# DISPOSITION TO RUPTURE: RESILIENCE THINKING AS A COPING MECHANISM IN THE FACE OF UNCERTAINTY OCCURRING IN THE URBAN SPACE

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

HELİN BİNGÖL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF ARCