological hazards</i>	Floods Coastal erosion Hurricanes/cyclones/typhoons Extreme temperatures Tornadoes Storm surges Drought Fires

For many years, disasters were perceived as ‘natural acts of divine power’ thrust upon human civilisation as punishment for its sins (Coaffee, 2019). It was not until mid-18th century that society started to recognise that external factors, such as lack of preventive measures or underlying social inequalities, might exacerbate the impact of natural phenomena ultimately leading to catastrophic disasters.

Within this context of viewing disasters as multidimensional phenomena, the first part of this chapter explores the Lisbon earthquake, one of the first disasters that was treated as not entirely natural. This reframing of disasters is explored through the famous debate between Voltaire and Rousseau, which elicited a paradigm shift in conceptualising disasters with great emphasis on inherent physical and social vulnerabilities, and arguably led to the birth of modern social sciences.

The second part of this chapter focuses on the importance of understanding and tackling vulnerabilities and reducing disaster risk, through Disaster Risk Management (DRM) approaches. Drawing on arguments made in Chapter 2, it is contended that initial DRM approaches were disproportionately influenced by engineering and technical sciences and directed funding and research towards strengthening physical defences against specific types of natural hazards. Essentially, such approaches were often accused of operating top-down and excluding the community and other stakeholders from the design and

implementation of disaster management mechanisms. Subsequently it is showcased how the rise of Disaster Risk Reduction (DRR) discourse, an evolution of DRM, signified a greater acknowledgment of social factors in tackling disasters and prepared the way for the arrival of resilience thinking in disaster scholarship.

The next shift of focus towards resilience thinking introduced a more holistic way of conceptualising disaster risk – as disaster resilience - that emphasised multi-hazard management, new arrangements of pre-emptive disaster governance that encouraged for the establishment of new bottom up institutions. Disaster resilience was initially conceptualised as the desired aim or outcome of a short-term '*bouncing back*', an approach frequently adopting a top-down and preservation mind-set. However, more recent approaches emphasised the improper focus of traditional Disaster Risk Management in accounting for socio-spatial inequalities (Manyena, 2006; Ruszczuk, 2019), focusing on the process of disaster resilience building in the long-term, which involves '*supporting the capacity of individuals, communities and states to adapt in ways that are relevant to their context and to learn lessons from previous disaster events*' (Coaffee, 2019, p.209). In resilience terms, disaster resilience incorporates the broader ideas of resilience, related to absorbing disruptions and recovering from shocks, through adapting, learning and transforming their structures to confront the complexity and uncertainty of modern world. Furthermore, the use of resilience to frame disasters repositions the focus of disaster management to preparedness and reduction of risk, and encourages pre-disaster interventions as well as post-disaster ones (ibid).

This framing of disaster resilience has become prominent features of global governance frameworks such as the Sendai Framework for Disaster Risk Reduction 2015-2030 and the 2030 Agenda for Sustainable Development (UNDRR, 2015; United Nations General Assembly, 2015). The commitments accompanying such documents do not de facto institutionalise resilience thinking for disaster management; nevertheless, they provide an important starting point for the beginning of gradual shift in the urban planning and emergency response apparatuses (UNDRR, 2019a). Disaster resilience after all,

is the outcome of successful disaster risk management and a capacity to address vulnerabilities better.

One importance gap that emerges in the broader discussion on disaster management and its incorporation into global discourses through the lens of resilience is the relative marginalisation of environmental and topographical characteristics. This inattention – deliberate or not – leads to an important consideration that underpins the second key aim of this study: *how important is the understanding of geological risk for resilience policies and why?* Geological insight is often downgraded in resilience policies for a number of reasons, such as political agendas, lack of effective integration of geologically related stakeholders and problematic governance arrangements. As this chapter will highlight, moving geological insights from the margins to the centre of risk governance is imperative if we are to better understand and act on the occurrence and impact of natural hazards.

3.2 The Lisbon earthquake and the rise of social theory in disaster studies

The discourse on the influence of ‘Mother Nature’ to human settlements and the need for greater accountability by local authorities in preparing and responding to the devastating repercussions of natural hazards was largely triggered among philosophical and academic circles by the Lisbon earthquake in 1755. The earthquake is often referred to by historians as the first modern disaster and signified a critical shifting point in the conceptualisation of natural phenomena as causes of disasters in juxtaposition with the prevalent at the time supernatural explanations (Smith, 2006; Coaffee, 2019).

At the time of the disaster, Lisbon was the capital of the Portuguese Empire and fourth largest city in Europe after London, Paris and Naples. The earthquake struck in the morning of 1 November 1755, lasted for almost five minutes and caused wide fissures in the centre of the city. One of its immediate outcomes was a tsunami, which engulfed the harbour and the downtown area and when its waters receded Lisbon was left burning for hours. In the shocking aftermath of the earthquake, at least 30,000 people lost their lives while approximately eighty

five percent of the city's buildings were destroyed, with famous palaces, churches and libraries among them. Shocks from the earthquake were also felt throughout the rest of Europe.

Timing and location of the Lisbon earthquake is of paramount importance. Lisbon at the time was a major centre of religious superstition and one of the strongholds of the Catholic Church. Moreover, this was the first disaster of such magnitude to affect a modern European city during the Enlightenment, a period when religious authority and traditional ideas and institutions were openly challenged in favour of intellectual freedom and reasoning (Dynes, 2000).

Moreover, as the western world was gradually becoming urban, the role of the state was slowly rearticulated, with government responsibility and accountability becoming progressively vital components of the emerging states. The Lisbon earthquake was the first documented disaster in which the state mobilised emergency response and accepted responsibility for what we now term disaster management and reconstruction. The Portuguese state assumed collective responsibility for the consequences of the earthquake, and it can be argued that one of the fundamental outcomes of the disaster's aftermath was the need for modern states to accept responsibility for managing emergency response and post-disaster recovery in cases of large-scale catastrophes.

In the aftermath of the earthquake, a philosophical debate also sparked between Voltaire and Rousseau, two of the most recognisable intellectual figures of the Enlightenment¹ as to the cause of the earthquake. The dispute between the two started when Voltaire, following his usual tactic, attacked the Catholic Church by questioning the compassion and motivations of an all-powerful God seeking to punish moral sins, through the use of natural phenomena. Being an impenitent reproacher of optimism and divine providence, Voltaire argued in his *'Poem about the Lisbon Disaster'* as well as in the *'Poem of Natural Law'* that the world we live in is cruel and natural hazards are just part of this reality people

¹ Enlightenment refers to an intellectual and philosophical movement in Europe during the 18th century, which emphasised reason and scientific methods major sources and tools to extract knowledge. Enlightenment dominated the philosophical debates of the 18th century, promoting radical ideas such as personal emancipation and religious tolerance.

and other living things experience. In response, Rousseau criticised his view and called on him to either renounce or embrace as beneficial the concept of divine providence. Furthermore, in an exchange of letters between the two that took place afterwards, Rousseau referred for the first time to the social dimensions of the disaster, claiming that urban planning and social behaviour exacerbated the repercussions of the earthquake:

[...] [N]ature did not construct twenty thousand houses of six to seven stories there, and if the inhabitants of this great city had been more equally spread out and more lightly lodged, the damage would have been much less and perhaps of no account.

Dynes 2000, p.106

Rousseau's arguments have been seen by many scholars as the seeds for the establishment of sociological theory on disasters and social science in general. It was perhaps the first attempt to conceptualise 'vulnerability', in the way that is widely understood today. He pointed out that the largely unplanned and crowded urban patterns in conjunction with housing types and the inherent topological and geological characteristics of the urban landscape amplified seismic risk and ultimately increased susceptibility to earthquake damage. In addition, Lisbon's layout and its close proximity to the sea coupled with its high seismicity rendered the city profoundly susceptible to tsunamis. This evolutionary view on disasters shifted the focus of attention from philosophical debates on divine providence to a discursive reflection on human responsibility.

The debate around the root causes of the Lisbon earthquake also mobilised one of the most well-known German philosophers of that era, Immanuel Kant². After collecting several different accounts on the earthquake and its effects, Kant published his essays, conclusions and comments on the matter in an attempt to advise citizens that despite the fact that the earthquake had physical causes, the disaster that followed could have been partially controlled by actions such as

² Immanuel Kant (1724-1804) is considered the most influential thinker of the Enlightenment era, as he made important contributions to modern science significantly contributing in its liberation from theology.

appropriate urban planning (Coaffee, 2019). Interestingly, Kant positioned the source of the earthquake in cracks and caverns in the Atlantic Ocean, with his work considered among the most influential in modern seismological research. Moreover, it constituted a milestone in connecting geology with the urban environments, signifying the importance of geological conditions for urban life.

In conclusion, the Lisbon earthquake, the first modern disaster, provided the conceptual ground for understanding the social and geophysical components of disasters, assisted in establishing an ethos of state accountability in managing natural hazards and led to the development of contemporary social science. Rousseau implicitly stated that disasters can be partially tamed with deeper understanding of local topography, social structures and predominant cultural beliefs in the communities where they strike; in other words, vulnerability and exposure are vital components of risk to natural hazards. This conceptual theorising of risk dominates the field of disaster studies to this day.

3.3 Disaster Risk Management and resilience

3.3.1 De-naturalising ‘natural disasters’: the concept of vulnerability

Since the Lisbon earthquake and Rousseau’s argumentation, disasters have been extensively characterised by many scholars, practitioners, politicians and media people as ‘natural’ (Furedi, 2007). Even today, disasters are often effortlessly considered ‘natural’ or ‘Acts of God’, sometimes within the academic realm itself ignoring the fact that their majority result from a combination of hazard severity, inherent social vulnerability, usually deriving from local hazardous conditions, and increased human exposure (Chmutina *et al.*, 2017). Consequently, a question emerging from this discourse is how natural are the so called ‘natural disasters’? (O’Keefe, Westgate and Wisner, 1976)

To provide a valid answer to that question, a clear distinction between natural hazards and disasters should be established. Boshier & Chmutina 2017 (p: 4) define hazards as *‘dangerous phenomena, substances, human activities or conditions that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruptions, or environmental damages’*. By contrast disasters occur as a repercussion of

hazards and in cases when significant numbers of people, resources and/or social relations suffer severe damage or disruption requiring significant recovery of the affected community as well as the replacement of physical infrastructure (Wisner *et al.*, 2004; Wisner, Gaillard and Kelman, 2012). Thus, a major distinction between the two phenomena lies in the preventive control the human have over disasters as opposed to hazards, since stronger ties between social actors and more robust planning and construction mechanisms can minimise the impacts of hazardous events.

Despite this understanding, disasters inflicted by natural hazards such as earthquakes, floods, tsunamis or epidemics are often labelled as ‘natural’. However, disasters are not natural or pre-ordained but occur as a result of social and political action that enhance inherent vulnerability. Many important human-induced factors, such as poor urban planning, ageing and low-quality building stock or poor regulatory framework, contribute in turning natural hazards into disasters (Bosher and Chmutina, 2017). Disasters happen when social processes like marginalisation, discrimination and inequitable access to knowledge and resources are apparent, intensifying the vulnerability of citizens. Such vulnerabilities are further enhanced by side-effects of neoliberal policies including -but not limited to- deforestation, rapid urbanisation, environmental degradation, and climate change (Chmutina *et al.*, 2017). Hence, the root causes of disasters should not be blindly sought in the magnitude or severity of natural hazards but in the underlying social processes such as social discrimination, inequitable access to resources, social inequality, class and power relations (ibid).

Once the distinction between hazards and disasters is established, the notion of vulnerability should be a further explored, as it is one of the main traits of socioecological systems converting hazards to disasters. Vulnerability emerged as a valid concept for understanding disasters during the 1970’s, especially after attempts to strip disasters of their natural dimension (O’Keefe, Westgate and Wisner, 1976). The detachment of disasters from natural phenomena, led to increased considerations of intrinsic vulnerabilities that exacerbate the effects of natural hazards, particularly in urban environments where the concentration of

human and physical resources is significantly higher (Desouza and Flanery, 2013). Consequently, many disaster scholars and practitioners shifted their focus from natural hazards to social processes and social order; the root causes that increase disaster risk and render communities unsafe in the first place (Bankoff, 2019). The outcome of this paradigm shift was the greater adoption of the term ‘vulnerability’, which incorporated both the exposure to natural hazards and the capacity of affected communities to recover from inflicted losses (Pelling, 2003; Adger, 2006; Bankoff, 2019).

The admission of vulnerability into the disaster management discourse was followed by attempts to model the relationship between natural hazards and disaster risk and vividly illustrated that risk can be directly referable both to the magnitude and severity of natural hazards and to social factors and processes that set people and infrastructure at risk (Bankoff, 2019). This thinking gave birth to the established formula, $\text{risk} = \text{hazard} \times \text{vulnerability}$ ³.

Perhaps the most complete among such attempts to model disaster risk, is the Pressure and Release (PAR) model (Blaikie et al. 1994⁴). The PAR model (Figure 3.1) conceptualises disaster risk as a composition of natural hazards and vulnerability, which originates in the social factors and processes that are in place. At the same time, vulnerability itself is reproduced over time at three spatial and temporal levels. The first of these levels, ‘*root causes*’, is a set of interrelated general processes within a society and the global economy and reflects political and economic systems, power relations and social structures. It is also temporally distant, as it engulfs ideologies, beliefs and social relations historically developed in the past and deeply embedded in the *modus vivendi* that are almost invisible and ‘taken for granted’ (Wisner et al., 2004). The second level is called *dynamic pressures* and constitutes an intermediate level translating and channelling the effects of root causes into particular types of *unsafe conditions*, the third and final level of vulnerability. Dynamic pressures

³ This pseudo-formula has been evolved during recent years. The determinants of risk were redefined with the inclusion of exposure in the equation (Cardona et al., 2012).

⁴ The PAR model was further refined and republished by Wisner et al 2004 and Wisner et al 2012.

are more contemporary and immediate and include macro-process such as population change and rapid urbanisation, as well as lack of institutional arrangements and appropriate social capital. Finally, unsafe conditions illustrate vulnerability's specific form of expression in both space and time. Such conditions include among other, people living in hazard prone areas lacking state protection, dangerous livelihoods, unprotected buildings and infrastructure. According to the model, higher pressures on social structures and people from either side -i.e. severity of hazard or increased vulnerability due to the described factors- leads to greater disaster risk.

Despite their techno-managerial nature and limited operational applicability, approaches like the PAR demonstrated the amplified attention gradually paid in the social components of disasters. The admission of vulnerability as an equal constituent of disasters assisted in 'de-naturalising' 'natural disasters' and shifted the attention of disaster scholarship and research towards the social processes that underlay disasters. This shift also generated a turn towards more proactive and holistic approaches and a move from disaster management to disaster risk management, concurrently cultivating a favourable mentality towards resilience thinking (Bosher and Dainty, 2011).

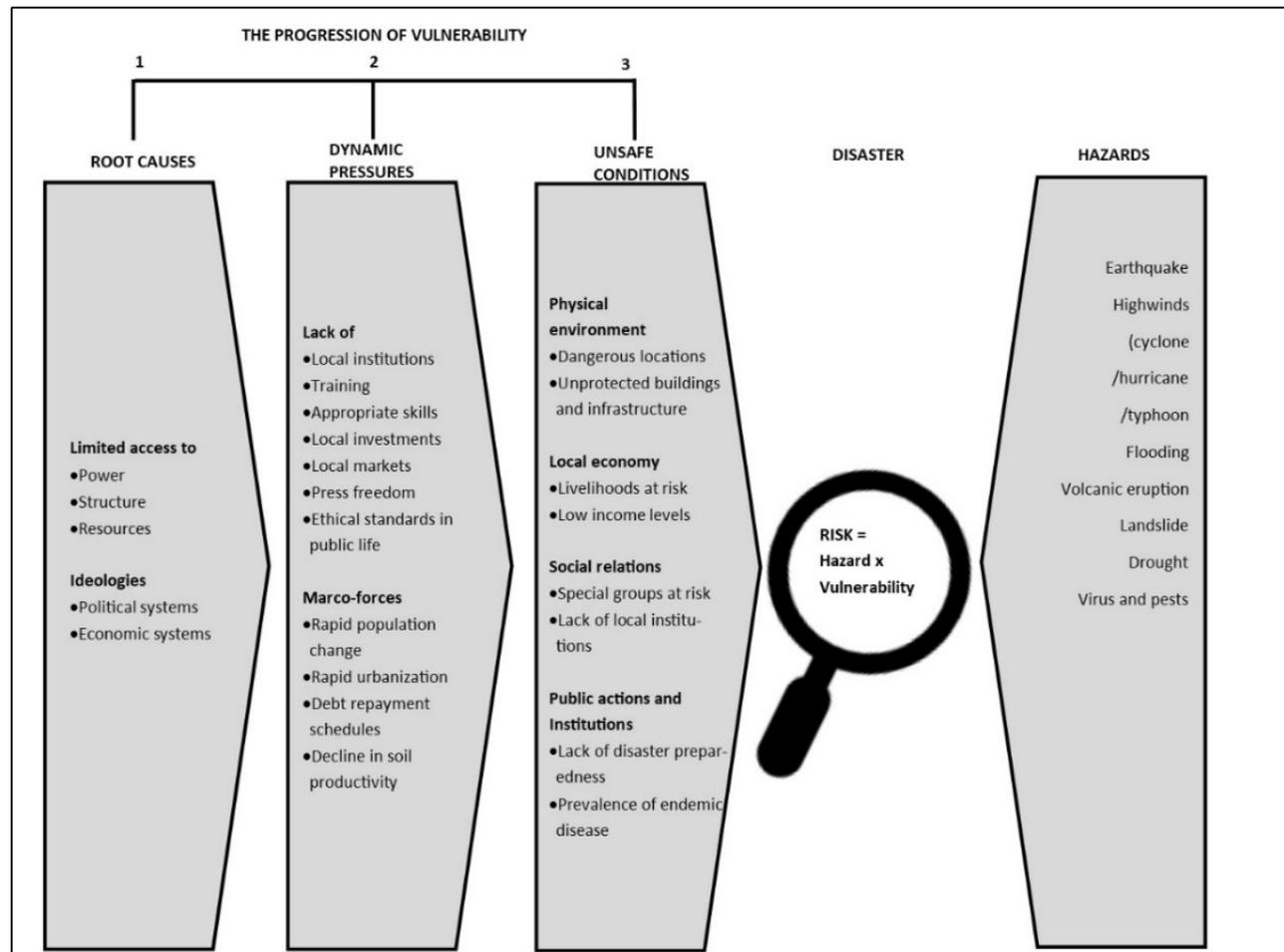


Figure 3.1: Pressure and Release (PAR) model: the progression of vulnerability (adapted from Wisner et al. 2004, p: 51)

3.3.2 From vulnerability to disaster resilience

Vulnerability and resilience are two related concepts in disaster scholarship that share many commonalities (Klein, Nicholls and Mimura, 1998). Some scholars even suggest that they are not discrete concepts (see Weichselgartner 2001), while others claim that they are simply different sides of the same coin (Blaikie *et al.*, 1994; Twigg, 2009; Manyena, Siambabala *et al.*, 2011). Thus, defining the actual relationship between them is a complicated endeavour as the multiplicity of definitions for both terms generates a plethora of interpretations. Properly understanding this relationship is a fundamental step to theorising the applications of resilience thinking in disaster risk management.

Although definitions of vulnerability to natural hazards predominantly derive from two distinct disciplinary perspectives, namely geography and natural sciences, there is a general consensus among disaster scholars that vulnerability is determined by a complex array of different actors. As Manyena (2006, p:440) argues: “[...] *vulnerability to disaster is determined not simply by a lack of wealth, but rather by a complex range of physical, economic, political and social factors or the predisposition of a community to damage by a destabilising phenomenon involving an interdependent natural hazard and anthropogenic pressures*”. Consequently, vulnerability is rather understood as an outcome of complex interrelated processes taking place within socioecological systems.

This outcome-oriented theorising of vulnerability constitutes its first fundamental distinction from disaster resilience. Resilience, as noted in Chapters 1 and 2, is better understood from an evolutionary perspective, as a continuous process focusing on the establishment and consolidation of strong ties among the system’s stakeholders and the consolidation of robust formal and informal institutions. A second distinction is apparent in the emphasis paid by vulnerability analysis to systems’ exposure and lack of resistance to natural hazards, as opposed to a dual focus on both preparedness, proactive action and post-disaster recovery that are central disaster resilience approaches (Klein, Nicholls and Thomalla, 2003; Davoudi, Brooks and Mehmood, 2013). Other differences between the two concepts can be traced in the negative connotation

of vulnerability contrasting resilience's positive undertone or in the overwhelming emphasis vulnerability bequeaths to mitigation as opposed to the importance of adaptation and adaptability resilience foregrounds (Bankoff, 2019).

In short, it is safe to argue that the two concepts are more discrete than similar (Manyena, Siambabala *et al.*, 2011). Vulnerability refers to the underlying characteristics of the environment and the processes and that constitute a city or part of it more prone to disasters. By contrast, resilience is more related to raising awareness and adequately preparing for hazards in a holistic manner, taking into account the underlying vulnerabilities and mobilising resources to address them. According to the National Research Council (2012, p.12) '*disaster resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events*'. This definition, which has been adopted and utilised by the UN in the Sendai Framework (UNDRR, 2015), clearly denotes the pre-emptive focus or disaster resilience, and its suitability in addressing the vulnerabilities and leading to gradual adaptation and ultimately recovery from internal and external perturbations. In other words, resilience thinking arguably enables systemic change rather than piecemeal solutions.

Whilst initial ideas of disaster resilience focused on 'bouncing back' to a pre-disaster state in a timely manner (Holling, 1973; Manyena, 2006; Lorenz, 2013), providing a clear distinction from the notion of vulnerability, disaster scholarship increasingly begun to embrace a 'bouncing forward' approach. This gave greater emphasis to both post-disaster recovery through community agency and reorganisation of current institutions -or establishment of new ones- as well as aiming to enhance local capacities to cope with the fluctuating nature of disaster risk. Disaster Risk Reduction underlined the importance of community mobilisation and empowerment to '*tackle the underlying problems of poverty, marginalisation, environmental degradation and political abuse, with emphasis on participatory processes in DRM, capacity building, removal of the root causes of vulnerability and mobilisation of less vulnerable sectors in support of those in need*' (Bankoff, 2019, p.228). For DRR the priority was disaster prevention and risk reduction, through better understanding of risk, improvement

of livelihoods and increasing of social mobilisation (ibid).

In sum, the focus of disaster resilience on recovery brings forward ontological debates around the discursive changes resilience thinking introduces to traditional Disaster Risk Management (DRM). Traditional Disaster Risk Management approaches disproportionately emphasised on improving the physical infrastructure for effectively mitigating the impact of natural hazards. Resilience thinking by contrast, has emerged more recently as a holistic approach to managing the rising risk, focusing on confronting the underlying social problems of contemporary cities and aiming at mobilising and empowering local communities and promoting multi-stakeholder collaboration and partnership (Normandin *et al.*, 2019). Moreover, temporally, resilience approaches could be perceived as long-term strategies to mitigate future disasters (Manyena, 2006), focusing on building institutional capacities for preparing and mitigating shocks and stresses, whereas disaster risk management incorporates the short-term mitigation and recovery practices constituting a rather the reactive approach emphasising on the disaster response apparatus (Lorenz, 2013). This distinction is even more visible as resilience thinking puts more attention to the social aspects of disaster management, including social dynamics, local culture, social justice and tacit institutional and governing arrangements in contradiction with DRM's pragmatic and rational engineering direction.

3.3.3 Disaster Resilience meets global sustainable development

The resurgence of resilience in developmental scholarship amplified the need for more effective integration of disaster risk considerations into developmental policies. The United Nations has played a lead role in the attempt to highlight the significance of reducing disaster risk by establishing in 1999 the UN Office for Disaster Risk Reduction (UNDRR) to serve as a focal point for coordinating synergies and activities between the UN and local organisations. *'UNDRR defines itself through its multi-stakeholder coordination approach based on the relationships it has developed with national and local governments, intergovernmental organizations and civil society, including the private sector, and by its mode of operating through a network of global partners.'* (UNDRR,

2019c).

This need to focus on disaster risk reduction and resilience has been explicitly expressed by the UN both in the *Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters* and in its successor the *Sendai Framework for Disaster Risk Reduction 2015-2030*. Both documents were outcomes of extensive consultations with a wide spectrum of stakeholders, including local authorities, governmental and non-governmental organisations, academics, practitioners and community organisations' representatives and emphasised the eminent need for more effective stance against disasters and reduction of risk posed by natural and human-induced hazards.

Adopted on January 22, 2005 the Hyogo Framework for Action (HFA) signified a global governmental commitment to reduce vulnerabilities and increase the resilience of nations and communities to natural hazards (UNDRR, 2005). The HFA provided a clear motivation to integrate disaster risk reduction into developmental policies and further support the development of institution, mechanisms and capacities to build resilience to natural hazards (UNDRR, 2005). It espoused a multi-hazard, interdisciplinary approach and prioritised the strategic goal and key activities to be operationalised for effective reduction of risk to natural hazards and adaptation to climate change. According to Manyena (2011, p.422):

The HFA clearly signals a move from a command and control environment to a community-based approach within an enabling policy framework. It seeks to promote an inter-disciplinary approach to disaster risk reduction and gives a specific example by stating that this must promote the integration of risk reduction associated with existing climate variability and future climate change into the strategies for the reduction of disaster risk and adaptation to climate change.

Following the way paved by the HFA, the Sendai Framework was adopted on March 18, 2015 at the World Conference on Disaster Risk Reduction in Sendai, Japan (UNDRR, 2015). Building on the experience gained by the

implementation of the HFA and aspiring to enhance and advance the knowledge provided by the ten years of its implementation, the Sendai Framework constitutes a more refined approach to dealing with multi-hazard risk. Its main objective is to *'prevent new and reduce existing disaster through the implementation of integrated and inclusive economic, structural, legal social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery and thus strengthen resilience'* (UNDRR, 2015). Despite this outcome-oriented conceptualisation of resilience, the Sendai Framework offers an integrated pathway to Disaster Risk Reduction applied to a range of administrative levels and temporal scales profoundly foregrounding the important role for better understanding of disaster risk and more efficient governance arrangements. To sum up, the Sendai Framework is a non-binding strategic document delivering directions for sustainable development with Disaster Risk Reduction and resilience in the forefront.

The HFA and the Sendai Framework offered a solid rationality for integrated development approaches galvanising national and local governments into taking resilience more seriously, while simultaneously also expressly consolidating the role of municipal governments in delivering resilience at the urban scale (Barnett & Parnell 2016).

This consolidation has further been expressed through the Sustainable Development Goals (SDGs). In 2015, the member States of the United Nations SDGs approved 17 *'integrated and indivisible'* SDGs in an ambitious effort to transform the operational framework and policy agenda of future global sustainable development (United Nations, 2015). The focus of different SDGs extends across 169 developmental targets while 230 indicators have been employed to monitor progress towards achieving them (Ulbrich, De

Albuquerque and Coaffee, 2019)¹.

Through the SDGs, the United Nations recognise and re-endorse the need to reduce disaster risk, already clarified and consolidated via the HFA and the Sendai Framework. Achieving many of the SDGs and several of their specific targets de facto presupposes consequent reduction of disaster risk. Examples of such targets are presented in detail below and concentrate around limiting vulnerability and exposure of poor people and communities to hazards, building resilient infrastructure and mitigating the impact of climate change, while a range of other SDGs and targets implicitly refer to actions that can contribute to reducing disaster risk reduction.

Resilience is also explicitly and implicitly acknowledged in several of the SDGs and in a variety of different ways, including wellbeing, poverty alleviation and disaster risk reduction (Bahadur *et al.*, 2015; Ziervogel *et al.*, 2017). For instance, it can be found in Goal 2 (Zero Hunger), Goal 9 (Industry Innovation and Infrastructure), and while it also represents the core of Goal 1 (No poverty) Target 1.5 (United Nations, 2015):

By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

Target 1.5 is fairly broad in terms of scope and seeks to address the impact of both shocks and stresses (Bahadur *et al.*, 2015). Limiting the focus of attention to natural hazards, Goal 13 (Climate Action) provides a more concrete view through target 13.1 ‘*Strengthen resilience and adaptive capacity to climate-related hazards and “natural disasters” in all countries*’, where resilience could be discerned both as an outcome and as a process of adaptive capacity building. Nonetheless, the most explicit reference to the concept of resilience is undoubtedly encountered in Goal 11 ‘*Make Cities and human settlements*

¹ The way these goals and targets are to be operationalised is not entirely clear and a dynamic process under discussion globally and according to many scholars depends highly on the appropriate choice of indicators (United Nations, 2019).

inclusive, safe, resilient and sustainable'. Notably, Goal 11 targets cities attempting to address all aspects of urban life. Among them is the reduction of urban disaster risk, mentioned in targets 11.5 and 11.b (United Nations, 2015):

Target 11.5: '[...] significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations'

Target 11.b '[...] substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, develop and implement, in line with the Sendai Framework'

The centrality of resilience in several SDGs alongside their categorical objective of enhancing urban resilience demonstrates the operational potential of the concept. The global UN developmental agenda with the SDGs in the vanguard, not only acknowledges the significance of resilience for the management of natural hazards and extreme events but also unlocks wider framings of resilience that move beyond disaster management and towards tackling social inequalities, promoting social justice and reducing human vulnerability (Bahadur *et al.*, 2015; Klopp and Petretta, 2017; Ziervogel *et al.*, 2017). Whilst there is a significant emphasis on implementing approaches that deliver resilience for all, by all (Coaffee, 2019), the social turn in resilience scholarship (Brown, 2014) has paradoxically served to de-emphasize important aspects of an apparently holistic and joined up approach to urban resilience. The relative absence of geological data or geologist informing ongoing decisions in disaster resilience is one notably gap in knowledge and application.

3.4 Resilience thinking and geological conditions

3.4.1 Geology, resilience thinking and the Anthropocene

To introduce the relationship between resilience thinking and local geological conditions, a brief discussion of the emerging and now popular Anthropocene discourse is required (Lorimer, 2012; Hamilton and Grinevald, 2015; Lewis and Maslin, 2015). According to many geoscientists, human activity in the second half of the twentieth century, through the appearance of manufactured materials in sediments (i.e. plastics) as well as particulates resulting from fossil-fuel combustion, has left - and continues to leave - a pervasive and persistent signature on earth, giving birth to a new geological epoch – the Anthropocene - named after the Greek word for human ‘*anthropos*’, despite other suggestions². According to Paul Crutzen and Eugene Stoermer (2000), who coined the term, the conditions in the Earth system have changed from the ones that characterised most of the Holocene (and previous interglacial states of the Quaternary Period), due to the impact of human activity (Waters *et al.*, 2016; Zalasiewicz and Waters, 2016a, 2016b).

The artefacts we produce to live as modern humans will form the techno-fossils of the future. Human-generated deposits now extend from our natural habitat on land into our oceans, transported at rates exceeding the sediment carried by rivers by an order of magnitude. That influence now extends increasingly underground in our quest for minerals, fuel, living space, and to develop transport and communication networks. These human trace fossils may be preserved over geological durations and the evolution of technology has created a new techno-sphere, yet to evolve into balance with other Earth systems.

(Zalasiewicz and Waters, 2016b, Summary)

² As the burning of fossil fuels in pursuit of the accumulation of capital in the west has been the predominant source of the emissions that produced the new geological epoch, some scientists suggested the ‘*Capitalocene*’ would be a more appropriate name (Davidson, 2019).

A debate around the actual validity of the Anthropocene as a geological epoch is currently ongoing among geologists³. However, regardless of the appreciation of the Anthropocene from geologists as a geological epoch succeeding the Quaternary period, the discussion around the visible impact of human activity on the environment is fundamental. The Anthropocene hypothesis has widely spread across both hard and soft sciences. In social sciences and humanities, the term has been used to denote *'the rapid increase in technological change, population growth and consumption, which is increasingly characterised by complex and dynamic system interaction, future volatility and ultimately an imperative to rethink the relationship of humans with nature, environment and technology'* (Coaffee and Clarke, 2016, p. 2).

The new conditions posed by the discourse around the Anthropocene - an age of 'persistent uncertainty' (Dalby, 2018)- highlight an increase in frequency of natural hazard occurrence as well as the complexity and interdependency of contemporary life that is increasingly impacted by disruption and disaster. Here, resilience thinking is becoming central in dealing with this new reality, through anticipatory and adaptable approaches to governing complexity. Resilience thinking further addresses the emerging political ecologies of the Anthropocene, which urge for more holistic and integrated ways of confronting uncertainty and risk, as well as innovative modes of equitable governance across multiple systems, networks and scales (Coaffee and Clarke, 2016).

The Anthropocene discourse underlines the significance of geological conditions in modern societies, but incongruously, is rarely apparent in urban resilience policies in any meaningful way. The remainder of this Chapter will explore this paradoxical omission.

³ The primary concern of the adversaries of the Anthropocene lies in the very few years that have passed in order to justify a shift from one geological epoch to the next. Geological changes in the subsurface are very slow processes, usually identified as such after thousands of years.

3.4.2 The introduction of geological risk

Whilst discussion of the Anthropocene illuminates the connections between geological conditions and contemporary urban life, geological analysis is rarely incorporated into urban policies, despite the focus resilience pays on amalgamating the efforts of built environment professionals and advancing new resilient urban designs (Bosher *et al.*, 2007; Bosher and Dainty, 2011; Bosher, 2014). As far as the built environment is concerned, engineers and planners discovered a strong potential for bridging the shear zone between the dynamic nature of adaptation and the static one of resistance by embracing an inclusive and holistic approach in the design, construction and operation processes (Bosher *et al.*, 2007; Hassler and Kohler, 2014).

Despite this however, a common characteristic of the approaches linking resilience with the built environment, is a lack of consideration of urban geological risk. Geological risk could generally be conceptualised following the standard definition of risk, analysed above: Risk = hazard x vulnerability x exposure. In this case, hazards are represented by the most imminent shocks threatening a city, vulnerability by the underlying geology and geomorphology of the urban settings, and exposure by the configuration and condition of the built environment.

The relationship between cities and geology dates as far as the establishment of first human settlements. From the dawn of civilisation people chose the most appropriate places for the establishment of large settlements based on local topography, landscape and availability of (geo)resources for construction, with this tight connection reaching an end only during the nineteenth and twentieth centuries, when reinforced concrete and steel became the universal building materials (Margottini and Spizzichino, 2015). Nevertheless, ground conditions – the underlying geology - continued to play a significant role in the development of modern cities, particularly when related to natural hazards, as they can significantly determine the level of vulnerability and ultimately disaster risk.

As a result of neoliberal development policies, and/or a shortage of developable

land in population-dense cities, ground conditions rarely prohibit development entirely. They can create regulations for the suitability of land, the urban design and the cost of development but these are often ignored by developers. As a result, current urban planning approaches tend to take the ground only marginally into account from a hazard point of view given other pressures they are under to deliver housing and infrastructure in the public interest (Margottini and Spizzichino, 2015).

A good example of this ignorance has been manifested in Houston's devastating experience with Hurricane Harvey. In summer 2017 Hurricane Harvey hit Houston affecting nearly 100,000 residential properties and almost 300,000 structures and cars, simultaneously resulting in the loss of 100 lives and the displacement of almost 30,000 people (Sebastian *et al.*, 2017; Coaffee, 2019). Regardless of the unprecedented brutality and magnitude of the Hurricane, urban planning decisions in the city of Houston has proven to be severely maladaptive, contributing to the devastating scale of the disaster. For instance, the increase of population by almost 40% since 1990 has driven urban sprawl to flood prone areas, with developers often deliberately concealing the unsuitability of such places for urban expansion, smartly utilising gaps in state legislation⁴ (Kelman, 2017; Satija, Collier and Shaw, 2017). Furthermore, urban expansion destroyed several natural defences, while concurrently failing to put aside appropriate drainage systems and open spaces, creating the ideal conditions for the flood to burst out of control⁵. Under such conditions, the great volumes of accumulated water run-off passed through and destroyed poorly planned urban areas.

Examples like Hurricane Harvey demonstrate the immense impact that poor urban planning and absence of geological insight might have in managing natural hazards. Emerging approaches to incorporating geology into planning and design could be extremely helpful in a wider spatial planning model and

⁴ The state law in Texas asked for sellers to disclose information regarding their property only if it was within a 100-year floodplain and not in 500-year floodplains or reservoir basins, as was the case for many of the affected areas (Satija, Collier and Shaw, 2017).

⁵ An analysis of developments permits in 2015 revealed that more than half of the developers did not provide adequate guidance on limiting the destruction of wetlands (Coaffee, 2019).

could also provide invaluable help in decision making regarding urban development. An interesting example towards this direction has been manifested in the city of Istanbul, where land use planning regulations '*force planners to consider natural/manmade hazards in planning processes*' (UNDRR, 2019a, p.21), in an attempt to secure considerations of geological conditions in planning processes⁶. Articles from existing regulations include the prohibition of land use plan preparations in urban areas without an approved geological-geotechnical or micro-zonation reports or the necessary approval by the Istanbul Metropolitan Municipality of a land suitability map and integrated analysis of geological structures for any new development in the city. Through such measures, geological considerations are slowly embedded in urban planning policies effectively supporting disaster risk management.

Other actions that could support further connection between geological conditions and urban planning and development can include (Bricker, Reeves and Campbell, 2015; UNDRR, 2019a)

- Illustrations of ground suitability for different uses;
- 3D urban planning tools connecting the ground properties with the land use;
- Connection of geo-environmental models with social and economic models;
- Monitoring in the long-term of individual development in urban areas;
- Direct connection of DRR measures with geological investigations;
- Inclusion of geological requirements into legislation and planning approval process.

3.4.3 Natural hazards and geological risk in 100RC

With the consolidation of softer approaches for the promotion of urban resilience, appreciation of geological risk lies (if at all) in the implementation

⁶ Istanbul has suffered from severe earthquakes in the past. Current disaster risks linked to earthquakes in Istanbul are due to unplanned and informal developments that have created an extremely dense, vulnerable built environment, in which a 7.5 magnitude earthquake is expected to cause 30,000-40,000 deaths (Strasser *et al.*, 2008).

level, with metropolitan and municipal authorities. As noted in Chapter 2 the 100RC network, provides a significant level of freedom to city managers in the selection of priority areas for targeting, based on the variety of shocks and stresses each city encounters. The structure and intentional aiming of the project allows for different interpretations by municipal authorities, which have frequently resulted in the overseeing of geological risk as well as the potential impact of natural hazards.

For the cities participating in the 100RC network design and implementation of their respective Resilience Strategies is undeniably site-specific and mainly targets structural governance change. Thus, integration of geological risk depends solely on the prioritising of shocks and stresses and thus, political criteria are often being applied to the preparation of the Resilience Strategy. Hence, a lack of adequate integration of geological risk in the emerging Resilience Strategies has been observed in many cases, where it should have undeniably been accounted for. For instance, while climate-related shocks, such as inland flooding or landslide related risk, are prioritised in the majority of cities that have released their Resilience Strategies, appreciation of local geological conditions to mitigate their impact is only observed in a few of them (i.e. Medellín, Rio de Janeiro) and often not in a direct manner.

Rio and Medellín, both are Latin American cities that have undergone an accelerated urban growth process in the past 50 years. This trend, which has rendered Latin America as one of the most urbanised areas in the world, was accompanied by the proliferation of marginalised urban neighbourhoods and informal settlements which are frequently exposed to multiple environmental hazards and poverty (Ferrari *et al.*, 2018). The situation in both of these major Latin American cities created an urgent need to improve the resilience of marginalised communities against rainfall-related geohazards. In both cases, and across many developing countries, recently built settlements growing up steep hillsides (also called “*favelas*” or “*comunas*”) have been particularly exposed to the acute shock of landslides (Smith *et al.*, 2017). This has led to the design of a number of initiatives to anticipate and manage risk more effectively so as to reduce the impact of disasters. Such interventions varied from building physical

protection barriers and improving urban planning to building early warning systems and raising awareness of communities.

With both cities becoming members of the 100RC network, geological conditions that threaten a great number of local residents, particularly in poor urban areas, were only superficially addressed in their respective Resilience Strategies, with socio-political and economic factors still acquiring the central focus of attention⁷.

Integration of urban geological risk in a Resilience Strategy is a complicated matter. Cities with ineffective governance configurations, such as many 100RC participants, face arduous implementation challenges. Moreover, the non-binding character of Resilience Strategies in most cases impedes that adoption of specific large-scale actions that would include geological and geomorphological interventions, which are time-consuming and usually centrally imposed. The lack of geological insight, along with the disconnection between emergency planning and the built environment and the ineffective communication among various geological organisations amplify geological vulnerability and exposure to urban geohazards, ultimately boosting the level of geological risk.

Furthermore, a focus on different urban priorities by local authorities, often stemming from a sense of complacency created by the limited frequency of natural hazards, shifts attention to more urgent urban problems. As natural hazards occur less frequently than election cycles, the impact of geological risk is unlikely to influence election results; hence, natural hazards are often treated as '*black swan*' events (see Taleb 2007) and are marginalised in the design of Resilience Strategies. This emphasis on other urban priorities, coupled with a problematic collaboration between municipal and environmental/geological authorities, creates a gap in proper understanding of geological conditions and their interdependencies, with increased unawareness of the environment resulting in a general failure to address these issues in local and metropolitan

⁷ Interestingly, in the case of Rio de Janeiro, the Resilience Strategy was published in 2016 but was immediately undermined and diminished once the local administration changed.

developmental policies.

In short, geological and geomorphological considerations are often largely ignored in urban resilience strategies for a variety of reasons. Within the 100RC network, this marginalisation is apparent in the vast majority of published strategies, justifying a need for deeper and more effective integration of geological risk and its connections to the built environment and regimes of urban planning. This study attempts to directly address the implementation challenges, and hence Chapter 7 *Investigating the influence of Urban Geological Risk in Thessaloniki*, explores the implementation challenges and implications emerging from the lack of geological insight in the city's Resilience Strategy.

The next chapter moves away from governance and natural hazards and presents tools and methods used for the assessment and monitoring and evaluation of resilience policy implementation, with particular emphasis is given in the City Resilience Framework - the 100RC network assessment tool. The chapter also discusses the benefits and limitations of quantitative metrics as a methodological approach to measuring and evaluating urban resilience.

Chapter 4 - Resilience Assessment, Monitoring and Evaluation

4.1 Introduction

In the two previous chapters, this thesis has explored the relationship of resilience thinking with urban governance and natural hazards. Emerging from these readings was the argument that urban resilience could be conceptualised as a process of meta-governance, or *'the governance of governance'*.

Here, a central question arising from these previously presented theories and conceptualisations is *how do we monitor and assess impact of resilience thinking in contemporary cities?* More specifically, *why do we need to assess and monitor urban resilience; and how can we develop tools, methods and indices to efficiently capture the outcomes of resilience policy implementation, including its success at institutionalising resilience thinking within regimes of local municipal governing?* In framing these questions, this chapter seeks to illuminate the prevalent motivation for assessing urban resilience as well as to provide an overview of a number of practices currently employed for this purpose. This chapter's principle objective within the wider study is to navigate analytical frameworks for assessing urban resilience and identify monitoring techniques that facilitate, or block transformations stimulated by the implementation of urban resilience policies.

As already affirmed in previous chapters, resilience is a highly debated, malleable and contested concept used in a variety of disciplinary contexts. Consequently, seeking to define universally applied indices and methods for its assessment and measurement is a very challenging task, which for some resembles the quest for the 'holy grail' (Levine, 2014). As Schipper & Langston (2015) further observe:

[T]he ability and methods to measure resilience are contested. [...] what counts as an indicator of resilience has been defined and redefined in semi-chaotic fashion

according to different interpretations of what the concept means, as well as how best to go about measuring it. Due to the need to be context-specific to be accurate and also rely on available data, universal indicators cannot exist, even though universal principles of resilience are necessary to ensure that there is accountability and above all that it is truly resilience that is being measured.

Yet, despite such inherent adversities, there is a broad consensus on why resilience needs to be assessed. According to Prior & Hagmann (2014), there are five main reasons for measuring resilience, to which Coaffee & Lee (2016) add a sixth one:

1. to *characterise resilience*, by articulating its constituents - a fundamental process especially for the academic realm;
2. to *raise awareness*, through directing observable measures of resilience-related information to adequate policy makers, particularly when resilience levels are below some predetermined threshold;
3. to *allocate resources for resilience*, in order to justify the allocation of risk management resources and funds in a transparent manner;
4. to *build resilience*, by developing resilience thresholds to assist emergency response and mitigation measures and also determine the changes in resilience levels as a result of a disruption or implementation of resilience-building policies;
5. to *monitor policy performance*, through evaluating the effectiveness of resilience- building policies by performing longitudinal comparisons of targeted policy entities;
6. to *appreciate learning and advocacy*, as a result of resilience policy implementation, with the ultimate goal of developing a shared knowledge community.

Considering these premises, it is becoming obvious that the importance of resilience assessment – particularly for cities- extends beyond the technicalities of creating appropriate indices and assessment frameworks. It becomes essential for

consolidating resilience thinking within the organisational chart of local governments, while concomitantly providing visibility to the outcomes of resilience-building processes. This visibility is also capable of rendering resilience more tangible for higher-level policy makers through the presentation of measurable resilience thresholds and indices.

However, it is exactly in the visibility of resilience outcomes where the danger of resilience assessment lies. Development of efficient and standardised indicators, tools and methods to assess urban resilience is a complicated endeavour, as it requires horizontal application to complex, heterogeneous socio-ecological systems. As already argued in Chapters 2 and 3, the application of resilience thinking is a highly localised practice, and thus employing measures to assess its success in different urban contexts can often prove to be highly problematic.

In order to better understand ongoing and future resilience assessment processes the remainder of this chapter explores a number of emerging frameworks for measuring urban resilience that have been developed by global organisations, academic institutions and NGOs, and used by local authorities around the world. Most central for the purpose of this study, is the City Resilience Index, developed by ARUP and the Rockefeller Foundation and implemented in the 100RC programme. The chapter will then present some reflections on the success and limitations of these current resilience assessment methods as well as the emerging challenges in evaluating the institutionalisation of urban resilience.

4.2 Assessing urban resilience: Current approaches and frameworks

4.2.1 UNISDR and the scorecard approach

With resilience rapidly becoming the new ‘buzzword’ for global sustainable development -including disaster risk reduction and climate change- the emerging need to develop effective mechanisms to measure and assess urban resilience has become more urgent (UN Habitat, 2014). The first attempts to create indices and

frameworks to measure resilience came from disaster scholarship and global organisations such as the World Bank and the United Nations Office for Disaster Risk Reduction (UNDRR, formerly known as UNISDR) and were focused on natural hazards and disaster recovery.

As noted in Chapter 3, the Hyogo Framework for Action (HFA), adopted in 2005, signalled a commitment for national and local authorities to reduce vulnerabilities and increase resilience to natural hazards. This commitment was accompanied by a set of indicators and tools for local authorities to self-assess their level of preparedness and resilience against natural hazards, based on a set of ten different criteria, called *The Ten Essentials for Making Cities Resilient Checklist* (Molin Valdes 2012, p.25). These were the following:

1. Put in place *organisation and coordination* to understand and reduce disaster risk, based on participation of citizen groups and civil society. Build local alliances. Ensure that all departments understand their role in disaster risk reduction and preparedness.
2. *Assign a budget* for disaster risk reduction and provide incentives for homeowners, low income families, communities, businesses and the public sector to invest in reducing the risks they face.
3. *Prepare risk assessments* based on updated data and use these as the basis for urban development plans and decisions.
4. Invest in and maintain *critical infrastructure that reduces risk*, such as flood drainage, adjusted where needed to cope with climate change.
5. Assess the safety of all schools and health facilities and upgrade these as necessary.
6. Apply and enforce *realistic, risk compliant building regulations and land use planning principles*.
7. Ensure that *education programmes and training* on disaster risk reduction are in place in schools and local communities.

8. *Protect ecosystems and natural buffers* to mitigate floods, storm surges and other hazards to which your city may be vulnerable.
9. Install early warning systems and emergency management capacities and hold regular public preparedness drills.
10. After any disaster, ensure that the *needs of the affected population are placed at the centre of reconstruction*, with support for them and their community organisations to design and help implement responses, including rebuilding homes and livelihoods.

Through the HFA, the importance of reducing underlying risk factors by directing planning policies towards minimising the impact of natural hazards became apparent. In order to achieve such a goal and inform the process of selecting the above-mentioned criteria for improving resilience and liveability of dissimilar urban environments, UNDRR identified a set of risk drivers. These drivers helped clarifying the local authorities' understanding of risk and assist in preparing measures to confront them (Molin Valdes 2012, p.8). Such drivers were:

- growing urban populations and increased densities in hazard-prone areas;
- concentration of resources at the national level and impeding of local authorities' capacity for disaster response;
- weak local governance and insufficient participation by local stakeholders in planning and urban management;
- inadequate water resource management and capacity to respond to floods and landslides;
- declining ecosystems due to the impact of anthropogenic factors;
- decaying infrastructure and unsafe building stocks that increase exposure to natural hazards;
- uncoordinated emergency services, which decreases the capacity for swift response and preparedness;
- climate change and its impact on the increased frequency and intensity of natural hazards.

The UNDRR approach used the so called ‘*scorecards*’, providing a change from traditional DRR resilience assessment frameworks. Instead of unilaterally focusing on natural hazards and disaster recovery, the scorecard approach introduced and established a governance lens on resilience assessment, one that emphasised other types of shocks (i.e. anthropogenic) or long-term stresses (i.e. socioeconomic). In other words, the pivotal role of governance in assessing the capacity of cities, with different qualities and characteristics, to absorb shocks was not only acknowledged but formalised through this approach. This constituted a step forward from traditional techno-rational approaches to assessing resilience, embodying the ‘*social turn*’ in resilience practices (Adger, 2000; Davidson, 2010; Brown, 2014).

Since the HFA, governance continued to play an key role in resilience for UNDRR and its resilience assessment frameworks. The Sendai Framework for Disaster Risk Reduction 2015-2030, the successor of HFA, re-adopted and re-framed the scorecard for resilience assessment in 2017, during the Global Platform for Disaster Risk Reduction in Cancun. The *Ten essentials* were updated and reintroduced. Figure 4.1 illustrates the new version of the essentials, which attempted to cover a broader area of needs for addressing by resilience strategies. Essentials 1-3 cover governance and financial capacity, while 4-8 cover planning and disaster preparation and 9-10 disaster response and recovery (UNDRR 2017a; UNDRR 2017b).

The updated version of scorecards offered the potential for cities to assess their resilience status in two levels, against a set of indicators under each of the resilience essentials (UNDRR, 2017c). First, the *Preliminary Level*, included 47 questions/indicators, each with a score of 0-3. The indicators reflected the Sendai Framework targets and indicators, expanding though their significance by incorporating some critical sub-sections. The approach was suggested to take place during a 1-2 day workshop including both city-officials and a wide array of external stakeholders from both private and public sectors (UNDRR, 2017b). The second level of assessment, *Detailed Assessment*, was comprised of a 1-4 months multi-

stakeholder exercise, constructed upon 147 indicator criteria and assessed on a 0-5 scale. The intention here was the outcomes of this exercise to provide the backbone of the Urban Resilience Plan for Action (UNDRR, 2017a). Finally, the scorecards allowed reflections on each indicator by the respondents in the form of comments. Through this process, city-officials were capable of enhancing their local knowledge and direct specific actions to certain designated areas.

Another fundamental contribution of the UNDRR scorecards campaign has been the facilitation of joint work among different urban stakeholders. Through their participation in this campaign, cities were given the chance to bring stakeholders in the same table and challenge top-down decision-making while simultaneously promoting multi-stakeholder responses. In particular, through using the scorecards, cities acquired the opportunity to initiate resilience conversations and combine local resources in an attempt to stimulate innovative planning ideas towards securing urban resilience. According to Johnson and Blackburn (2014, p.30):

the [Making Cities Resilient] campaign promote[d] resilience-building in cities through many mechanisms, including raising awareness of DRR among local governments through high profile events, providing tools, technical assistance and training to local authorities and facilitating city-to-city support networks and learning opportunities

The scorecard approach provided a solid basis for cities to set the local baselines and identify gaps and disconnections in the planning, governance and disaster response nexus. During 2017 and 2018, 214 cities from Asia, Sub-Saharan Africa, the Americas and the Arab States conducted the scorecard assessment. In April 2019, UNDRR published a report with a detailed presentation and analysis of the preliminary results of their participation (UNDRR, 2019b). Although, the outcomes of this participation were highly context- related and thus difficult to generalise, it has been shown that the majority of cities benefited from their participation to the process. Especially the *Preliminary Assessment Level* has been characterised by city-officials as a key component of resilience building and the major driver for a

sustainable future. Conversely, a lack of appropriate human and financial resources to both undertake assessment and implement innovative transformative resilience strategies were also identified as the most urgent needs for city authorities. According to the report (UNDRR, 2019b):

The preliminary scorecard assessment provides an analysis and common understanding for local governments on DRR in the cities. If cities are the frontier in the endeavour to reduce disaster and climate risks, and achieve sustainable development, the results show a significant gap in achieving resilience. Cities should take initiatives to improve by incorporating identified actions for reducing disaster risks into related plans and take proactive steps to implement DRR actions to ensure the resilience and thereby reduce the loss imposed by disasters. A very significant effort is required globally to respond to the challenges for achieving urban resilience and the sustainable development goals. A business as usual approach will not suffice.

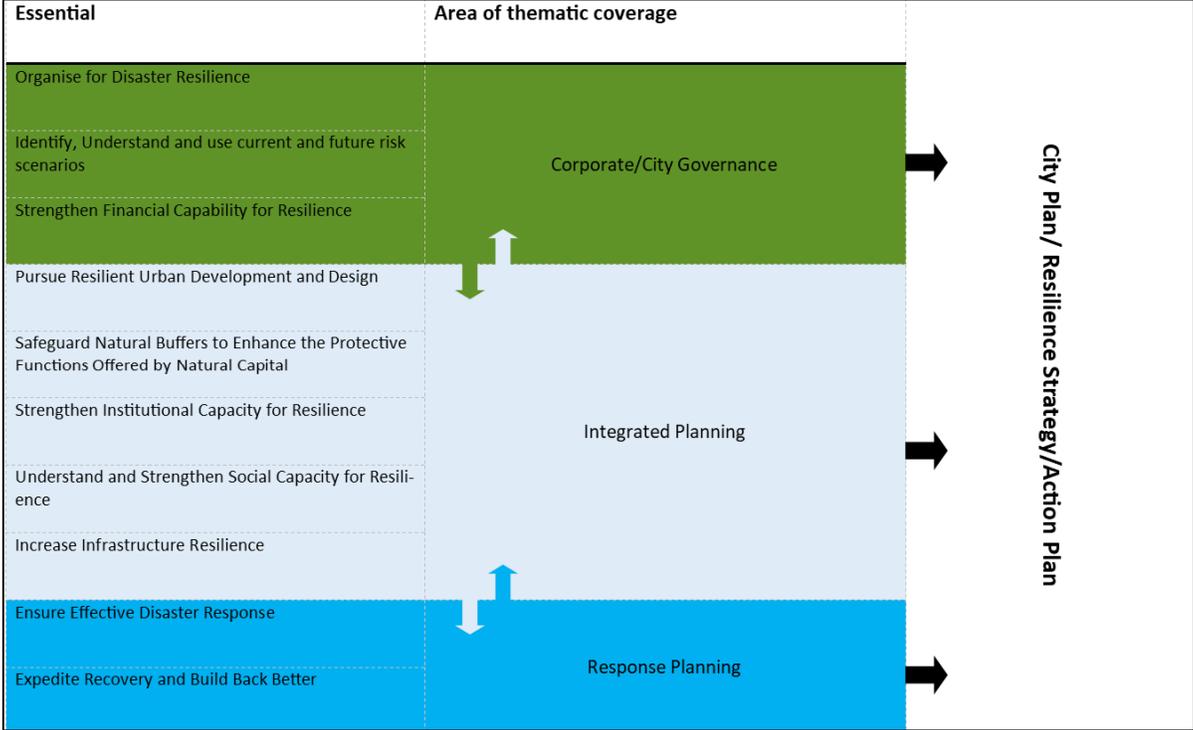


Figure 4.1: The Ten Essentials for Making Cities Resilient (adapted from UNDRR 2017a; UNDRR 2017b; Personal elaboration)

4.2.2 Monitoring resilience through SDG 11 targets and indicators

Another framework for measuring urban resilience, operating in parallel with the UNDRR scorecards, stems from the Sustainable Development Goals (SDGs). As noted in Chapter 3, in 2015 17 SDGs were adopted by the United Nations as the main drivers of the next generation of sustainable development. The SDGs overall are comprised of 230 indicators, employed to monitor 169 developmental targets. SDG 11 *Make cities and human settlements inclusive, safe, resilient and sustainable* - includes 10 targets and 15 indicators (Table 3) emphasising different aspects of urban life such as urban planning, environmental degradation, climate change, social and economic inequalities, etc. The majority of indicators are designed to be measured at the local city level and be reported back to the national level (United Nations, 2018).

SDG 11 indicators are further divided in practice to more specific sub-indicators, so as to facilitate the work of local authorities. Monitoring the performance of cities against the SDG 11 targets and indicators is a process in nascent phase and thus cannot be extensively analysed. Many of the SDG 11 indicators also require the collection of data at the city level; thus, the use of surveys and censuses, as well as innovative methods deriving from geospatial information technology and remote sensing, such as a QGIS extension tool called *Land Use Efficiency Tool*. This tool was developed by the Joint Research Centre of the European Commission to support the monitoring of SDG 11.3.1, and is easily adapted to several other input data layers (European Commission, 2018).

By analysing Table 4.1 in a little more detail, it is becoming clear that through its proxy indicators, SDG 11 seems to emphasise more technical issues, such as land coverage, economic losses etc. without significantly advocating for governance change and transformation processes. Despite references on the need of local governments to adopt DRR strategies, targets and indicators do not adequately focus on the process through which such adoption might be facilitated; thus governance

change can be argued that is somehow demoted, even though it constitutes one of the key prerequisites for a successful resilience building strategy, as noted in Chapter 2.

Emerging critiques of SDG 11 also doubt the capacity of such monitoring indicators to promote inclusive development as they are constructed under a techno-managerial approach, which unevenly relies on quantitatively defined parameters without proper consideration of local variation and intra-urban inequalities (Ulbrich, De Albuquerque and Coaffee, 2019). Further, they rely heavily on existing (i.e. convenient) national indicators and statistics offices. The last part of this chapter analyses the equitable nature of SDG monitoring indicators in more detail.

Table 4.1: Targets and indicators of SDG 11 (adapted from UNDRR, 2019b)

TARGETS		INDICATORS	
11.1	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	11.1.1	Proportion of urban population living in slums, informal settlements or inadequate housing
11.2	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	11.2.1	Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities
11.3	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	11.3.1	Ratio of land consumption rate to population growth rate
		11.3.2	Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically

11.4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage	11.4.1	Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed and World Heritage Centre designation), level of government (national, regional and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector and sponsorship)
11.5	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.	11.5.1	Number of deaths, missing persons and persons affected by disaster per 100,000 people
		11.5.2	Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services.
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	11.6.1	Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities
		11.6.2	Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)
11.7	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	11.7.1	Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities
		11.7.2	Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months

11.A	Support positive economic, social and environmental links between urban, per-urban and rural areas by strengthening national and regional development planning	11.A.1	Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city
11.B	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	11.B.1	Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030
		11.B.2	Number of countries with national and local disaster risk reduction strategies
11.C	Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials	11.C.1	Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings utilizing local materials

4.2.3 The City Resilience Framework and City Resilience Index

Building on the scorecard approach and the SDG resilience assessment frameworks analysed above, the Rockefeller Foundation along with Arup, a multinational engineering and planning consultancy, developed their city resilience assessment tool, the *City Resilience Index*, first published in 2014 (see Da Silva and Moench, 2014). As briefly mentioned in chapter 2, the *City Resilience Index* is a comprehensive framework of resilience designed to provide technical support to the cities participating in the 100RC network and constitutes one of the most advanced approaches to assessing urban resilience to date (Coaffee and Lee, 2016; Spaans and Waterhout, 2017). Acknowledging the urgent need for integrated and holistic approaches to urban policy making, it offered a basis for participating cities to

“*assess the shocks and stresses they face, and their capacity to address them*” (Fitzgibbons & Mitchell 2019, p.650).

The *City Resilience Index* echoes the Rockefeller Foundation’s holistic understanding of urban resilience as a combination of activities taking place in and across different service silos (Da Silva and Moench, 2014; Martin and McTarnaghan, 2018). The CRI is organised around four categories (people, place, organisation and knowledge), 12 goals and associated key indicators, 48-54 sub-indicators and 130–150 variables (Table 4.2). All indicators and sub indicators are assessed against the seven urban resilience qualities analysed in Chapter 2 (reflectiveness, resourcefulness, robustness, redundancy, flexibility, integration and inclusiveness (Figure 4.2). According to Da Silva & Moench (2014, p.8): “*These qualities are considered to be important in preventing breakdown or failure; or enabling appropriate and timely action to be taken. They can be observed in relation to the various assets, systems, behaviours and practices that collectively contribute to achieving the 12 outcomes (or indicators).*”

Table 4.2: *The City Resilience Index* (adapted by Da Silva & Moench 2014)

Category	Indicator	Description
Health & Wellbeing	Minimal human vulnerability	Extent to which everyone’s basic needs are met.
	Diverse livelihoods and employment	Level of access to finance, ability to accrue savings, skills training, business support, and social welfare
	Adequate safeguards to human life and health	Integrated health facilities and services, and responsive emergency services.
Economy & Society	Collective identity and mutual support	Observed as active community engagement, strong social networks and social integration.
	Social stability and security	Includes law enforcement, crime prevention, justice, and

		emergency management.
	Availability of financial resources and contingency funds	Observed in sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital, and build emergency funds.
Urban Systems and Services	Reduced physical exposure and vulnerability	Relies on environmental stewardship, appropriate infrastructure, effective land use planning and enforcement of planning regulations.
	Continuity of critical services	Results from diversity of provision, redundancy, active management and maintenance of ecosystems and infrastructure, and contingency planning.
	Reliable communications and mobility	Enabled by diverse and affordable multi-modal transport systems and information and communication technology (ICT) networks, and contingency planning.
Leadership & Strategy	Effective leadership and management	Relates to government, business and civil society and is recognisable in trusted individuals, multi-stakeholder consultation, and evidence-based decision-making.
	Empowered stakeholders	Is underpinned by education for all, and relies on access to up-to-date information and knowledge to enable people and organisations to take appropriate action.
	Integrated development planning	Presence of a vision, an integrated development strategy, and plans that are regularly reviewed and updated by cross-departmental groups.

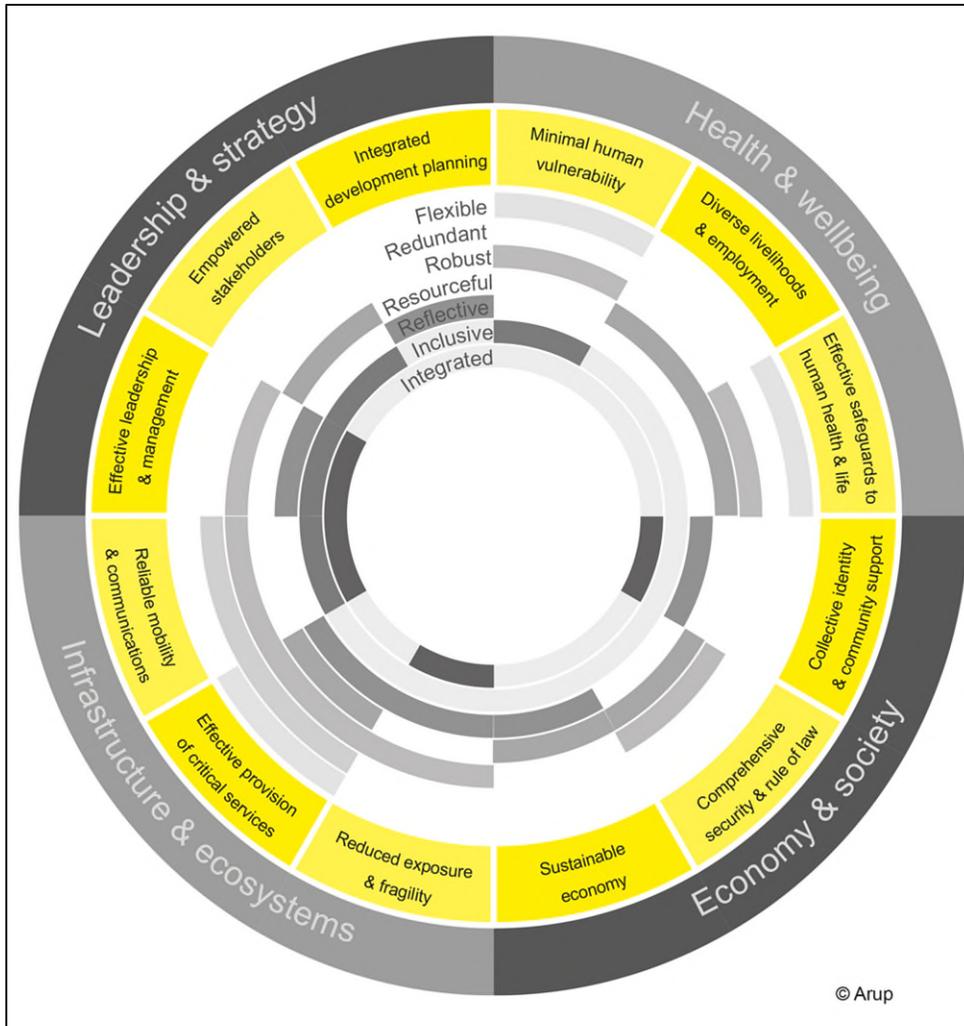


Figure 4.2: The City Resilience Index wheel (Da Silva and Moench, 2014)

The CRI, with some minor alterations, has been applied to all participating cities in the 100RC network. Widely utilised during the Preliminary Resilience Assessment phase, the CRI initially assisted local authorities and stakeholders to identify strengths and weaknesses of their respective cities and contribute in co-designing a responsible and reflective Resilience Strategy. Related work has shown that working groups during the PRA phase managed to create action areas and practices to inform the Resilience Strategy design process (Fitzgibbons and Mitchell, 2019; Meerow, Pajouhesh and Miller, 2019). Moreover, prioritisation of resilience themes was a key outcome of cities using the CRI. In a number of cases (including

Thessaloniki), the initial stress and shock priority themes that had underpinned a cities application to 100RC significantly altered in this phase.

Whilst the practicality and utility of the CRI, as well as the obscurity of several of its indicators, has been criticised by several authorities and stakeholders (Coaffee *et al.*, 2018; Pitidis *et al.*, 2018), the CRI is a useful and comprehensive tool for assessing the capacity of cities to withstand external shocks and internal stresses. Although it resembles previously applied DRR assessment frameworks (i.e. scorecards), providing implicit opportunities for governance change and transformation to the municipalities using it, its over-complicated structure not only renders it often unusable and overly bureaucratic, but in many cases results in the extraction of unclear outcomes frequently neglected during the Resilience Strategy development process. This fact echoes the path urban resilience is following towards privatisation and professionalisation, which many scholars have highlighted (Reid, 2012; Joseph, 2013; Welsh, 2014; Chandler and Reid, 2016). The CRI, an outcome of the joint venture between ARUP and the Rockefeller Foundation, can be perceived as a vivid example of semi-academic framework of urban challenges, developed to tempt local governments in utilising it, with the real objective, according to some resilience scholars, being the provision of paid knowledge and expertise by private consultants to local governments and the promotion vested interests in urban resilience scholarship (Coaffee and Lee, 2016).

Irrespective of such critiques, the CRI addresses the first phase of resilience assessment for cities participating in the 100RC network. The next stage of assessing urban resilience is related to monitoring the embeddedness of resilience thinking into governance structures and processes; in other words, it focuses on the evaluation of urban resilience institutionalisation.

4.2.4 Monitoring and evaluating the institutionalisation of urban resilience

100RC identified, from the first years of the initiative's implementation that transforming the fundamental public institutions, functions and operations of city governance is the key ingredient to mitigating the impact of acute shocks and chronic stresses. Through the promotion of inclusive planning practices, encouragement of cross-sector collaboration and the comprehensive use of the CRI to analyse urban capacity to withstand external and internal perturbations, the attempt to systemically change urban governance was encouraged (Martin and McTarnaghan, 2018).

However, transforming planning institutions and changing governance arrangements in a manner that is truly holistic and innovative and does not recycle 'business as usual' models requires the institutionalisation of resilience thinking and practices (Sharifi, 2016; Coaffee *et al.*, 2018; Normandin *et al.*, 2019). Institutionalisation of urban resilience is a challenging and time-consuming process, where top-down decision-making and operational obduracy meet community participation and flexible governance configurations. Therefore, any effort to embed resilience entails strong political leadership, departmental engagement and consistency actions from changing local governments and other urban stakeholders (Anguelovski, Chu and Carmin, 2014).

In December 2018 the Urban Institute, in collaboration with the Rockefeller Foundation, published a report entitled '*Institutionalizing Urban Resilience A Midterm Monitoring and Evaluation Report of 100 Resilient Cities*', where the preliminary outcomes regarding the institutionalisation of resilience in 22 participating cities were presented (Martin and McTarnaghan, 2018; see also Chapter 2). In order to do so, the authors of the report used a highly qualitative methodology based on surveys and interviews with the CROs as well as a variety of

other urban stakeholders. The evaluation process emphasised 12 areas of institutionalisation among the sample cities (Martin and McTarnaghan, 2018):

- the explication of resilience in city planning;
- the internal consistency across member cities' plans;
- the establishment of a central resilience office or similar cross-sectoral coordinator;
- reduction in the strength of governmental silos;
- commitments from city leaders and state or national entities for resilience efforts;
- changes to budgetary review procedures or leveraged funds for resilience-building efforts;
- the use of evidence for planning;
- the consistency of city plans with state and national entities;
- operational commitments from the same entities;
- community participation processes;
- centrality of vulnerable populations;
- governmental transparency.

Inasmuch as the institutionalisation of resilience thinking into governance practices is a slow process which depends on administrative culture and tradition, successful examples presented in this report varied from across the different participating cities. The report identified high integration of resilience thinking from the Resilience Strategy to official planning documents in all of the participating cities, while also underlined significant de-siloing results, particularly during the preparation of the PRAs. It should be mentioned that the level of institutionalisation has been correlated with robust planning and other city functions prior to 100RC, the size of the city and its corresponding governmental bureaucracy and the political transitions throughout the project's implementation period. An interesting outcome was that medium-sized cities with middle-to higher income inhabitants and stable

leaderships seem to achieve better institutionalisation rates (Martin and McTarnaghan, 2018). The empirical case of this study, the city of Thessaloniki belongs to this group of cities, hence reaching a relatively high level of institutionalisation – with higher potential- albeit with the lingering obduracy of its governance functions. This will be thoroughly explored in Chapter 6 of this study.

Despite the significant limitations of this evaluation framework, such as the very limited implementation period (1-3 years) of the resilience strategies examined or the low number of interviewees, some of the outcomes of this report are enlightening. For instance, the consolidation of resilience as a boundary phrase for leading municipal developmental agendas as well as its clear distinction from sustainability constitutes an initial step towards future institutionalisation. Furthermore, the development of specific indicators for tracking institutionalisation levels, despite its over-qualitative and pliable nature, has the potential for providing a useful tool for future inter and intra municipal comparative studies.

4.3 Reflections on resilience assessment frameworks

4.3.1 Limitations of quantitative metrics

Despite providing invaluable insights on the current level of vulnerability and exposure to a wide array of varying external shocks and internal stresses in different cities, assessment frameworks per se are bound by several limitations. Such limitations are both conceptual and practical and relate to inherent drawbacks of quantitative metrics, the reproducibility of the indicators and the dysfunctional applicability of frameworks across spatial and temporal scales.

Impact assessment tools can be categorised into ‘summative’ and ‘formative’ (Sharifi, 2016). While summative tools provide sheer measurement of resilience levels operating on an outcome-oriented basis, formative ones are more procedure-oriented, paying attention in the methodology used and its advantages and disadvantages. Resilience, being a highly dynamic process itself (Manyena, 2006;

Davoudi, 2012), is almost impossible to measure if reduced to scores and scorecards; thus, the focus of most recent assessment tools falls in formative tools (Levine, 2014). However, pragmatically, data scarcity in developing countries in conjunction with the holistic nature of resilience has led global organisations, like UNISDR, into adopting summative assessment methods.

The techno-rational approach embraced by the majority of existing resilience assessment frameworks often tends to oversimplify resilience processes, which are inherently complex, due to resource scarcity and time pressure (Prior and Hagmann, 2014). Therefore, arbitrarily weighted quantitative indicators inevitably lead to non-representative core indicators, which ultimately produce biased assessment results. Importance of the spatial context, scale and risk specificity is essential in the construction of meaningful resilience indicators (Cutter *et al.*, 2008). For example, highly technical resilience assessment frameworks, emphasising on physical infrastructure robustness and protection against natural hazards might not be relevant in every context or could require variations for effective application.

Another important limitation of overly qualitative tools relates to the availability of data to feed the resilience assessment frameworks. Assessing resilience is a data-demanding process and even though developed countries tend to accumulate vast amounts of detailed and diverse data from various sources, the reality in developing countries is significantly different. Countries in the Global South are still not following the pace of global digitisation and data accumulation and is producing uneven geographies between data-rich and data-poor communities. Moreover, the reliability of such data in many contexts is questionable, as statistical authorities, which are commonly responsible for data collection, possess limited operational capacities. Consequently, scalability and transferability of the assessment frameworks is seriously impeded.

Another critique on resilience assessment frameworks is focusing on the view of resilience they are adopting and hence the basis upon which they are constructed.

Assessment frameworks such as the CRI are usually informed by a particular business perspective concurrently promoting certain business interests. In more detail, cities in the 100RC network are given access to specific types of services provided by external consultants to the project to support the design and implementation of their Resilience Strategies. Even though consultancy advice is initially covered by the project, the funding period is constrained as well as the amount of money to be spent (Rockefeller Foundation, 2018).

As businesses and agencies affiliated with the Rockefeller Foundation and the 100RC project have their own viewpoints on resilience, the danger of a potential privatisation of urban resilience always lurks. Privatisation of resilience services is partly advanced through the resilience assessment frameworks, with private companies developing quasi-academic indicators to which they claim to have the experts in addressing (Joseph, 2016). From this vantage point, urban resilience seems to *'sustain and naturalise neoliberal paradigms of contemporary governance'* (Welsh 2014, p:16) – see subsection 2.5.2- through the global application of assessment frameworks based on relatively simple rationalities (Raco and Street, 2012). Ultimately the process of designing, implementing and assessing resilience policies often results in business as usual outcomes, without significant impact on the either on the institutionalisation of resilience within the city's governance structure.

Undoubtedly, quantitative indicators in resilience assessment frameworks represent a critical tool in the decision-makers' arsenal, from the perspective of prioritising developmental actions and providing a tangible measurement of the imposed interventions. However, such metrics have limited capacity when applied to resilience, as they fail to address in satisfying ways fundamental facets of urban life. Qualities such as social dynamics, community adaptive capacity, individual ability to cope with disturbance (resourcefulness) or institutional robustness are inherently difficult to quantify. Indeed, the identifying of thresholds and the quantifying of its levels might even constrain resilience's transformative potential.

4.3.2 The equitable nature resilience indicators

Another limitation of resilience assessment frameworks is linked to the equitable nature of resilience indicators. The UN Habitat's call in 2015, through the SDGs, to develop tools and methodologies aimed at providing a measurement of urban resilience to contribute to the advancement of equitable urban development, set the tone for this initiative. However, in the way they are currently arranged, disaster risk reduction and resilience policies at the municipal level usually frame risk in ways which are not sensitive to the local reality of marginalised urban neighbourhoods and thus are not able to capture highly localised aspects of urban reality that are crucial for effective reduction of the economic and human costs of natural hazards - such as the human/social aspects of vulnerability and local physical infrastructural factors. This situation echoes a fundamental two-part question, posed in Chapters 1 and 2 of this study: resilience to what and for whom (Cutter *et al.*, 2008; Davoudi, 2012; Cutter, 2016)?

The answer to this question needs to be sought in the structural distinction between equilibrist and evolutionary resilience. Most of the resilience assessment frameworks in spite of claiming to adopt an evolutionary approach to resilience, tend to possess equilibrist characteristics, as presented in Chapter 2, Table 2.1. The high level of abstraction used to develop of the resilience assessment tools combined with their decontextualised nature *'typify an equilibrist engineering-based model of urban resilience, though with a pre-eminence of techno-rational framing and quantitative measurement provide a degree of certainty, seen by many as a desire of urban and regional planning systems'* (Coaffee & Lee 2016, p:129). After all, the heavily quantitative techno-rational approach to measuring resilience is more familiar and comfortable to policy-makers and hence easier to adopt (White and O'Hare, 2014).

Furthermore, while emerging resilience assessment frameworks claim to support evolutionary resilience ideas that seek to 'bounce-forward' to a 'new normal'

reality, the competence of techno-rational assessment methods to effectively accommodate normative assumptions for promoting such ideas, instead of bouncing back equilibrium principles, is questionable. The 100RC and its CRI is a good example of this tendency. Although the project aims to prioritise the needs of the most vulnerable communities and individuals, recent research reveals that, in reality, focus on inequality and injustice in the emerging resilience strategies is only piecemeal (Fitzgibbons and Mitchell, 2019) and in many cases not adequately addressed (Meerow, Pajouhesh and Miller, 2019). This disconnection between the initial aspirations and the actual reality in the implementation process, apart from echoing the implementation gaps discourse (Chapter 2), also reflects the largely futile content of the CRI.

So, if the CRI, arguably the most advanced resilience assessment framework, is unsuitable for advancing the assessment of evolutionary pathways to resilience, what kind of approach in measuring resilience should be pursued? This question echoes the initial research objective of this chapter i.e. *explore the utility and/or potentialities of resilience assessment methods to track governance change and mainstream resilience practices*. In short evidence of the utility of existing assessment indices and frameworks show that mixed-method practices, which combine quantitative and qualitative measures that take into account particularities of dissimilar urban contexts seem to be the most appropriate approach (Cutter *et al.*, 2008). Generalised frameworks or indices, such as the CRI, do have their own significance, as they provide the overall picture of vulnerability and exposure to acute shocks and chronic stresses; yet, assessing the transformative potential resilience demands qualitative in-depth understanding of the local urban context and longitudinal analysis across space and time.

Overall, the resilience assessment frameworks presented in this chapter are rigid and static. They provide a chronological timeline of resilience measurements across different points in time and against a general set of predetermined assessment criteria. Recently, however, the Rockefeller Foundation, identifying the inflexibility

of this approach, has made an initial attempt to measure the institutionalisation of resilience throughout the 100RC implementation period and after (Martin and McTarnaghan, 2018); an attempt with clear strengths and weaknesses. Chapter 8 of this study will provide an in-depth longitudinal analysis of the implementation of resilience in Thessaloniki, utilising a mixed-method approach including -but not limited to- the CRI.

This chapter marks the conclusion of the first part of the thesis, which has set the theoretical foundations upon which the following empirical chapters are built. The following chapter is going to present, in detail, the methods and research approach followed to generate data for the empirical chapters. Through this research approach, which primarily draw methods and practices from the social sciences, urban planning and policy and human geography , the resilience journey of Thessaloniki in unveiled through participation in the 100RC network, with a focus on governance transformation, geological risk and resilience assessment. These address the three main research questions of the study, as articulated in chapter 1:

- How can resilience strategies induce the transformation of the traditional pathways of urban policy delivery?
- What are the implementation challenges for urban resilience policies deriving from the inattention to urban geological risk?
- Are resilience assessment methods capable of tracking governance change and mainstreaming resilience practices?

Chapter 5 - Research Approach and Methods

5.1 Introduction

Part 1 of this thesis followed the ontological journey of resilience across different disciplines elucidating the emergence of the notion of urban resilience. That is inextricably related to governance transformations, as the focus of resilience scholarship shifts away from static, engineering-inspired interpretations towards more evolutionary, procedural conceptualisations. Therefore, the implementation of resilience policies and strategies directly targets governance configurations and structures, albeit the transformation process is not without challenges related to spatiotemporal context, deeply embedded governance traditions and insecure political landscapes. Commonly these challenges generate implementation gaps between resilience theory, directives and practical applications.

Part 1 also approached resilience from a disaster standpoint. It used vulnerability as a linking concept between resilience and disasters, after deconstructing the idea of 'natural disasters', and concluded by showcasing the frequent marginalisation of geological and other environmental concerns in emerging resilience policies in favour of socioeconomic concerns, via the introduction of geological risk. The first part of the thesis concluded with an analysis of existing assessment, monitoring and evaluation frameworks and methods used in large-scale resilience building projects, paying significant attention to the popular discourse around monitoring of the SDGs. This underlined the limitations of resilience assessment frameworks and brought the theoretical underpinnings of this thesis full circle by highlighting the important role of spatial, cultural and political context in institutionalising a culture of urban resilience governance. Across part 1, the Rockefeller 100RC network acted as the thread between the three chapters, binding together the different resilience themes analysed.

In order to undertake the research work required for the empirical chapters of this thesis (part 2) it was necessary to focus on the fundamentally important agents involved in the design and implementation of the resilience related actions in the city of Thessaloniki. Therefore, a case study methodology was adopted aimed at gathering fine-grained data and information about the city's understanding of urban resilience principles as well as the differing approaches of urban stakeholders to implementing resilience strategies. It needs to be noted here that this chapter will present the general methods employed for data collection and analysis in this study. Further explanation of more specific methods, and their application, is provided in each of the following empirical chapters.

One of the particularities of this study was the fact that it coincided almost exactly with the unfolding of Thessaloniki's resilience journey. Therefore, besides the retrospective analysis of data for Thessaloniki, due to the longitudinal nature of the study, the data collection also required continuous monitoring and updating. From a researcher's perspective, this situation led to some important decisions regarding the research strategy.

First, in order to effectively follow the unfolding of Thessaloniki's resilience journey, structuring a schedule for interviewing people involved in the resilience-building process of Thessaloniki was crucial. Thus, I had to construct a schedule of visits and interviews with local officials and other individuals; a schedule which had to include recursive discussions with the same people, in order to capture the transformative influence of resilience in urban governance, and also first-time interviews with other individuals. Therefore, semi-structured interviews were selected as the principal approach throughout the thesis. Dunn (2005, p.80) defined semi-structured interviews as '*a form of interview that has some degree of predetermined order but still ensures flexibility in the way issues are addressed by the informant*'. The semi-structured interviews aimed at acquiring what Kvale (1996, p. 5) saw as '*descriptions of the life world of the interviewee with respect to interpreting the meaning of the described phenomena*'.

The semi-structured interview approach had some significant advantages for the present study. First, as the process of designing and implementing the Resilience Strategy of Thessaloniki was ongoing throughout the duration of the current study¹, an initial lack of primary resilience-related documentary information was apparent. Thus, interviewing was a crucial method for obtaining original empirical data, which concurrently motivated the interviewees to critically reflect on their approach to dealing with urban resilience in practice. Moreover, after the publication of several documents in the context of Thessaloniki's participation in 100RC, interview transcripts provided an invaluable source of complementary and corroborating information to the published documents, which allowed me to compare and analyse stakeholders' visions on urban resilience implementation in the city. In short, interviewing was the ideal way to gather information for the empirical part of this thesis providing instrumental and unique insights in different aspects of urban resilience implementation in Thessaloniki.

Second, documentary analysis to supplement part of the conducted interviews² as well as build a baseline for the situation in Thessaloniki prior to the implementation of the project was performed. Documentary analysis included published work of Thessaloniki Resilience Office as well as archival data, media reports and social media activities³. Such data sources were used as secondary data to provide the basis for the interviewing and also supplement the interview transcripts during the data analysis phase. The integration of data from these sources assisted in keeping track of the activities undertaken in the context of the Resilient Thessaloniki project

¹ It should be also underlined that Thessaloniki was the first city to engage with urban resilience theory and practice in the Greek context, and hence lack of previous resilience-related work was almost complete.

² Here I am referring to the interviews conducted after the publication of the Preliminary Resilience Assessment and the Resilience Strategy. Thessaloniki's Resilience Office published a number of other documents in the context of the city's participation in the 100RC network; such documents were analysed and provided further insight to the interviews that were conducted.

³ Social media activities included tweets and Facebook comments.

throughout the longitudinal analysis and sometimes elucidating the complex, and at times confusing rationale behind some planned actions.

Finally, as part of this thesis required the application of a small-scale spatial analysis in order to pinpoint geological risk, authoritative spatial data for the metropolitan area of Thessaloniki were also gathered and analysed. Such data included superficial geology and lithology, topographical differences and gradients that make the city susceptible to geohazards as well as evidence of recent urbanisation in the Metropolitan Area of Thessaloniki. Spatial data were both gathered by the researcher through various open-access sources and kindly provided by external collaborators of this study⁴. Such data were used for the analysis performed in Chapter 7; in the subsection 7.2, a comprehensive presentation of the datasets used as well as their respective sources is provided (see Appendix II).

The remainder of this chapter is divided in three parts. The first discusses the case study strategy adopted and utilised throughout this thesis, simultaneously addressing some ethical considerations taken into account during the planning and implementation of the research. The second part describes in detail the interview process focusing on the types of questions asked, the background and characteristics of the interviewees as well as methodological approaches used for the collection of interview data. Finally, the third part details the sources of secondary data obtained and illuminates the process of analysis and reporting of the collected information.

5.2 The case study research strategy

Studying complex social, political and organisational phenomena through case studies is a common strategy in qualitative research (Baxter and Jack, 2008). The case study research approach can be understood as a '*systematic inquiry into an*

⁴ External collaborators include the British Geological Survey, which supported both financially and in-kind this research and the SDGEE Unit of the Civil Engineering Department of the Aristotle University of Thessaloniki.

event or a set of related events which aims to describe and explain the phenomenon of interest [and] is an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 2014, p.18). To put it more simply, case studies provide an in-depth understanding of a contemporary phenomenon that takes place in a specific real-life context, focusing on the diversity of different perspectives on processes in play and derived outcomes, predominantly when the phenomenon and the context do not have clear boundaries (Idowu, 2016). Case studies assist in gradually building up explanations for 'how' and 'why' some phenomena are taking place.

Case study approaches are most appropriate than other types of research methods when studying longitudinal development of both formal and informal processes, as they allow researchers to analyse the result of changing social, institutional, political and governance relations. This is particularly important for this thesis, since the results of resilience strategy implementation are highly depended on socio-political geographic contexts and their study requires longitudinal monitoring and analysis. As Flyvbjerg (2006, p. 221) has eloquently argued: *'in the study of human affairs, there appears to exist only context-dependent knowledge, which, thus, presently rules out the possibility of epistemic theoretical construction'*. Thus, through analysing a specific case study research emphasis is placed on the sequence of events that led to the shaping of policy initiatives and their ensuing outcomes. In this context, the utilisation of other research methods (i.e. surveying) would be less appropriate as the generated data for analysis would be more time-specific and not capable of capturing the dynamic and complex set of evolving policy processes.

Nevertheless, the method of approaching social issues through case studies has been widely critiqued in the social sciences for its lack of generalisability. For instance, according to Abercrombie, Hill and Turner (1984, p. 34)

'[C]ase studies are detailed examinations of a single example of a class of phenomena, that cannot provide a

reliable information about the broader class, but may be useful in the preliminary stages of an investigation since it provides hypotheses, which may be tested systematically with a larger number of cases.'

Other researchers have also doubted the validity of the case studies as a method for testing predetermined hypotheses, arguing that their suitability primarily lies on generating them instead, while others challenge the capacity of case study outcomes to be formally generalised (Campbell, 1975). Although, the last point is a valid limitation of case study approaches, formal generalisation of the results is merely one way of accumulating knowledge, and the fact that knowledge cannot be formally generalised does not *de facto* diminishes the significance of the case study process. Descriptive, phenomenological case studies have helped creating paths towards scientific innovation in the past, without aiming at generalising their outcomes (Flyvbjerg, 2006).

Ultimately, the success of a case study largely depends on its design and the awareness of its limitations. The design of the study determines the research methods that need to be employed in order to address the topics of interest lying within the ambient research scope of the study, as well as the agents (institutions and individuals) that need to be included in the data collection process. Moreover, awareness of limitations and methodological constraints in given research areas and topics assist in avoiding bias and tackling potential ethical concerns. In this study, special attention was paid to areas of potential concern, specifically focusing on possible political disputes and preferences of the interviewees

It should also be pointed out that the outcome of this were derived following an inductive approach. Inductive reasoning, in direct contrast to deductive reasoning, does not require a predefined conclusion from the researcher, but rather focuses on the evidence provided by the collected data in order to verify or reject a certain research hypothesis (Copi, Cohen and Flage, 2007). Inductive logic is a bottom-up process, which starts from the collected data reaches progressively a conclusion that often includes an epistemic uncertainty (Locke, 2007). Specifically in this study,

although previous examples of resilience-policy implementation in different cities indicated specific difficulties and considerations, the outcomes derived exclusively from Thessaloniki's case. Hence, in some cases the hypothesised arguments were supported by the collected data, while in other instances collected data led to the emergence of different outcomes.

The adoption of an inductive approach was chosen for the purpose of this work predominantly due to the absence of any previous application of resilience-related policy in the case of Thessaloniki. With resilience policy implementation being a context-specific, any assumption of Thessaloniki's resilience journey outcome would be rather ungrounded. Nevertheless, it should be highlighted here that comparisons with other cities were made and probable hypotheses were made in some cases, but the actual outcomes of the case study were exclusively related to the urban reality of Thessaloniki and to the data collected through the different methods employed. Thus, it could be argued that deductive arguments were in some cases implicitly posed; however the major methodological theory was undeniably inductive.

Within this context, the three main methodological tools employed during the investigation of this particular case study were longitudinal studies, studying and interviewing political elites and action research.

5.2.1 Longitudinal studies

Longitudinal studies are research studies that involve observations and measurements of the same variables over time (Wall and Williams, 1970). In social science, they are often used to measure the same individuals and estimate relationships and processes at different time occasions. They are also frequently used to study social change and transformation over specific period of time. According to Goldstein (1979, preface) '*longitudinal studies can be said to occur whenever the information collected on all or some of the individuals in the study, relates to two or more points in time*'. Other types of longitudinal studies might

include a series of cross-sectional studies on similar or same population groups (Blaikie, 2009).

Three main variations of longitudinal studies can be found in social science literature, all of which can be characterised as prospective studies⁵. The first one is *time series research*, focusing on studying a group of people that share particular characteristics (i.e. geographic location) at different time intervals. The second is *panel study research* which involves contact with the same group of individuals over time, while the third one is a variation of a *panel study* called *cohort analysis*, where same categories of people, instead of the same individuals, are examined over time (Blaikie, 2009). Although every variation has its strengths and weaknesses, *panel studies* are considered to be the most ideal, but limitations on cost and tracking of the same people often impeded their implementation.

In this study, a combination of panel and cohort analysis was chosen. The reason for this was the solid relationship created with the Resilience Office, which facilitated the process of contacting the same people for a sustained period of time; at the same time however, changes in the direction of the resilience strategy in conjunction with problems in re-contacting other urban stakeholders rendered cohort analysis inevitable. In more detail, *cohort analysis* was not initially planned to be implemented as a *panel study* approach was designed and planned to be exclusively followed. Nevertheless, when this plan was rendered impossible, as some of the interviewees did not answer back after primary discussions, a *cohort analysis* method was adopted to overcome methodological problems.

Thus, research for this study required flexibility from my side as a researcher in order to adapt to the different emerging problems and face them in an appropriate manner. Choosing to incorporate *cohort analysis* as a methodology in my research

⁵ Prospective studies are those which begin in the present and plan further development and change in the future.

strategy was a conscious decision that was facilitated by the interactions with local officials who introduced me to other urban stakeholders, with whom I had no previous encounters. Because of this update, I was able to categorise my interviewees into different groups and explore the views of different individuals throughout the development of this study.

Lastly, retrospective analysis of was also undertaken throughout the study, through oral stories and life experiences narrated by individuals and elite members that participated in the interviews.

5.2.2 Studying and interviewing political elites⁶

During the past three decades a growing interest around studying political elites has arisen in the wider spectrum of social sciences, following a period of general dearth in using such methods (Semenova, 2018). This lack in studying elites is probably related to inherent difficulties in accessing and penetrating political elites, due to their powerful nature, which renders them more capable of resisting intrusion for social analysis purposes than less powerful groups (Hunter, 1995). This difficulty in accessing political elites is quite apparent in urban studies, especially in research involving urban governance configurations. Analysis of governance institutions requires the identification of urban political elites and their influence in the decision-making process as well as the development of a strategy to approach them. Such a strategy is not always successful, since a series of barriers related to the ever-changing local context frequently impedes the researcher from building the relationships that would allow in-depth analysis of the elite groups (Bassett, 1996; Woods, 1997).

⁶ While definitions of political elites can be traced to Plato and the post-Socratic philosophers, and can also be contradictory with one another (power elites, social elites, oligarchies) (Parry, 2005), it needs to be clarified that for the purpose of this study political elites refer to individuals and institutions that exert power in urban environments.

Studying elites in the urban context presupposes an approach towards society ‘as a cluster of individual actors bound by strong social, professional, or political ties’ (Woods, 1998, p. 2105). In such a conceptualisation, elites operate as interconnected, highly context-specific networks, with fluid shape and form, possessing massive influence on the many aspect of social life. Moyser and Wagstaffe (1987, preface) eloquently highlighted this influence:

‘Elites are a crucial element of modern society. Whether they are taken to be ‘top people, the wielders of power or merely those whose opinions and actions count most, their presence can be felt in most aspects of life’.

Therefore, studying elites can help elucidate the inner stratification and structure of societies and also provide useful insights in terms of power dynamics and relations. In the urban context, research of political elites is exceptionally relevant in longitudinal case studies, as it can help in answering questions such as: Who are the most important agents in the study? What are their attitudes towards the urban policy research question? What is the extent of their power? What drives that power? How does the urban context constrain their power? Do spatial conditions play any role in power relations? Therefore, studying of political elites became particularly relevant for this study and was selected as a principal method for data collection.

To extract information from political elites in order to answer such questions an interviewing process needs to be undertaken. Interviewing elites is a useful conceptual tool to investigate the power relations among institutions and uncover the complexity of contemporary urban societies (Zuckerman, 1972). Nevertheless, the interview process requires careful design and application in order to be successful. This is predominantly connected to an initial lack of trust between the researcher and the interviewee, as the interviewer could easily be perceived as holding the power to blemish the respondents through the acquired information and knowledge (Brinkmann and Kvale, 2015). Such issues were taken into account throughout this study and specific techniques and methods were employed

in order to overcome them. These methodological techniques are analytically presented in the remainder of this chapter.

The first step in conducting elite interviews is to gain the trust of the respondents (Harvey, 2011). To achieve that, I started building the relationship with them on the basis of complete transparency. I provided the respondents with the information about myself such as: who I am, which institution I am representing, what is the nature of my research, which are the sources funding my research, how the data will be used and how will the outcomes of the research be disseminated, so as to assist them getting acquainted with general framework of my work. This initial transparency coupled with an intrinsic familiarity they felt towards me due to the lack of linguistic and locality barriers⁷, helped me built a trusted profile from the beginning and develop a methodological approach that took into account the expectations, requirements, fears and potential impacts of the research and confidentiality considerations⁸.

However, although initial access to the elite networks is achievable, and was actually achieved in my case, cooperation with elite groups can be easily compromised and eventually terminated, for different reasons. For instance, asking probing questions that the respondent might not feel comfortable to answer, such as questions close-end questions with a constrained set of answers, as they prefer to articulate their way of thinking and justify their answers (Aberbach and

⁷ Also, the fact that I was representing a world-class, well-known British institution (University of Warwick), as well as the involvement of the British Geological Survey in my research, significantly assisted in the trust-building process.

⁸ Confidentiality is a key concern in elite research. To achieve high levels of confidentiality a number of stages in the methodology need to be followed. Such stages include the initial contacting of possible respondents, the actual interviewing process, including transcription and analysis of the acquired information and finally in the reporting process. Furthermore, before the interview a written of verbal agreement should be made between the interviewer and interviewee regarding the content and form of the information that will be used. Interviewees should give their consent for utilisation of the interview data and they also need to be aware of the location where their data will be stored and for how long.

Rockman, 2002; Dexter, 2006). Another reason for compromising the relationship with elites, particularly important longitudinal studies such as with this thesis, is personnel changing. In such cases, relationships and trust with the new staff need to be rebuilt, sometimes even from the beginning⁹.

Elite interviewing provided the vast majority of primary data used in the second part of this thesis. I believe that my approach to the respondents was successful, as most of them were willing to provide clarifications and additional information even after the completion of the interview. Moreover, I believe that I was successful in building a trusted relationship with Thessaloniki's Resilience Office, as they were always willing to answer my requests and even introduce me to urban stakeholders and external collaborators that would be of potential interest to my research. A good example is the introduction to the new Chief Resilience Officer (CRO) in January 2018, as well as further collaboration with the outgoing CRO even after the succession¹⁰. Finally, I was invited to participate in a number of engagement and policymaking events in the framework of Thessaloniki's participation in the 100RC network, where I had the chance to partly seek transformative change through undertaking what might be termed 'action research'.

5.2.3 Action research

Another way of approaching the understanding, developing and improving social practices is action research (Rowell *et al.*, 2015). Action research should be better contextualised as an 'orientation to enquiry' rather than a methodology *which 'seeks to qualities of engagement, curiosity and question posing are brought to bear on significant practical issues'* (Reason and Bradbury, 2009, preface). Action research

⁹ Interestingly, this happened during this study, as Thessaloniki's first Chief Resilience Officer stood down in summer 2017 and was replaced by another elected official, who remained in the position until the end of the project in summer 2019.

¹⁰ Thessaloniki's first CRO was appointed by the 100RC network as a Managing Director for Europe and the Middle East, based in London, and started working there immediately after the completion of the work undertaken in Thessaloniki.

pays significant attention to questioning methods and outcomes both by the researcher and by the 'subject' of research. This relationship between the 'inside' and the 'outside', also referred to as '*collaborative studentship*', usually provides mutually beneficial insights for all the bodies involved (Somekh, 2006). As Patton (1990, p.207) expressively argues:

'Experiencing the program as an insider is what necessitates the participant as part of participant observation. At the same time, however, there is clearly an observer side to this process. The challenge was to combine participation and observation so as to become capable of understanding the program as an insider while describing the program for outsiders'.

'*Collaborative studentship*' in this study came with its benefits and shortcomings. On the one hand, access to several individuals driving and supporting the design and implementation of Resilience Strategy within the municipality was provided, along with occasional participation to internal meetings of the Resilience Office, which proved greatly beneficial for understanding 'change' in governance structures and relations stimulated by the introduction of urban resilience. On the other hand, however, I had to keep myself relatively detached from the ongoing processes I was involved in, so as to maintain my academic position, as this obscurity regarding the researcher's roles, along with the researcher's capacity to potentially influence the outcomes of the research, often leads to lack of subjectivity in the collected data (Coghlan and Brannick, 2001). This danger brings forward the pivotal discussion on positionality and the subsequent power interview respondents often hold. In this study, action research was applied in a very limited way, in an attempt to secure my position as a researcher towards the outcomes of the study. Ultimately the success of the interviews conducted partly depended on not altering the positionality of the researched and the researcher, a phenomenon also referred to as '*intersubjectivity*' (Lindsay, 1997).

5.3 The study area

This study was centred on the Municipality and the metropolitan area of Thessaloniki, the second largest city in Greece after the capital Athens. Thessaloniki was founded in 315 BC and has since its founding has faced continuous urbanisation phases. The city is in close distance to the Greek land borders with Albania to the northwest, the North Macedonia and Bulgaria to the north and in relative proximity (approximately 340 km) with Turkey to the east. Due to its geographical location Thessaloniki has historically played a dominant role as a focal trading, exchange, transportation, multinational and cultural point at both a national and an international level. Its port is the second biggest in Greece and among the most important in the Mediterranean, while the HELEXPO International Exhibition Centre plays a dominant role in the business community in south-eastern Europe. The wide seafront is one of the most significant assets of the city, especially after its renovation was completed in 2014, where continuous pedestrian and bicycle paths intermingle with a series of consecutive thematic gardens, recreational areas and sport centres (Vayona, 2011). This is the longest developed waterfront in south-eastern Europe, stretching for almost five kilometres.

Thessaloniki can be characterised as a second-tier city in terms of its role in the national urban hierarchy¹¹. The metropolitan area of the city consists of 11 municipalities (Figure 5.1) with a total population of approximately 1.12 million, while the municipality of Thessaloniki, which is the economic and administrative centre of the metropolitan area, has a population of 324,766 people (2011 census). Today the city hosts approximately 150,000 students in the four public academic institutions and several private colleges, rendering it the largest university town in the country, while it was awarded the European Youth Capital title in 2014.

¹¹ Second-tier cities are not by any means second class or less important than the capital cities. They can be defined as ‘*cities outside the capital whose economic and social performance is sufficiently important to affect the potential performance of the national economy*’ (Parkinson *et al.*, 2012, p. 9)

Thessaloniki has undergone several significant disruptions in the 2,300 years of its existence including invasions by external conquerors, disasters from natural hazards and rapid population changes. Probably the most eminent among them has been the Great Fire of 1917, only five years after its recapturing by the Greek forces, which almost completely destroyed its historic centre and led to a new design from the ashes of the fire¹². Other major disruptions include the relocation of hundreds of thousands of Greek immigrants from Asia Minor between 1922 and 1925, the elimination of the vast majority of the city's Jewish population during World War II, a major earthquake in 1978 and resettlement of around 10,000 refugees (mainly from Syria and Afghanistan) between 2016 and 2018. Moreover, the city faced significant budget cuts following the austerity measures Greece had to implement from 2010 onwards. The Municipal budget dropped by almost 60% limiting the capacity of local authorities to implement their developmental agenda. Table 5.1 presents a timeline of the major disruptions the city faced in its modern history, some of which are further analysed in Chapters 6 and (especially) 7 of this study.

¹² The city centre was designed by planner Ernest Hebrard, based on the most influential planning method of the era, namely modernism, and led to the elimination of the Thessaloniki's "oriental" feeling (City of Thessaloniki, 2016).

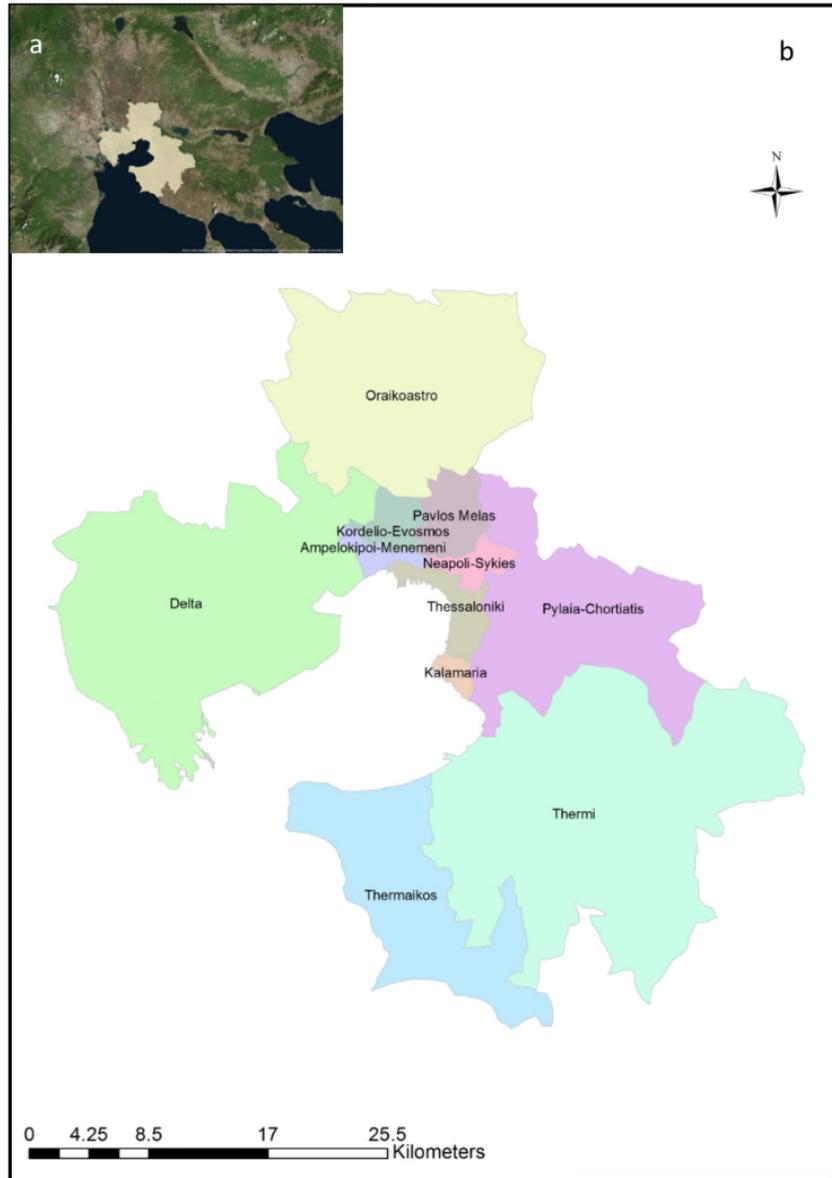


Figure 5.1 (a) and (b): Location of the metropolitan area of Thessaloniki and its 11 municipalities

In 2014, Thessaloniki became a member of the Rockefeller Foundation-funded 100 Resilient Cities network. This project was the first manifestation of urban resilience policies in Greece signifying a new era of governance where local priorities, as opposed to prescriptive national policies, became significant drivers of change. Through its participation in the network Thessaloniki attempted to secure a resilient future for its residents through creating a long-term Resilience Strategy aiming at

2030. The official participation of the city in the network ended in 2019, but as the following chapters will outline, the seeds of resilience seem to have been deeply planted in the city’s operational agenda, already producing some essential transformational results. To capture such transformations, data was gathered from different sources across the city, following the methods and techniques previously noted.

Table 5.1: Major shocks in Thessaloniki’s modern history and their impacts (adapted from, City of Thessaloniki, 2016)

Year	Major shocks in modern history	Effects and impacts
1912	The Liberation of Thessaloniki	Greek forces captured the city and ended the Ottoman rule started in 1430.
1917	The Big Fire	Destroyed the historical centre of the city
1922	130,000 refugees from Asia Minor settled in Thessaloniki	The city doubled in size within 6 months. The refugee flow influenced the residential development of the city
1943	50,000 Greek Jews were sent to concentration camps	The Jewish community constituted 20% of the population in 1940
1956	New Building Legislation	New building ordinances allowed intense building development that led to high densities and extended urban sprawl.
1978	Major Earthquake	It was the first large earthquake to hit an urban centre in Greece. The response addressed immediate problems but also became a catalyst for radical changes in earthquake policy
1986	Industrial accident in the Oil Refinery	More than 14,957m ³ of crude oil burned. The total cost of the disaster was estimated at \$22m, while there were many implications for agriculture and local economy.
2010	The first austerity measures were implemented	The municipal budget dropped by 60%
2016	Creation of the first camp for refugees from the Middle East	Around 10,000 refugees are hosted in camps in the region around Thessaloniki

5.4 Data gathering

5.4.1 Preliminary contacts and pilot interviewing

Even before officially starting the research for this project, connections and contacts with city officials in Thessaloniki had already been established. I even had the chance to participate in the first activity of the city's resilience project; a stakeholder workshop organised by the Municipality of Thessaloniki in May 2015¹³. During this event I was able to identify and target prospective individuals that would be important to interview during later work. Such individuals included members of the Municipal Office of Thessaloniki working on resilience-related issues and other key urban stakeholders, such as academic researchers, public and private NGOs, municipal officers from various departments and representatives of EU departments located in the city. Thus, only a few months into the project, I managed to obtain substantial material and store it in a 'case study database' (Mills, Durepos and Wiebe, 2010). of designing the strategy helped me immensely in establishing good relations with the local authorities and familiarising myself with the direction they were planning on following throughout the project implementation.

Having this relationship allowed me to contact the identified people fairly easily and arrange some preliminary interviews in Thessaloniki at an early stage in my PhD (December 2015). The structure of such interviews was more informal and did not target specifically the acquisition of data that would be directly used in my research, but rather emphasised on testing my interview methods before enacting more detailed agendas at a latter stage of the project with the use of semi-structured interviews. To be more precise, these 'pilot' interviews sought to explore the background of Thessaloniki's bid in the 100RC network, in an attempt to appreciate the motivation behind this endeavour and the socio-political and financial expectations local authorities had from the city's participation in the

¹³ At this point the Resilience Office had not yet been officially recognized and established.

project. They also assisted me in defining some fundamental groupings of people that needed to be interviewed in the future and have a first idea about the likelihood of their assistance.

In a nutshell, pilot interviews assisted me in identifying groups of interest within the resilience Thessaloniki network and ‘get an idea’ about the project’s background and expectations. Through this process, I managed to create a shortlist of potential interviewees that would be willing to assist with my research. The City also included me in the list of ‘interested parties’ of the project, letting local authorities know about my research and expectations.

5.4.2 Research visits to Thessaloniki

As already noted, a number of research visits needed to be organised in order to obtain the data for this thesis. In addition, given the longitudinal nature of this study, the visits had to be recurring and with planned time intervals among them, so as to allow me to capture the processes of transformation induced by the implementation of resilience principles in the city. Thus, I chose to perform five distinct research visits to the city¹⁴. The first one took place in December 2015, before the publishing of the Preliminary Resilience Strategy, while the second one in July 2016, only one month after the publication of the Preliminary Resilience Assessment. The third visit was realised in September 2017, after the publication of Thessaloniki’s Resilience Strategy¹⁵, while the fourth and fifth visits were organised during the implementation period of the Resilience Strategy in February 2018 and September 2018 respectively. Research visits lasted for one week each and included interviews and participation in several engaging events.

¹⁴ Other informal visits to the city of Thessaloniki that involved discussions with urban stakeholders and members of the Resilience Office were undertaken throughout the project implementation, with the last one taking place in January 2019. Such visits were facilitated by my personal relation to the city of Thessaloniki, which is my birthplace.

¹⁵ Thessaloniki’s Resilience Strategy was officially published and presented on the 30th of March 2017.

The main contact in all of my field visits was the Resilience Office of Thessaloniki. During the first visit, the Resilience Office had just started its operation and the newly appointed personnel were still trying to figure out the right process they were going to follow in order to design the Preliminary Resilience Assessment. This process involved identification of shocks and stresses the city is facing as well as mapping of relevant urban stakeholders. The Resilience Office had already organised two workshops to inform their process and were very open and willing to share their outcomes. They also informed me about their future plans for obtaining more information as well as the problems they have faced with stakeholders that were unwilling to collaborate. Some of these stakeholders were considered as very key participants in the design and implementation of the resilience agenda and hence the Resilience Office was determined to come back to them in the near future. They also provided me with a long list of material they have used for shaping their methodological approach to implementing both the Preliminary Resilience Assessment and the subsequent Resilience Strategy¹⁶.

At this point the City's project was still in a nascent stage. However, using the Resilience Office as a liaison, I managed to establish connections with the Aristotle University of Thessaloniki, and specifically with people from the Schools of Civil Engineering and Architecture. Such contacts were also interviewed during my second research visit, as they provided not only intellectual consultation to local authorities, but also tangible data from the outcomes of their research. Their insights on the content of the PRA as well as the process followed in conducting it was invaluable for my research. Notably, members of the Research Unit of Soil Dynamics and Geotechnical Earthquake Engineering (SDGEE) from the School of Civil Engineering of the Aristotle University provided data about the city that was used in the empirical chapters (specifically Chapter 7) of this thesis. Furthermore, during my first visit, I was also introduced to officers from different departments of

¹⁶ Most of the material was provided by the Rockefeller Foundation and included Official Documents and approaches followed by cities with similar characteristics to Thessaloniki.

the Municipal Office and updated them on the content of my research. Such Departments included the GIS Unit of the Municipality, Department for Education, the Department of Transportation and the Department of Sanitation.

Having already established myself as a researcher interested in following the city's resilience journey, I attempted to capitalise on the connections I established on my second visit. Thus, I interviewed people from the different Municipal Departments, particularly focusing on their involvement in the process and their personal opinions on governance relations within the municipality and cross-sectoral collaboration. Their answers enriched my hypothesis and helped me slightly reshape my approach to analysing changing governance structures in the city. Interestingly, the majority of them were rather pessimistic regarding the transformative potential of the resilience process, as they perceived it as another practice to sustain 'business as usual'. However, the majority of them had faith in the staff of the Resilience Office and seemed to trust the CRO.

During my first two visits I faced some difficulties reaching out to some urban stakeholders that did not traditionally have close relations with the Municipal Office. Some of them were very reluctant to participate in the interview process, while others kindly refused, as they felt that their contribution would not be of great importance, due to their limited engagement with the project. The problems were partially solved with the intervention of the Resilience Office in some cases, whereas in others making direct contact proved impossible. This was another choice I had to make as a researcher that required flexibility and strategic thinking, as some of the initially sceptical interviewees, proved to be very significant agents of Thessaloniki's resilience journey. Perhaps the most representative example here is the European Centre for the Development of Vocational Training (Cedefop), where officials had not understand the concept of the project and their role in the beginning, but became active stakeholders throughout the implementation of the city's Resilience Strategy.

The third research visit was actualised after the official publication of Thessaloniki's Resilience Strategy and targeted many of the previous respondents as well as some newly involved urban stakeholders. For instance, people from the Boroughs of the municipality of Thessaloniki were contacted and interviewed, to provide their insights on the changes stimulated by the Resilience Strategy regarding the new role and operation of the Boroughs in the city (more details are provided in Chapter 6). The interviews were focused on the content of the Resilience Strategy as well as the planned next steps not only until the implementation period but also after the completion of the city's participation in the network.

The fourth and fifth research visits took place within 2018, in a period of where the Resilience Strategy was being implemented. They were mainly focused on providing supplementary material on the implementation process, as well as monitoring the progress of governance transformations and the institutionalisation processes. During these visits, interviews with previous respondents, mostly working within the City Hall, were sought. In the interviews and discussions that followed, respondents were asked about their views on potential change in governance structures and relationships and facilitation of cross-sectoral collaboration introduced by the city's participation in 100RC project. Furthermore, interviewees expressed their ideas on the future of resilience in the city as well as the chances of institutionalising resilience principles.

5.4.3 The interviews

As already mentioned, the method I employed for conducting my field work was semi-structured interviews. The interviews were designed in a particular way that encouraged an open-ended discussion as well as spontaneous statements by the interviewees, in topics that they felt needed more attention. Through this technique, respondents were allowed to present their own reality and communicate their personal side of the story. The interviews produced rich insights regarding the

personal opinions and experiences of the respondents, especially with regard to the interrelationships between topics under discussion, which would have been difficult to attain through other methods of social inquiry. For example, the exploration allowed in these semi-structured interviews, would have been impossible to accomplish in a questionnaire, where there is no opportunity to devise new questions or to clarify responses given.

The interviews for this study took place predominantly in the period between October 2015 and November 2017. Thirty interviews were conducted in total, and lasted between 45 and 90 minutes each, with some of them, however, exceeding this time limit. Nineteen of the interviews were conducted in person while eleven via teleconference (Skype). For the interviews conducted in person, most of them took place in the interviewee's place of work (City Hall, University etc), on some occasions more informal setting were used, such as restaurants and cafes, as some of the interviewees preferred a more relaxed and informal setting.

The vast majority of the interviews were tape-recorded and transcribed afterwards. Taping the interviews assisted me in the process of data analysis, allowing me to concentrate on the discussion and not worry about missing some important points made. It also secured the process from intentional or unintentional bias that could potentially transpire, when trying to remember what written notes might refer to. Prior to commencing every interview, I contacted interviewees in advance and provided them with a short outline of my study aims and objectives and also with a list of topics that I would like to discuss. Moreover, I made an explicit request to tape-record, to which none of the participants objected. Moreover, on some occasions, interviewees were a bit hesitant to respond to particular questions and hence I tried to rephrase the question where applicable¹⁷. There were also some occasions

¹⁷ This was definitely related to the relationship I had with the Resilience Office of Thessaloniki, which led many of the interviewees to believe that I was working for them as a consultant, despite explicitly explaining my affiliation and role from the beginning. However, I proceeded with

where interviewees wanted to share some additional information they did not want on tape, so they asked me to turn off the tape recorder, a request to which I immediately obliged.

Another important issue that needed to be addressed was confidentiality and anonymity, especially given the fragile political nature of my research. Therefore, I made clear from the beginning of the interview process that I am working towards a doctorate degree representing a UK-based university and anonymity and confidentiality of the information provided was secured by internal procedures established for fieldwork research by the University. I also made clear that I will be responsible for the utilisation of the acquired data and any potential use of it would require my written permission. Despite the fact that many of the interviewees were happy to be referred to or cited with their names or roles, I decided to grant anonymity to all of them to secure them to prevent tracing back the information given to the individual provided it, a frequently observed phenomenon in elite research. Thus, during the transcription and writing process, I made sure that it would be difficult to trace the information back to a given source. Finally, in some cases, I was provided with information that had not yet been published or with documents that were at a preliminary stage. In such instances I was instructed to use the information from the documents for my research but not acknowledge the existence of the provided documents, which I did.

5.4.3.1 Planning the interviews

The conduction of interviews required careful planning in advance. Following the pilot interviews, I had already identified groupings of people that I was going to approach for interviewing. However, I still needed to categorise the respondents, contact them and prepare the outline for the semi-structured interviews.

clarifications in such occasions immediately and this led to some of the interviewees opening more in subsequent discussions,

In order to proceed with the sampling for the interviews I employed the ‘snowballing’ technique. Snowballing is a technique for finding research subjects where ‘one subject gives the researcher the name of another subject, who in turn provides the name of a third, and so on’ (Vogt, 2005, p. 148). Using the Resilience Office as the initial reference point, I asked my contacts there to get me in contact with other people with this process continuing until the point I reached the number and variety of respondents I had initially designed.

I decided to use snowballing for my research sampling for two main reasons. First because of the benefits of the technique per se, particularly connected with difficult-to-reach contacts and individuals in key positions with great influence in the resilience building and implementation process. Second, using the connections of my previous interviewees, I managed to legitimise my research network by contacting people that would be rather difficult to approach or even know their involvement in the design and implementation process of the Resilience Strategy.

The interviews were focused on the political elite of Thessaloniki as a local authority, namely the people involved in the design and implementation of the Resilience Strategy from the municipality’s side, academics involved in the process as well, NGO members and other individuals engaged with the project, officers and chiefs from several municipal departments affected directly or indirectly by the activities and actions that took place in the framework of Thessaloniki’s resilience journey. Initial documentary analysis and pilot interviewing had designated some ‘key players’ related with urban governance and urban geohazard management as well as project evaluation and measurement of success. However, each interviewee was also asked to suggest other people they regarded as important in their area of practice or expertise, or other individuals more generally connected to urban development, planning and risk management. Such people were contacted afterwards with a request for an interview, which some of them actually accepted.

After receiving the answers of all of the contacted potential interviewees, I begun constructing an interview schedule. Such a schedule assisted me in organising my interviews and maximising the outcomes of my research visits to the city. Although I attempted to meet each of the respondents in person, in some cases this was not feasible and consequently interviews took place on Skype instead. Finally, I paid significant attention to building a good rapport with the respondent, as I understood this process as fundamental to the success of the interview, and I believe that this attention has led to the acquisition of more rich and significant data from the interviews.

5.4.3.2 The interview schedule

The interview schedule was organised to capture the longitudinal change induced by the implementation of resilience principles in Thessaloniki. In this context the five research visits were planned, with a clear focus of targeting different stages of the city's resilience strategy design and implementation. Additionally, I also conducted interviews after the completion of the research visits and throughout the implementation phase of the Resilience Strategy, particularly with members of the Resilience Office and sporadically with other urban stakeholders. Interviewees included people that provided technical support to the project, representatives of the European Union based in the city (European Centre for the Development of Vocational Training or Cedefop) and NGO members deeply involved in the implementation of the Resilience Strategy, formal officers working in the Boroughs as well as participants in the neighbourhood assemblies, representatives of the 100RC network in London and finally the resilience team of another 100RC participant, Manchester¹⁸.

¹⁸ Greater Manchester became a member of the 100RC network in 2016, one year after Thessaloniki, joining the third cohort of cities. Semi-structured interviews with the people from Greater Manchester's resilience team took place in April 2017, at a very initial stage of Greater Manchester's resilience journey. They were focused on similarities and differences with Thessaloniki in terms of the resilience approach they were planning to follow. Greater Manchester published its Resilience Strategy in summer 2019.

The semi- structured interviews were specifically tailored to each of the interviewees based on their position and expertise. However, some key topics and themes were common, reflecting the scope and individual aims of the study. This allowed me to categorise the respondents' views on the different aspects of my research, namely urban governance, urban geohazards and resilience assessment and evaluation. Upon the commencing of the interview programme, I used a framework of general questions, arranged in a number of different sections, so as to ensure that all topics and issues that needed to be discussed were adequately covered. The framework was subdivided into general questions regarding:

➤ *Personal background of the interviewee.*

- Which organisation do you represent? What is the role of your organisation in urban-related issues in Thessaloniki? How long have you been doing this? What has the introduction of the 100RC project changed in the way you operate?

➤ *Personal view on the content of resilience.*

- Have you ever heard of urban resilience before the participation of Thessaloniki in the 100RC network? What does resilience mean for you? Do you see resilience as a quality, a process or a goal? How much influence on your view of resilience has the 100RC had? Do you think Thessaloniki was a resilient city before the project's implementation? Do you think it has become one after it?

➤ *Personal involvement in the process of design and implementation of the PRA or the Resilience Strategy.*

- In what capacity have you been involved in the design and/or implementation of the PRA/Resilient Strategy? Who else was involved? Did you interact with other stakeholders involved? To which extent? What were the different individual or collective agendas that drove the process forward and how were you or your organisation involved in these? What

were the agendas that hindered this process? Did you have any direct involvement in such agendas? Do you think that all of the active parties in your area of expertise have been adequately involved in the process?

- *Personal views on urban governance structures and relations in Thessaloniki.*
 - How effective is urban governance in Thessaloniki today, in your opinion? What are the main problems of governance delivery? Has the city's participation in the 100RC project solved any of the problems? Do you believe that the project can deliver institutional changes in governance delivery? Have you (or your organisation) experienced such changes? Do you think that any potential changes induced are made towards the right direction?
- *Personal opinion on geohazards and their (potential) impact in Thessaloniki's urban setting.*
 - Do you think that Thessaloniki is threatened by natural hazards (and specifically geohazards)? Which types of geohazards do you consider as more eminent threats? Do you think that the city is doing well in addressing such threats? Is collaboration between the organisations involved in geohazard management efficient? Do they need to do more? As far as geology is concerned, how is the city incorporates geological conditions in the strategic planning? How do you communicate with geologists/geoscientists so far in the RS process?
- *Personal opinions on the impact of the project in the city operational and governance structure.*
 - Do you think that the project has affected institutional relations in the city? Is the municipality more trusted after the implementation of the project? Has governance structure changed? Are resilience principles being used to improve governance delivery? How? Do you feel that with the project has a significant impact in the city's governance? What is the role of the Municipality of Thessaloniki and the other 10 municipalities in the

Metropolitan area? Do you think that resilience discourse can be used to transform the relations and institutional structures in Thessaloniki?

- *Personal opinion on the future of resilience discourse in Thessaloniki after the completion of the project.*
 - Do you believe that the project will die after its official completion? Are there any outcomes that will remain? What are the most important in your opinion? Has the project had any positive impact on the city, in your opinion? Do you think it Thessaloniki gained from its participation? What types of actions should the next steps include? To what extent do you believe that resilience can be institutionalised in the city?
- *Can you recommend useful contacts and documents that should be included in the context of this research?*

These questions were used as a checklist, which introduced the topic and led to follow-up questions. They were mainly descriptive and open-ended, attempting to introduce the interviewee to the scope of the research and allow him/her to express their views on resilience and Thessaloniki's participation in the 100RC network. The checklist approach was fundamental for covering all research themes and topics as thoroughly as possible, especially when interviewing elites, who usually have limited amount of time to spare.

Throughout each of the interviews I followed the open-ended discussion approach, but I often had to steer the conversation towards the main goals of my research, using specific phrases and questions. On occasions where the respondent was hesitant to reply, I repeated the question rephrased or changed the emphasis of my questioning, in order to seem more inviting for the respondent. The ultimate goal after all was to apprehend the perception of the interviewees on Thessaloniki's engagement with urban resilience, in their own terms, and possibly capture governance and institutional dynamics in place.

The completion of each interview was followed by the tape recorder turning off, which in most cases led to the initiation of an informal conversation with the interviewee. This conversation began with me summarising the outcomes of the interview, often reintroducing some of the questions of high importance. In the majority of the interviews, additional issues often emerged and were discussed in addition to some subjects the interviewees were not comfortable to discuss whilst the tape recorder was on. The data from such informal conversations was captured in the form of written notes and assisted greatly in deciphering the power dynamics within the urban stakeholders as well as other understanding specific choices made during the implementation of the resilience strategy.

Tape recordings from the interviews were subsequently transcribed, providing transcripts of varied length (between 3000-5000 words). The transcripts were representative of the content discussed during the interview, with the only omissions identified on topics completely irrelevant to the study. In general, the rule I followed during the transcription process was to write down everything that was mentioned in the discussion and was recorded, except for repetitive, factual information and clearly irrelevant discussions. In short, interview material was transcribed in three different ways:

- summary notes, which provided general background and repeated information (not transcribed);
- intermittent quotes, (important sentences and phrases were transcribed);
- extensive paragraph length quotes transcriptions (they served as a powerful description of one or more topics within the research scope).

5.5 Secondary data

Although interviewing was the main source of data collection for this study, data gathered from interviews can often be flawed for a number of reasons (i.e. personal bias of the respondents or insufficient memory regarding certain events) (Brinkmann and Kvale, 2015), and as a result, secondary sources of information

were also utilised. Such sources were primarily documentary, and helped me construct a background of the topics I was planning to explore in each of the interviews. Details such as the interviewees' involvement to the 100RC project or governance culture and traditions in Thessaloniki prior to the implementation of the project were of high importance. Similarly, social media played a critical role in helping me to keep track of the activities realised in the context of the project. Other sources of information included publicity and consultation documents, policy and committee details and other media reports (i.e. newspaper clippings)¹⁹. In general, the sources of secondary information contributing to this study came from numerous different sources, the most exemplary of which are briefly explored below.

Official documentation regarding urban governance, geohazards and planning processes before, during and after the completion of Thessaloniki's participation in 100RC network were thoroughly analysed. Such documents have the advantage of revisiting, while simultaneously containing of useful contacts for possible future respondents. However, access to such documentation might often be blocked and bias might occur if the author is unknown a complete set of documents cannot be obtained. The Resilience Office, in collaboration with several internal and external bodies published a number of official documents under the umbrella of 'Resilient Thessaloniki 2030', all of which were thoroughly analysed. Social media and other media reports helped alerting for the publication of such documents.

Furthermore, I used archival records in order to provide a tentative timeline of the official records. It needs to be noted here that for privacy reasons some of this data were not be accessible. In the case of this study, for example, despite gaining access to a number of neighbourhood assembly minutes from the recent years, I was not able to acquire minutes of older assemblies, in order to have a comparative measure.

¹⁹ Collected information from secondary sources was of vital importance for the study. However, the potential bias some of the documents analysed might entail was appreciated from the beginning. For instance, documents published under the municipal administration that drove the project tended to highlight the benefits the project had on the city, often overestimating their actual impact.

I knew that such documents existed, but the process acquiring them was lost in a bureaucratic maze. Nevertheless, through some of my interviews, I managed to get access to personal notes of individuals, which provided an overview of the situation. In analysing such notes I always took personal biases into consideration.

Another valuable source of information for this study has been geospatial data. Spatial data in this case includes all types of data having an implicit or explicit reference to a specific location (de Smith, Goodchild and Longley, 2007). The data utilised for this purpose was acquired from various sources and through different methods. For example, available authoritative data was downloaded and created the basis for spatial analysis, while geological, geotechnical and hydrological data was kindly provided by some of the interviewees (SDGEE). Furthermore, some of geologically related data for the area of Thessaloniki was found in printed maps in the repository of the British Geological Survey. Such maps were georeferenced and subsequently digitised while their content was fully used for analysis in Chapter 7²⁰.

In addition to these sources of secondary data, additional forms of information were also briefly considered throughout the project. For example, direct observation during the visits to Thessaloniki was employed, yielding a number of insights on the everyday operation of different municipal departments and interdepartmental cooperation. Finally, attendance to physical resilience-related meetings and projects provided valuable views on the new role of resilience in the city's agenda²¹.

²⁰ More information on the process followed for spatial analysis is provided in Chapter 7 and more specifically in sub-section 7.2.

²¹ A good example of such participation was the 'Smart Mature Resilience' project's Stakeholder dialogue event, which took place in Thessaloniki from 7-8 November 2017. This event gathered representatives from 17 cities and municipalities in Thessaloniki, which along with 8 other cities became the newest members of the SMR project, joining the project's 7 cities, which have been working with researchers since 2015. More information on the event are presented in Chapter 8.

5.6 Data analysis and reporting

The empirical data collected for this study was analysed in different ways in order to construct a framework for communicating the outcomes of the research. Each of the three following empirical chapters (part two) include detailed subsections for the methods used for analysis and reporting. However, a general outline can also be provided here to introduce the principles followed for overall analysis and reporting.

Data analysis begun during the preparation phase of the interviews, were specific questions were incorporated into the interview process in an attempt to verify hypotheses and assumptions related to the aims and objectives of the study. The questions created for the interviews were designed in such a manner so as to baseline the governance situation in the city and capture the initial plans and thoughts of interviewees prior to the beginning of Thessaloniki's resilience journey. Here the ultimate goal was to create a baseline dataset in the beginning of the project and compare it to the collected data at later stages of the Resilience Strategy implementation, due to the longitudinal nature of the study. Questions used during the different stages of this research are presented in Appendix I.

After the conduction of the initial interviews, the transcribed documents were imported to the 'case study database', which was continuously updated throughout the whole duration of this study. Transcriptions from the initial interviews were subsequently categorised based on the research questions and key theoretical research interests set in the beginning of the project. The analysis was also enriched by an initial examination of the recorded data, which later informed the development of connections between different categories and the drawing of conclusions about the topics discussed.

In more detail, the interview transcripts were compared to other sources of qualitative data, such as official published documents, reports, social media posts, and others, for a cross checking of their validity. Another outcome of this process was the emergence of interlinkages between the collected data, which drove the

analysis process forward and led to a further categorisation of the collected data into appropriate sections. Such sections were updated on a regular basis, incorporating newly collected data from interviews, published documents, social media posts etc. in an attempt to both follow the unfolding of the project's implementation in Thessaloniki and unveil meaningful and interrelated schemas of knowledge.

Specifically, in analysing interview data different approaches and methods were employed, including editing out of trivial material and generation of concept maps to visualise the categories in which the collected data were divided into and de-crystallise the meanings of the relationships between the different thematic areas. Moreover, potential areas where the collected data was not sufficient were also highlighted and prioritised for the following visits. As mentioned above, the longitudinal nature of this study required the same process to be repeated after the conclusion of a series of interviews and in preparation for the next one, allowing me to focus on thematic areas of weakness, where further work was needed and also target related people for interviews.

Finally, reporting was another critical phase of analysis for this study. One of the highest priorities was the anonymisation of interviewees and other respondents, a process aiming at restricting the tracing back interview responses to the interviewees. Other concerns during the reporting phase, that might relate to long-term benefits or disadvantages regarding the content of the responses, were not encountered in this study. My interviewees were more interested in 'having their side of the story told' and less concerned about the potential effects of their stories. Hence, many criticisms on processes and propositions of the Resilience Office throughout Thessaloniki's resilience journey were not only noted but also emphasised during the interviews²².

²² Some of the interviewees also asked me to provide them with a copy of sections of my research relevant to their interests, after completion, while some others asked me to present my findings to their colleagues.

5.7 Summary and personal reflections

The methods and techniques employed for data collection, curation and analysis in this study reflected not only the nature of the study but the interdisciplinary approach adopted. Hence, due to the focus of this study in different disciplinary fields such as urban studies, urban planning, geoscience and human geography, the endorsement of an interdisciplinary approach, one that would allow different methods from both the social and physical sciences to be implemented, was an imperative. Additionally, the parallel unfolding of the Thessaloniki's resilience plan and this thesis obliged me to update my data on a regular basis and often significantly revise my results, based on new emerging evidence. However, this coincidence, coupled with the lack of familiarity of Thessaloniki with resilience implementation, offered a close relationship with the local authorities, which also resulted in action research, via partially influencing of the city's Resilience Strategy implementation.

Several methodological concerns were taken into account for the undertaking of this study. The design of the methodological approach, following the case study strategy, was very carefully examined and assisted in indicating the research stages which needed to be followed. Also, the longitudinal emphasis of the thesis required continuous updating on resilience-related issues in Thessaloniki, which proved to be a challenging process, predominantly because of the researcher's lack of continuous physical presence in the city. Nevertheless, research visits along with the establishment of solid relations with the interviewees and their familiarity with teleconferencing software, assisted in overcoming any geographical obstacles.

On a personal basis, through my research, I felt a part of Thessaloniki's resilience journey. Having built close relationships with many individuals and groups involved in the design and implementation of the city's resilience agenda I had the opportunity to understand in depth the underlying socio-political context of a resilience-related policy implementation in a second-tier city of the European south.

Furthermore, this thesis provided me with the chance to design and operationalise a robust research plan, organise and conduct interviews with political elites and other stakeholders of Thessaloniki and utilise and combine different research methods to extract scientific knowledge. I strongly believe that this process has given me the wide range of skills required for further social, political and spatial urban research.

Finally, I should highlight the importance of flexibility in dynamic and ongoing urban research. During my fieldwork for the purpose of this study, I was required to revise my research plans and update my schedule several times, due to a variety of different reasons, including the postponement and cancellation of meetings, departing of city-officers and other officials from their roles²³, budget cuts and updating of the Resilience Strategy due to pressing urban issues (i.e. Syrian refugee influx). However, as I was aware that such issues might emerge, I had already created a list of interviewees to be contacted in case some individuals become impossible to approach. Similar risk-management actions were planned for the entirety of the data collection phases.

From an epistemological perspective, the longitudinal nature of this research, in conjunction with the uncertain outcome of the Resilience Strategy implementation, rendered a constructivist approach most appropriate for this study. In practice, this research rather attempted to construct knowledge by observing activities and interacting with urban stakeholders, by following a specific methodological approach and by utilising a particular conceptual framework of interpreting resilience policy implementation (Busher and James, 2009). This epistemological perspective echoes the inductive approach followed throughout this research (see 5.6). Empirical chapters in part two of this study will make extensive use of the interview and supplementary material described above. The majority of evidence obtained will be presented with anonymity to protect the respondents' identities.

²³ With some of the departing officers and senior officials, I had established very close relations and a need to create new contacts with the new officials emerged.

Each of the empirical chapters include a thorough explanation of the methodological approach followed for answering the three respective research questions, as posed in chapter one and theoretically visited in part one of this study.

Chapter 6 will explore the transformation of urban governance processes and structures in Thessaloniki stimulated by the introduction of urban resilience principles and the implementation of the Resilience Strategy. Chapter 7, will emphasise the lack of adequate focus on urban geological risk in the Resilience Strategy, drawing upon the observed marginalisation of geology and other environmental and physical components of cities contemporary resilience strategies. Chapter 8 will provide an initial evaluation of Thessaloniki's participation and monitoring processes established in the 100RC project, particularly focusing on the institutionalisation of urban resilience in the city, and future challenges for local authorities in engaging with urban resilience. Finally, Chapter 9 will present a summary of the whole study along with its major conclusions, its scientific contribution in the field of urban resilience, and will propose areas where future research should focus.

Chapter 6 - Resilience Thinking and the Transformation of Thessaloniki's Urban Governance

6.1 Introduction

This chapter marks the beginning of the second part of this Thesis. Here the theoretical points of the first part are explored through the longitudinal study of resilience implementation in the city of Thessaloniki, within the context of the Rockefeller foundation-funded 100 Resilient Cities (100RC) network. Each of the following empirical chapters directly reflects themes and topics discussed in part one, through investigation of Thessaloniki's experience with operationalising urban resilience.

This chapter focuses on potential of resilience thinking to induce governance transformations, as conceptualised in Chapter 2. Given the acknowledgement that many city governments have become trapped in formalised ways of operating that shape future planning possibilities (Coaffee and Healey, 2003), this chapter interrogates what it might take for innovations in governance stimulated by urban resilience to be translated into 'mainstream' practices, in ways, which transform conventional ways of governing rather than just incorporate new ideas and practices into an established *modus operandi*. Moreover, it addresses an identified gap in the burgeoning urban resilience literature by providing a longitudinal case study of resilience-driven governance change in Greece's second largest city.

As mentioned in Chapter 5, Thessaloniki became a member of the 100RC network in December 2014. As a result, urban resilience ideas in the city were operationalised through the work of the Thessaloniki Resilience Office, which, as this Chapter will illuminate, has changed the way the city is operating, representing a new point of reference for stakeholders not adequately

incorporated into the planning efforts of the past. Here, traditional siloed governance is slowly giving way to an appreciation of the need to work horizontally and engage with a wide spectrum of stakeholders. The fundamental shift in conceptualising urban governance and decision-making as a holistic process not exclusively delivered by the local government, but rather administered by it, is also currently transforming the way the city is operating with local communities now considered a co-designer of urban policies as opposed to a mere recipient.

Overall, this chapter analyses how resilience thinking and its incorporation into urban policy has been used to mobilise adaptive governance capacity and shift long held patterns of decision-making by facilitating horizontal coordination of actions and mobilising the local community in the design and implementation of urban projects. In essence, the city of Thessaloniki emerges as a notable example of resilience functioning both as a conceptual framework and as an incentive for urban stakeholders to reorganise traditional governance patterns, reshape organisational habits by embedding adaptability, and allow new ideas to be mainstreamed. However, as this chapter will also showcase, such transformation has not been unproblematic as calls for innovation in governance often challenge a deeply rooted governance culture rendering the institutionalisation of resilience thinking a slow and unsure process. This chapter will thus briefly highlight some of the problems that have arisen in Thessaloniki.

In order to facilitate the process of tracking governance change induced by resilience thinking, an analytical framework of adaptive governance has been advanced. As noted in Chapter 2, adaptation in this case is conceptualised as the long-term ability to mobilise resources to adequately confront the impact of both endogenous and exogenous risks and disruptive challenges through the inclusion of multiple forms of knowledge and inclusive, participatory decision-making processes (Matyas and Pelling, 2015; Moser *et al.*, 2019). Adaptive governance from this perspective provides an institutionalist approach to social

system management. Analytically, the focus of this framework lies on tracking the evolution of a flexible institutional environment, which allows fair access to key governance assets, and facilitates the establishment of new governing arrangements able to not only respond to changes but also to anticipate them and plan proactively for the future. This framework is also influenced by the Rockefeller/Arup City Resilience Framework (CRF), given its use throughout the implementation of the project in Thessaloniki. As noted in Chapter 2, 100RC recognises multiple qualities of urban resilience that ‘distinguish a resilient city from one that is simply liveable’ (Da Silva and Moench, 2014), namely reflectiveness, resourcefulness, robustness, redundancy, flexibility, integration and inclusiveness.

The remainder of this chapter is divided into three main sections. The first provides a brief outline of conventional governance structures and relations in Thessaloniki before the beginning of the resilience project in 2015. The second outlines and details the analytical framework through which changes in the governance relations induced by the participation of the city in the 100RC network have been tracked. The third presents an assessment of how resilience has been used to mobilise adaptive governance capacity and shift long held patterns of decision-making, reorganise the traditional governance apparatus, break operational silos, reshape organisational habits by embedding adaptability, and, allow new ideas to be mainstreamed, while also including a short critique on issues that have been overseen throughout the Resilience Strategy implementation.

6.2 Governance structures and relations in the city of Thessaloniki

Local authority governance in Greece consists of two main administrative levels: municipalities and regions, with no metropolitan governance system operating to connect these two administrative levels. The Municipality of Thessaloniki, along with 10 other smaller municipalities that constitute the

metropolitan area of Thessaloniki, are part of Central Macedonia Region, which respectively belongs to the Decentralised Administration of Macedonia and Thrace.

This modernised governance structure for local and regional administration was introduced to the Greek context in 2011 through the Kallikratis plan, a plan that instituted a major reform in Greek public administration with aiming at re-scaling governance levels and increasing the cost-effectiveness of service delivery (Chorianopoulos and Tselepi, 2019). Through the Kallikratis plan, the number of municipalities in Greece decreased from 1034 to 325, while the distribution of responsibilities significantly shifted to lower levels of local administration - regions and municipalities - yet without subsequent reallocation of financial resources. In addition, spatial planning jurisdiction remained with the central state, through Decentralised Administrations, which additionally enjoyed financial and administrative autonomy.

This inherently complex and fluid political landscape has generated a set of challenges regarding the operation Greek municipal authorities. Traditionally, Greek local governance has a very strong central focus. First, the financial and administrative over-dependence of local authorities on state financing limits their capacity to diversify their funding sources and leverage new public-private partnerships that could maximise the return on the investment (City of Thessaloniki, 2017; CWRA, 2019). Moreover, Greek local authorities are heavily dependent on European Union funding to develop local development projects. However, the management of European funds stops at the regional level, dispossessing municipalities from the ability to allocate funds locally to projects of their own choice. Thus, funding implications are a fundamental impediment for the development of urban strategies at the municipal level in Greece and was further deepened during the austerity programme Greece was forced to follow since 2010.

Another governance challenge for Thessaloniki was the disjointed and conflicting jurisdictional boundaries across municipalities, regional authorities and central governance on a variety of urban issues, including - but not limited to - disaster risk management and urban mobility (City of Thessaloniki, 2017). This complicated operational environment has fostered an institutional alignment of service delivery via operational silos. Collaboration among the different departments of the Municipality has traditionally been hampered by poor inter-departmental communication, ingrained bureaucratic routines and institutional practices that have constrained the ability of the City Hall to produce joint capacities and comprehensive responses to citywide urban problems. This was intensified by the lack of human capacity in the municipal administration, particularly after the beginning of austerity measures, where municipal authorities were expected to do ‘more for less’. Collaboration across administrative scales has also been shaped by fractious local politics, resulting in limited cross-sectoral collaboration and engagement of external urban stakeholders, due to the lack of communication and trust.

Furthermore, Thessaloniki follows the Greek pattern of top-down governance delivery, with very limited or non-existent participation of local community members in urban management or decision-making processes. This long existing practice, along with a number of corruption incidents connected to misallocation of municipal funds, have cultivated a profound mistrust amongst the citizenry towards elected officials¹. Renewing greater levels of trust is usually a time-consuming process but constituted one of the key priorities in Thessaloniki’s resilience work. Such work is often highly dependent on co-producing a shared vision for the medium and long -term urban development; on strengthening of internal community networks and institutions and on the active integration of

¹ This mistrust is not only directed towards local officials but also against the state in general, partly reflecting the integral obscurity of administrative jurisdictions.

citizens from the start of the resilience strategy development, and throughout all the stages of its implementation (Coaffee *et al.*, 2018; Normandin *et al.*, 2019).

Overall, prior to its participation in the 100RC network, Thessaloniki's urban governance shared the general traits of Greek municipal government notably a lack of horizontal communication among municipal departments and other urban stakeholders and misconnection of goals, objectives and outcomes among different projects undertaken by the city. This situation, in conjunction with the reduced funding the city received as a result of national austerity measures, motivated the newly elected Mayor and other municipal officials, to seek alternative pathways to confronting the challenges of Greece's co-capital. The proposal for participation in the 100RC network was a key catalyst in this pursuit.

6.3 A methodology to track urban governance through resilience action

The adopted methodological approach for understanding the influence of resilience thinking on city functions, was influenced by the City Resilience Index (CRI). This official assessment device consisted of a wide and complex set of qualitative and semi-quantitative features dividing urban resilience into four categories (people, place, organisation and knowledge), 12 goals and associated key indicators, 48-54 sub-indicators and 130–150 variables (Rockefeller Foundation, 2015). The CRI attempted to describe a city's most essential systems in terms of four dimensions, each of which contained three different goals, which accordingly reflect the actions cities can take to enhance urban resilience (Table 6.1).

Along with the CRI, 100RC recognised seven qualities of urban resilience that complement the Framework and '*distinguish a resilient city from one that is simply liveable*' (Da Silva and Moench, 2014), namely reflectiveness, resourcefulness, robustness, redundancy, flexibility, integration and

inclusiveness. In Chapter 2, these qualities were further grouped into three distinct clusters based on their function in securing the resilience of a system (Figure 2.1).

Building on the predefined structure of the CRI, some objectives for the reorganisation of governance in Thessaloniki were added as well as some assessment criteria and the corresponding resilience qualities identified for each one of them. Later, these criteria were contrasted with the experiences observed in the case of Thessaloniki during this longitudinal study, reflecting governance culture both before and after the introduction of resilience-thinking.

Table 6.1: Dimensions and goals of the City Resilience Framework (Da Silva & Moench, 2014)

City Resilience Framework				
<u>Dimensions</u>	Leadership and strategy	Health and wellbeing	Economy and society	Infrastructure and ecosystems
	Effective leadership and management	Minimal human vulnerability	Collective identity and community support	Reduced exposure and fragility
<u>Goals</u>	Empowered stakeholders	Diverse livelihoods and employment	Comprehensive security and rule of law	Effective provision of critical services
	Integrated development planning	Effective safeguards to human health and life	Sustainable economy	Reliable mobility and communications

This approach here, sought to track governance changes through breaking down the goals of the first dimension of ‘Leadership and Strategy’, as this is the one dimension incorporating the vast majority of the governance challenges for the city of Thessaloniki. Here, some specific objectives were added to the leadership and strategy goals, which reflected the aspirations for governance transformation set by the Municipality of Thessaloniki. Moreover, relevant resilience qualities used, were addressed by the selected objectives and were also identified and utilised in the framework. Such qualities derived from the CRI and the definition of urban resilience used in the 100RC network (Table 6.2).

The objectives themselves, emerged from both documentary analysis, focusing on Thessaloniki’s Preliminary Resilience Assessment and the following Resilience Strategy and other published accompanying documents (City of Thessaloniki, 2016, 2017), and reflections on interviews with City Officials, including the former Chief Resilience Officer and members of the Municipality’s Resilience Office.

Table 6.2: Objectives of the Leadership and Strategy dimension goals

Leadership and Strategy		
Goals	Objectives	Resilience Qualities
Effective leadership and management	Reorganisation of traditional governance apparatus	Robust; Inclusive; Integrated; Flexible
Empowered stakeholders	Mobilisation adaptive governance capacity	Resourceful; Inclusive; Integrated;
Integrated development planning	Co-production of a shared vision for medium- and long-term urban development at multiple scales	Reflective; Flexible; Integrated; Inclusive

The next step of this methodological approach emphasised the generating of representative assessment criteria for tracking governance change induced by resilience-thinking. The criteria developed took each of the objectives for ‘Leadership and Strategy’ dimension and suggested specific features that might be present in the governance structure of Thessaloniki after the introduction of the resilience initiatives (Table 6.3). This process was aided by evidence from some of the activities undertaken throughout the implementation of the Resilience Strategy, which depicted the operational and attitudinal changes stimulated by municipal officials engaging with resilience-thinking, and which are capable of shaping a novel and innovative governance delivery future for Thessaloniki.

Table 6.3: Assessment Criteria for governance change

Objectives	Criteria
<p>Reorganisation of traditional governance apparatus</p>	<ul style="list-style-type: none"> • Institutional changes in the Municipality’s organisation chart • Devolution of responsibilities to smaller scale • Alignment of sectoral plans and institutional projects with the resilience vision of the city
<p>Mobilisation adaptive governance capacity</p>	<ul style="list-style-type: none"> • Inclusion of citizens and other urban stakeholders in the design of actions • Breaking of cross-sectoral silos • Promotion of inter-departmental coordination
<p>Co-production of a shared vision for medium- and long-term urban development</p>	<ul style="list-style-type: none"> • Clear understanding of urban resilience content, principles and aims • Raising of awareness towards shocks and stresses • Encouragement of bottom-up activities local governance scales

The governance change tracking process begun in 2015 and has proceeded since through a number of interlinked phases - the City applying for and being accepted into the 100RC network, assessing its initial resiliency capacities, and devising and implementing strategies to enhance urban resilience. In all phases, this study has sought to track the criteria listed in Table 6.3 in order to understand how the resilience policy agenda affected change and transformation in governance dynamics.

Thessaloniki began its resilience journey in early 2014 when it prepared a bid to become one of the 100RC and in December 2014 it was officially accepted as a member of the 100RC network, in the second cohort of selected cities, along with 33 other municipalities from around the world. Interestingly, the initial application was inspired by damages and demonstrations taken place in the city during previous years and focused on urban unrest; an approach fundamentally changed throughout the process of developing the Resilience Strategy.

The application process for participation in 100RC consisted of a brief explanation of Thessaloniki's background and the issues the city dealt with through its history. The application was submitted in early 2014 and focused on riots and civil unrest and terrorism, an outcome of the insurgence of civil unrest in the city marked by the aftermath of December 2008 (Karamichas, 2009) and Thessaloniki's lack of a comprehensive response plan to coordinate relevant public authorities around a common response or prevention approach. Moreover, the initial application included an appreciation of the threat earthquakes pose to the city, the devastating impact on which Thessaloniki experienced in 1978. These disruptions were identified as the most imminent at the time and according to a city official the idea for the application matured in the heads of local officials when local citizens '*lived once again through the chaos of every December, with continuous demonstrations and damage of civil property*'² (Interview with city official). Attention in the city's application was also paid in social cohesion, the impact of financial crisis and shifting macroeconomic trends, aging infrastructure and political instability.

The city was accepted to join the 100RC in December 2014 and was officially introduced to the project in early 2015. According to 100RC representatives, the city was chosen because: '*it has shown good leadership, innovative approach to organisation and decision -making and they felt that the city had a variety of experiences to share with the other members of the network*' (Press Release from 100RC, 2015). The major goal for the city at this point was to acquire support from a global organisation, improve intra-national and international networking and find ways to a more sustainable and resilient future.

² Every December a demonstration takes place in Thessaloniki and other Greek cities in the memory of Alexis Grigoropoulos, the 15-year-old student who was murdered in Athens by a police officer on the 6th of December 2008.

From the beginning, the city's participation in the 100RC network posed great challenges for the municipality; a lack of familiarity with resilience concepts and principles, which were introduced for the first time to the Greek urban management context; growing city-wide fiscal retrenchment; a lack of public confidence in existing governance arrangements and political disputes with the central government. As one senior local official noted at the time, *'mistrust embedded in the mindset of urban stakeholders was the most important obstacle to overcome from the beginning of the project'* (Interview with city official).

The preparation of Thessaloniki's Resilience Strategy, that was to underpin its involvement in the 100RC network, was undertaken in two phases and helped to encourage resilience-thinking within internal municipal arrangements and wider stakeholder engagement. The first phase of strategy development included the preparation of a Preliminary Resilience Assessment, to identify the main areas of intervention and was concluded in June 2016³ (City of Thessaloniki, 2016). Following the publication of the Preliminary Resilience Assessment, further diagnostic work was undertaken to advance an overarching Resilience Strategy.

On March 30, 2017 Thessaloniki released its Resilience Strategy *Resilient Thessaloniki: A Strategy for 2030*, the first resilience strategy ever conducted in the Greek context (City of Thessaloniki, 2017). The Strategy set some strategic goals, objectives and actions for short- medium- and long-term urban development but more fundamentally was seen as *'an attempt to assist in the development of a holistic framework of urban governance, focusing on restructuring the current operational models in the Metropolitan Area, enhancing the city's attractiveness, and facilitating the everyday life of citizens'* (Pitidis *et al.*, 2018). This emphasis on generating new ways of governing is now explored through the framework criteria with a focus upon reorganising

³ A thorough analysis of the process the city followed to develop its Preliminary Resilience Assessment as well as the tools and methods it employed is provided in Chapter 8 of this study.

traditional governance approaches, mobilising adaptive capacity and generating co-productive future visions.

6.4 Tracking governance changes in Thessaloniki

Thessaloniki's participation in the 100RC network from its inception to its operationalisation and subsequent implementation has been a critical shift in the traditional top-down management approach the city followed for a number of years. It has also stimulated a number of governance changes in the ways the city operates and introduced a new era in Thessaloniki's governance landscape. Figure 6.1 presents a brief exploration of the stages through which Thessaloniki passed throughout its resilience journey.

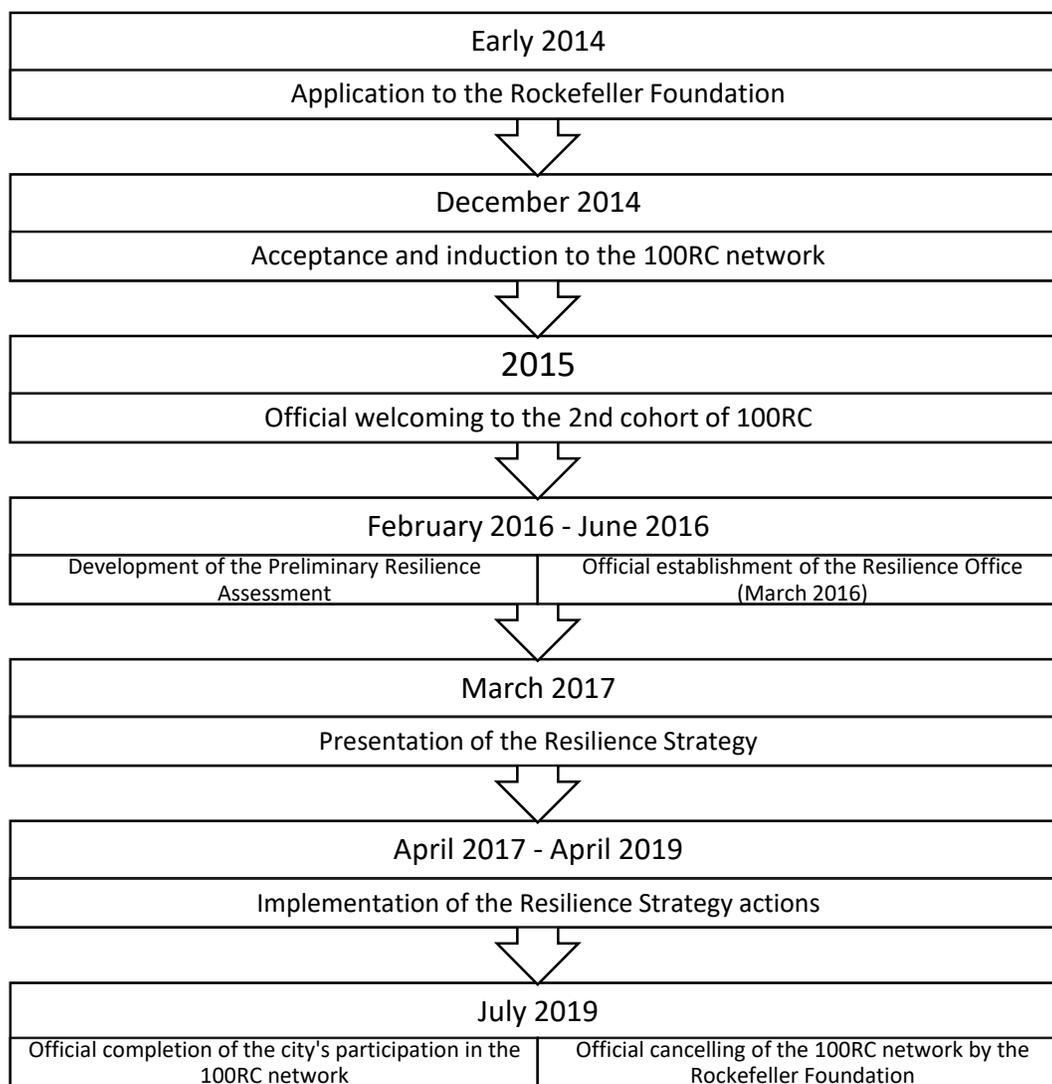


Figure 6.1: Timeline of the stages Thessaloniki went through in its engagement with resilience ideas (Source: Personal elaboration)

6.4.1 Reorganisation of traditional governance apparatus

One of the early challenges faced by the City authority was to position the overall resilience project and the newly appointed CRO in the current municipal governance structure. Instead of allocating the responsibilities for resilience efforts to one of the existing Deputy Mayoral Offices or General Directorate Departments, the Municipality decided to establish a new Department for Urban Resilience. Initially, the newly established Department started operating jointly with the Metropolitan Development Agency of Thessaloniki, becoming the

liaison department between the Metropolitan Development Agency and the Municipal Office (Figure 6.2). Among the responsibilities of the Department was the organising of workshops, working groups and events as well as the pursuit of cross-sectoral partnerships between the city, other public and private institutions and NGOs and feed into the Preliminary Resilience Assessment the city's existing resilience capabilities.

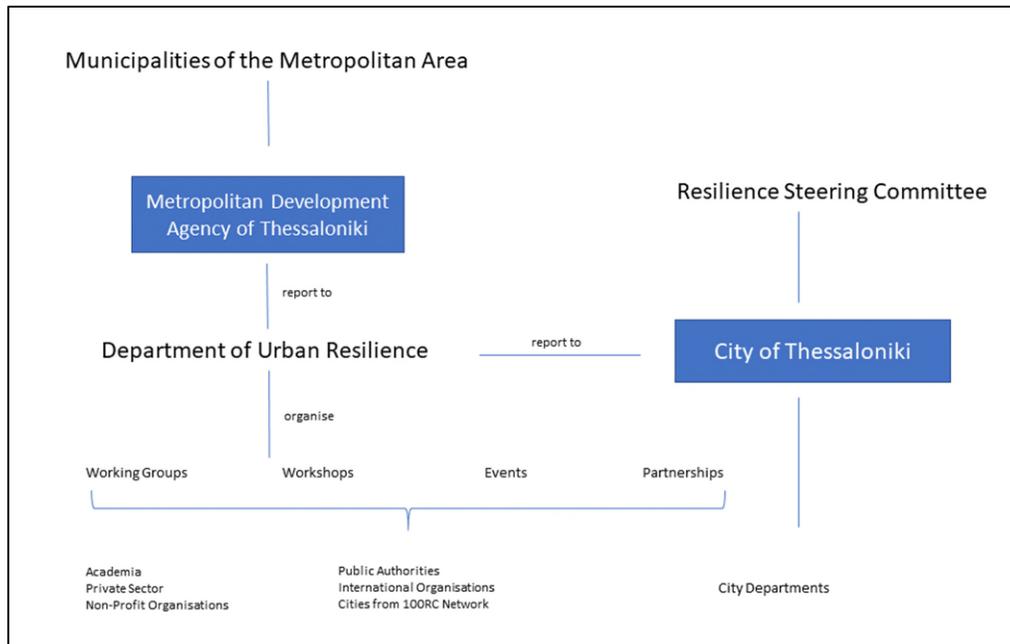


Figure 6.2: Department of Urban Resilience organisational structure (adapted from City of Thessaloniki, 2017)

The power and influence of this Department was enhanced as *Resilient Thessaloniki* was being prepared, with the (political) appointment a Deputy Mayor to monitor and organise the Department's activities and as the de facto Chief Resilience Officer (or Deputy Mayor of Urban Resilience and Development Programmes) alongside four other resilience officers and one intern. Responsibilities of the new Deputy Mayor included, amongst others, monitoring and coordination of the implementation process of the Resilience Strategy as well as supervision of other operational projects run by the Municipality. This involved the alignment of Thessaloniki's current projects and future bids with the city's Resilience Strategy's goals and objectives. Other direct responsibilities, included the promotion of cross-

sectoral collaboration and strategic design and interdepartmental coordination of actions with the other Deputy Mayors. Indeed, Thessaloniki was the first city in the wider 100RC network to create a Deputy Mayor position for urban resilience⁴ with this innovation showcasing the increased attention paid to delivering the goals and objectives of the 2030 *Resilient Thessaloniki* Strategy.

Whilst, the resilience-driven reorganisation of traditional governance in the city of Thessaloniki underlined the potential of resilience-thinking to stimulate institutional change in governance when strong leadership and well-defined roles are in place; also, it has led to attempts for greater citizen voice being fed into decision-making processes. Here, a significant transformation proposed by the Resilience Strategy was the restructuring of the role of local Boroughs. In the spirit of area decentralisation or new localism (see Chapter 2), the Municipality of Thessaloniki attempted to restructure the role of the pre-existing six smaller municipal Boroughs, comprising the Municipality of Thessaloniki to enhance citizen engagement and aid governance transparency. The municipality of Thessaloniki consists of six local Boroughs (A, B, C, D, E and Triandria) the role of which in decision-making has been very limited in the past.

This restructuring aimed at increasing the responsibilities of the Boroughs, which were expected to play an important intermediary role between the municipality and the local residents and bring the government closer to the people. Thessaloniki's Resilience Strategy further introduced a set of activities and pilot projects at the neighbourhood level focused on participatory methods, awareness-raising and learning, to upgrade the role of Boroughs, decentralise power and introduce an innovative and inclusive model of local governance; one that will rely on trust and engagement between local authorities and citizens. As a senior city official noted, *'today there is definitely a lack of trust between the citizens and the local*

⁴ In Greece, mayors can choose the thematic or policy portfolio for their deputy mayors and can appoint deputy mayors from the elected officials of the local council.

authorities. We believe that upgrading the role of local Boroughs citizens will feel the Municipality closer to them and will be encouraged to participate in shaping the future of their neighbourhood' (Interview with city official). This sounds an attractive statement in theory, but in practice proved to be a complicated endeavour.

Thus, a practical example of this new participatory approach was the activity 'Park as you want it' ('Πάρκο όπως το θες') which took place in the Patrikiou park located in the Borough E on the 5th of November 2017. The goal of the activity was the revitalisation of the park and the sensitisation of local citizens to participate in the upgrading of public space in the city (Voria.gr, 2017). Local citizens participating in this activity submitted their ideas on future activities that could be organised in the park while also expressing their concerns on future actions that would transform the park into a welcoming space for the local community. Another significant objective of the activity was the gradual establishment of a regulatory framework that would facilitate the collaboration between active local citizens and the Municipality in order to secure its support for bottom-up initiatives based on their aspirations and desires for their neighbourhood.

However, this greater area decentralisation to Boroughs is still an incomplete project with changes (as of 2019) required to the city's overarching regulatory framework, regarding the devolution of responsibilities from the Municipality. This has resulted in the Boroughs being operationally impaired since the Municipality possesses almost all authority (the power to make decisions and resources) and consequently, to date, have had a limited impact on governance changes in their jurisdictions. Many have pointed to the ineffective communication between the Borough council and the local community regarding the organising and running of local neighbourhood assemblies as a central cause of their ineffectiveness. As a local representative noted: *'The collaboration with the Municipality in the framework of the 100 Resilient Cities has been extremely successful. However, more institutional power and open communication lines are needed to maximise the potential of the Borough'*.

This illuminates that despite the ambitious inception and the dynamic re-introduction of the role of Boroughs, which existed before but had limited power and resources to implement activities, building trust with the local community is a long and time-consuming process. To date, participation in the neighbourhood assemblies has increased but is still in most cases limited, in spite of the establishment of a meeting calendar with pre-defined agenda facilitated by the Municipality. Moreover, whilst through the introduction of resilience in Thessaloniki, participation in the awareness raising events has been sufficiently higher than before, the conduct and organisation of meetings has retained many elements of traditional organisation and where local meetings are dominated by powerful institutional agendas. This has generated a tension between the desire on the city to formulate rules of engagement and provide strategic direction, and the opposite pressures to devolve decision-making to local people.

In Thessaloniki, this effort to upgrade the localist role of Boroughs through the concept of resilience, directly portrays the potential of resilience thinking to induce transformation in urban governance by promoting increasingly participatory methods that seek to shift traditional patterns of decision making and strengthen neighbourhood assemblies, but is only in its gestation phase. More specifically, findings suggest that whilst the process has been sufficiently embraced by local residents, the building of trust remains a significant obstacle in embedding innovative local governance models.

6.4.2 Mobilisation of adaptive governance capacity

The first steps towards mobilising adaptive governance capacity in Thessaloniki came through attempts to include citizens and other urban stakeholders in the development of both the Preliminary Resilience Assessment (PRA) and the Resilience Strategy. From the start of the development of the PRA, the Resilience Office attempted to engage with city-wide stakeholders to address their views on shocks and stresses for the city and identify the city's strengths

and weaknesses at an early stage. This process began in May 2015, shortly after the Thessaloniki's invitation to join the 100RC network, when an 'Agenda Setting' Workshop was organised, and in which approximately thirty representatives of several city-wide institutions, including academia, NGOs, private organisations and research centres participated. During the workshop, participants were initially asked to share their personal understandings of urban resilience definitions and principles, connect their perspectives to the local context of Thessaloniki, and contrast their personal views to the 100RC's definition of resilience. Later, participants proceeded with prioritising the most imminent shocks and stresses for the city and to particularly bring to light lesser-known or less obvious risks, frequently overlooked by the local authorities. The workshop, which I attended as a facilitator, concluded with an early-stage diagnostic of the city's strengths and weaknesses based on an early version of the CRI and a city-wide mapping of, and inter-dependences between, urban stakeholders. Amongst other, this workshop, which was supported by ICLEI and the Rockefeller Foundation, acted as an official introduction of the project to local stakeholders and a first examination of their views and ideas on the trajectory that the city should follow in the future.

Similar engagement activities were organised throughout the development of the PRA and which helped significantly in defining the main areas of action for the Resilience Strategy. Such activities also included online questionnaire surveys, open workshops in the city centre to attract the participation of local citizens, one-to-one interviews with other urban stakeholders and wide promotion of the project with local and national media. According to the Preliminary Resilience Assessment, more than 850 citizens participated in the online survey, while members of four academic institutions and local research centres were contacted to present their perspective on enhancing urban resilience.

Whilst it would be accurate to say that the development of the Preliminary Resilience Assessment and ultimately the overarching Resilience Strategy was

largely driven by expert coalitions brought together by the Municipality, there was also opportunity for community knowledge's to be fed into the process. However, it was observed that the composition of citizens that participated did not adequately reflect the different population groups of the city. For instance, despite the fact that people from different backgrounds participated in the online survey, those without access to the internet or with limited familiarity with online technologies were effectively excluded from the process. This served to exacerbate the issues of equal representation in the mobilisation of adaptive capacity that did nothing to dispel the mistrust of citizens towards the local authorities which was identified as a major impediment for their participation, especially during the initial stages of the project. For example, 40% of the online survey participants characterised their communication with the municipality as ineffective (City of Thessaloniki, 2017). Nevertheless, and bearing in mind that this was the first comprehensive attempt to actively deploy participatory processes in the design of a city-wide strategy, the overall outcome of the process can be largely characterised as successful, since it achieved city-wide participation of interested parties and mobilised a range community members and urban stakeholders to collectively reflect on the urban challenges of Thessaloniki.

Another fundamental outcome of the development process for the PRA was unquestionably the establishment of more tangible connections between formal urban stakeholders. As one of interviewees eloquently argued:

'The development of the PRA has been without a doubt the most important stage of Thessaloniki's resilience journey. Just brining people from different institutions and with different interest in the same table has been a very important and it would be a great success for our city if cross-sectoral collaborations triggered by this project would continue after its termination'.

Interview with member of the Resilience Office

Traditionally, collaboration amongst different urban stakeholders in Thessaloniki had been problematic and resulted in the delivery of actions and operations in silos. The introduction of resilience-thinking and its continuous focusing on holistic working in the design and implementation of the Resilient Strategy, stimulated cross-sectoral collaboration of activities among a diverse array of urban stakeholders operating within the city limits who did not effectively collaborate in the past.

One of the tools employed for facilitating such cross-sectoral collaboration was the CoLab tool. The CoLab tool was introduced to the city by the 100RC and sort to assist multiple stakeholders and partners working together to solve complex urban challenges, through organising workshops that focused upon the integration of the different stakeholder ideas in city management. The tool was extensively utilised in Thessaloniki to tackle issues such as urban mobility, urban regeneration and local development. A good example of the tool's utilisation to bring together a diverse array of stakeholders from around the city is portrayed in the three-day international meeting 'Metro and Urban Development: The Egnatia Street corridor', that took place in the City Hall of Thessaloniki between 11-14 June 2018. With the new underground system planned to be delivered in 2020, considerations around the transformational impact it would have in the city's infrastructure, mobility and everyday life were urgent and pressing. As the city's CRO pointed out '*this new line holds potential for transformational impact – improving traffic congestion but also unlocking economic opportunities for different parts of the city, increasing efficiency and productivity, and creating more value in the land around the infrastructure*' (cited in Dimarelos & Jang, 2018). Inspired by Goal 1 of the Resilience Strategy 'Shape a thriving and sustainable city with mobility and city systems that serve its people' the CoLab brought together more than forty representatives of several urban institutions to discuss innovative solutions to this

complex challenge and to identify wider opportunities arising from regenerating a central part of the city⁵.

Regardless of its tangible outcomes, that included five main proposals for maximising the benefits of the Metro investment, the utilisation of the CoLab tool succeeded in gathering key stakeholders around the same table and encouraging them to share their vision and expertise for confronting a specific urban problem, while simultaneously aligning their priorities. This holistic approach of urban resilience, inspired by the principles of integration and inclusiveness, assisted in achieving cross-sectoral coordination of activities among stakeholders used to operating in silos. Conducting similar co-produced activities has key to unlocking greater inter-sectoral collaboration amongst stakeholders who are still operating in relative isolation. Such initiatives are now regularly undertaken by the Resilience Office in Thessaloniki (including 28 Labs and 26 workshops organised as well as several informal meetings with stakeholders around the city), aimed at driving lasting cross-sectoral collaborations.

6.4.3 Co-production of a shared vision for medium- and long-term urban development

Defining the proper scale and context for the application of the Resilience Strategy, as well as fostering a shared vision for medium- and long-term urban development, are critical factors for facilitating effective governance. As mentioned above, several engagement activities have taken place in order to help municipal authorities create a comprehensive and holistic vision for the resilience future of Thessaloniki. Such activities resulted in the generation of a shared vision for a Resilient Thessaloniki, which was portrayed in the four goals of the RS:

⁵ Participants included academics, representatives of the Thessaloniki Chamber of Commerce and Industry and the Thessaloniki Chamber of Tradesmen, the Regional and Municipal Antiquities Service of Thessaloniki, the Metropolitan Development Agency of Thessaloniki, research centres and several Municipal Departments. The workshop was also supported by international partners such as Arup, AT Osborne, the British Council Cisco and ESRI.

- Shaping a thriving and sustainable city with mobility and city systems that serve its people;
- Co-creating an inclusive city that invests in its human talent;
- Building a dynamic urban economy and responsive city through effective and networked governance;
- Re-discovering the city's relationship with the sea – Integrated Thermaikos Bay.

Notably, the last of these goals has been most visible and been driven through major urban planning and regeneration efforts. As one senior city official noted *'Thessaloniki is a city that is characterised by its relationship with the sea. Thermaikos Bay is arguably the city's most important asset and needs to be further exploited'*. Enhancing recent development processes that has seen the area becoming the longest developed waterfront in South-eastern Europe, an integrated strategy for the redevelopment of the waterfront zone was prioritised by both citizens and other urban stakeholders in the Preliminary Resilience Assessment. This saw a clear vision for the future, co-created by a range of engagement activities, emerge in the Resilience strategy. Importantly, the city managed to leverage both internal and external resources, notably from the World Bank. This led to the publication an analytical Framework Plan for the redevelopment of the city's waterfront (Delloite and World Bank, 2018)⁶. Furthermore, it presented financial propositions and governance arrangements that could facilitate the redevelopment process. In this case, the processes put in place through developing the Resilience Strategy facilitated the Redevelopment Framework Plan. To date, this constitutes probably the most important legacy of the city's participation to the

⁶ This was the first collaboration with the World Bank in the framework of the project and one of the first activities the World Bank undertook in Greece. The Framework Plan was advertised by the local authorities and established a collaboration with the World Bank that is expected to continue in the future.

100RC network, showcasing the city's collective vision for investing in its relationship with the water and maximising the benefits of its geographic location⁷. Furthermore, the Framework for the Waterfront Redevelopment Strategy demonstrates the capacity of resilience as a strategic goal to mobilise resources and producing integrated plans for future development.

More broadly, in Thessaloniki the city is also attempting to embed resilience in its existing sectoral plans, with the Resilience Strategy being treated as an overarching non-binding strategic directive, with a 13-year implementation horizon. This, if successful, will influence the operational programs of the city regardless of political administration changes, constituting the first stage in the process of institutionalising resilience-thinking in the city administration⁸. In this situation of searching for new governance approaches, the introduction of resilience-thinking enabled horizontal and interdepartmental coordination between the different municipal departments. Through the implementation of the Resilience Strategy, active participation of different departments of the municipality in city-wide projects has not only been encouraged but also supported and actualised.

A further example of this collaboration in strategic planning has been the creation the Risk Data Portal for the city of Thessaloniki that was an action promoted and implemented by the city's Resilience Office. This portal has been central to enabling local stakeholders to share information for disaster risk prevention and planning through the platform. Until the development of the portal this information was produced by a number of different organisations, research centres or utility companies and was only partially integrated to the city's preparedness plans. The

⁷ Geographic location had been identified as the city's strongest point during the Preliminary Resilience Assessment both by local citizens and the municipality.

⁸ However, with the local government stepping down after May 2019 election results, there is no guarantee for the continuation of the strategy for the continuation of project alignment under the resilience thinking umbrella, despite the currently proven determination until today.

Resilience Office has further attempted to combine the portal development with a participatory mapping activity and in so doing draw on a wide range of technological and social media applications that allowed volunteered geographic information to be added to official data bases by local citizens (Horita and Porto de Albuquerque, 2013). The use of VGI has recently become a very powerful tool for disaster risk management in their attempt to enhance the resilience of local communities to extreme events. In one of its applications in Thessaloniki, local students were asked to map hazards on their route to school⁹. This activity involved the coordinated work of four separated municipal departments who had, prior to the residence agenda, functioned separately. This project as one of the flagship cross-sectoral and inter-departmental collaboration examples, creates a successful precedent for similar future collaborations to follow in order to diversify the source of data used for disaster risk management and highlight the importance of VGI.

6.5 Discussion

6.5.1 Lessons Learned

Governance changes in Thessaloniki provides a concrete example of resilience-thinking application in an urban environment previously unfamiliar with resilience ideas. Through the lens of resilience, the city of Thessaloniki attempted to advance innovative ways of delivering urban governance by shifting the traditional patterns of public administration, moving away from single risk approaches through adopting a holistic thinking, and creating a shared vision for securing a sustainable and resilient the future for the city. In this analysis, an analytical framework to track some of these transformations in

⁹ This activity was part of another program of the Municipality for mapping safer routes to schools (SafeRoutes) and involved mapping activities with local students and teachers. Thus, during the mapping activity, paper maps created by the students were translated to digital information by mapping experts and were subsequently integrated in the Risk Data Portal to inform users and local authorities about street improvements around the pilot schools participated in the project. The success of this participatory mapping activity led the Municipality to develop an educational programme for local schools on raising awareness around the benefits of car-free urban mobility.

urban governance achieved through the participation of the city on the 100RC network was used, and which has illuminating areas that need to be enhanced in pursuing a resilient future. These emerging experiences from this case study are presented against the previously set assessment criteria in Table 6.4.

Most immediately, as far as reorganisation of the city's governance apparatus is concerned, the establishment of a Deputy Mayor position for Urban Resilience constituted a major change in the city's organisation chart. Apart from officially recognising resilience as a fundamental semi-constitutional factor of the Municipality's structure, it also embedded a resilience dimension into different sectoral developmental plans, thus positioning resilience in the centre of attention for the city's future. This has also led to an alignment of developmental plans for the city through the actions proposed by the Resilience Strategy. This is an endeavour that aspires to tackle the 'policy-rich-delivery-poor' reality of Thessaloniki prior development and service delivery experiences (along with other Greek cities) and avoid implementation gaps in operationalising resilience in practice (Pitidis *et al.*, 2018).

Advancing strategic visions has also gone hand-in-hand with attempts to devolve power and responsibility to smaller local scales, through reforming the role of Boroughs and re-introducing the public as an intermediary level between citizens and the local government. Whilst operationally this has been largely successful there is, nevertheless, a need for sustained engagement of local citizens in the process to build up levels of trust that can enable citizen's voices to actively influence decision-making.

Organisationally, in the municipality, there has further been a drive to mobilise adaptive capacity through the promotion of horizontal coordination among external urban stakeholders and municipal departments. This has been set as a key priority by the 100RC network throughout its implementation, as argued by a Senior Programme Manager of 100RC: '*Working across silos, teams and*

departments is more important than ever to address the interconnected challenges of the 21st century. Moving away from single risk approaches, urban resilience forefronts inclusive and integrated way of planning cities' (emphasis added) (Gubbels, 2019). The de-siloing efforts in Thessaloniki have had some success in widening participation of stakeholders and different city-departments in the activities organised within the framework of the 100RC project. Improved levels of engagement and integrated working came as a direct consequence of the collaboration stimulated during the development of the Resilience Strategy. This is similar to the results of the Midterm Evaluation Report on Institutionalising Urban Resilience published by the Urban Institute on behalf of the Rockefeller Foundation (Martin and McTarnaghan, 2018), which argued that the process of generating overarching strategies, such as Resilience Strategies, tends to encourage new forms of collaboration and models of citizen engagement.

Finally, the co-production of a shared vision for the future of the city has been developed, expressing a clear understanding of resilience content and principles as well as a necessity to prioritise external shocks and internal stresses the city might experience, or is currently facing. Raising awareness and appreciating continuous uncertainty and risk for contemporary urban environments is a vital component of building urban resilience. Thessaloniki embraced this rationale and mobilised a series of actions and activities to raise the level of awareness among citizens and urban stakeholders in the effort to cultivate a city-wide resilience mentality. In evidence of this the city, from 2017, established a 'City Resilience Day' where city-wide events are organised in the city's waterfront in collaboration with various municipal departments, academics, NGOs, cultural institutions and other urban stakeholders. In its inaugural year one, the key event was a story-telling workshop run by local citizens who experienced the devastating 1978 earthquake, which was complemented by lectures from

academics and practitioners on preparing and responding to emergencies, and particularly earthquakes¹⁰.

The establishment of a ‘City Resilience Day’ showcases the capacity of resilience to translate local experiences into meaningful urban actions by consolidating a ‘risk vernacular’ for dealing with risk and uncertainty and constitutes an important short-term legacy of the city’s participation in the 100RC network. However, in the medium-long term, continual effort and action is required to further generate and sustain a city-wide shift towards resilience as well as the implanting of its principles into everyday administrative practice and localised governance¹¹.

6.5.2 Critiques on Thessaloniki’s Resilience Strategy implementation

Despite the unequivocal benefits from the transformation of local governance stimulated by the implementation of the Resilience Strategy, some considerations regarding the process should also be pointed out. Many of such considerations relate to the critiques of urban resilience, presented in Chapter 2 of this study.

First, as already presented, one of the main pillars of Thessaloniki’s Strategy was the devolution of power to local Boroughs and eventually to the citizens in an attempt to build trust and mobilise the communities. However, this approach echoes a major critique of resilience related policies, the neoliberal doctrine of responsabilising citizens in order to reduce municipal responsibility. In the case

¹⁰ Local authorities symbolically chose the 20th of June, as it is the day in which the city experience a great earthquake in 1978, which caused the death of 49 people and extensive damages of its building stock and infrastructure (Penelis *et al.*, 1989).

¹¹ The first step towards this direction has been made. This is manifested in the establishment of a post-graduate programme in 2018 in ‘Planning for Sustainable Development and Resilience’ at the School of Planning and Development of the Aristotle University of Thessaloniki, the largest and most prestigious university in the city.

of Thessaloniki, and given the existing disconnection and mistrust between local residents and municipal authorities, this process of power devolution could be seen as a trust-building move towards engaging civic society; equally though, it could be interpreted as an attempt to share responsibilities, but not equally rights, as local Boroughs, even with their extended roles, would still be unable to take binding decisions, and only offer ‘suggestions’ to the municipal authorities.

This non-binding role of local authorities reflects another urban resilience critique that questions the truly transformative potential of resilience policies. In Thessaloniki, it is apparent that the city was been presented with a great opportunity to transform the ways of operating and actions needed to be focused on the underlying factors that impede governance from being effective. For instance, Thessaloniki’s Resilience Strategy – for different reasons - does not adequately deal with issues present in the city, such as socio-economic inequalities, precarious housing and living conditions, and urban poverty. This inattention of focusing on underlying socio-spatial factors, as it will be explained in Chapter 7, is capable of completely derailing the Resilience Strategy from achieving its goals and might lead to positive outcomes on the short-term, while real problems would be perpetuated. Ultimately, such actions ought to be mainstreamed and not just ephemeral if resilience is to have any tangible footprint on the local governance milieu of Thessaloniki.

Table 6.4: Assessment of governance transformation in Thessaloniki

Objectives	Criteria	Emerging Experiences from Thessaloniki
Reorganisation of traditional governance apparatus	<ul style="list-style-type: none"> • Institutional changes in the Municipality’s organisation chart • Devolution of responsibilities to smaller scale • Alignment of sectoral plans and institutional projects with the resilience vision of the city 	<p>Establishment of the Deputy Mayor of Urban Resilience.</p> <p>Developmental projects of the Municipality are required to follow the Resilience Strategy goals and objectives</p> <p>Problems in the reintroduction of the role of Boroughs have been identified.</p>
Mobilisation adaptive governance capacity	<ul style="list-style-type: none"> • Inclusion of citizens and other urban stakeholders in the design of actions • Breaking of cross-sectoral silos • Promotion of inter-departmental coordination 	<p>Citizens and urban stakeholders have been central in the development of the Resilience Strategy. Some issues on equal participations have been identified.</p> <p>De-siloing process has been initiated and cross-sectoral collaborations enabled. More actions needed towards this goal.</p> <p>There is a precedent for inter-departmental collaboration that needs to be expanded.</p>
Co-production of a shared vision for medium- and long-term urban development	<ul style="list-style-type: none"> • Clear understanding of urban resilience content, principles and aims • Raising of awareness towards shocks and stresses • Encouragement of bottom-up activities local governance scales 	<p>The content and principles of resilience have been introduced and are based on 100RC definition</p> <p>Awareness is starting to raise but the further engagement and promotion in the future is key for keeping the momentum</p> <p>Bottom-up activities and collaboration with NGOs is satisfactory but needs to be more encouraged.</p>

Early evidence indicated that the danger of continuing a ‘business as usual’ approach is more than apparent for the city of Thessaloniki. Here, it should be also mentioned that the departure of Thessaloniki’s first CRO from her elected position to work for directly for 100RC was widely criticised and cultivated a feeling among many urban stakeholders, including the civic society, that this project was merely a bridge for particular individuals to fulfil their professional aspirations, with the benefits for the city not being a major objective. Moreover, the example of Borough assemblies, where participation of citizens is still very limited and centred on specific individuals is rather representative of this business as usual ethos. Moreover, the lack of full institutionalisation of resilience-influenced changes in the municipal organogram, indicate such changes are finding difficulty ‘sticking’ and that instituting change and transformation has proved tricky. Interestingly, the new local administration does not seem keen on continuing with many of such changes that have been attempted or are in train. The danger of abandoning all types of interventions implemented throughout the Thessaloniki’s resilience journey is more than apparent. This topic is further explored on Chapter 8.

6.5.3 Future resilience challenges for Thessaloniki

The introduction of resilience in many of the governance practices in Thessaloniki has come with benefits but also with a number of challenges that need to be addressed for resilience-thinking to have a significant footprint in transforming traditional governance configurations and in order to avoid returning to ‘business as usual’ practices. Such challenges include encouraging more integrated and holistic conceptions of problems and solutions amongst historically isolated departments, but also further engagement of citizens and urban stakeholders that have not been sufficiently included in the first phases of the Strategy implementation. In Thessaloniki, as elsewhere, opening up the process of de-siloing and inviting institutions and citizens from across the city to actively engage in decision-making still involves convincing them of the benefits of their participation in the resilience building process and understanding of the key concepts around urban resilience. To

date, this remains a fundamental challenge for changing the local governance culture and nurturing a resilience-thinking praxis.

Institutionalising urban resilience is thus as a very challenging endeavour that requires strong leadership, shared values and political commitment. Whilst avoiding the uncritical translation of ‘best’ practices, the lessons from Thessaloniki generated by this study can be generalised to other cities facing similarly complex governance structures and corresponding governmental bureaucracy, and who are seeking to quickly transform urban governance and embed adaptability and resilience-thinking across their core functions. The building of capacities to transform governance and operate in resilient ways is, above all else, a long-term endeavour - a time-consuming process that requires development of trust between urban stakeholders and the local authorities. The process of trust-building however, is fragile and can be easily derailed due to political transitions that threaten the longevity of any new governing approach (in this case resilience), particularly when such transitions involves handing of reins to opposition political parties (Martin and McTarnaghan, 2018).

In Thessaloniki, the resilience journey until now has been led by the same administration; but, the recent change of administration in May 2019, poses a potential threat to the medium and long-term implementation of the Resilience Strategy. Experiences from other cities that participated in the 100RC network also reveal that new leadership has often intentionally rejected resilience-building efforts in an attempt to diminish the work of the previous administration. For instance, in Rio de Janeiro the participation of the city in the 100RC programme, which led to the development of the city’s Resilience Strategy, was followed by a change in local administration and a complete side-lining of the project’s findings and directions, which were perceived as acts of the previous administration and thus were immediately abandoned. This is a challenge that Thessaloniki, and other cities that have embraced programmes of resilience-building, will need to confront in order to

keep up the momentum around urban resilience and capitalise on the transformations already achieved.

Another challenge that many city administrations needs to face is the securing of funding for long-term implementation of resilience – a requirement that has been made more pertinent given the sudden demise of the 100RC initiative in mid-2019 (Bliss, 2019). In this situation the need to secure resources for the longevity of actions has become an imperative amongst the 100RC network. While Thessaloniki has fortunately managed to secure funding for the short-term (until 2022) from regional funds, chiefly to staff the newly established Urban Resilience Observatory¹, additional funding will need to be secured if resilience is to be more fully institutionalised. Furthermore, the establishment of a the Global Resilient Cities Network, a network of ex-100RC participants led by previous members of 100RC network with the initial inclusion of Thessaloniki, could offer additional opportunities for the continuation of Thessaloniki’s resilience journey in the future, while also providing a platform for local officials to share their experiences with other cities and learn from different examples. The emphasis of the Global Resilience Cities Network is on governance, and more specifically on a model that is more decentralized and centred around the city CROs themselves, through a global steering committee (Whybrow, 2020).

After all, Thessaloniki’s participation in the 100RC network has generated collaborations and peer-peer learning with other participant cities, and especially with the other Greek participant, Athens. A further catalyst of such city-city collaborations has been the Network Exchange on Cities and Migration, with the participation of Amman, Athens, Los Angeles, Medellin, Paris, Montreal, Ramallah and Thessaloniki, as well as other similar collaborations, which have flourished as a

¹ The Urban Resilience Observatory will monitor and track changes in ecological, social and economic level in order to analyse and update urban resilience metrics and will monitor the implementation progress of the activities set by Resilience Strategy. More detailed analysis on the work of the Observatory is provided in Chapter 8.

result of the extended network provided by 100RC. In other words, participation in 100RC positioned Thessaloniki in a pool of European cities dealing with resilience in practice, whilst enabling further international collaborations in the context of resilience implementation.

6.6 Conclusions

The longitudinal analysis of Thessaloniki's resilience journey highlights the potential of urban resilience to induce transformations in city governance. Resilience building is a long process that requires the mobilisation of a wide array of stakeholders, the local community and strong political will. Moreover, understanding resilience as a strategic goal can facilitate the adoption of new governance models that challenge traditional bureaucratic governance habits, allow new ideas to be mainstreamed and avoid, or fill, gaps between resilience theory and practice. Co-developing a multi-stakeholder vision for future urban development based on the principles of resilience as well as raising awareness and working across sectoral and departmental silos is key in facilitating the resilience building process. However, normalising or institutionalising resilience so that it become baked into the DNA of city operations is a very slow, unsure and highly contextual process, dependent on governance traditions, culture and political circumstances. In short, developing and operationalising a resilience strategy, or future vision, helps in illuminating the importance of integrated and holistic governance, but also the process of becoming truly resilient is never-ending and highly insecure (Pitidis and Coaffee, 2018). The institutionalisation process in the city of Thessaloniki is more extensively analysed in Chapter 8 of this study.

The next chapter moves away from governance transformations, focusing instead on the implementation challenges that emerge from the marginalisation of urban geological risk in Thessaloniki's Resilience Strategy. As will be analysed, resilience strategies frequently tend to overlook environmental threats and prioritise socio-economic stresses, generating serious implementation challenges for cities seeking to reach their resilience potential.

Chapter 7 - Investigating the influence of Urban Geological Risk in Thessaloniki's Resilience Strategy

7.1 Introduction

This chapter moves away from general issues of urban governance and the influence of resilience thinking in city-operations, to investigate considerations of urban geological risk¹ in the implementation of urban resilience. As this chapter will illuminate, Thessaloniki's Resilience Strategy was designed with a clear focus on everyday resilience and urban governance, disproportionately emphasising actions for tackling chronic stresses rather than acute shocks – in 100RC terms. This was an intentional decision made by the city's Resilience Office as they felt that the city is *'not particularly threatened by extreme environmental shocks'*, (Interview with city official). However, the evidence and history books support the notion that geological risk is a major peril for Thessaloniki, and its marginalisation in strategic visioning and decisions connected with urban development could potentially generate critical problems for the city in the future.

The situation in Thessaloniki also reflects a wider challenge of incorporating geological risk, deriving from urban geohazards, into strategic urban policies in a meaningful and systematic way. As already mentioned in Chapter 3, this is not uncommon in the urban resilience literature. Here the emphasis of many resilience efforts is framed in terms of mitigation of risk; either through hard engineering solutions or through 'softer' social capacity building practices, driven by adaptability, transformability and preparedness (Davoudi, 2012; Brown, 2014). However, in both hard and soft solutions, geological risk tends not to be well

¹ The definition of urban geological risk for the purposes of this study is given in subsection 7.2.

integrated with the more process-orientated aspects of urban policy and planning, which are often prioritised.

By analysing two carefully selected mini case studies, this chapter also attempts to illuminate the underlying vulnerabilities of the built environment in Thessaloniki and deconstruct the ‘natural disasters’ narrative that many disaster scholars still embrace (see Chmutina and Meding, 2019). As shown in this chapter, Thessaloniki’s prior catastrophic experiences (and future vulnerability) with earthquakes and flash floods are inextricably connected to lack of planning integration, the condition of the building stock and an absence of a concise regulatory framework to prevent urban sprawl in disaster prone areas.

Moreover, as previously argued, it is fundamental that those tasked with enhancing urban resilience view city systems holistically, i.e. understand the multiple systems that make up the city and the interdependencies in order to reduce exposure and vulnerability to natural hazards (Da Silva and Moench, 2014; Rodin, 2014). However, to date, the appreciation and integration of geological risk into Resilience Strategies in the 100RC network has depended on local politics the prioritising of shocks and stresses by each local authority. This has raised a series implementation challenges in advancing resilient urban development. Here as geohazards (are predicted to) occur less frequently than election cycles, the potential impact of geological risk is marginalised in the design of resilience strategies leading to the emergence of resilience-policy implementation challenges for local authorities.

Analysing such implementation challenges, and the integrating of geological and geomorphological conditions into risk reduction measures within emerging Resilience Strategies in Thessaloniki, is the main focus of this chapter. More specifically, this chapter focuses on the two specific geohazards - earthquakes and surface flooding - that were identified by the Preliminary Resilience Assessment as the most imminent acute shocks for the city. As such, the first section briefly outlines the methods used to assess geological risk in the city. The second section reviews the geological context and natural hazard susceptibility in the Thessaloniki

city region. After, the third section proceeds with an analysis of the results from two carefully selected neighbourhoods, which illuminates the main implementation challenges and the dangers of not properly considering geological conditions when devising urban resilience strategies. Finally, the main implementation challenges identified for the city of Thessaloniki are presented along with some recommendations for potential improvement of the current Resilience Strategy².

7.2 A methodological approach to assessing geological conditions

This chapter addresses the implementation challenges for Resilience Strategies to consider geological risk. Its methodological approach follows the hypothesis that certain resilience policies tend to overlook geological risk, a tendency that often results in the generation of policy implementation gaps. Geological risk is conceptualised following the classic definition: Risk = hazard x vulnerability x exposure. In Thessaloniki's case, hazards are represented by the most imminent acute shocks identified for Thessaloniki in the Preliminary Resilience Assessment, namely earthquakes and surface flooding, vulnerability by the underlying geology and urban geomorphology of the urban settings, and exposure by the configuration and condition of the built environment.

As part of this study a re-examination of the geology and physical environment of the whole region covered by the official boundaries of the Metropolitan Area of Thessaloniki (Figure 7.1) was carried out. Through this exercise, undertaken at city-scale level, the lithological, superficial geology and topographical differences and gradients that make the city susceptible to geohazards (seismic hazards and surface flooding) were identified. Additionally, a review of the history of natural hazard

² The emphasis of this discussion is on the strategic planning level and as such technical and engineering projects that have been initiated to reduce vulnerability from natural hazards, will not be detailed.

events that affected the city as per the records in the Greek national catalogues of hazard events was also undertaken³.

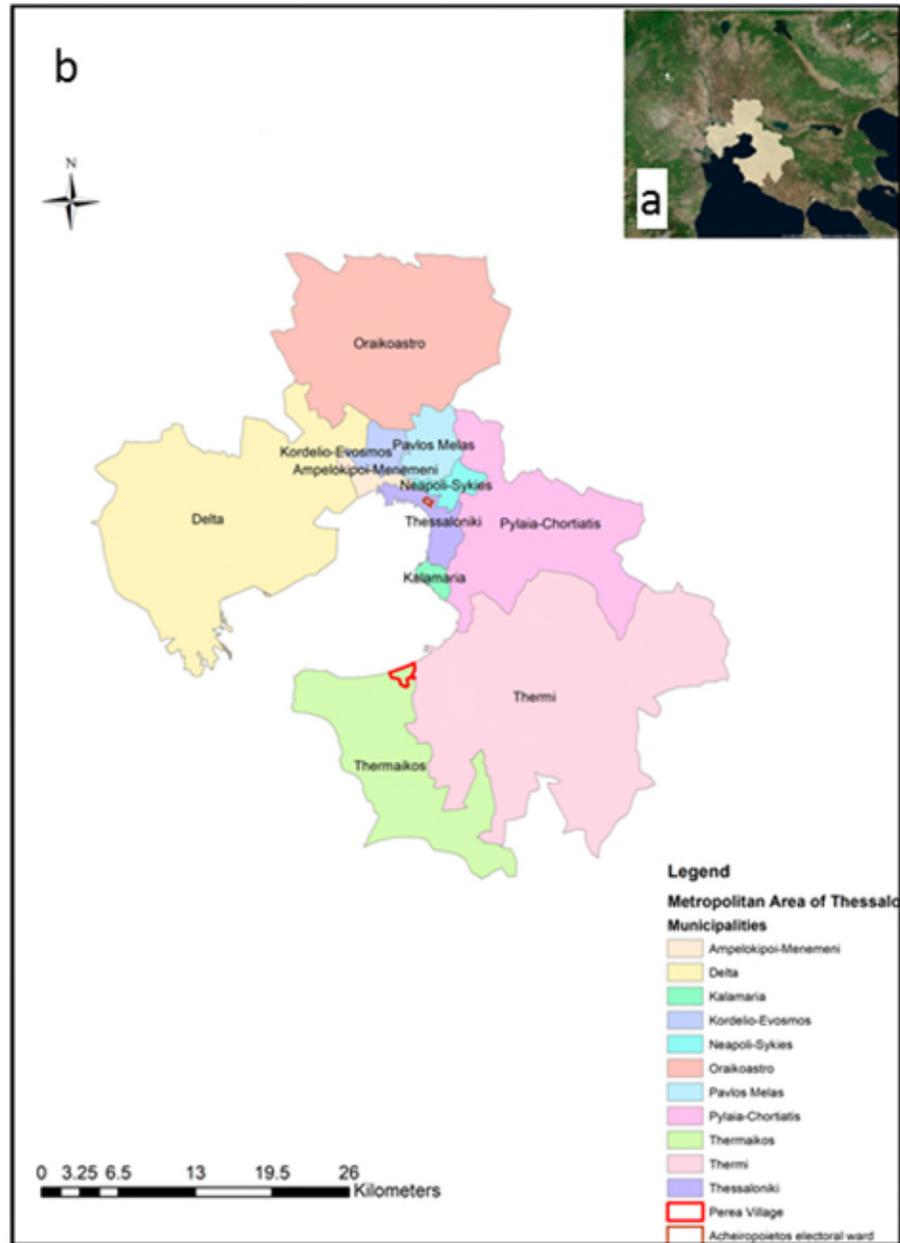


Figure 7.1: (a) Geographic location of the Metropolitan Area of Thessaloniki; (b) the 11 municipalities with indication (red boxes) of the location of Acheiropoietos and Thermaikos neighbourhoods.

³ Table II.1 in the Appendix II section lists the spatial data used for this purpose and their respective sources.

The spatial intersection between the hazardous geological and topographic conditions and the characteristics of the built environment that could exacerbate the impact of earthquakes and floods was investigated. In particular, the historical urbanisation of Thessaloniki was reviewed, with significant attention paid to deposits and stratifications in the older city centre, as well as more recent urban sprawl in the adjacent municipalities. This was performed by combining different sources of information (see also Appendix II for details and data sources):

- location, footprint and use of buildings, roads and infrastructure as per the official datasets available from the city data portal, Open Street Maps and Copernicus Land Monitoring Service Urban Atlas;
- thickness and distribution of the anthropogenic deposits published in the specialist literature, particularly by Makedon, Chatzigogos and Spandos, (2009) - but others as well- which was also the main reference for the spatial classification of buildings in the city centre by building code, damage mapped after the major earthquake occurred in 1978, and thickness of the underlying deposits;
- location and extent of new urban development as evidenced by analysing the time series of high-resolution satellite optical imagery (2003–2017) available in Google Earth and Bing Maps.

Figure 7.2 depicts schematically the conceptual research approach followed in this chapter.

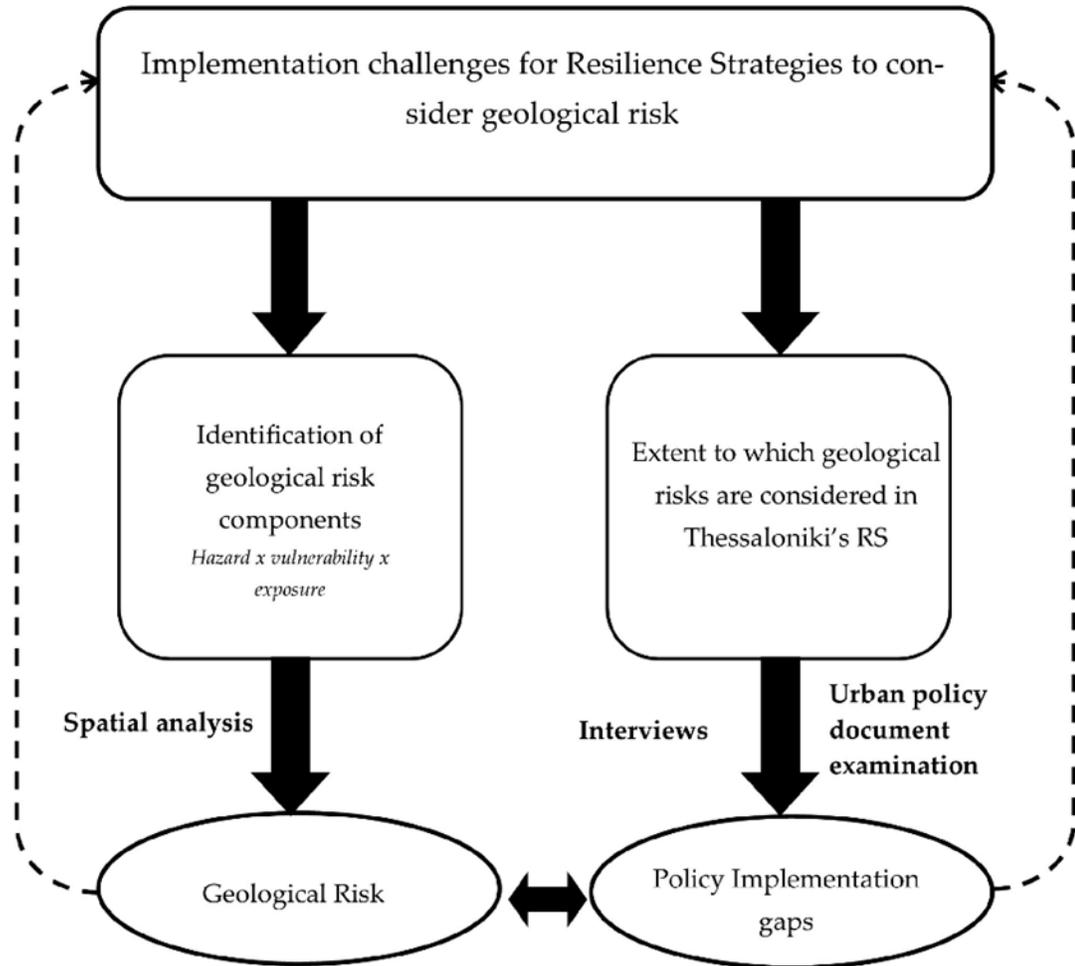


Figure 7.2: Chapter 7 Research approach

A base-map of Thessaloniki's surface and subsurface environment was also created. The geological map of the Thessaloniki Metropolitan Area was digitised, as well as the engineering geology map of the city and maps of geomorphological interest, such as urban fills in the historic centre of the city and combined it with other publicly available datasets producing a visual representation of the city's Metropolitan Area. Administrative criteria were applied in choosing the two focus areas, i.e., an electoral ward in the historic centre of the city and a municipality in the southern side of the metropolitan area. Both areas have had disastrous experiences with earthquakes and surface flooding respectively. Such experiences have been largely induced by the unregulated urbanisation and poor integration of geological insight in local planning policies.

To perform this qualitative spatial analysis, the abovementioned data were combined to create maps of the metropolitan area in ArcGIS and QGIS, eventually focusing on the following two selected areas: Acheiropoietos in the city centre and Perea in the Thermaikos Municipality. In the case of Acheiropoietos the building density of the residential building blocks was measured through the utilisation of the floor area ratio index (FAR)⁴. The mean number of floors was also added as well as building heights. Furthermore, the mean and minimum distance of the building blocks from urban free spaces was calculated, through the utilisation of the centroids of the respective free-space lots and building blocks. The process followed for spatial data analysis is presented in Figure 7.3.

As a last step, the spatial analysis was complemented with data collected from interviews with city officials (including Thessaloniki's Chief Resilience Officer and the members of the Municipality's Resilience Office) and a detailed analysis of Thessaloniki's resilience policy documents. This process assisted in identifying the major implementation challenges for the Resilience Strategy, connected to geological risk and the aspirations of the city, its vision and planned actions to achieve the goal of reducing geological risk. These are detailed in the subsequently sections of this chapter.

⁴ FAR is defined as the ratio of the total square meters of a building divided by the total square meter of the lot where the building is located. In principal, higher FAR numbers tend to indicate more dense urban areas. In this way, the index is accounting for the whole total floor area of a building and not only for its spatial footprint.

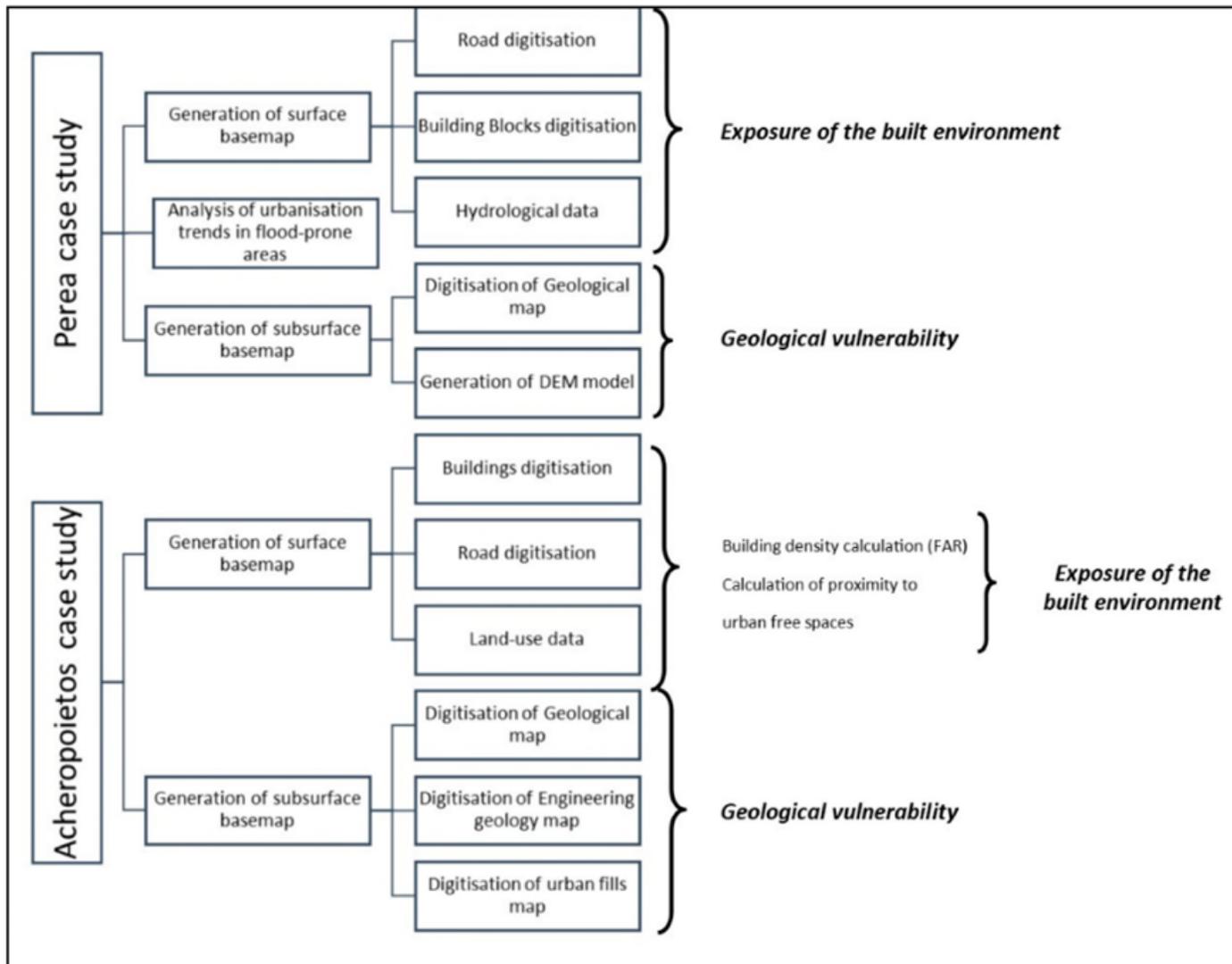


Figure 7.3: Spatial data analysis process for Chapter 7

7.3 Thessaloniki and urban geohazards

The participation of Thessaloniki in the 100RC network was itself a great challenge for the city. The lack of familiarity with resilience principles and policies has arguably been the most important challenge for Thessaloniki’s Resilience Strategy, as new concepts and principles introduced for the first time to local officials, who were asked to incorporate them to the organisational chart of the city. Thus, the first step of the Resilience Strategy was to clarify the city’s strengths and weaknesses, identify potential opportunities and threats and create an effective and viable vision for the city (see Chapter 6 and Chapter 8).

In this Preliminary Resilience Assessment earthquakes and surface flooding were identified as the priority shocks or stresses for the city. A historical review of the major shocks, either natural or human-induced, was also included in this assessment. Figure 7.4 is a modified version of the Thessaloniki Resilience Timeline that was published in the Preliminary Resilience Assessment (City of Thessaloniki, 2016).

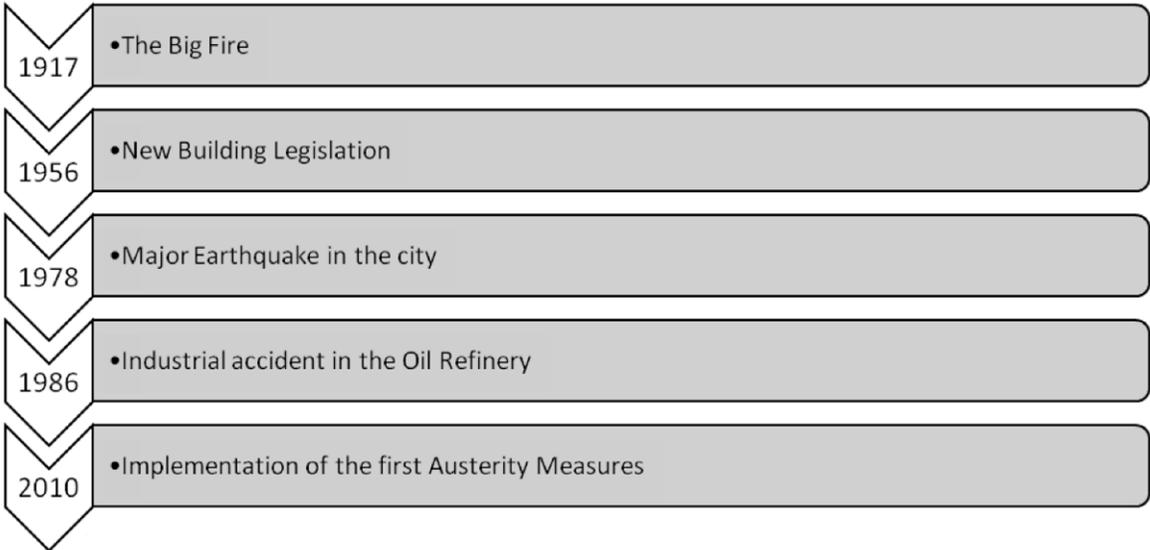


Figure 7.4: Thessaloniki hazard timeline (adapted from City of Thessaloniki, 2016).

These shocks were recognised as having generated either positive or negative impact on the urban environment and have also shaped city policies for disaster management and risk reduction. On the broad level, this confirmed that the city, prior to starting its official resilience journey, already had a history of positive relationships between hazards and urban planning and design, despite the fact that this process has not always constant or linear.

Other primary shocks identified in Thessaloniki's Preliminary Resilience Assessment include heatwave, urban fires and atmospheric pollution, but are not directly connected to urban geohazards.

7.3.1 Seismic Susceptibility in Thessaloniki

Thessaloniki's recent history has been significantly marked by the 1978 earthquake. Therefore, earthquakes have since been perceived as major threats for the city's urban environment by local authorities, academic institutions and local citizens.

Thessaloniki's seismic susceptibility primarily derives from geological subsurface in the Metropolitan Area. The geological map of the Metropolitan Area demonstrates the heterogeneity of lithologies upon which the city has developed throughout the years (Figure 7.5a). Holocene deposits, red clay and sandstone marl dominate the southern and western parts, while the higher altitudes of the eastern part, the Chortiatis mount rises, are primarily covered by various metamorphic formations. Thessaloniki's historic centre in particular, is located in the junction of three different lithologies, each characterised by different depth (Figure 7.5 a, and b). This geological heterogeneity increases earthquake susceptibility as the various subsurface conditions possess different geotechnical characteristics and thus different levels of resistance to earthquake events.

Moreover, after many years of continuous inhabitancy, the historic centre consists of large areas of filled ground with different characteristics and attributes (Makedon, Chatzigogos and Spandos, 2009). In general, buildings located in areas with deeper urban fills are much more prone to earthquake damage (Watts and Charles, 2015).

In Thessaloniki's case, the city centre is divided into three zones urban fills have been identified by Makedon, Chatzigogos and Spandos (2009) (Figure 7.6). In Zone II (Figure 7.6), an area within the limits of the historic city-centre, urban fills exceed the average fills of similar size and historical background cities by far reaching even 15 m walls¹. This area has also been identified as the most prone to building damage from a 100-year earthquake event² (Makedon, Chatzigogos and Spandos, 2009).

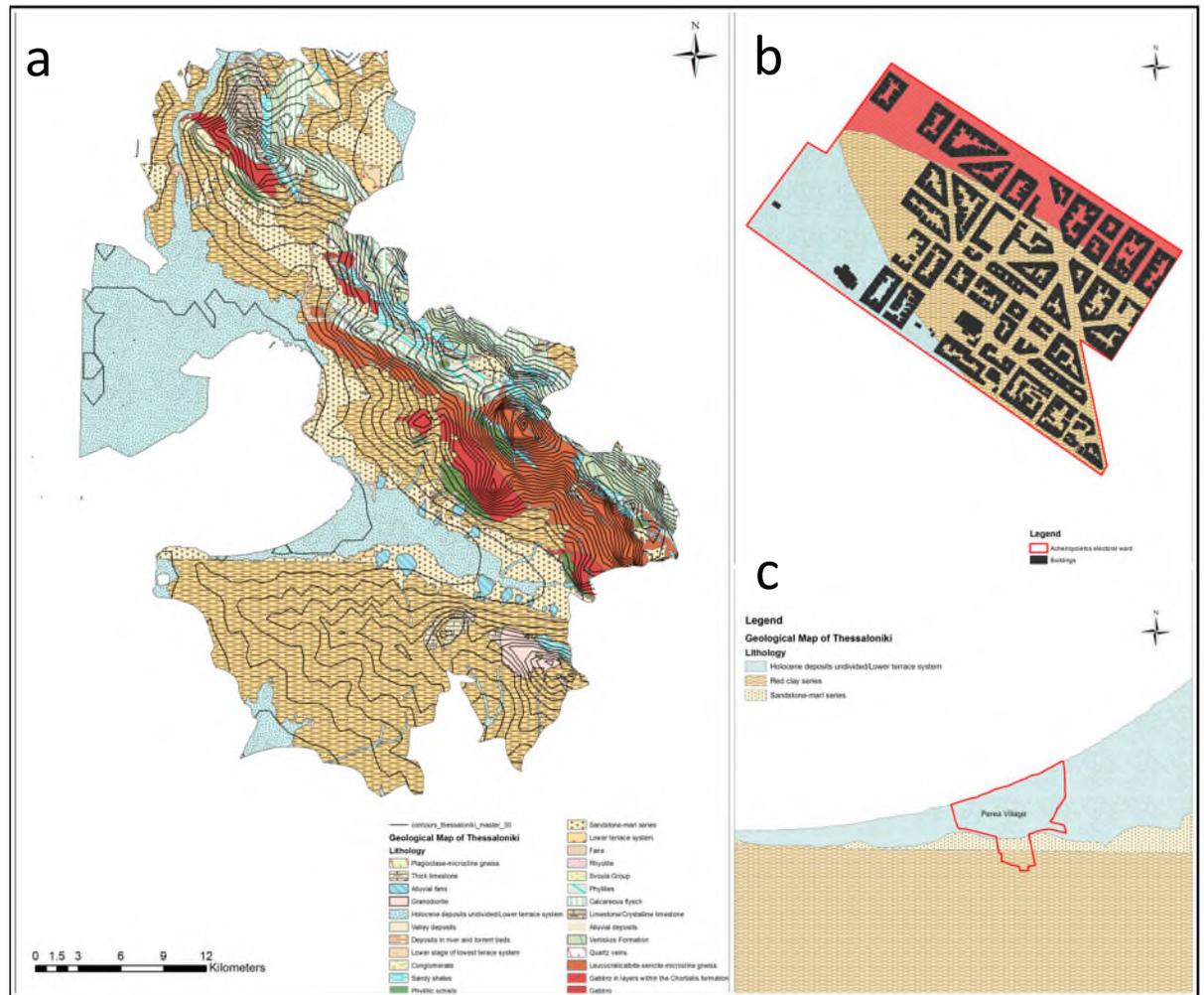


Figure 7.5: (a) Geological map of the Metropolitan Area of Thessaloniki with 300 m contours. (b) Bedrock geology in Acheiropoietos; (c) bedrock geology in Thermaikos neighbourhoods.

¹ Cities with deep urban fills and similar historical background as Thessaloniki (such as Rome) have been identified with fills 6-10m deep.

² An 100-year earthquake is an earthquake that is expected to happen once in an 100 year period.

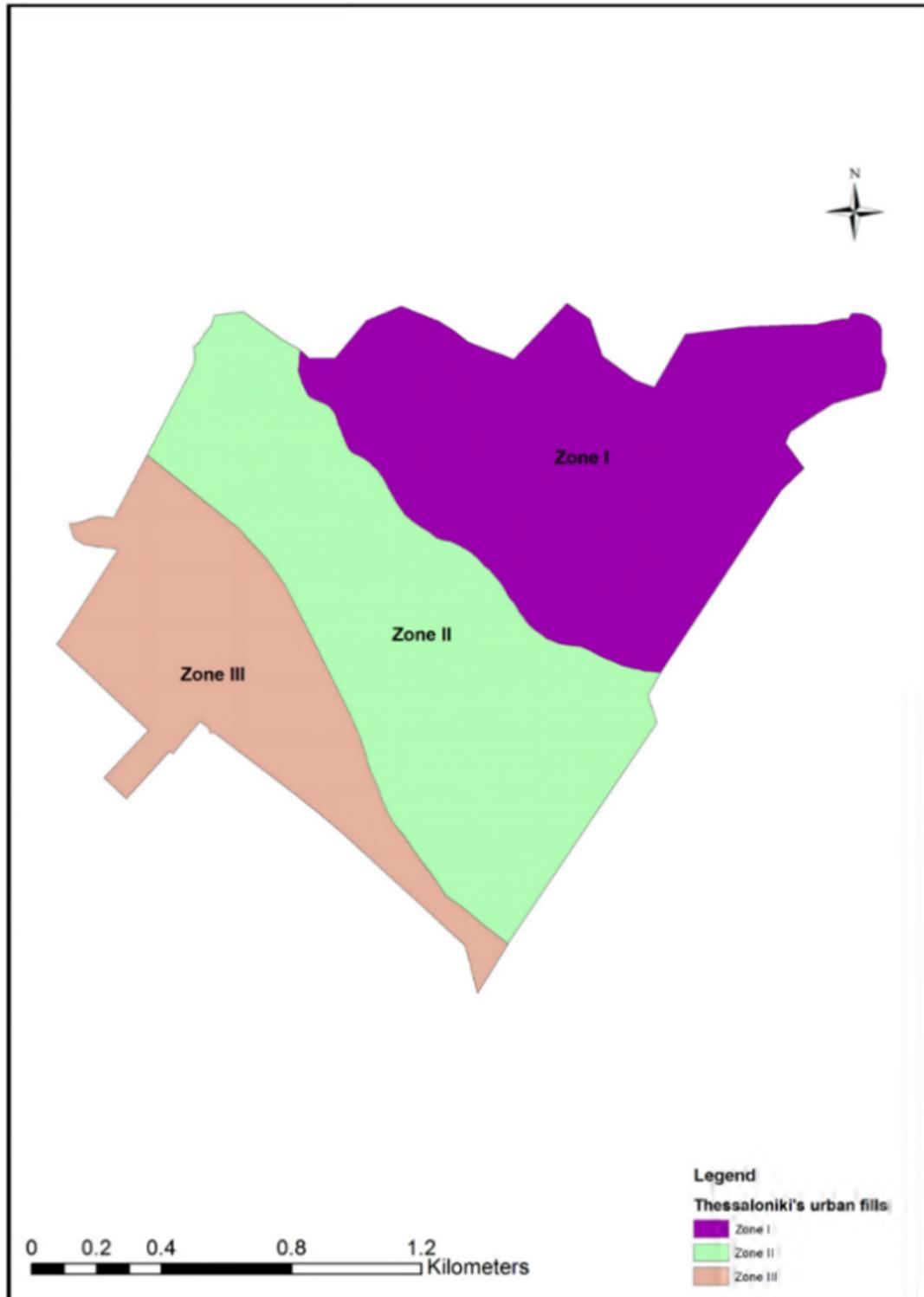


Figure 7.6: Map of urban fill thickness underneath the historic city centre (modified from Makedon, Chatzigogos and Spandos, 2009).

From a tectonic perspective, Thessaloniki belongs to the Circum-Rhodope zone, which traverses the central part of Macedonia in northern Greece at a general NW–SE direction and lies between Axios zone and the Serbomacedonian massive (Figure 7.7). Even though Thessaloniki is partly located in the least active seismic zone (Axios), the Serbomacedonian massive lying nearby is a geotectonic zone presenting very high levels of seismicity (Makedon, Chatzigogos and Spandos, 2009). Apart from the 1978 earthquake, which was the highest of a series of approximately 100 earthquakes that occurred in a period of three days, seismic activity in Thessaloniki is still more than apparent, with several light, moderate and strong events occurring almost every year.

The current seismic susceptibility of Thessaloniki's built environment to damage also has its roots in past construction practices. The city suffered wide structural damage during the 1978 earthquake from differential settlement on soft sediments, particularly within its historic district (Pitilakis *et al.*, 2007). In parallel, the absence of an organised and robust planning regulatory framework contributed in dense, unregulated and earthquake vulnerable urban planning. This absence has led to urban expansion in hazard-prone areas, particularly within the city centre (no detailed seismic micro-zonation was present at the time), lack of open public spaces (potential assembly areas during evacuations) and high probability of cascading effect due to the proximity of buildings to one another.

The building stock of the city consists primarily of Reinforced Concrete (R/C) and Unreinforced Masonry (URM) buildings designed without complying to any building code or according to older building codes³. Buildings constructed before the first building code in 1959, (known as 'pre-code' buildings) found to have similar performance to the ones based on the 1959 building code (Penelis *et al.*, 1989). Additionally, the city accommodates 340 impressive historic monuments from the Roman, Ottoman and more accurately Byzantine period. Most of them are

³ The first building code in Greece was published in 1959 by a Royal Decree (Manos, 1994).

religious settings (i.e., churches, mosques) and they are predominantly located within the Municipality of Thessaloniki, and are extremely vulnerable to earthquakes, as they are built in thapst and without complying to any code whatsoever.

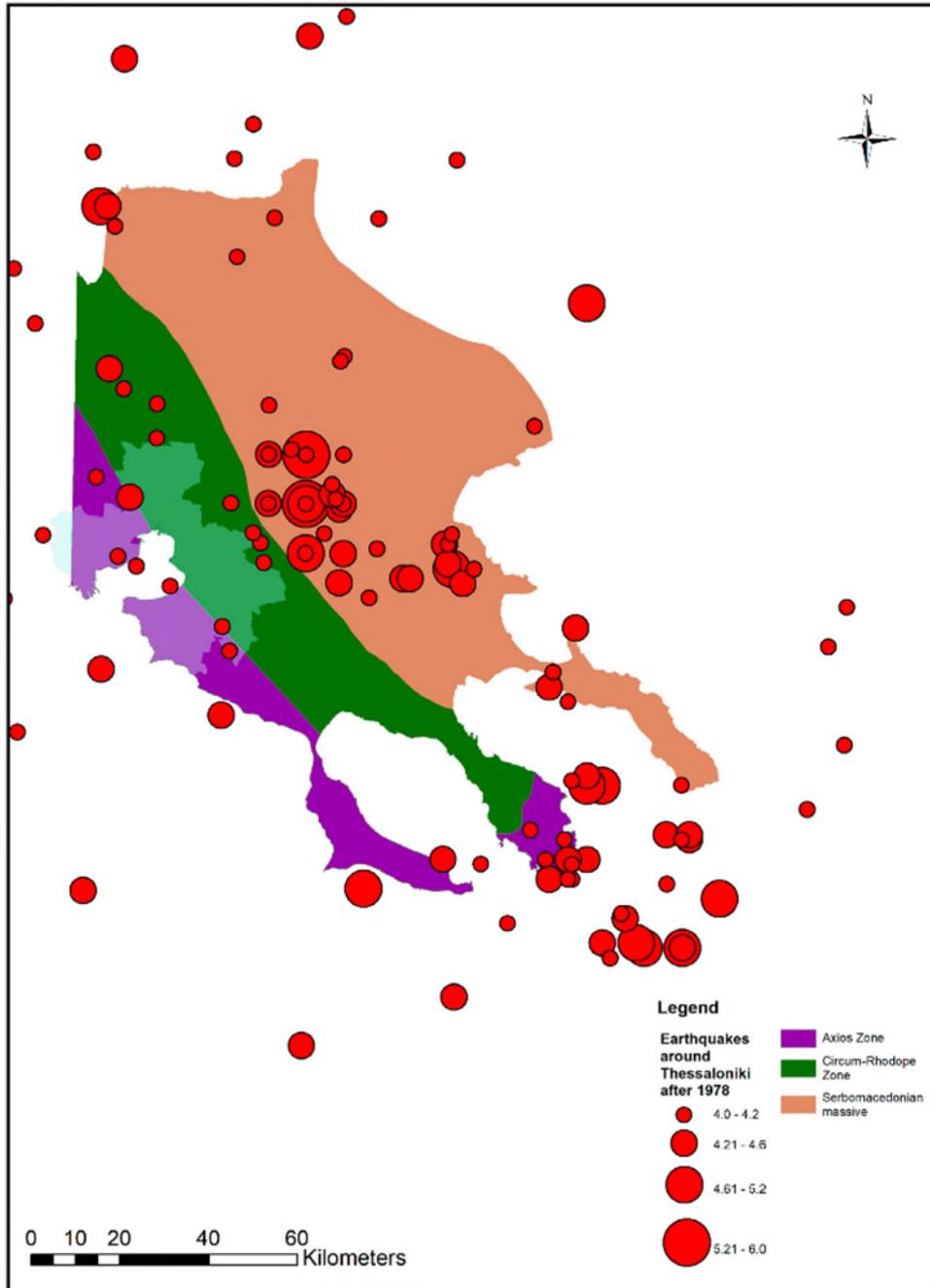


Figure 7.7 Earthquakes over 4.0 Richter magnitude around Thessaloniki Metropolitan Area after 1978 and the geotectonic zones of Northern Greece

The 1978 earthquake, which resulted in the death of 49 people, the collapse of a nine-storey R/C building and the damage beyond repair of 4.5% of the city's building stock (Penelis *et al.*, 1989), induced a massive reform of the building 1959 code, especially within the historic centre of the city (Pitilakis *et al.*, 2007). Yet, despite this reform most constructions following the old code and presented similar engineering performance (Pitilakis *et al.*, 2007; Makedon, Chatzigogos and Spandos, 2009), as the historic centre of Thessaloniki has been predominantly built with the use of R/C as a result of the Great Fire of 1917 and has experienced very low reconstruction rates after the 1978 earthquake, due to the already high building densities and semi-regulated urban planning⁴ (Kappos, Panagopoulos and Penelis, 2008).

Since the 1978 earthquake the seismic code in Greece has been changed and upgraded several times (Manos, 1994; Makedon, Chatzigogos and Spandos, 2009). The most important reform was the release of the New Seismic Code for Building Structures in 1984, which was introduced after the earthquakes in Thessaloniki (1978) and Alkionides (Athens) 1981. This code divided Greece into three different seismic zones, with associated regulatory frameworks for new constructions. In this division of the country to different seismic zones, the first one (Zone I) corresponded to areas with relatively low earthquake activity, the second one (Zone II) to areas with moderate earthquake activity, and the third one (Zone III) to the areas with the most intense seismic activity⁵ (Manos, 1994). Thessaloniki was included in Zone II, meaning that it was not compelled to retrofit all the existing buildings and infrastructure (also due to the lack of funding), but national and local

⁴ It is worth noting that rubble from the 1978 seismic damage has contributed, along with other geomorphological factors, to the formation of current urban fills. Based on an analysis of the composition of Thessaloniki's urban fills, Makedon, Chatzigogos and Spandos, 2009 projected that a seismic event could still inflict substantial damage in the historic centre.

⁵ It has to be noticed here that Greece is a country with very intense seismic activity and thus even areas designated in Zone II typically experience a significant number of earthquakes relatively often.

officials needed to pay extensive attention to the potential impact of an earthquake in the city.

The performance of Thessaloniki's building stock in case of an earthquake has been widely analysed in the literature, via models, risk assessments and scenario-based methodologies (Penelis *et al.*, 1989; Kappos *et al.*, 2006; Pitilakis *et al.*, 2007; Kappos, Panagopoulos and Penelis, 2008; Riga *et al.*, 2017). It is beyond the scope of this chapter to analyse in detail the assessment methods used in the cited studies; however, their common conclusion is that the city, and particularly its historic centre, would be severely impacted by an earthquake similar to the one that occurred in 1978. Around 10–12% of the current buildings located within the Municipality of Thessaloniki are expected to suffer severe damage, while the estimated costs of repair for direct damage reach approximately €1,5 Bn (Kappos, Panagopoulos and Penelis, 2008). Moreover, indirect economic and cultural blows are expected to be inflicted by damage to historic monuments, which serve as tourist sites and preserve Thessaloniki's urban identity.

In addition to building codes, urban design following the typical approach favoured by other Greek cities plays a key role in intensifying Thessaloniki's exposure to catastrophic damage in case of seismic events. The historic centre and inner zones are characterised by high densities of buildings, a lack of public open spaces and green spaces, and insufficient parking lots (Gospodini, 2012). Narrow streets and unregulated urban development constrain the ability of local and national authorities to design appropriate evacuation routes in case of emergency, impeding the role of civil defence in planning disaster management. The lack of open spaces (potential assembly areas) and the ageing building stock, as highlighted in the Preliminary Resilience Assessment, represent major concerns for the city. Such concerns, unaddressed by the Resilience Strategy are explored in a neighbourhood study in section 7.4.

7.3.2 Surface/Groundwater Flooding

Groundwater flooding (also known as surface flooding) has been recognised as the second most imminent acute shock for Thessaloniki by the Preliminary Resilience Assessment. Thessaloniki's current urban area ranges in a NW–SE direction between the hills of Oreokastro and the mount of Chortiatis (Figure 7.1a). In parallel, the Metropolitan Area of the city extends further in the west up to Loudias River and south, surrounding the whole areas around the Thermaikos gulf. From a geomorphological perspective, the city's elevation starts at sea level and reaches almost 950 m around Chortiatis, while within the urban area it does not exceed 150m, with smooth ascents (Makedon, Chatzigogos and Spandos, 2009). This morphology favours the outburst of surface flooding phenomena to specific downstream sites in the Metropolitan Area. For instance, the existence of streams and gullies in the relatively low elevation areas and in close proximity to residential settlements in the municipality of Thermaikos has played a central role in the accumulation and channelisation of the excess of water during heavy rainfall events (see section 7.5). Similar issues have been identified in the Municipality of Delta in the western part of the Metropolitan Area, where three different rivers flow in (see Raspini *et al.*, 2014).

Moreover, the geological heterogeneity of the Metropolitan Area analysed above, has created divergent geographies susceptible to distinct types of geohazards. For instance, the Holocene deposits in Delta Municipality and Perea Region (Figure 15c) lead to land subsidence whenever farming activities and urban development require high levels of groundwater abstraction (Raspini *et al.*, 2013, 2014). Furthermore, during the last decade, continuous pumping has led to the exposure of low-lying areas to surface flooding, due to the recovering of groundwater levels and constrained drainage of the water flow as a result of the deeper topography (Raspini *et al.*, 2013)

The review of Greek national catalogues of natural hazard events and scientific literature on nation-wide flood hazard and risk assessment (see Appendix II)

confirms that the whole prefecture of Thessaloniki is highly susceptible to flash floods. Flash floods normally occur as a result of substantial precipitation in areas with limited ground absorption capacity; they may also cause cascading urban geohazards, such as landslides, sinkholes, and erosion (Cao *et al.*, 2016). Moreover, they are extremely complex phenomena, which take place in short temporal periods and thus are very challenging to predict (Gaume *et al.*, 2009). As global climate change is expected to increase the frequency of extreme weather incidences, there are more compelling reasons for local authorities to focus on addressing their impact.

From a historical perspective, the spatial distribution of the flood events recorded in 1880–2010 and found that the Metropolitan Area of Thessaloniki is second in Greece after Athens, for either total number of events per prefecture or number normalised per 100 km (Diakakis, Mavroulis and Deligiannakis, 2012)². There is further evidence for an increased clustering of flood events around the Thessaloniki area, with a total of 27 events in the decade 2001–2011, of which 71% were flash floods⁶ (Papagiannaki, Lagouvardos and Kotroni, 2013; see also Nikolaidou *et al.*, 2014). In Thessaloniki, geology can also favour surface flooding. Quaternary lower terrace alluvial deposits and red clay, which tend to be impermeable, exist predominantly in the southern and eastern parts (Figure 15a, c), and are highly susceptible to runoff water and inevitably to enhanced the potential for serious flooding downstream, during heavy rainfall events⁷.

⁶ Indeed, across the Metropolitan Area of Thessaloniki, severe floods occurred on 8 October 2006 and 21 September 2011 (both events were also studied by with the aid of Earth Observation data from satellites), 16 July 2014, 7 September 2016 and 11 May 2018.

⁷ This runoff water afterwards concentrates in ravines and streams, forms larger volumes of water and frequently joins in a fast-flowing mass of water and debris.

7.4 The Acheiropoietos Electoral Ward Case Study

7.4.1 Geological Vulnerability

The first case study presented in this Thesis is the electoral ward of Acheiropoietos. Acheiropoietos neighbourhood is located within Thessaloniki's Municipal Unit A and is a typical example of an earthquake vulnerable neighbourhood within Thessaloniki's historic centre. The neighbourhood stands upon three different types of lithology (Figure 7.5b): Holocene clay-sand pebble alluvial Deposits (SE), sandstone marl (CE) and the superficial, metamorphic gneiss, epigneiss and green schists and of the Chortiatis magmatic suite, thus having increased vulnerability as explained earlier in this chapter. Anastasiadis, Raptakis and Pitilakis (2001) include Acheiropoietos among the areas most prone to damage from an earthquake with moderate to high intensity. Factors that can act detrimentally in such circumstances include: slight local topography, large inclination of the buildings with regard to the top of the bedrock, the presence of superficial artificial fills with great thickness (up to 13 m) and the strong lateral variations regarding seismic and geophysical parameters of the high plasticity of the clayey formations. Additionally, the low engineering behaviour (i.e., the capacity of the ground to bear construction and buildings) of loose alluvial deposits in conjunction with the unstable metamorphic formations, and the thick layer of historical fills and embankments lying between the surface and bedrock geology, produce a complex, heterogeneous geological environment with unpredictable behaviour in turbulent conditions.

Finally, the presence of thick urban fill below the study area (see Figure 6) exacerbates its earthquake vulnerability. The high damage ratio of this historic fill embankment is also closely correlated with the current condition of the building stock, which is ageing and not properly maintained.

7.4.2 Exposure of the Built Environment

Acheiropoietos is a residential area characterised by dense building blocks of similar typology (6–8-storey buildings), the majority of which are used as general housing, while some blocks accommodate educational facilities, and more specifically schools, denoting the continuous presence of vulnerable populations such as students in the area (Figure 7.8a). The built environment of the neighbourhood also includes some important historical monuments and buildings, such as Thessaloniki's Roman Forum, the 11th-century CE Byzantine Church and an Ottoman Hammam, which underwent extensive restoration after the earthquake in 1978.

Furthermore, this neighbourhood was almost entirely built under the low building code (pre-1984) and provides a vivid example of the damage caused by the 1978 earthquake. In more detail, out of the 440 residential buildings within the neighbourhood more than 80% have been built under the low building code (pre-1984), and 18% of buildings within the neighbourhood experienced moderate or serious structural damage from the 1978 earthquake (much higher than the city's overall ratio of building stock affected) (Theilen-Willige *et al.* 2012).

High building density, in conjunction with increased building heights and the proximity of buildings to one another, also increase the exposure of the built environment to seismic events. Acheiropoietos has a mean building density (FAR) of 3.37, a number similar to most of the neighbourhoods within the historic centre of the city and significantly higher than the other parts of the city (Verani, Pozoukidou and Sdoukopoulos, 2017). Figure 7.9 demonstrates the high building density and number of floors of the building blocks within the study area.



Figure 7.8: (a) Land use (building block level); (b) bedrock geology underneath the buildings in Acheiropoietos.

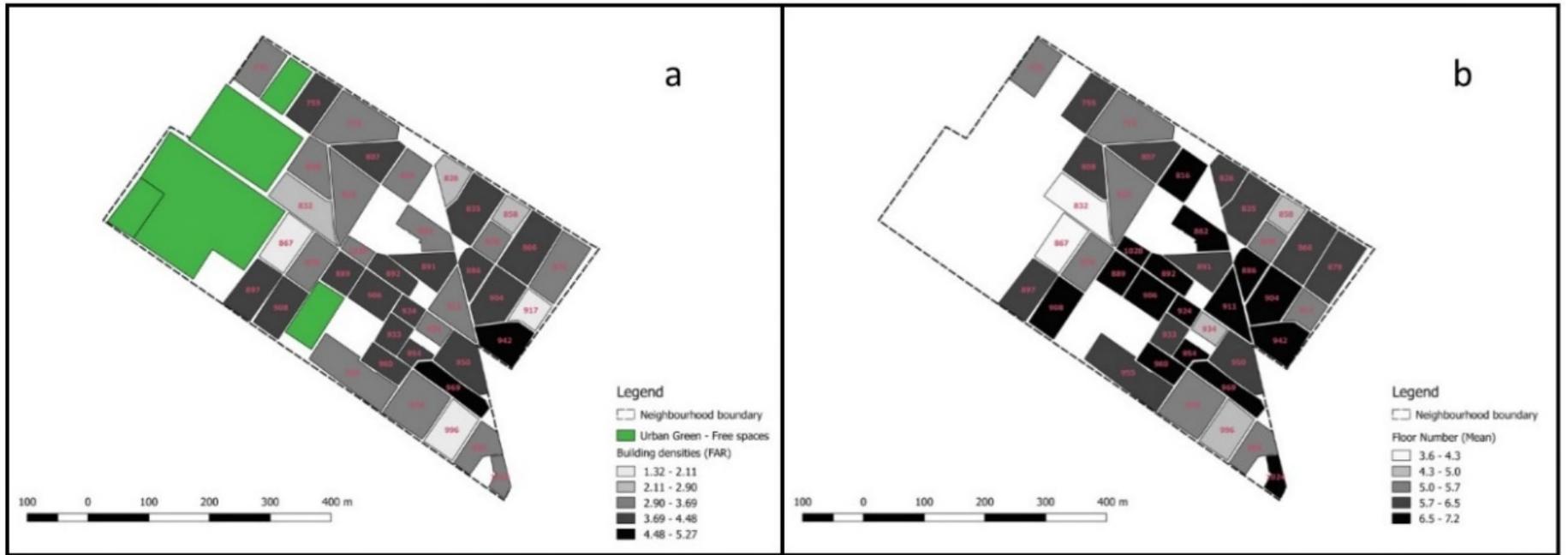


Figure 7.9: (a) Building densities and (b) floor numbers per residential block in Acheiropoietos neighbourhood

Average building heights are also quite high, 6.07, a factor that, combined with the proximity of buildings mentioned above, could result in ‘domino’ collapse during an earthquake. ‘Domino’ collapses are one of the most significant reasons for major fatalities in urban earthquake events. Rubble accumulation from building collapses can obstruct narrow streets during evacuation and restrict the access of emergency responders to the site. In the Acheiropietos neighbourhood, even though there is a greater presence of open spaces than in other urban neighbourhoods of the historic centre (26% of the total land coverage), some of the building blocks with very high building densities (i.e., 866, 879, or 1024) are more than 350 m away from them. This fact, in conjunction with the very narrow local streets in the neighbourhood (<4 m), could impede large-scale evacuations in the case of earthquake disasters (Yamamoto and Li, 2017). Table III.1 in the Appendix III presents the urban features and characteristics identified in the Acheiropietos neighbourhood by building block, including building heights, density and mean and minimum distance of each residential block from a free space within the neighbourhood. Figure 7.10 also visually highlights the high density of building blocks in the study area as well as the narrowness of the streets of the peripheral neighbourhood.

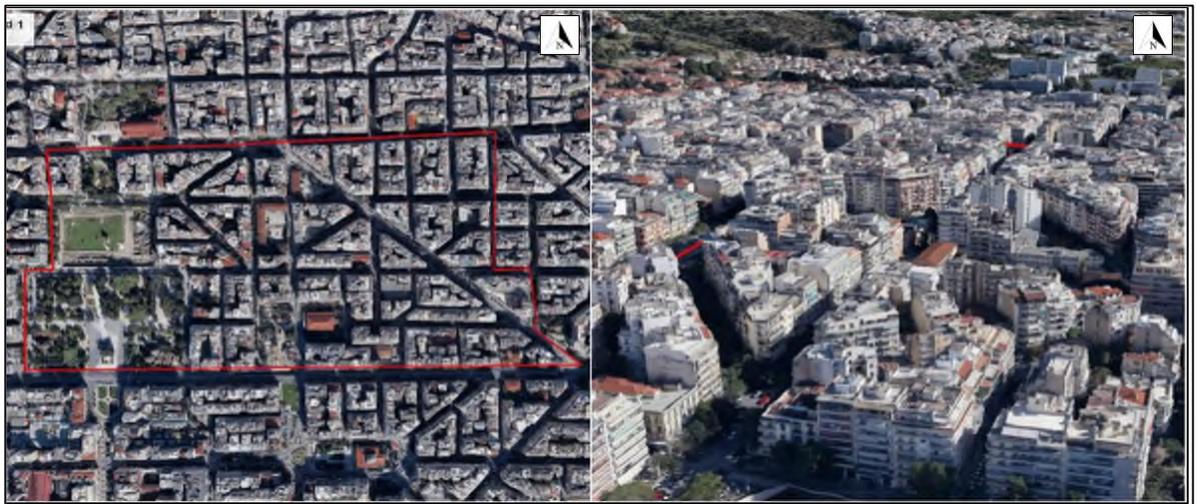


Figure 7.10: (a) Aerial nadir view of Acheiropietos neighbourhood; (b) oblique view of Acheiropietos neighbourhood. Both figures highlight the high density and height of buildings and narrowness of the streets in the area (© 2017 Google).

To sum up, Thessaloniki's geological risk of earthquakes, particularly when referring to its historic centre, is clearly visible in the Acheiropoietos case study. The component of vulnerability comprises high seismic activity, different layers of bedrock geology and thick and damage-prone urban fills, while exposure consists of ageing building stock, high building densities, difficult access to free spaces (potential assembly points in case of an earthquake) and the constant presence of vulnerable populations in local schools.

7.4.3 Earthquakes in Thessaloniki's Resilience Strategy

By analysing Thessaloniki's published resilience documents and from interviewing resilience officers, a struggle in the operationalisation of the measures reduce seismic risk is evident. Although earthquakes as a hazard have been prioritised in both the Preliminary Resilience Assessment, where it was even identified as the most imminent acute shock for the city, and the Resilience Strategy, as the main topic of the newly established 'City Resilience Day' (*Goal 2, Objective A, Action 6*), no significant actions to deal with vulnerability and exposure of the built environment are included in the rest of the document.

More specifically, geomorphological vulnerability has not been included in either document, demonstrating the absence of geological insight during the preparation of the Resilience Strategy, despite the collaboration with the Institute of Engineering Seismology and Earthquake Engineering (ITSAK) and the Aristotle University of Thessaloniki. Moreover, exposure of the built environment is largely absent, despite the appreciation of the ageing building stock and the fragmentation and lack of open/free spaces.

The only vaguely earthquake-related Actions in the Resilience Strategy come under Goal 3, *Objective H: Local risk reduction and risk management systems*; however, the focus of the proposed actions is generally put on natural hazards and not specifically on seismic risk management.

The main reasons for this absence and disconnection between the Preliminary Resilience Assessment and the Resilience Strategy, according to city officials were:

1. A general understanding that the municipality should not be responsible for accounting for geological risk, as other institutions, such as the Decentralised Administration of Macedonia and Thrace or the Institute of Geology and Mineral Exploration, are more appropriate for this task.
2. The environment of the historic centre of the city is a retrofit environment and was perceived as having very little degree of adaptive opportunities, and thus technical measures were not explored further.
3. The fact that responsibility for policy, such as building codes, does not sit in the municipality, but with higher administrative levels, namely regional and -mostly- national.
4. Earthquake management was not categorised as a top-priority area for the design of the Resilience Strategy.

In a nutshell, the Resilience Strategy appreciates, but does not adequately address, Thessaloniki's urban geological risk to earthquakes. Moreover, there is an implementation gap between the Preliminary Resilience Assessment and the Resilience Strategy when it comes to earthquake management, as the proposed actions do not adequately reflect the outcomes of the assessment stage.

7.5 The Thermaikos Municipality Case Study

The Municipality of Thermaikos has been continuously affected by surface flooding, with the latest manifestation being the floods of September 2016 and May 2018. These events caused losses of human lives and extensive damage to public and private property. Local authorities, in coordination with the national government, have undertaken the task of compensating the affected people, a gesture that cost significantly, especially within the financially unfortunate conjuncture for the whole country, as proper insurance mechanisms have not been accounted for in advance.

Based on such events, the second selected area of study was Thermaikos municipality, and more specifically the area of Perea. Thermaikos' geological vulnerability and exposure of its built environment to surface flooding, is a function of its physical geography and topography combined with extensive, semi-regulated urbanisation, which started around 25 years ago and worsened during the last decade. Hence in this case natural geological factors and human induced change reinforce each other and lead to higher levels of exposure.

7.5.1 Geological Vulnerability

The underlying geology of the area is relatively homogeneous and includes two major geological units (Figure 7.5 a,c): Neogene deposits outcropping at the areas with higher elevation towards the mainland, and Quaternary alluvial deposits in the plain area towards the coast. The Neogene deposits consist of two main sequences, the upper sand and gravel sequence and the lower sandy marls–red clays sequence. At the same time, the Quaternary formations occupy the central part of the so-called Anthemountas basin (Raspini *et al.*, 2013, 2014), with increasing thickness towards the coast. According to Raspini *et al.* (2014), the Quaternary formations, consisting of alternating layers of clastic and fine-grained sediments, create conditions favouring the development of an upper phreatic and several successive semi-confined aquifers, while the depth of coastline sediments reaches 140 m.

Consequently, V-shaped, nearly parallel, ravines are formed, following the natural topographic gradient of the region down to the coastal plain, where recent urbanisation has occurred as either new development or densification of the pre-existing built environment. In addition, the impermeable Quaternary alluvial deposits, along with the increasingly limited absorption capacity of the urbanised physical ground, due to the imperviousness of tarmac and concrete pavements, increase the possibility of runoff water concentration and the formation of streams along the roads and urban routes.

Lastly, it is worth recalling that the intensification of industrial development and agricultural activities and the consequent increasing water demand have recently led to overexploitation of local aquifers and amplification of compaction of compressible deposits and ground subsidence phenomena, further increasing geological vulnerability (Anastasiadis, Raptakis and Pitilakis, 2001; Raspini *et al.*, 2016). In a scenario of a continuation of such increasing groundwater overexploitation of the aquifer system in the coastal zone of Thermaikos Municipality, land subsidence may become a further threat, principally in areas where Quaternary alluvial formations are thick, and the ground level is lowering.

7.5.2 Exposure of the Built Environment

The Municipality of Thermaikos is one the most rapidly developing suburbs of Thessaloniki, with an increasing urbanisation trend and substantial population growth after the 1990's¹ (Figure 7.11). This rapid urban development has left a significant spatial footprint in the Municipality, with many semi-regulated dwellings being located in flood-prone zones. Although the current restrictions of the fiscal crisis have partially halted this rapid urban expansion, pressure on landscape and physical resources is more than evident².

Urban development in some of the most expose location – notably the village of Perea - has occurred in areas at the end of gullies, where pluvial and fluvial waters are naturally driven on their way to Thermaikos Bay. In cases where elevation rapidly decreases and considering the fact that those buildings are predominantly

¹ Between 1991 and 2011 the population of the Municipality increased by 150%, with this increase reaching 35% after 2001.

² It should be added that the Municipality of Thermaikos, in its current form, was created through the Kallikratis Plan in 2011, after the merging of former municipalities and current municipal units of Epanomi, Michaniona and Thermaikos (smaller).

one- to two-storey residential dwellings, it can be easily concluded that they are largely exposed to impact from heavy rain and flooding events³.



Figure 7.11: Evidence of recent urbanisation in Perea as captured from space from 2002 to 2016 (© 2018 Google). Red circles highlight areas of new urban development and densification.

³ This is a typical phenomenon in many southern European cities (Raspini *et al.*, 2016).

Moreover, the street network of Perea constitutes a physical continuation of natural geomorphological features such as gullies, ravines and streams (Figure 7.12). This geospatial analysis of the natural environment highlights the existence of such ravines upstream with regard to local settlements and which results in stormwater being cascaded through the urban fabric, increasing the exposure of local infrastructure. The energy of stormwater flow channelled along the roads can also push vehicles, garbage bins and any other large objects to create physical blockages of water flow (a dam effect) and obstructions to potential evacuation routes, Figure 7.13 vividly shows some of the damages inflicted from the September 2016 floods in Thermaikos municipality.

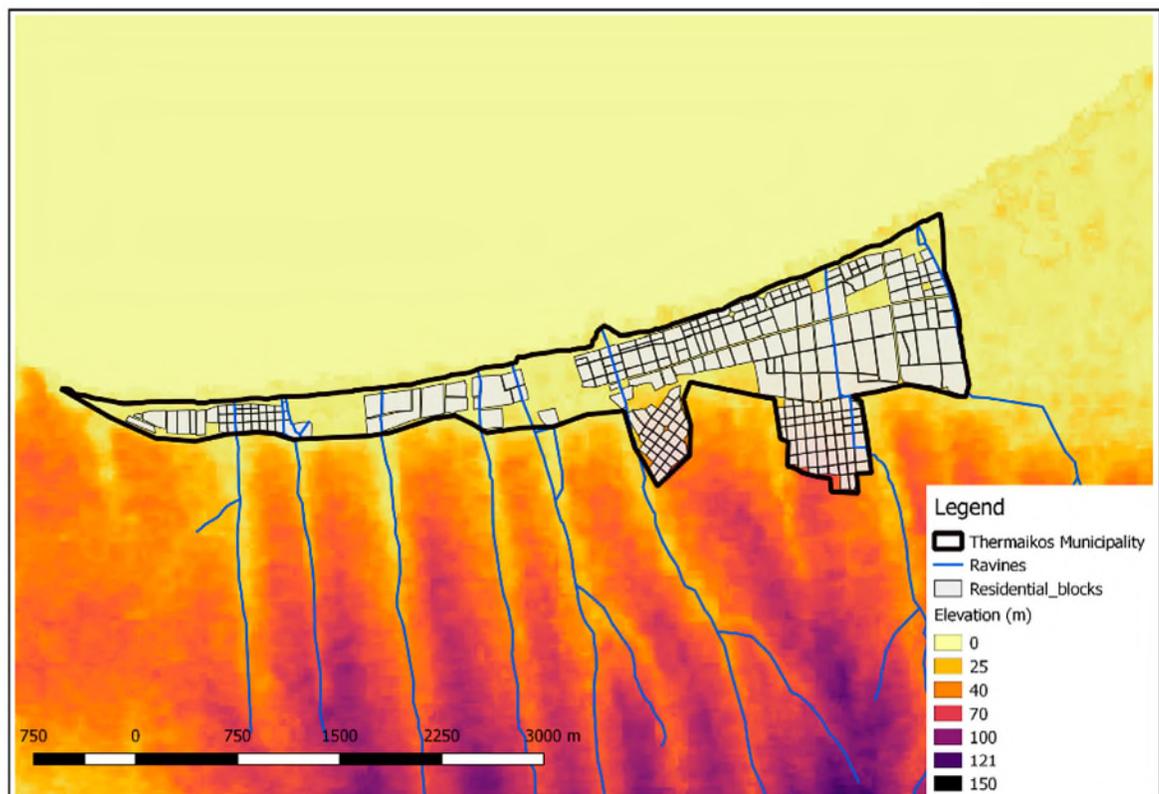


Figure 7.12: Digital elevation model of Thermaikos Municipality, with indication of the natural network of ravines, highlighting local topography and natural incisions passing through residential blocks in Perea. The downstream location of urban development is apparent.



Figure 7.13: Snapshots of the damages from the flash-flood event that hit Perea village in September 2016 (Photo source BBC News ,2016, Personal archive).

7.5.3 Surface Flooding in Thessaloniki's Resilience Strategy

Arguably, surface flooding has been more directly addressed in Thessaloniki's Resilience Strategy than seismic risk management. Notably, in Action 5 under Objective H in Goal 3 '*Strengthen flood prevention*', there is a direct appreciation of the geological vulnerability of Thessaloniki, with a reference to the urban terrain. This Action also includes some future measures for flood risk management. The Resilience Strategy concludes that, despite the city's favourable topography, flood mitigation infrastructure in the metropolitan area needs substantial improvement.

There is a growing awareness that greater vulnerability and exposure to flooding has resulted from: poorly regulated urbanisation, an obsolete sewerage system that cannot handle peak water flows during flood events, and building densities that do not allow substantial retention or storage of stormwater, causing failure of the structures under extreme precipitation (City of Thessaloniki, 2016).

Nevertheless, there is a policy implementation gap also apparent here. Regardless of the ambitious nature of the flood prevention plan, flash floods in May 2018 showed that such proposals have not yet been sufficiently operationalised. The May 2018 flash-floods also generated an outburst of complaints from local citizens and opposition members of the City Council, which directly targeted local officials and Thessaloniki's Resilience Strategy. Specifically, the Mayor and the Resilience Office were accused of turning Thessaloniki into a 'rezili-city'⁴ instead of a resilient city, paraphrasing the title of the widely advertised 100RC programme (Tachiaou, 2018). The Mayor of Thessaloniki, however, defended the resilience strategy and blamed the unprecedented rainfall for the damages inflicted in the city, while he also admitted that the city *'still has time until it becomes resilient to urban flooding'* (kathimerini.gr, 2018). Nevertheless, the impact of the May 2018 floods was quite significant (Figure 7.14) for the city both in financial terms and in terms of reputation for the Resilience Strategy and the Resilience Office of the city.



Figure 7.14: Snapshots from the damages inflicted in Thessaloniki from the flash-floods of May 2018 (Source: Chrysochoou, 2018)

⁴ 'Rezili' (in Greek: 'ρεζίλι') is the Greek word for 'ridiculous'.

More broadly, the exposure of built environment has yet to be adequately addressed, and thus urban planning is *still* disconnected from the flood-prevention plan. A more robust regulatory framework that would prohibit urban development in flood-prone areas is not in place and, subsequently, future emergency responses will only be partially informed.

Finally, returning to the study area of this subsection, Perea stands outside the jurisdiction of the municipality of Thessaloniki, but within its metropolitan area. Thus, it is unlikely that it will have tangible benefits from any future interventions towards flood prevention funded by the municipality of Thessaloniki. However, as already discussed, it is a highly flood-prone area accommodating an increasingly exposed built environment. The decision to focus on the municipality of Thessaloniki in relative isolation, and not on the metropolitan area as a whole was made as a compromise between offering a detailed analysis of the specific problems of a finite area and expanding to a larger metropolitan scale, since city officials argued that *'both goals could not be practically achieved simultaneously'* (Interview with local official). In reality, what this lack of focus in the metropolitan area is likely to produce, are a series of unintended consequences as a result of trading off different priorities. This is a classic example of what has been referred to as a resilience trade-offs – where an effort to build resilience by reducing risks exposure in one location leads to a corresponding increase in risk exposure elsewhere (Chelleri *et al.*, 2015)

7.6 Discussion

Integrating urban geological risk within Urban Resilience Strategies is a very challenging task. Through the two neighbourhood case studies in Thessaloniki, an approach to understanding urban geological risk connected to geohazards and the extent that this risk is or is not being considered in Resilience Strategies was displayed.

This general marginalisation of urban geological risk has generated implementation challenges for Thessaloniki's Resilience Strategy that appears focused on harnessing the 'momentum' stimulated by ongoing resilience efforts to stimulate new and innovate ways of managing city resources and stimulating further development (Chapter 6). But, the strategic developmental decision of emphasising everyday resilience does appear to come at the expense of geohazard management, particularly because local authorities feel that the city is '*less threatened by them compared to its timely socioeconomic slow-burn events*', (Interview with local official). Yet there seems to be little planning for preventing the impact of low-probability-high-magnitude events in the urban fabric.

Through the analysis of the two study areas, it is clear that disasters in the city of Thessaloniki caused by earthquakes and surface flooding are not 'natural'. Instead, they are the result of poor integration of urban and emergency planning, high urban densities, ageing building infrastructure and unregulated urbanisation in flood-prone areas, that increase the exposure of the built environment to specific types of natural hazards, to which the city is susceptible.

Moreover, the outcomes of this analysis lead to the identification of three major implementation challenges for Thessaloniki's Resilience Strategy: a lack of geological insight in the design of Resilience Strategies; an inefficient relationship between the built environment and emergency planning; and, problematic horizontal communication among the geological-related organisations. These challenges emerged through the synthesis of geological vulnerability and exposure of the built environment to urban geohazards with the policy implementation gaps, echoing the adopted research approach (Figure 7.2).

7.6.1 Lack of Geological Insight in the Design of Resilience Strategies

Poor understanding and interpretation of subsurface urban ground conditions, which tend to vary due to multiple phases of development, especially in cities with a rich historical background, such as Thessaloniki, increase geological vulnerability and

ultimately urban geological risk (Bricker *et al.*, 2012). In this case study, sporadic references to natural hazards can be identified throughout the document, without, however, a reference to the underlying geology.

The Acheiropoietos example demonstrates the heterogeneity of the city's geological conditions and the presence of a thick layer of urban fills in its historic centre, which affected the performance of the building stock during the 1978 earthquake. Similarly, the Quaternary superficial deposits in Thermaikos enable runoff water accumulation, contributing to surface flooding.

Deeper appreciation of the underlying geology and geomorphology could provide helpful insights in strategic urban planning as it could decrease exposure to natural hazards by regulating urban expansion and providing further direction for urban development. For instance, despite the largely unregulated development in the Thermaikos Municipality, its spatial footprint is reversible, as building densities are far lower than in the historic centre. Consequently, collaboration with geoscientists and geological organisations from the early stages of Resilience Strategy design and throughout the entire process of its implementation could result in a more thorough interpretation of subsurface ground conditions and ultimately in a more integrated resilience outcome.

7.6.2 Relationship between the Built Environment and Emergency Planning

Thessaloniki is characterised by hasty, informal and largely unregulated planning, which has led to a very dense urban core and uneven urbanisation in the outskirts. Through the analysis undertaken in this chapter it is demonstrated how irregular planning, coupled with non-appreciation of the geomorphological setting, increases geological vulnerability and exposure to earthquakes and surface flooding.

In Acheiropoietos, the presence of an ageing building stock is profoundly increasing exposure to earthquakes, as the past has already proven, particularly when combined with Thessaloniki's problematic urban planning milieu. Moreover, difficult access

to open spaces is impeding the application of effective emergency planning responses. At the same time, in the Thermaikos municipality, urban development in the fringes of hilly formations and gullies, and the design of street networks as a natural prolongation of local ravines, facilitates run-off water and ultimately surface flooding.

As a result, emergency planning in Thessaloniki seems to be hampered by the configuration of the built environment and produces a great implementation challenge for the Resilience Strategy. In Thessaloniki, as elsewhere there is a disconnect between spatial planning and emergency planning (see for example Coaffee and Bosher, 2008). On the one hand, the municipality's power to effectively intervene is limited, while on the other hand, invasive interventions to ameliorate the current situation would involve delicate negotiations with Thessaloniki's historical character and the need to keep all city parts connected.

Although it is acknowledged that such an endeavour would be particularly challenging, it can be argued that the role of strategic planning is to facilitate such negotiations by directing developmental action to proactively address them. Therefore, a future revised version of the Resilience Strategy should address such issues focusing and involve the outcomes of city-wide discussions and coordination.

7.6.3 Horizontal Communication among the Geologically Related Organizations

The Resilience Strategy is an overarching strategic document that is intended to provide direction for future urban development. Therefore, its preparation and design should, in theory, be an inclusive process among *all* relevant urban stakeholders, facilitating the inter-municipal and inter-metropolitan communication routes or establishing them whenever absent. In the case of Thessaloniki, although one of the most substantial outcomes of the 100RC Programme so far has been the gradual overcoming of operational silos and the beginning of trust-building among urban stakeholders operating within the Metropolitan area (as already mentioned in

Chapter 6), geological organisations are not sufficiently represented in this emerging discourse.

This communication gap is partially connected to the lack of geological insight, as explored above, but it also derives from the complicated vertical responsibility allocation between different national administrative scales. Municipal and metropolitan organisations with a engaged in geological processes are restricted by their authoritative power, while national agencies depend on the political priorities of the central government. As a result, little, if any horizontal coordination is undertaken, and geological risk is not accounted for in the strategic planning level.

The Resilience Strategy, as a strategical planning directive, should include a clear identification of the roles of organisations dealing with geological phenomena and a clarification of their tasks and jurisdictions. Doing so would establish permanent communication channels among them and facilitate their effective connection with urban planning activities occurring on the ground while would also assist in reducing geological vulnerability and exposure.

7.7 Conclusions

Thessaloniki's Resilience Strategy's inability to sufficiently incorporate urban geological risk highlights the ineffective governance configuration within which many local administrations both within and outside the 100 Resilient Cities network are operating. This reality poses fundamental implementation challenges for local authorities. The lack of geological insight, along with the disconnection between emergency planning and the built environment and the ineffective communication between the various geological organizations, negatively affect cities facing similar urban problems, and amplify their geological vulnerability and exposure to urban geohazards.

There remain key implementation challenges connected to geological hazards that need to be considered and assessed throughout Thessaloniki's journey towards urban resilience. Emphasis on other urban priorities, coupled with problematic

collaboration between municipal and environmental/geological authorities, creates a gap in the proper understanding of geological conditions and their interdependency, resulting in a general failure to address these issues in local and metropolitan developmental policies. In the case of Thessaloniki, failure to address earthquakes and their repercussions is apparent, while, concurrently, flood prevention is being addressed much more adequately, but crucially without a holistic resilient vision.

This raises a crucial question about the relative success of Thessaloniki's resilience approach, how this process is monitored and how to consider geohazard management more effectively as part of the overarching aspiration to create a resilient city. The focus of the following chapter thus proceeds with an initial assessment and evaluation of resilience thinking implementation in Thessaloniki and navigates the potential of institutionalising resilience thinking as a strategic direction for holistic urban development.

Chapter 8 - Monitoring and Assessment of Urban Resilience in Thessaloniki

8.1 Introduction

In the previous two empirical chapters this study investigated important aspects of Thessaloniki's resilience journey. Chapter 6 explored governance transformations stimulated by the application of resilience thinking in the city, which positioned resilience in the centre of its developmental agenda. Chapter 7 by contrast, emphasised the marginalisation of geological risk in Thessaloniki's Resilience Strategy and the implementation challenges it produced. In practice, these process-driven accounts were mediated by a requirement to successfully enhance resilience, as well as a set of questions as to what success looked like in this context.

As such, this chapter concludes part two of the Thesis by unpacking the assessment methods and tools utilised by the city to assess and monitor the outcomes of the Resilience Strategy implementation. As highlighted in Chapter 4, resilience assessment frameworks are widely utilised by local authorities and resilience practitioners to monitor the impact of resilience policy implementation (Prior and Hagmann, 2014; Coaffee and Lee, 2016). However, the utilisation of such frameworks is subjected to serious limitations related to their capacity to track changes in governance, culture and inter-organisational relations, predominantly due to the highly statistical and technical structure of their indicators (Hinkel, 2011; Larkin *et al.*, 2015). Moreover, the holistic nature of resilience approaches in conjunction with the malleable definition of the term hampers the development and application of *'resilience indicators and variables that are both accurate and fit for purpose'* (Prior and Hagmann, 2014, p.4). This 'conceptual vagueness' in agreeing on a universal understanding for urban resilience (see Strunz, 2012) has led many scholars to argue that measuring resilience with the use of quantifiable measures is not practically possible. To date, most of such assessment approaches are based on building a set of indicators to capture the performance of cities in several aspects of

their operation, but more often than not are constrained by the inherent limitations of quantitative metrics upon which such indicators are built, linked and weighted (Levine, 2014).

Despite this, the use of indicators and other sets of variables for assessing urban resilience is a method that gained significant ground during recent years (Cutter *et al.*, 2008; Sharifi, 2016). These, more contemporary approaches to assessing urban resilience increasingly seek to use participatory methods in an effort to appear more inclusive and subjective (Sharifi, 2016) and to better assess the impact of resilience policies in situ.

In this context, and drawing on insights from Thessaloniki, this chapter addresses the third research aim of this study: *Are resilience assessment methods capable of tracking governance change and mainstreaming resilience practices?* More specifically, this chapter focuses on the actual tools and methods used by Thessaloniki's Resilience team to drive the monitoring process in the city and raises a question about their capacity to account for changes that are not adequately captured by numerical indicators. This question should not be seen in isolation and but in complementarity with Chapter 6 and the methodology created in this study to track changes in governance structures and relations. As such, this chapter will also emphasise the extent to which the process of resilience assessment and monitoring helped the institutionalisation of resilience thinking in Thessaloniki, largely with the establishment of the Urban Resilience Observatory in 2019.

Importantly, Thessaloniki did not establish its own assessment process, tailored to their particular traditions, practices and existing data sets. Instead, the city's participation in the 100RC network essentially compelled the local authority to utilise the proscribed CRI, despite the relative freedom provided by 100RC to explore different assessment methods. This, as will be analysed, led the Resilience Office (with the assistance of consultants) to produce specific indicators to monitor

the progress of actions proposed by the Resilience Strategy, but which were arguable less effective at tracking social changes, especially at the local scale¹.

As this chapter will discuss, Thessaloniki's internal process of monitoring and evaluating the progress of its Resilience Strategy implementation has had some shortcomings. Local officials encountered severe difficulties in utilising the CRI due to its complex and overly statistical structure, based on which they structured the indicators for monitoring the progress of the actions proposed by the Resilience Strategy. However, despite these operational flaws, the assessment and monitoring process has generated some valuable benefits for the city, hardwiring resilience in the city's operations and contributing significantly to the process of mainstreaming resilience thinking in Thessaloniki; this contribution is also capable of leading to the institutionalisation of resilience in the near future.

The remainder of this chapter presents a detailed account of the three phases of resilience assessment Thessaloniki experienced (and is still experiencing) and provides an evaluation of the methods and tools used, including the learning experiences gained for local authorities in Thessaloniki.

8.2 Assessing and monitoring urban resilience in Thessaloniki

Thessaloniki entered its resilience journey without having any prior familiarity with resilience principles or resilience assessment frameworks and tools. As one of the city's Resilience officers argued: *'When we started the project, we had no idea of resilience assessment tools. Some of us were familiar with methods for assessing vulnerability in social contexts but the holistic understanding of resilience was*

¹ The assessment and monitoring process of resilience implementation in Thessaloniki has been internal and orchestrated by the Resilience Office. Assistance from external consultants and other practitioners was also provided through sharing of knowledge and experiences from other cities that have utilised resilience assessment frameworks. It should also be mentioned, that the majority of the consultants involved were already affiliated with the Rockefeller Foundation and thus followed similar principles in terms of assessing and monitoring urban resilience with the 100RC network.

completely new to us and we did not know how to measure it, where to start and where to finish’ (Interview with member of the City Resilience Office).

The process of assessing and monitoring urban resilience in Thessaloniki can be divided in three distinct periods, two of which have already completed while the third has only recently started. The first period was the initial assessment of the city’s strengths and weaknesses and started in February 2016 and was concluded with the publication of the Preliminary Resilience Assessment, in June 2016. The second period started after the publication of the Resilience Strategy and focused mostly on the monitoring of indicators designated by the Resilience Strategy in order to track the progress of the actions proposed and was completed in June 2019 with the closure of Thessaloniki’s participation in the 100RC network. Finally, the third assessment and monitoring period started in July 2019, with the announced beginning of operation of the Urban Resilience Observatory and is expected to last until July 2022 (Figure 8.1).

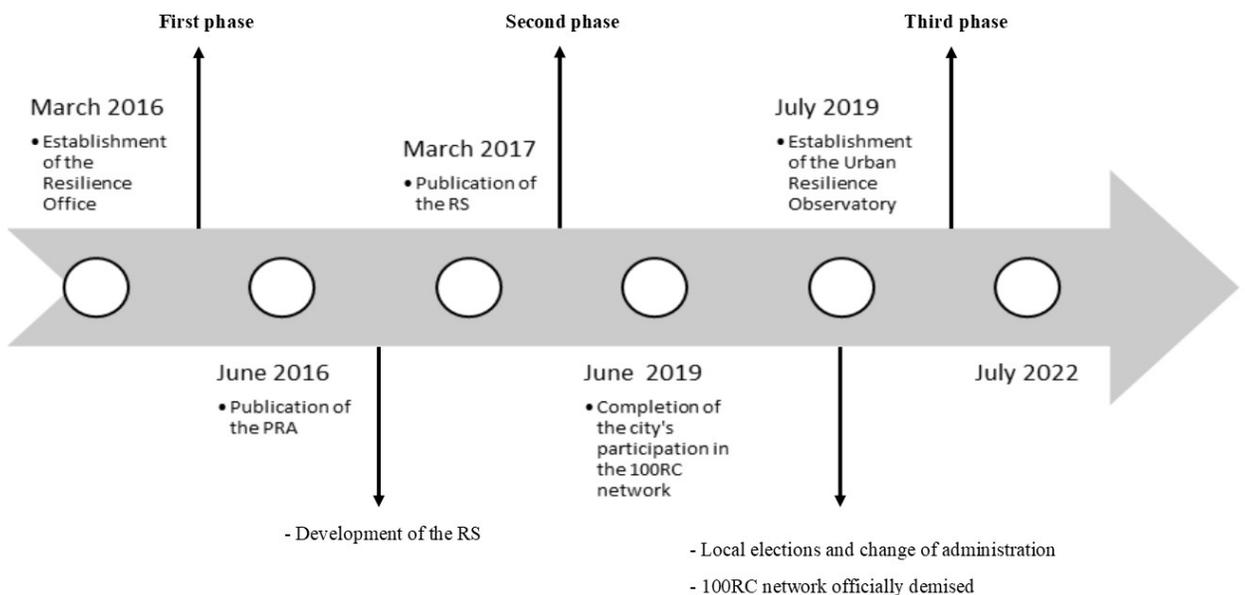


Figure 8.1: Timeline of resilience assessment phases in Thessaloniki

8.2.1 The first phase of resilience assessment (February 2016 – June 2016)

The first phase of resilience assessment in Thessaloniki officially started on March 2016² and lasted for approximately five months. It was concluded in June 2016 and could be summarised in the activities undertaken for the development and publication of the Preliminary Resilience Assessment (PRA). The process was run exclusively by the Thessaloniki's Resilience Office, with the contribution and assistance of a wide variety of public, private and academic stakeholders. The relative inexperience of city officials in using tools to measure urban resilience along with the inextricable connection between the city's resilience journey and its participation to the 100RC network, led to the utilisation of the CRI as an initial tool for baseline assessment, upon which the development of the PRA was constructed. After all, this was a mandatory step the city needed to undertake in order to proceed with the development of its Resilience Strategy (Rockefeller Foundation, 2018).

The PRA was essentially a baseline assessment of the city's strengths and weaknesses, as well as a review of the shocks and stresses currently affecting or anticipated to affect the city in the future. Yet, the objective of the PRA was slightly extended, incorporating the analysis of the outcomes of the baseline resilience assessment and the identification of priority topics, themes and areas *'where the city wants to develop more knowledge, gather more data, and conduct more analysis'* (City of Thessaloniki, 2016, p.46) in order to inform the development of the Resilience Strategy.

The PRA was itself developed in different stages and utilised a number of methods and tools to assess the level resilience in Thessaloniki. Such methods included personal interviews, online surveys, questionnaires, workshops etc. (see also Chapter 6). The outcomes of such data collection activities were subsequently

² The Resilience Office was officially launched on March 2016, but it has already begun its operation from February 2016.

gathered and fed back to the CRI not only for presentation but also for analysis purposes. In more detail, the stage of the process followed by the PRA included (City of Thessaloniki, 2016):

- The presentation of a ‘city profile’ with contextual information to determine the City’s powers.
- An analysis of actions and plans currently underway in Thessaloniki to identify efforts by the municipality, academia, civil society groups and other partners.
- A gathering of perceptions of Thessaloniki’s’ strengths and weaknesses from a broad range of stakeholders and citizens during a series of engagement activities.
- A preliminary asset scan, to identify the significant assets that exist in Thessaloniki and contribute to the City’s physical, economic and social resilience.
- A review of shocks and stresses, to identify the most significant shocks and stresses that affect Thessaloniki today, or which are anticipated to affect Thessaloniki in the future.
- A presentation of the outcomes of the analysis using the City Resilience Framework.

This initial baseline assessment mapped different actions around the city related to the process of resilience-building. Such assessment included the municipality of Thessaloniki, representatives from academia and civil society groups. The involvement of the private sector at this stage of the project was relatively limited to some individuals and organisations already collaborating with the municipality in other projects. An early impediment to this process was the difficulty in contacting and including the public sector in the process. The full commitment of the local authority to implementing the Resilience Strategy had not yet been adequately communicated to public sector representatives, who considered the process with

relative suspicion, and as yet another way of the local administration to strengthen its profile. As a senior member of the City Resilience Office noted:

‘We tried to engage with as many stakeholders as possible from the beginning of the assessment process. In the majority of the cases we were very successful, like approaching different departments of the Aristotle University of Thessaloniki and other academic institutions such as the University of Macedonia and the International Hellenic University. With the public sector we were not so lucky in the beginning, as many of the organisations we invited felt that this will be another attempt to promote the work we are doing as an administration.’

Answers from stakeholders involved in the initial assessment process were subsequently aggregated and fed onto the CRI, resulting in the generation of three assessment ‘wheels’ (Figures 8.2 a, b and c). Afterwards, the three individual CRI wheels were analysed by the members of the Resilience Office and this analysis led to the development of a combined visualisation which operated as the first layer for the baseline assessment of the city’s strengths and weaknesses (Figure 8.3).

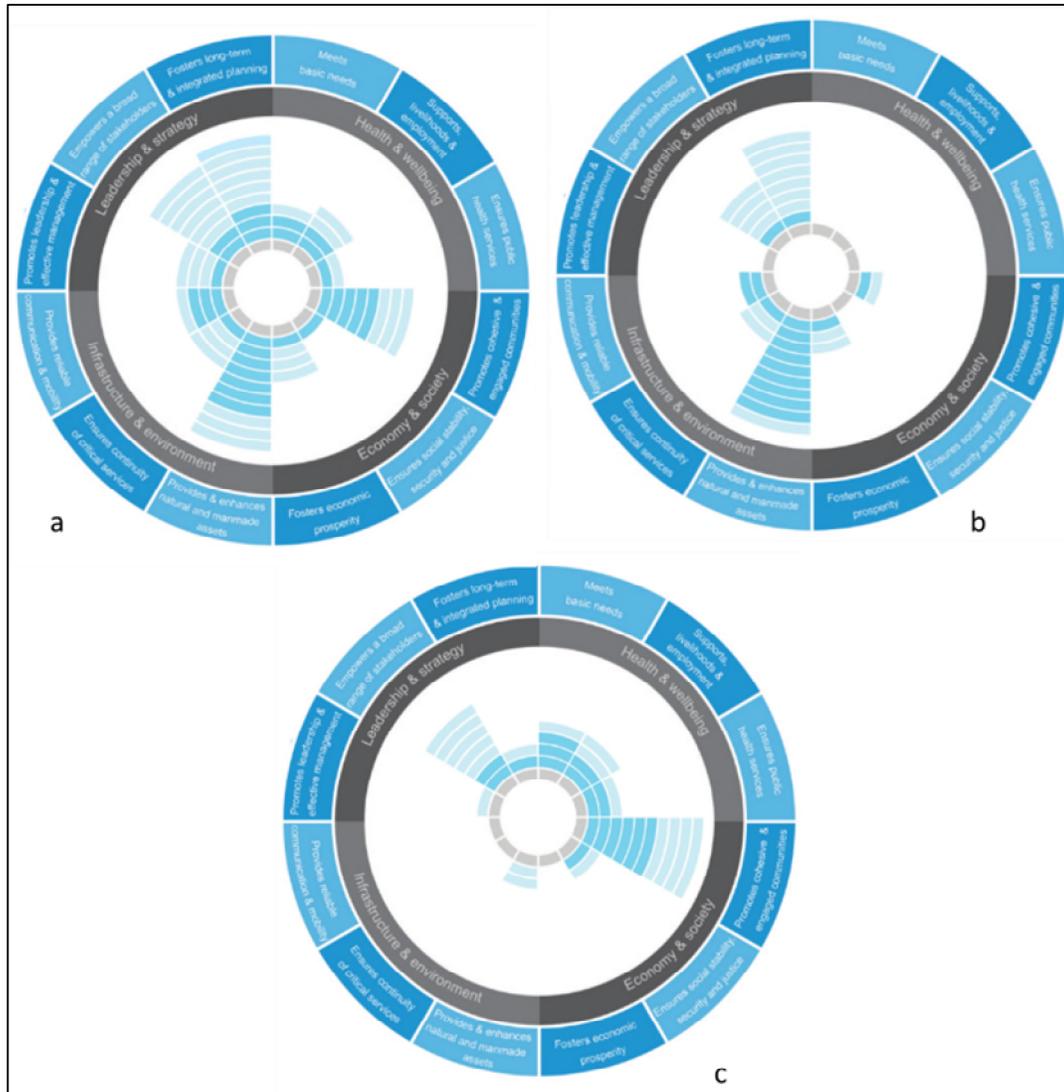


Figure 8.2: Visual representation of the actions undertaken by (a) The municipality of Thessaloniki, (b) Academia and (c) civil society in Thessaloniki (Source: City of Thessaloniki, 2016)

By reflecting on the outcomes of this first layer of the baseline assessment, some interesting conclusions emerge. For instance, there is a disconnection between the areas of where the municipality of Thessaloniki, local academic institutions and the civil society concentrate their actions. This disconnection produces further questions about the level of communication and coordination across these sectors and the extent to which they operate in silos. More specifically, the majority of the civil society's actions are concentrated in the area 'Promotes cohesive & engaged communities' where academia does not seem to have significant activity. This

indicates that on the one hand the civil society has a better understanding of social dynamics and relations around the city but on the other hand it lacks scientific knowledge and resources to track the impact of their work. Furthermore, in areas such as ‘Provides & enhances natural and manmade assets’ and ‘Fosters long-term and integrated planning’, actions from the civil society are very limited in comparison with those of the Municipality, suggesting different prioritisation by the local authorities as well as lack of appropriate knowledge from the civil society’s side to engage with physical planning and the natural environment.

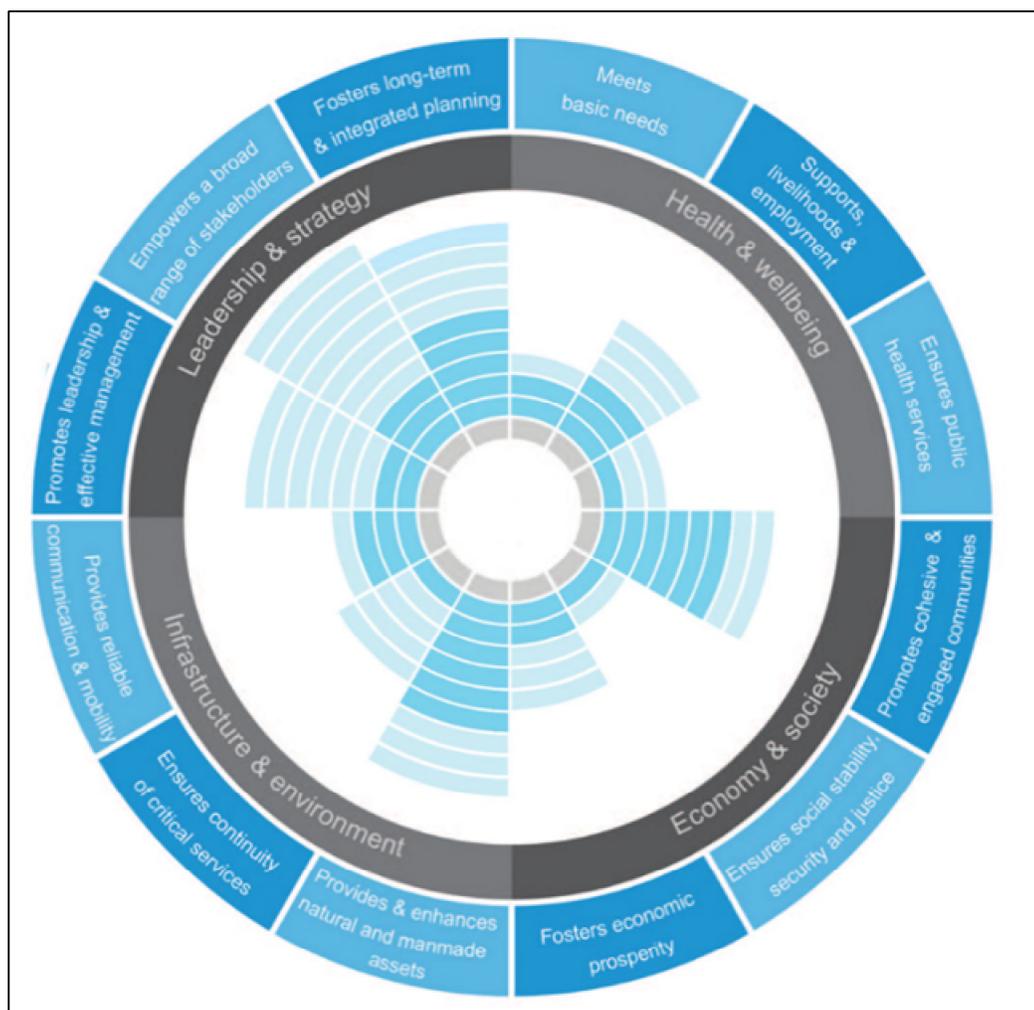


Figure 8.3: Aggregated visual representation of the actions in Thessaloniki (Source: City of Thessaloniki , 2016)

The CRI was used by the Resilience Office to capture programmes and actions in all ten municipalities included in the Metropolitan Area of Thessaloniki (see Figure

5.1). The results in each municipality were collected and combined to produce an aggregated visual representation of the actions undertaken throughout the Metropolitan Area³ (Figure 8.4). This action showed that the majority of programmes and actions were concentrated around infrastructure and specifically on the areas that ‘ensures continuity of critical services’ and ‘provides & enhances natural and manmade assets’, rather than projects focused on social solidarity that had dominated in recent years and as a result of severe austerity impacts.

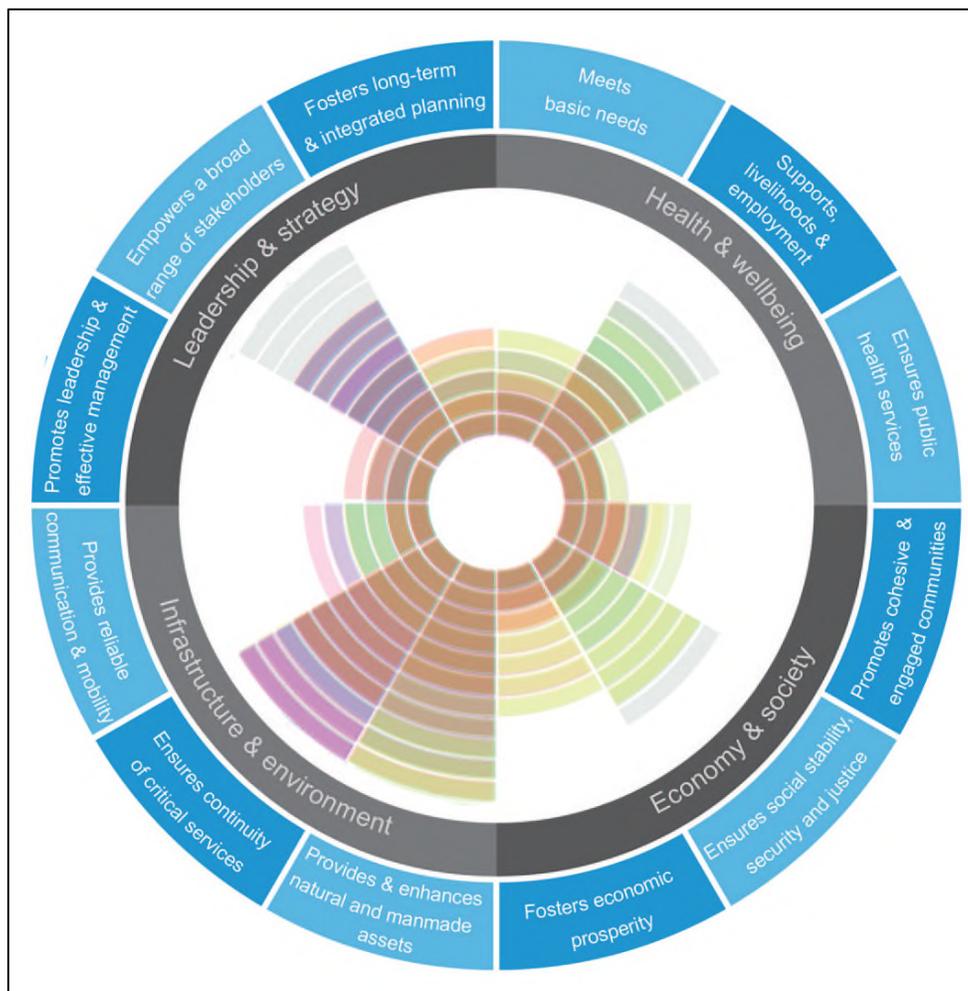


Figure 8.4: Aggregated visual representation of the programmes and actions in the Metropolitan Area of Thessaloniki (Source: City of Thessaloniki, 2016)

³ This was an outcome of the city’s collaboration with the Metropolitan Development Agency, despite the fact that the 100RC project focus on the Municipality of Thessaloniki and not on the Metropolitan Area of the city.

Finally, the last part of the first layer of baseline resilience assessment was concluded by a combination of actions and projects undertaken within the city with perceptions on the city's strengths and weaknesses, collected through interviews and online surveys with the general public, and resulted in the final mapping of areas that the city was operating well -designated as areas of strength- and those where improvement was needed (Figure 8.5). This assessment constituted the basis for identification of the main areas for the development of the Resilience Strategy.



Figure 8.5: Visual representation of Thessaloniki's areas of strengths and weaknesses. The darker green colour designates the areas of strength, the lighter green areas that the city is doing decent but need improvement and the red colour represents areas that the city needs to do better. (Source: City of Thessaloniki, 2016)

The PRA was concluded by a summary of the major of shocks and stresses collected by the participants in the study. Five major shocks and five major stresses were identified as the most imminent for the city and are summarised in Table 8.1 in descending order (City of Thessaloniki, 2016). The improvement of the city’s capacity to respond to the identified threats was intended to drive the actions of the Resilience Strategy⁴.

Table 8.1: Primary shocks and stresses identified for the city of Thessaloniki (Source: City of Thessaloniki , 2016)

Primary shocks	Primary Stresses
1. Earthquake	1. Unemployment and diverse livelihood opportunities
2. Surface flooding	2. Lack of diverse livelihood opportunities
3. Heatwave	3. Aging Building and Mobility Infrastructure
4. Fire at the peri-urban forest	4. Lack of access to affordable health care
5. Atmospheric pollution incident	5. Insufficient integration in planning

Summing up, phase one of resilience assessment in Thessaloniki was dominated by the use of methods and tools provided by the Rockefeller Foundation. However, this initial baseline assessment helped local officials to identify some key themes and topics for the Resilience Strategy to focus on. Moreover, the process assisted in communicating the objectives and goals of the strategy to a wide variety of urban stakeholders, including the civil society and invite them to co-produce meaningful actions for Thessaloniki’s future development. In other words, this was the first capacity building exercise in the framework of the city’s participation in the 100RC

⁴ As already noted in Chapter 7, natural hazards, and especially geohazards, were not addressed effectively.

network; an exercise which also contributed in building internal capacity to measure the success of the project within Thessaloniki's Resilience Office.

8.2.2 The second phase of assessing urban resilience Assessment tools developed for the Resilience Strategy (March 2017 – April 2019)

The second phase of resilience assessment in Thessaloniki started immediately after the publication of the Resilience Strategy in March 2017 that was constructed upon the findings of the PRA. This phase was composed of a great number of directed actions classified under different goals and objectives which the municipality decided to emphasise in pursuing urban resilience. The publication of the Resilience Strategy was accompanied by a set of indicators addressing the strategic aims set before. These indicators were specifically designed to monitor the performance of the city not only throughout the implementation period of the Resilience Strategy but until 2030, which is the Strategy's target year. Apart from these indicators, the city committed to continue to 'Measure city performance using the City Resilience Index' (Goal 3, Objective I, Action 4). In order to effectively achieve this and to boost the capacity of the city council to undertake this task, the Resilience Strategy proposed '*training of city staff to use the City Resilience Index and incorporate the monitoring process into wider decision-making processes in the city*' (City of Thessaloniki, 2017).

As such, in order to secure effective monitoring of the progress of such actions, specific indicators and metrics were developed. Such indicators were categorised under the four generic goals of the strategy and were specifically focused on the measuring the progress of some metrics which the municipality identified as representative of the Strategy's objectives. Table IV.1 (Appendix IV) introduces the indicators set by the Resilience Strategy along with a short description of the metrics they aspired to monitor.

Despite the fact that the indicators set by the Resilience Strategy were designed without the explicit use of the CRI (though they were conceptually influenced by it),

it is obvious from an initial analysis of their content, that the process of building resilience in Thessaloniki has been predominantly monitored by statistical indicators. All of the suggested indicators in the Resilience Strategy are numerical showing that the municipality was convinced that the resilience process is capable of being monitored through the utilisation of statistical metrics. As one local official argued: *'We used indicators and metrics from other global assessment tools. We chose the ones that we felt as more appropriate for Thessaloniki, but the process was based on our subjective decisions'* (Interview with a member of the Resilience Office).

Comparing the indicators with the actions proposed in the Resilience Strategy, a clear misrepresentation of a large number of actions can be identified. This includes the vast majority of highly ambitious short-term actions that failed to be delivered before the completion of the city's participation in 100RC. An example of such a case is the *Thessaloniki City Dashboard*, a visualisation tool designed to aggregate, analyse and visualise data as well as develop comprehensive data strategies (City of Thessaloniki, 2017). The Dashboard was supposed to be designed in collaboration with the Aristotle University of Thessaloniki and with the participation of local community groups and included the following development aims:

- Establishment of a formal organisation to advocate for policy and legislation of data management;
- Creation of a distinct brand for the open data initiative;
- Conduction of technical training for city staff and stakeholders;
- Creation of an active environment for data collaboration;
- Establishment of a steering committee to guide the adoption process;
- Implementation of a campaign to increase engagement;
- Establishment of a governance framework to promote trust and implementation;
- Establishment of an Institute Data Advisory Counsel;

- Institutionalisation of the open data governance process (City of Thessaloniki, 2017).

To date official commitments for the delivery of the dashboard have been made but the actual tool has not yet been released (Open Government Partnership, 2018). Nevertheless, the city has made significant progress in the opening of its datasets and has undertaken a number of participatory mapping activities (see Chapter 6).

The ultimate aim of the Strategy has been the '*creation of a resilient city in 2030*' (Interview with city official). Therefore, the indicators proposed by the Resilience Strategy are intended to be monitored in the long-term. However, a preliminary use of the indicators was undertaken by the municipality close to the ending of the project, in order to track the level of progress the city has made. This was an internal process organised and completed by the Resilience Office, without an official public communication of the outcomes. Official presentations of the outcomes of the Resilience Strategy to the public have taken place in different occasions after April 2019 and were primarily focused on activities and actions undertaken throughout the implementation period and how such actions have consolidated the presence of urban resilience within the city's future developmental strategy.

Thessaloniki's second phase of resilience assessment focused on the actions of the Resilience Strategy and the statistical indicators defined through it. The assessment process was internal and partly focused on evaluating the actions undertaken throughout the Resilience Strategy implementation period. It also emphasised the capacity of Thessaloniki to reach the targets set by the Resilience Strategy by 2030.

8.2.3 The third phase of resilience assessment: The Urban Resilience Observatory (July 2019 - July 2022)

The third phase of resilience assessment in Thessaloniki begun in July 2019 with the establishment of the 'Urban Resilience Observatory'. Clearly, this phase has only started recently and there are no tangible outcomes from the work of the Observatory; yet some indications of its responsibilities and actions can be revealed.

In more detail, the Observatory will monitor and evaluate the implementation of the projects and actions that are part of the Resilience Strategy, while at the same time will be responsible for identifying changes to the currently utilised environmental, social and economic indicators.

‘The work of the Observatory will assess the appropriate environmental, social and economic indicators that reflect the urban resilience of the city, record data in areas not covered by existing data collection systems and utilise digital tools through data integration and the use of existing platforms.’

Interview with municipal department officer

In essence, the Urban Resilience Observatory is expected to monitor the implementation of the Resilience Strategy, and thus it will be a part of the Resilience Office. Regarding the methods and tools that it will use, local officials provided contradictory opinions. One of them argued that *‘it will use similar tools as the ones we already used in the development of the PRA and the Resilience Strategy’* (Interview with city official). However, it seems that another approach is likely to be followed in this third phase of resilience assessment. The CRI will probably be abandoned and while some of the indicators developed in the Resilience Strategy (and monitored during the second phase of assessment) are expected to be partially used, new indicators will definitely be developed.

In order to ensure the implementation of the Resilience Strategy, the implementation process will be monitored through scientifically acceptable and universally established indicators based on reliable data.

City of Thessaloniki, 2019

After the previous two assessment phases, local authorities in Thessaloniki seem to be aware of the implications of developing locally representative indicators for the monitoring of urban resilience, such as the lack of availability of appropriate datasets to evaluate the actions and implemented policies, or the inherent

complexity of assessing the impact of policy implementation in social systems. Hence, they plan to organise a series of actions to improve the way data is collected and managed, with a view towards facilitating monitoring the impact and effectiveness of existing measures designed and implemented as well as to support the redesign and harmonisation of the implemented strategies.

In conclusion, the discontinuation of Thessaloniki's participation in the 100RC in June 2019, threatened to leave the monitoring process incomplete, jeopardising the completion of the many of the city's resilience goals and actions. In this critical moment, the municipal administration managed to secure funding from the Region of Central Macedonia⁵ -the higher level of regional administration in Greece- in order to continue monitoring the progress of the Resilience Strategy implementation, via the establishment of the Urban Resilience Observatory that will take a lead in tracking the impact of resilience:

'The primary responsibility of the Resilience Observatory will be to monitor the progress of the Resilience Strategy implementation. Of course, the Observatory will also have other responsibilities towards the municipality and the citizens but monitoring and evaluation of the project's actions will be its top priority'

Interview with city official

The Observatory is expected to operate from July 2019 to June 2022 and during this time available *'data will be collected and evaluated, while the data collection will be optimised and appropriate indicators will be developed to support the durability of designed urban development policies'* (City of Thessaloniki, 2019). This denotes the process of resilience assessment in Thessaloniki is entering a new phase. This phase will be distinct from the previous ones as it will not focus on baseline assessment, as the first phase have already done, nor will be internal, as the second

⁵ The funding secured reaches € 306,000, a very significant amount for Greek local authorities especially within the austerity environment they are currently operating.

phase was. Instead, it will focus on updating the existing resilience proxy indicators and building new ones in order to monitor the progress of resilience implementation in the city of Thessaloniki. Therefore, it seems that the process of institutionalising urban resilience in Thessaloniki is inexorably related to the operation and success of the Urban Resilience Observatory.

8.3 Evaluating resilience assessment in Thessaloniki

The three phases of resilience assessment that Thessaloniki experienced represent important milestones in the city's resilience journey. As described above, the process of baseline assessment helped the city discover its main strengths and weaknesses and also identify the major acute shocks and chronic stresses that are currently disrupting its operational capacity or threaten it with future uncertainty. The first phase of resilience assessment was undertaken following an open, participatory process, that combined active projects and other actions at the time, assets, risk scanning and individual perceptions to identify discovery areas in which the city would *'like to develop more knowledge, gather more data, and conduct more analysis to shape its future resilience work'* (City of Thessaloniki, 2016, p.46). The PRA identified five Discovery Areas⁶, which later influenced the four goals, thirty objectives and 106 actions of the Resilience Strategy.

The second stage of assessment was based on monitoring some of the indicators proposed by the Resilience Strategy and, unlike the baseline assessment, was an internal city council-driven process undertaken by the Resilience Office. Finally, the third stage, that has only recently started, identified how the city intends to enhance its ability to monitor the impact of resilience actions through the development of a more locally appropriate indicator set and monitoring framework.

⁶ The five discovery areas identified by the PRA were: a) Thermaikos Bay: Bringing water in the everyday life of the city; b) Creating an ecosystem that enables human talent; c) Co-ownership of public space; d) Mobility as a driver for change and e) Data empowered city.

By critically reflecting on the methods and tools utilised in these phases of resilience assessment in Thessaloniki, some interesting outcomes related to the methods applied can be derived. Thessaloniki's resilience assessment has been overly dependent on development and measuring of statistical or other types of numerical indicators. Hence, the limitations that accompany the use of indicators to measure urban resilience are particularly related to the limits of using indicators to assess and monitor social processes, such as urban resilience (see Chapter 4). In the case of Thessaloniki, the lack of longitudinal evidence over a long period of time together with time constraints imposed by the structure of the 100RC network, generated three major concerns regarding resilience assessment, which are summarised below.

8.3.1 Limitations of indicator sets

Resilience assessment in Thessaloniki has been a process characterised by the extensive use of pre-defined frameworks and indicators. This has generated several practical problems for local users of such frameworks, particularly in cases where the subject of assessment did not accurately reflect the content of the pre-defined indicator or could be considered as cross-cutting between two general assessment categories. This problem was specifically encountered during the first phase of assessment, where the use of the CRI often confused the members of the Resilience Office, who were 'kindly invited' to utilise it for the development of the PRA. As a result, they often needed to be 'creative' and use their own judgement to categorise some of the initial findings and feed the CRI.

'Categorising perceptions was not a big issue, as we had prepared our questions and people replied to them. The main problem we had was the categorisation of some actions, particularly in the other municipalities of the Metropolitan area, which we considered as addressing more than one indicator of the CRI.'

Interview with member of the City Resilience Office

The second phase of assessment was driven by numerical indicators proposed by the Resilience Strategy. The vast majority of the introduced indicators included statistical metrics for monitoring and assessing specific aspects of urban activity, related to the goals of the strategy. In some cases, such numerical indicators were capable of accurately assessing the city's progress in achieving some of its resilience goals. For example, statistical metrics connected to measuring tailpipe emissions, percentage of the volume of recycled waste or volume of wastewater that end in Thermaikos Bay, are useful indicators for designating level of progress in addressing specific goals of the Resilience Strategy.

However, in other instances, the validity of such indicators is questionable, especially when employed to monitor aspects of urban life that require a more qualitative understanding. For instance, one of the indicators of *Goal 2: Co-create an inclusive city that invests in its human talent*, was called 'Citizens initiatives' and aspired to increase bottom up initiatives and active citizens, using as a metric the '*percentage of participation in neighbourhood assemblies*'. As already seen in Chapter 6, a simple increase of participation in neighbourhood assemblies is a relatively crude measure and does not *de facto* guarantee active engagement of the civic society in the decision-making process, as other factors, such as the diversity of participants, trust between citizens and official or the willingness to share and discuss a range of options are equally important (Coaffee and Healey, 2003).

Another example of the unsuitability of many proposed indicators can be identified in the 'Digital services' indicator included in Goal 2 to measure the effectiveness of digital services is the '*number of municipal services provided through e-governance and municipal portals*'. In this case, the effectiveness of digital services is reduced to measuring the number of services digitally delivered by the municipality, without accounting for the number of users of such services or the quality of the information they provide. Effectiveness here seems to be conveniently represented by the provision of digital services alone without an established feedback process should to assess the validity and meaning of this indicator.

Arguably, Thessaloniki's Resilience Strategy as a whole was overly focused upon tracking easy to measure (known) indicators and did not pay significant attention to issues regarding social equity in the city that require a far more nuanced assessment approach or to unknown shocks and stresses. For example, in mid-2017 and early 2018 the city experienced a great influx of a refugees and asylum seekers from the Middle East, a disruption that was not predicted or planned and towards which Thessaloniki was rather unprepared. Therefore, there was not a readily applicable indicator that could be used to as a proxy for this. As noted by one of the members of the Resilience Office: *'We didn't' see it coming at all. It was a shock for the city against which we were not initially prepared'* (Interview with member of the Resilience Office). Without considering issues such as social equity or diversity as major priority for the future, the nature of the indicators developed in the Resilience Strategy could not reflect the rising level of inequalities the influx of Middle Eastern refugees entailed. This state of affairs did however lead to a new set of policy recommendations based in the appreciation of importance of equality in city decision-making.

In May 2018, the city published the *'Integrated Action Plan for Integration of Refugees'* (City of Thessaloniki, 2018a) in an attempt to bridge this gap in the Resilience Strategy⁷. The Integration Action Plan was the first official organised response from the city in a strategic level towards the new reality created in terms of socio-spatial inequalities, and proposed the establishment of an Integration Index, to *'assess the degree of integration and inclusion of refugees and asylum seekers and take corrective measures in collaboration with key actors'* (City of Thessaloniki,

⁷ The Action Plan was developed in the content of another EU funded project (URBACT Arrival Cities) and involved people from the Resilience Office as well as other municipal departments.

2018, p.3). This Integration Index was framed as being independent yet complementary to the indicators proposed by the Resilience Strategy⁸.

While the city enters the third phase of resilience assessment, monitoring the integration of refugees and asylum seekers should be one its top priorities. The Urban Resilience Observatory is planned to be responsible for monitoring the refugee integration process along with the other issues that will be undertaken. In the words of one of the city officials: *'The integration of refugees in one of the greatest challenges we are going to face in the next years. We will try to facilitate the process in every way that we can and definitely with the assistance of the Resilience Office and the Urban Resilience Observatory'*. (Interview with city official). The way that the Observatory will contribute in the integration process is still unclear, but according to local officials it will be congruous with the goals of the Resilience Strategy and the actions and objective of the Integration Action Plan.

In a nutshell, it has become clear that the restrictions of the CRI and the subsequent indicators of the Resilience Strategy in Thessaloniki served to limit the capacity of the city to effectively monitor the changes that resilience thinking introduced. Here, pre-defined universal frameworks of resilience assessment not only impeded the baseline assessment, hampering the process of identifying strengths and weaknesses for the city, but also the statistical indicator set established appeared unsuitable to monitor the progress of resilience implementation both in the short and in the long-term.

8.3.2 The inappropriate scale of indicators resilience assessment

A second concern emerging from the analysis of Thessaloniki's resilience assessment process is associated with the spatial scale of resilience indicators' application. It has been highlighted by several international organisations that the

⁸ However, it should be mentioned here that the city supported the integration of refugees, particularly through collaborating with local NGOs and volunteer groups who organised workshops and other engagement activities sponsored or facilitated by the municipal authority.

development of tools and methodologies aimed at providing a measurement of urban resilience is an imperative so as to contribute to the advancement of equitable urban development. However, as they are currently arranged at the municipal level, resilience policies, such as Thessaloniki's Resilience Strategy, usually frame risk and resilience in ways not sensitive to the local reality of local neighbourhoods and thus are not capable of capturing highly localised aspects of urban life that are crucial for building capacities to withstand acute shocks and chronic stresses, such as the human/social aspects of vulnerability and local physical infrastructure. This poses a fundamental two-part question, prominent in the literature on risk and resilience: resilience to what and for whom? (Cutter, 2016)

In the case of Thessaloniki, the indicators utilised in the first two phases of resilience assessment focused on the municipality of Thessaloniki, as the project's funding and initial scope did not allow further expansion to lower spatial scales. Despite the fact that many actions and activities of the Resilience Strategy had a clear local focus, such as the 'Park as you want it' (see Chapter 6), the proxy indicators developed were constructed to capture changes at a higher resolution, without properly accounting for the smaller local scale.

This approach had some advantages. Initially, it provided a general picture of the areas where the city could rely for support as well as other areas where it is underachieving, and more work from local authorities and urban stakeholders was required. This way, an initial prioritisation of resources was allowed to take place, targeting actions to improve the city-wide level of adaptive and coping capacity. However, after this initial stage a more locally reflected process for assessing resilience is required; one that would focus on the neighbourhood level and that would be able to distinguish the progress and performance of different spatial zones within the municipality of Thessaloniki. The upgraded role of the six Boroughs of Thessaloniki's municipality (see Chapter 6), was expected to assist in this new localism process, but as noted, this has arguable been ineffective so far. What is required now is a further devolving of responsibility (and resources) to a sub-

borough scale, one that would be appropriate to capture intra-Borough disparities, and inequalities.

Moreover, the work of the Urban Resilience Observatory in the third phase of resilience assessment, could focus on investigating the impact of resilience thinking through the implementation of the Resilience Strategy at the neighbourhood level, identifying appropriate methods for measuring the success of the proposed activities in different areas of the city.

8.3.3 Lack of capacity to track governance change

Another concern regarding the assessment methods applied in Thessaloniki during the phases of its resilience assessment relates to the capacity of the methods and indicators employed to track changes in the ways urban governance is structured and delivered. Here, the methods for assessing the level of governance provision during the first stage were based on the pre-defined CRI thus providing very limited freedom to local officials to qualitatively assess changes that they might recognise as important. As also noted in Chapter 6, tracking changes in urban governance based on the use of the CRI is possible, but it is a process that requires further expansion of the goals of the indices, in order to specifically track governance transformations with longitudinal evidence. This is something that has not been applied in Thessaloniki, as the first phase of assessment was directed by the goals, indicators and sub-indicators of the CRI, while the second phase was more driven by quantitative metrics and statistical indicators and was restricted by limitations in time. Both processes focused on short term measures of success to demonstrate ‘quick wins’ rather than on the longer-term changes required for the city to become resilient in the future.

The reason behind the prioritisation of short-term measures or outputs was largely resource availability and expediency (time constraints). Tracking governance change and transformation requires longitudinal evidence over a long period of time in order to provide meaningful insights for policy implementation (Coaffee *et al.*,

2018). In Thessaloniki, the application of resilience thinking in the urban environment has been strongly linked to the city's participation in the 100RC network; yet, this participation was connected with strict timelines, within which the municipality had to produce deliverables and implement actions. This rigidity of the project's structure did not allow meticulous evaluation for many of the outcomes of the resilience process, especially ones related to governance transformation.

'We had six months in total to prepare the Preliminary Resilience Assessment, time which was even more reduced as we completed the staffing of the Resilience Office in February 2016 and officially launched the Office only on March 2016. We had to produce outcomes by June 2016, and I think we did a remarkable job in delivering at the end.'

Interview with member of the City Resilience Office

Regarding the second phase of assessment, time constraints in implementing the Resilience Strategy were coupled with a lack of personnel to concurrently monitor the progress of the Strategy, based on the indicators defined. This lack of human resources was also intensified by the departure of some key officers from the Resilience Office, including the first Chief Resilience Officer and Deputy Mayor for Urban Resilience & Development Programmes, who was succeeded in October 2017 by another elected member of the City Council⁹.

Moving into the third phase of assessment that will be undertaken until 2022, early indications are that the Urban Resilience Observatory will have new officers dedicated to monitoring the progress resilience activity implementation and tracking changes in urban governance. As a senior city official argued on the need to track governance change: *'This is definitely something we will need to think about when developing our new indicators'* (Interview with city official). It should be mentioned here that after the completion of Thessaloniki's participation in the 100RC project,

⁹ The new CRO was the former Deputy Mayor for Education and Sports.

only one member of the Resilience Office continues working for the municipality. This indicates that professionals trained in understanding and utilising resilience principles and operational processes will not be able to contribute on a continuous basis from now on. Thus the city should ask for external expertise for resilience - assessment consultation in the future, in order to train the Resilience Observatory's new staff, echoing issues of professionalisation of resilience assessment (see Coaffee and Lee, 2016)

8.4 Discussion

Resilience assessment in Thessaloniki has been undertaken in three different phases, the last of which has only recently started and is expected to be completed in 2022. Throughout the overall assessment process, the city managed to identify basic strengths and weaknesses using participatory methods and also develop some basic indicators to monitor its future progress in implementing urban resilience. However, the limitations of the pre-defined assessment frameworks and the statistical indicators utilised to drive the assessment process, have generated some serious concerns regarding the capabilities of such tools to effectively capture the current situation on the ground (baseline assessment) and concurrently track changes in urban governance.

Nevertheless, despite its flaws and limitations, the assessment process has generated some significant benefits for the city. Such benefits resonate the main reasons for proceeding with resilience assessment, as presented in Chapter 4, and can, in the case of Thessaloniki, be summarised in three general categories: communicating of Resilience Strategy outcomes, appreciating learning and knowledge exchange, and, driving the process of resilience institutionalisation. These categories are thoroughly discussed below.

8.4.1 Communicating of the Resilience Strategy Outcomes

The results of resilience assessment were expected to be communicated to several audiences with different understanding of the resilience concepts, its goals or the

process followed to achieve them. In Thessaloniki, the utilisation of the CRI, as well as the establishment of specific indicators by the Resilience Strategy, assisted in the dissemination of the findings both to higher local officials of Thessaloniki municipality *and* to local citizens. Presentation of the findings addressing specific goals and targets enabled different audiences to understand the efforts of the Resilience Office and communicate the success (or otherwise) of the project implementation.

An interesting example of this successful communication was the participation of Thessaloniki's Resilience Office in the Conference '*Safe Kozani*' in November 2018. Through a presentation of the results of the Resilience Strategy utilising the initial findings of the first phase of assessment, as well as through examining the next steps of the Resilience Strategy implementation, the municipality embraced the chance to communicate their actions not only to representatives of the academic community but also to representatives of the local municipal administration. The success of this communication led to the establishment of a very close relationship with the municipality of Kozani, located in North-Western Greece; the Mayor of the city invited the Resilience team of Thessaloniki to guide an initial resilience assessment in Kozani, by sharing their experiences from Thessaloniki and teaching local municipal officers to use the tools and methods they employed.

Similarly, in September 2019 the city of Larissa, in the Region of Thessaly in Central Greece, decided to fund the development of an initial resilience assessment in the city. The municipality of Larissa released a funding of €80,000 to the University of Thessaly to undertake the process, which will be based on the CRI and will involve experiences in using the tool from Thessaloniki and Athens respectively¹⁰.

¹⁰ Interestingly, the University of Thessaly has asked the author for consultation in the process of conducting the city's Preliminary Resilience Assessment.

8.4.2 Appreciating learning and knowledge exchange

Throughout its resilience journey, Thessaloniki was also exposed to some new frameworks for assessing and monitoring the implementation of the Resilience Strategy and other resilience related activities. This exposure was a result of the inclusion on Thessaloniki in the ‘map’ of resilient cities in Europe, yet another outcome from the participation in the 100RC network. One of the frameworks introduced to the local authorities came through the EU funded ‘Smart Mature Resilience’ (SMR) research project. The SMR model was designed to ‘*support the resilience building process by providing a comprehensive resilience management guideline and a “maturity model”*’ (Smart Mature Resilience, 2019). This so called ‘maturity model’ was developed to support the resilience implementation process through a suggested roadmap consisting of five maturity stages and four dimensions (Table 8.2). Thessaloniki was selected for the pilot implementation of the model as a tier-3 city in 2017 and also hosted the launch event where city stakeholder could share their experiences.

Table 8.2: Dimensions and stages of maturity based on the SMR model (adopted from: Smart Mature Resilience, 2019)

Dimensions	Stages of maturity
Leadership and Governance	Starting
Preparedness	Moderate
Infrastructure and resources	Advanced
Cooperation	Robust
	Vertebrate

The city supported the project by providing insights from the Resilience Strategy and initial results from its implementation but did not extensively proceed with utilising the maturity model. However, through methods utilised in the first two

phases of assessment, local officials managed to share the knowledge they accumulated and exchange experiences with representatives from nine other cities that have been through similar assessment processes, as well as with eight others that were just entering the baseline assessment process¹¹. As discussed in Chapter 4, this process of peer-peer learning is considered a positive by-product of embarking on programmes of resilience assessment, not only for understanding how the process plays out in different contexts but also for initiating a wider process of shared dialogue between city officials that contributes to breaking down operational silos.

8.4.3 Driving the process of resilience institutionalisation

As argued in Chapter 6, institutionalising resilience is a challenging and slow process that requires strong leadership, political commitment and shared values. In Thessaloniki, the establishment of the Urban Resilience Observatory along with the continuation of the work of the Resilience Office, is currently driving the process of institutionalisation in the city, through monitoring the progress of the Resilience Strategy implementation. It is still too early to foresee the success of institutionalising resilience in Thessaloniki, as political commitment and the appreciation of resilience values by the new political administration is not yet determined. Arguably, this will largely be determined through the work of the Observatory and the capacity of assessment methods and frameworks to demonstrate success that might facilitate the mainstreaming of resilience practices in the city. Embedding a culture of resilience thinking into the DNA of city operations in the long term will be a great challenge for local authorities, especially in the current political environment, which is characterised by great flux in local administration.

¹¹ Interestingly, 16 out of the 17 cities that participated in the event were members of the 100RC network.

8.5 Conclusions

This chapter identified and unpacked three main phases of resilience assessment for the city of Thessaloniki. The first phase was comprised of an initial baseline assessment of the city's strengths and weaknesses and employed a variety of methods, including participatory ones. This phase was concluded with the publication of the Preliminary Resilience Assessment and the identification of 'Discovery Areas' for the Resilience Strategy. The second phase began in March 2017, when the Resilience Strategy was published, and ended in June 2019 with completion of Thessaloniki's participation in the 100RC network. This phase was more internally focused, and significantly constrained by time limitations imposed by the 100RC agenda. Finally, the third phase started in July 2019 with the establishment of the Urban Resilience Observatory and is expected to last for three years. Despite the inherent limitations of the assessment tools and methods utilised for assessing and monitoring urban resilience in Thessaloniki, it can be argued that the assessment process has generated some invaluable benefits for local authorities, as analysed in subsection 8.4.

Coming back to the initial research question tackled by this chapter - *are resilience assessment methods capable of tracking governance change and mainstreaming resilience practices?* - the example of Thessaloniki showcases that although such tools and methods are not sufficiently capable of tracking governance change, they could be extremely useful in mainstreaming resilience practices and even drive the institutionalisation process forward. The establishment of the Urban Resilience Observatory supports this hypothesis; yet further analysis of the methods, tools and general approach to resilience assessment that the Observatory will adopt will be required in order to justify this assumption.

This chapter concludes the second part of this study, which has presented the outcomes of the empirical undertaken in the city of Thessaloniki. The next chapter concludes this thesis by exploring its major findings, its major contributions in the field of urban resilience, its limitations and focus areas for future research.

Chapter 9 - Conclusions

9.1 Introduction

Since 2013, when resilience was declared by Times Magazine as the environmental buzzword of the year (Walsh, 2013), a global tendency towards prioritising resilience in the global development agenda has suddenly emerged

(UNDRR, 2015; United Nations, 2015; Habitat III, 2016). Resilience thinking offered a holistic approach to cope with a variety of disruptive events and efficiently confront a turbulent world suffering from financial crises, climate change, geopolitical instability and growing inequalities. Furthermore, resilience provided an innovative and comprehensive way of governing complexity and uncertainty (Duit *et al.*, 2010; Chandler, 2014a; Welsh, 2014) through encouraging transformation of existing practices, multi-agency working, individual accountability and flexible governance arrangements (Hynes *et al.*, 2013; Boyd and Juhola, 2015). In other words, it provided a viable response to the emergent call to '*adapt or die*' (Walsh, 2013; Coaffee, 2019).

This call has mobilised action in a plethora of think-tanks, governmental institutions, private organisations, community groups and philanthropic organisations. Among them was the Rockefeller Foundation, a philanthropic institution that succeeded, through its 100RC initiative, to practically introduce resilience into the vocabulary of mainstream urban policy. Although the 100RC ultimately proved to be a short-lived project, the dedication of both the Rockefeller Foundation and other philanthropic institutions to support resilience-related efforts does not seem to have diminished¹. Urban resilience has 'come to stay' and the

¹ On 1 May the Atlantic Council announced the establishment of the Adrienne Arsht-Rockefeller Foundation Resilience Centre, through a generous a \$30-million grant received from the Rockefeller Foundation (The Atlantic Council, 2019). Moreover, the creation of the Global Resilient Cities

central question that arises for local governments and urban practitioners is *how can we facilitate the implementation of resilience strategies and transform the way cities are currently governed, and to do so in ways that don't merely reproduce conventional models or business as usual approaches?*

Seeking to respond to this question, this study followed the resilience journey of a member of the 100RC network, the city of Thessaloniki. This longitudinal study has focused on the transformation of urban governance, the marginalisation of urban geological risk and the overall potentialities of resilience assessment methods to institutionalise urban resilience. This chapter will provide a summary of the thesis before presenting the major findings of the study, which address both the overarching objective and the three accompanying research aims set in Chapter 1. Moreover, the findings of this study address several theoretical considerations regarding resilience implementation and presented in this chapter through the unfolding of the findings from the empirical study. Afterwards, the threefold contribution of this thesis- conceptual, methodological and practical- will be unpacked, while the last part of the chapter will explore the limitations of the study and propose some directions future research should follow in the investigation of resilience policy implementation.

9.2 Summary of Thesis

In light of the global interest in the application of resilience thinking to urban environments and taking into account the complexity of resilience implementation and institutionalisation, this study aspired to better understand the implementation gaps of resilience policies by providing a longitudinal study of Thessaloniki's experience of applying resilience in situ. The broad objective of the study was to *examine the potential of resilience-thinking to influence urban governance and to*

Network in 2020, with the participation of several 100RC city-members and the support of the Rockefeller Foundation shows the dedication towards encouraging resilience action across the world

identify explicit actions that facilitate or impede this process. This study was an attempt to fill the existing conceptual and practical void in urban resilience studies, created by the dearth of analytical studies of urban resilience implementation over a substantial period of time. This broad objective was later unpacked in three clear aims, namely:

- How do resilience strategies induce the transformation of the traditional pathways of urban policy delivery?
- What are the implementation challenges for urban resilience policies deriving from the inattention to urban geological risk?
- Are resilience assessment methods capable of tracking governance change and mainstreaming resilience practices?

The thesis itself was developed in two parts, broadly focusing upon literature review and empirical research (see Figure 1.4). Chapter 1 served as an introduction to the whole study providing the theoretical context of resilience as a concept- with specific reference to urban resilience- while also presented the major objective and the specific aims of the research. Chapters 2, 3 and 4 served as literature review chapters, providing a well-structured demonstration of previous work related to the research's objective and aims. Each of the literature review chapters was connected to the above-mentioned research questions and was further analysed empirically in part two of the study, consisting of chapters 6, 7 and 8. In more detail, Chapter 2 looked at the connection between resilience thinking and urban governance conceptually introducing Chapter 6, which explored the potential of resilience strategies to stimulate transformation in urban governance. Chapter 3 connected urban resilience with vulnerability and natural hazards (specifically geohazards), paving the way for the investigation of implementation challenges stemming from the negligence of urban geological risk, which was presented in Chapter 7. Finally, Chapter 4 discussed resilience assessment methods and their inherent limitations, which were later empirically examined in Chapter 8. Chapter 5 reviewed the

research approach and methods adopted for this study, with this chapter discussing the major outcomes and conclusions of the research.

The study was predominantly qualitative in nature and focused upon a singular case study of the city of Thessaloniki. Consistent with the tenets of case study strategy, the study utilised various sources of data and information, including semi-structure interviews, documentary analysis, personal observations, qualitative spatial analysis, official published reports, archival data, media reports and social-media posts, in order to address its objectives. Individuals who contributed viewpoints to the study included the political elite of Thessaloniki's local authority (people involved in the design and implementation of the Resilience Strategy from the municipality's side), academics, NGO members, officers and directors from other municipal departments. The major findings of the study, addressing the research questions presented above, are reviewed in the following section.

9.3 Major findings of the study

From its inception to its implementation, this study has attempted to contribute to the field of urban resilience research by shedding light to different aspects of resilience policy implementation. Through following the case of Thessaloniki, this study demonstrates how the concept of resilience evolved from initially denoting a mere systemic quality, to an evolutionary process and a strategic goal, around which the governance apparatus of the city reorganised (Davoudi *et al.*, 2012; Coaffee *et al.*, 2018; Moser *et al.*, 2019). Here, as in many other cities around the world, the concept of resilience was seen as an alternative resource of funding for the local authority, which was trapped in the midst of austerity measures and subsequent budget cuts from the central state. In such a situation of fiscal retrenchment resilience operated as a 'boundary concept' (Brand and Jax, 2007; Olsson *et al.*, 2015) infiltrating the city's operational milieu, transforming several governance procedures and ultimately playing a key role in driving the city's developmental future.

Another interesting finding of this study relates to the changing meaning of the concept of resilience as it becomes operationalised in different contexts. Initially employed as an approach to confronting acute shocks deriving from natural hazards and social unrest -in Thessaloniki's case- due to its flexible and malleable definition (Chmutina *et al.*, 2016), the Resilience Strategy ended up largely neglecting geohazard management and completely omitting social unrest. Here, it could be argued that as the implementation of urban resilience is contextual and evidence-based this shift of focus reflected the outcomes of the initial baseline assessment; yet, such changes in the emphasis of resilience policies often mirror differing political agendas and priorities lead to strategies which are neither truly holistic nor genuinely innovative themselves. In this situation resilience policies just promote 'business as usual' without effectively transforming ways of operating, diminishing resilience to another buzzword, as several critics of the term forewarn (Diprose, 2014; Joseph, 2016).

Nevertheless, while acknowledging several major considerations regarding the concept of resilience and its implementation, this study is deliberately focused on the benefits of resilience policy implementation and the potential of resilience to provide a viable pathway to urban governance and development (Béné *et al.*, 2018; Brunetta and Caldarice, 2019b). Instead of limiting the conversation to the obstacles and predicaments of working under a resilience framework, this work attempted to highlight the benefits local authorities and civic societies are capable of gaining, even from seemingly debated actions, such as assessment and evaluation of urban resilience (Chapter 8).

Ultimately, this study was guided by three research questions, which primarily informed the structure and content of both the theoretical and the empirical chapters. The remainder of this section summarises the key findings that emerged from the empirical analysis of Thessaloniki's case study.

a) How do resilience strategies induce the transformation of the traditional pathways of urban policy delivery?

To address this question, an initial assessment of governance structures and relations in the city of Thessaloniki was undertaken, in order to understand the current governance conditions which resilience thinking could potentially transform. Following the traditional norm of Greek local governance, Thessaloniki's governance structures were found to be obdurate, strongly mandated by the national government in terms of funding and operational capacity and starkly top-down oriented. Consequently, this allowed very limited participation of citizens and other urban stakeholders in the urban management and decision-making processes. In addition, cross-departmental and cross-sectoral collaboration, both within the municipality and across different urban stakeholders, was problematic, as a result of deep-rooted bureaucratic routines and institutional practices as well as lack of trust. These deeply rooted impediments constrained the ability of the Municipality to produce integrated, inclusive and holistic responses to its urban issues. This path dependency was further reinforced as a result of financial austerity measures and the subsequent limitations in human and material resources such measures caused.

Considering the fact that Thessaloniki did not have any previous exposure to resilience principles or the implementation of resilience in action (urban resilience was not really a word in Greek until recently), tracking governance changes specifically induced by the concept of urban resilience was a challenging endeavour. It required the development of a method and analytical framework to track governance changes over time, brought about through resilience action. This process was influenced by the ongoing work of the city in using the Rockefeller and Arup *City Resilience Framework* that sought to '*distinguish a resilient city from one that is simply liveable*' (Da Silva and Moench, 2014).

Addressing the first objective, the *Reorganisation of traditional governance apparatus*, Thessaloniki enthusiastically embedded resilience in its organisation chart, primarily by establishing an elected position of a Deputy Mayor for Urban Resilience. This has led to resilience starting to operate as an overarching principle in the developmental agenda of the city, directly influencing, and often guiding,

sectoral developmental plans. The decision of the Mayor to align *all* individual developmental plans with the actions proposed by the Resilience Strategy also demonstrates the will of the local authority to support resilience building and make a tangible effort to overturn existing problems of traditional governance delivery in the city.

Regarding the second objective, the *Mobilisation of adaptive governance capacity*, this study has demonstrated this to be a largely successful endeavour, since for the first time large numbers of external organisations (over 40) and citizens (over 2000) actively participated in co-productive resilience dialogue, and helped set the ground work for the implementation of the Resilience Strategy (City of Thessaloniki, 2017). This wide multi-stakeholder engagement generated a new reality for the city in achieving, a first layer of resilience building, by creating capacities within and outside of the Municipal authority to act in new ways, which were largely absent in the past. Notably, cross-departmental and cross-sectoral collaborations have been facilitated through numerous activities the city organised and supported; however, further engagement of urban stakeholders and citizens is needed in the future. Such sustained engagement will ultimately be the key for releasing Thessaloniki's resilience potential.

The third objective, the *co-production of a shared vision for medium- and long-term urban development*, was also embraced by Thessaloniki and manifested through the establishment of a 'City Resilience Day' as well as through the mobilisation of a series of other resilience-related activities aimed at familiarising citizens with the concept of urban resilience and nurturing a 'resilience mentality' across the city. Whilst arguably still driven by Municipal concerns, such a co-productive ethos also fed into the process of devising the Resilience Strategy. Today, this strategic document provides a roadmap for guiding developmental activities in the city. Nevertheless, this momentum needs to be consolidated by the Municipality of Thessaloniki in the long term: an objective that that been questioned by changes in local politics, as the city welcomed a new administration in September 2019. The

near future will show to what extent resilience thinking and action has been hardwired into the everyday operating procedures of the city.

This study has demonstrated that resilience building is a long process that requires the mobilisation of a wide array of stakeholders, the local community and strong and sustained political will. Moreover, understanding resilience as a strategic goal can facilitate the adoption of new governance models that challenge traditional bureaucratic governance habits, allow new ideas to be mainstreamed and avoid or fill gaps between resilience theory and practice. Co-developing a multi-stakeholder vision for future urban development based on the principles of resilience as well as raising awareness and working across sectoral and departmental silos has emerged as perhaps the key factor in facilitating the resilience building process².

Summing up, empirical research in Thessaloniki has shown how calls for innovation in governance rub up against a deeply ingrained governance culture and a fractious political landscape meaning that the institutionalisation of a culture of urban resilience has become a very slow and unsure process. This has implications not only in Thessaloniki, but for international attempts for cities seeking to utilise resilience programmes to quickly transform urban governance in direct response to current and future crisis and uncertainty.

b) What are the implementation challenges for urban resilience policies deriving from the inattention to urban geological risk?

This study has illuminated how and why a consideration of urban geological risk has been largely marginalised in resilience strategies, and also why its incorporation is often a very challenging endeavour. Despite the original identification of the risk geohazards posed to the city of Thessaloniki, the subsequent Resilience Strategy did

² However, the Thessaloniki's resilience journey was not only full of successes and benefits for the city. Revisiting the design and implementation of the Resilience Strategy from a critical perspective, it could be argued that the project has been used by local individuals for fulfilling their career aspirations.

not provide a comprehensive response for geohazard management, highlighting policy implementation gaps, and in some cases enhancing vulnerability rather than resilience. To a large extent, such challenges emerged from the strategic decision made by the local authorities to focus on the social and cultural aspects of everyday resilience; a decision that came at the expense of geohazard management. In total three major implementation challenges were recognised as a result:

First, a *Lack of Geological Insight in the Design of Resilience Strategies*, has been identified in the case of Thessaloniki, with a lack of appreciation of geology and geomorphology being fed into decision making. Geologists and geo-scientists were not adequately involved in the process of developing the Resilience Strategy. Even when geological insight was emphasised, it was subsequently diminished in favour of other aspects of the resilience-building process. Within the Resilience Strategy, only sporadic references to natural hazards or geohazards were made with a significant absence of any reference to underlying geology.

Second, the *Relationship between the Built Environment and Emergency Planning* has been proven to be problematic in Thessaloniki, as the city's hasty and informal urban planning has both led to the generation of a very dense city core and to unregulated urbanisation on the city outskirts. Such an urban planning reality has produced substantial vulnerability and exposure to external risks and generated challenges for the implementation of the Resilience Strategy. This was reinforced by the limited capacity of the municipality to dynamically intervene, both in terms of administrative power and the ability to enforce building codes, and in terms of financial resources available to uphold this process. The challenge of strategic planning in the future will be to better regulate and enforce appropriate development that is more resilient (reduced vulnerability and exposure) and improve retrofitting actions across the existing built form that will reduce risk.

The underlying vulnerabilities in the city of Thessaloniki imposed by the problematic relationship between the built environment and emergency planning demonstrate that the serious disruptions and disasters the city is experiencing are far

from ‘natural’ (O’Keefe, Westgate and Wisner, 1976; Chmutina and Meding, 2019). Instead, they are deeply rooted in the inherent vulnerabilities of Thessaloniki’s built environment, which is characterised by aging infrastructure and a dense urban core and are exacerbated by the lack of a robust planning regulatory framework; a lack that has resulted in inappropriate planning practices and urban expansion to disaster prone areas.

Third, *Horizontal Communication among the Geologically Related Organizations* was identified as problematic, as not only geological organisations were not sufficiently represented in the preparation of the Resilience Strategy, but also because of the vertical misalignment regarding geological risk between different national administrative scales. In this case, the role of the Resilience Strategy, as an overarching developmental document, should be to encourage and facilitate communication among geological organisations at all scales and better connect urban planning with geological vulnerability and exposure of the built environment.

In conclusion, resilience policies should create a resilient vision for cities through mobilising the local community, facilitating horizontal coordination of actions within public administration and nurturing a pre-emptive management mentality. In this framework, the wider appreciation of geological risk is fundamental in the process of dealing with uncertainty and pursuing holistic and integrated urban resilience. This requires further engagement of geoscientists from the early stages of strategic urban planning, a clearer connection between emergency and urban planning and wider and more effective coordination among organisations responsible for dealing with geological vulnerability and natural hazards. This requirement to appreciate the multifaceted nature of decision making and stakeholder engagement across time and space (and above and below the ground) also reinforces the truism that there is nothing natural about ‘natural disasters’.

c) *Are resilience assessment methods capable of tracking governance change and mainstreaming resilience practices?*

To address this question a thorough analysis of the methods and tools utilised by Thessaloniki's Resilience Office to assess the outcomes of the Resilience Strategy was undertaken, in combination with wider Rockefeller Foundation evaluations, in order to the 'success' of the initiative to date.

It was found that despite Thessaloniki's attempts to utilise the CRI, as mandated by Rockefeller as a condition of funding, this proved to be a fairly complicated task. The main cause of this operational difficulty was the predetermined nature of the indicator sets used which failed to address changes at the smaller scale and often led officials to arbitrarily assign some findings to proxy indicators. Another complication identified was the lack of available data for some of the 120 sub-indicators, recognised in the CRI.

Therefore, the simple answer to the research question would be that the resilience assessment methods fail to adequately track governance change due to their complicated nature and the limitations of quantitative metrics (Levine, 2014; Prior and Hagmann, 2014). However, this study identified three major benefits that emerged from the utilisation of the CRI and *the process* of assessing and evaluating urban resilience in Thessaloniki.

First, the utilisation of the CRI facilitated the *Communication of the Resilience Strategy outcomes*, both to higher officials, including the Mayor, representatives of other non-100RC member cities and the general public. In fact, the presentation of the results of designed activities and actions addressing specific goals and targets enabled different audiences to comprehend the work undertaken by the Resilience Office as well as the implications met throughout the process. Interestingly, members of adjacent Greek municipalities determined to secure funds for carrying out assessments of their resilience levels, contacted Thessaloniki officials in order discuss the resilience experience of the city.

Second, through the participation of Thessaloniki in the 100RC network and the exposure to a variety of assessment and monitoring methods assisted the city in

Appreciating learning and knowledge exchange. As a member of a small pool of European and South-Mediterranean cities funded in part by 100RC to deal with resilience in practice, Thessaloniki has been able to learn from experiences of other cities in dealing with similar urban problems and proceed to peer-peer learning, which could support the process of exchange and transfer of knowledge and experiences.

Third, resilience assessment, monitoring and evaluation is currently *Driving the process of resilience institutionalisation* in Thessaloniki. This was the central reason for recently securing regional funds to finance the Urban Resilience Observatory that could monitor the progress of Resilience Strategy implementation. This will become additionally important after the completion of Thessaloniki's participation in 100RC, and the subsequent end of funding from the Rockefeller Foundation. Here resilience assessment and evaluation are set to become the main factors upon which the institutionalisation of urban resilience in the city depends and through which further resources for resilience building can be leveraged.

To sum up, the utility of existing resilience assessment frameworks to track governance changes has been limited due to the techno-rational structure of their indicators. However, experiences from Thessaloniki show that despite the complexity of their approach the process of assessment is capable of providing some benefits for local authorities and even support the process of institutionalising urban resilience and mainstreaming resilience practices.

9.4 Wider contributions of the study

This study has made some significant contributions to the field of urban resilience. Key among such contributions is the presentation of a longitudinal study of resilience strategy design and implementation from its inception to its current state. This is something that has been identified as missing from current resilience scholarship (Moser *et al.*, 2019). Through both studying the emergence of resilience as an external observer and (partially) participating in the process of developing and

implementing a resilience strategy, this study has been able to extract some invaluable insights on the process urban resilience is operationalised in a complex political environment unfamiliar with resilience concepts and principles. The contribution of this study is threefold.

From a *methodological perspective*, the study presents a research approach and analytical framework for exploring and tracking resilience implementation strategies and governance dynamics for an extended period of time through studying political elites and performing action research. This is an approach that has already been adopted and proved to be useful in other studies, as the importance of the actual process of implementing resilience and the appreciation of resilience as a never-ending journey, rather than a fixed destination, becomes more widespread (Coaffee, 2019). Such an approach sits in contrast to existing resilience assessment methods that are seen as too technical and de-contextual (Levine, 2014). Notably, indicators and monitoring points are incapable of tracking smaller-scale local changes or governance transformations rendering their utilisation of limited value for local authorities (notwithstanding their invaluable role in establishing connections and trust among urban stakeholders).

Conceptually, this study provided significant insights in the way resilience thinking induces the transformation of governance structures and relations. By analysing the case of Thessaloniki, such insights could inform future research on the ways of adopting new and innovative flexible and adaptive governance arrangements that actually 'stick' rather than revert back to conventional patterns. This has positioned urban resilience as something that is evolutionary, centred on bouncing forward to a new normality that is conditioned by greater levels of uncertainty (Davoudi *et al.*, 2012; Coaffee and Lee, 2016). By contrast this study has also underlined the limits of some conventional models of resilience (bounce-back or equilibrist approaches) that are difficult to apply in complex social, political and organisational environments (Chandler, 2014b).

Additionally, the study showed that an emergent emphasis on socio-economic problems in contemporary resilience strategies often comes at the expense of the detailed consideration of natural hazards (Pitidis *et al.*, 2018). Appreciation of the role of a combination of geological risk and the human-induced roots of urban disasters should be at the centre of emerging resilience attempts, particularly in cities that have suffered the devastating effects of ‘mother nature’, such as Thessaloniki.

Finally, from a *practice and policy implementation* standpoint, the study has illuminated a range of factors that have created implementation gaps or challenges in terms of actually grounding resilience. These factors include, but are not limited to, breaking cross-departmental and cross-sectoral silos and raising awareness around the transition from risk management towards resilience (Coaffee *et al.*, 2018; Meerow, Pajouhesh and Miller, 2019). Notably, this study highlighted that using resilience as a policy metaphor can bring urban stakeholders and citizens to the same table and assist in the process of building the trust that is important in any programme of city building. It also demonstrated that building resilience is a long-term process and not a systemic quality and that identifying the features of public administration that facilitate or hinder efforts to transform existing practices is central to successful resilience actions.

9.5 Limitations and future research

This study provides a comprehensive review of Thessaloniki’s resilience journey, from the development to the implementation of its Resilience Strategy. It has expanded existing knowledge of resilience policy implementation by highlighting the implications emerging from the operationalisation of urban resilience. It also led to the production of two peer-reviewed papers, one of which has already been published.

However, the study was affected by some limitations and constraints. Notably, although this research constitutes a thorough longitudinal study of resilience

implementation in Thessaloniki, wider generalisation of its outcomes in other cities would require a deep understanding of local political environments as well as their experience with resilience principles and governance arrangements. This is due to case study strategy that was adopted and links to the contextual nature of resilience policies that limits the generalisability of the outcomes of case studies in resilience implementation.

Another limitation of this study relates to the constrained amount of time available to effectively monitor the process of resilience institutionalisation. This is a typical limitation of action research approaches that effectively track an ongoing process. In Thessaloniki, the city has only recently (June 2019) finished the implementation phase of its strategy, concluding its participation in the 100RC network. The 100RC network itself announced its closure in May 2019³. As a result, this study was unable to monitor the city's engagement with resilience principles following the completion of this participation. Whilst, encouraging soundings derive from the establishment of the Urban Resilience Observatory, this is yet to be staffed⁴, and the conceptual, methodological or operational approach they will follow is unclear. The reorgasing and evolution of 100RC network into the Global Resilience Cities Network in 2020 (Whybrow, 2020) engenders new opportunities and challenges for Thessaloniki and time will show how willing and ready local authorities to continue the legacy of 100RC participation in the city.

Tracking this ongoing process into its next post-100RC phase remains an ambition of future research. Such research could focus on the tools and methods that the Observatory will undertake in monitoring the implementation of the Resilience Strategy as well as analysing the role it will acquire, especially after the release of almost all of the Resilience Office staff. Thessaloniki is entering a new phase of its

³ The closure was announce in May 2019 but became official on the 31st of July 2019.

⁴ Advertisement of two fixed-term positions for the staffing of the Urban Resilience Observatory was released in July 2019.

resilience journey and it will be very interesting to see the reaction of the newly elected municipal administration to the flagship project of the previous one. Institutionalising urban resilience in the long term is the next call to which the city has to respond.

In addition, similar longitudinal studies from other participants of the 100RC network, which share similar characteristics with Thessaloniki in terms of size, familiarity with resilience principles and obdurate governance structures, would provide an interesting comparison with the outcomes of this study. Such comparisons will expand knowledge on the capacity of resilience to stimulate governance transformation and will also render the generalisation of this study's outcomes more justifiable⁵. Significant research value would also be added by analysing the ways in which 100RC participants dealt with natural hazards in their respective resilience strategies and if so, to what extent the actions they proposed informed urban policy or emergency response mechanisms.

⁵ Such cities could be Athens, Amman or Ramallah.

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Appendix I

I. Questions discussed in the semi-structured interviews undertaken throughout this study

I.1 Questions asked after the publication of the Preliminary Resilience Assessment

- A. Which were the initial urban problems identified when you submitted your file to the 100 Resilient Cities Network and how have those problems been altered after the first stage of your investigation in the city?
- B. What kind of acute shocks and chronic pressures is the city facing currently facing or is more prone to and how do you plan to tackle them in the long-term?
- C. The strategy you are currently setting out is based on five areas of attention which have emerged after a Preliminary Resilience Assessment you have conducted. What were the methods, techniques and tools you used in order to come up with those areas.
 - i. Did you use any index-based model, or any other model provided by the 100 Resilience Cities Platform?
 - ii. Do you have any data gathered from this process which you can share?
- D. Which of the above-mentioned areas are you currently focusing your attention on and why?
- E. In your opinion, will the city be benefited in the long-term from the implementation of the project in terms of both money and resources saved? Can you provide some examples?
- F. Do you think urban geological conditions have been adequately included in the five finding areas your Development Strategy will focus on?

- i. If yes, please elaborate more on your way of thinking about urban geology. If not, why do you think that happened? Are you planning on including it on a latter stage of the strategy?
 - ii. Which external stakeholders could prove to be potentially interesting for framing geological dimension of your strategy? Are you in touch with them?
- G. Which are your aspirations for the legacy of the project after its completion? Do you think that resilience will continue to be in the centre of attention during the next years? How are you planning on building on the outcomes of this project for enhancing the resilience of the city in the future?

I.2 Questions asked after the publication of the Resilience Strategy

Governance

- A. Which are in your opinion the main achievements of the project so far? What else are you expecting to achieve?
- B. Is resilience a goal or a process for Thessaloniki Municipality?
- C. What future steps are you considering following after the publication of the Resilience Strategy.
- D. Is there a shift towards participatory governance? What are the limitations of such an endeavour in your opinion?
- E. Where does the RS stands in the priority ladder as far as developmental projects are concerned?
 - i. Are there any connections between the RS and other ongoing project for the municipality?
 - ii. What is the RS role? Is it binding? Is it an overarching directive strategy?
 - iii. Are there any similar project for the municipality abide to the directions set by the RS?
- F. Have you identified/intended to achieve any changes in the way Thessaloniki is governed through this project? If yes can you elaborate more on the matter?

- G. Do you believe that resilience could be institutionalised in the local government?
- H. What is the role of the Municipality of Thessaloniki and the other 10 municipalities in the Metropolitan area?
 - i. Is there an attempt to operationalise resilience through downscaling of governance scheme? What is the role of Boroughs in this endeavour?

Geohazards

- A. Why did you decide to focus on everyday resilience? Don't you think that this focus neglects environmental hazards?
- B. As far as geology is concerned, how is the city incorporates geological conditions in the strategic planning?
- C. Is there any consultation/engagement of geoscientists in urban strategic planning in Thessaloniki?
- D. How do you communicate with geologists/geoscientists so far in the RS process?
- E. Do you feel tha the Resilience Strategy could efficiently impact geohazard management in Thessaloniki?
- F. Is in your opinion the relationship between urban planning and emergency planning efficient in Thessaloniki?

Assessment

- A. How is the city using open data sources and initiatives started through engagement with the 100RC network?
- B. How are you planning on assessing Thessaloniki's progress in resilience terms?
 - a. What types of data are you using?
 - b. What is your opinion about the assessment tools provided by 100RC?
- C. Can you describe the process of assessment you are planning on following until the end of the project?

D. Can you describe the process of developing and using the indicators published with the Resilience Strategy? Do you think they will be effective in capturing the city's resilience goals? What is your timescale for monitoring the implementation of the Resilience Strategy?

Appendix II

Table II.1: Spatial data and imagery used to investigate the relationship between geohazards and urbanisation in Chapter 7.

Dataset	Source	Year
Administrative boundaries	Thessaloniki GIS portal (https://gis.thessaloniki.gr/)	2018
Geological Map of Greece—Thessaloniki Sheet (scale 1:50,000)	Institute of Geological and Mining Research of Greece	1978
Engineering Geology Map of the Thessaloniki Wider Area (scale 1:50,000)	Institute of Geology and Mineral Exploration (IGME)	2000
Earthquakes over 4.0 Richter Magnitude	National Observatory of Greece, Institute of Geodynamics (http://www.gein.noa.gr/en/seismicity/earthquake-catalogs)	2017
Database of high-impact weather events in Greece (2001–2012)	National Observatory of Athens (NOA), Papagiannaki, Lagouvardos and Kotroni (2013)	2013
Floods in Greece (1880–2010)	Diakakis, Mavroulis and Deligiannakis (2012)	2012
On-Line Flood Database for Greece	Nikolaidou <i>et al.</i> (2014) (ceogis-floods.web.auth.gr)	2014
Building uses in Thessaloniki Metropolitan Area	Thessaloniki GIS portal (City of Thessaloniki, 2018b)	2018
Building geometry (from Open Street Maps)	Open Street Maps (https://www.openstreetmap.org/)	2018
Geo-tectonical zones of Northern Greece	Makedon, Chatzigogos and Spandos (2009)	2009
Urban fill thickness	Makedon, Chatzigogos and Spandos (2009)	2009
Land cover map	Copernicus Land Monitoring Service, Urban Atlas (https://land.copernicus.eu/)	2006
High-resolution satellite optical imagery (2003–2017)	Google Earth, Bingmap	2017
Digital Elevation Model (DEM)	USGS (https://earthexplorer.usgs.gov/)	2000
Hydrology	http://data.gov.gr/ , and digitised based on Google Earth and DEM	2018

Appendix III

Table III.1 Urban features and characteristics of the Acheiropoietos neighbourhood

Building Block	Number of Floors (Mean)	Building Density (FAR)	Building Height (Mean) (m)	Area (m²)	Mean Distance from Free Space (m)	Minimum Distance from Free Space (m)
725	5.50	3.08	15.40	4157.27	229.03	51.98
755	6.45	3.72	18.06	4267.51	223.39	52.36
772	5.59	3.07	15.65	7436.36	260.04	127.44
807	6.38	4.04	17.86	4226.22	272.35	183.40
808	5.82	3.38	16.30	4144.63	199.22	120.05
816	6.67	3.44	18.68	3704.44	317.25	247.30
822	5.43	3.10	15.20	6474.97	238.77	191.95
826	6.00	2.78	16.80	2799.39	380.67	310.23
832	4.19	2.27	11.73	5616.51	194.60	147.41
835	6.27	3.82	17.56	5908.81	414.50	313.56
858	4.50	2.62	12.60	2129.89	472.53	362.05
862	7.14	3.32	19.99	3554.42	347.24	228.20
866	6.12	3.98	17.14	6200.24	508.38	370.42
867	3.60	1.32	10.08	4272.53	193.33	127.04
870	5.09	3.33	14.25	2288.76	449.53	316.06
878	5.69	3.66	15.93	4021.97	221.81	86.59
879	6.25	3.17	17.50	5584.88	560.68	410.32
886	7.17	4.18	20.08	2649.88	431.18	271.32
889	6.83	4.29	19.12	2767.56	256.89	82.19
891	6.25	4.01	17.50	3922.29	364.38	203.68
892	6.50	4.37	18.20	2542.18	318.44	145.54
897	6.36	3.81	17.81	4715.72	216.32	110.05
904	6.64	4.12	18.59	5166.53	478.42	300.28
906	6.64	4.00	18.59	3789.76	308.07	103.82
908	6.69	4.19	18.73	4486.10	238.70	57.32
911	6.63	3.39	18.56	4130.45	422.39	229.71
917	5.40	2.00	15.12	2548.11	536.24	355.72
924	6.50	4.05	18.20	1454.69	364.04	155.29
933	6.40	3.74	17.92	2305.83	365.00	133.99
934	5.00	3.03	14.00	1698.38	411.23	197.18
942	6.80	4.51	19.04	4387.58	517.39	315.02
950	6.40	3.93	17.92	4924.47	478.83	256.03
954	6.67	4.47	18.68	1340.47	408.04	174.84
955	6.36	3.23	17.81	7245.13	364.44	112.58
960	6.67	3.96	18.68	2578.19	386.51	141.21
969	7.14	5.27	19.99	3348.01	490.67	256.61
974	5.29	2.94	14.81	6592.56	468.36	222.92
995	5.47	3.19	15.32	3349.77	587.30	346.52
996	4.89	2.00	13.69	4585.28	535.98	293.22
1024	6.60	3.39	18.48	1558.93	644.60	403.41
1028	7.00	3.16	19.60	1278.08	263.20	126.92

Appendix IV

Table IV.1: Indicators developed during the Thessaloniki's Resilience Strategy (Source: City of Thessaloniki, 2017)

Indicator	Description	Metric	Desirable outcome
Goal 1: Shape a thriving and sustainable City with mobility and city systems that serve the people			
Intermodal transportation	Availability of intermodal connections and quality of the interchange facilities	Number and frequency of the connections between the different transport modes and the reported good organization, information and physical access in the interchange facilities	Increase
Tailpipe emissions	Air polluting emissions of all passenger and freight city transport modes	Total tailpipe harmful emission harm equivalent per year per capita.	Decrease
Congestion and delays	Delays in road traffic and in public transport during peak hours compared to free flow travel	Weighted average per trip of the ratio of peak period travel times to free-flowing travel times with respecting rules inroad traffic and travel time adherence of public transport during peak hours	Decrease
Recycling rate	The recycling rate is a highly relevant measure when measuring progress towards a circular economy.	Percentage of the volume of treated waste by recycle as a proportion of the total amount of domestically treated waste.	Increase
Clean modal share	The sum of portion of modal split that is realized by a specific transport mode	The percentage of travellers using non-motorised (pedestrian and cycling) and electric vehicles.	Increase
Goal 2: Co-create an inclusive city that invests in its human talent			
Citizen initiatives	Bottom up initiatives taking action within the city	Participation to the commons, such as number of community-led projects or percentage of participation in neighbourhood assemblies	Increase
Open spaces	Well maintained, green, accessible and inclusive open spaces	Total amount of accessible open space in the city per capita	Increase
Youth participation	Inclusion of the youth to the city's decision- making processes	Number of young people being active members of established structures that foster youth participation and empower the youth such as youth council, youth organisations and so on.	Increase
Jobs creation	New jobs opportunities that were created within the city's economical ecosystem	Companies and start-ups launched and jobs created in the city by alumni of the city's higher education institutions.	Increase
Diversity and participation	Leadership, participation and empowerment for young women.	Women entrepreneurs, first generation women entrepreneurs, women in public office, women in community leadership roles, women in executive leadership or on boards at companies.	Increase
Inclusive public spaces	Inviting, accessible and appropriate public spaces for citizens of all ages and abilities	Number of families - residents in the city	Increase
		Installation of particular infrastructure that facilitates accessibility to all such as bike lanes, ramps, proper signage, proper sidewalk area and street equipment	Increase

Goal 3: Build a dynamic urban economy and responsive city through effective and network governance			
Diversity	Economic productivity through diversification, technological upgrading and innovation, including through a focus on high added value and labour-intensive sectors	Annual amount of private investment in the city that contributes to diversification of economy.	Increase
Business Data	Relevant business data	Amount of open, easily accessible, and real-time data on urban economy.	Increase
Linkages	Linkages between large companies, industry and institutions with freelance workforce and emerging sectors	Amount and proportion of urban economic activity resulting from corporate and industry.	Increase
Partnerships	Cross-sector and international partnerships with local impact on economy and society, and greater ease in launching partnerships	Number of new private partnerships and investments with local impact on economy and society. Contribution of cross-sector partnerships to economic growth and social impact indicators.	Increase
Finance	Access of small-scale industrial and other enterprises to financial services, including affordable credit, and their integration into value chains and markets	Businesses have access to affordable credit and financial services at all stages of business growth. Larger supply chains (large companies, multinational companies and industry) procure services and products from smaller local businesses and entrepreneurs.	Increase
Emergency Plans	Emergency plans and the crucial role and services that the city must maintain in view of sudden event	Clear "Government Contingency and Continuity Plan" created. Municipality awareness and practice exercises held to test awareness.	Increase
Resilience Finance	Financial management and creditworthiness of the organisation	Risk investment analysis through realistic and thorough long-term investment plan	Decrease
Digital services	Easy and reliable communication between city's authorities and citizens	Number of municipal services provided through e-governance and municipal portals. Results delivered more quickly, effectively and transparently. Assessment of information used to design future services and policies.	Increase
Goal 4: Re-discover the City's relationship to the sea – Integrated Thermaikos Bay			
Blue investments	New investments for Thermaikos covers a whole spectrum, from transportation infrastructure to new marinas	Annual amount of public and private investments for onshore and offshore development of Thermaikos Bay compared to a base year. Investments match integrated, long-term strategy.	Increase
Data monitoring	A sea ecosystem is monitored by various physical parameters, sea surface temperature, salinity etc.	Number of the available tools for integrated monitoring (GIS-based and modelling), and amount of data gathered, specifically open and accessible data.	Increase
Water pollution index	Pollution index characterises sea water quality based on the values of different pollutants	State of pollution of the sea water, based on analysis of individual parameters and threshold values	Decrease
Overflow	Sewage overflow of the combined system, mainly during strong rainfalls	Volume of wastewater that ends in the Bay	Decrease

Administration	The complex administration of the Bay relies on many different public organisations	Number of public entities with jurisdiction over Thermaikos.	Decrease
		Different entities held accountable to common targets.	Increase
Civic participation	Sport clubs, environmental organisations, and cultural associations that are active around Thermaikos	Organisations and people that participates in activities around the Bay area. Economic value and social/well-being value created by these activities.	Increase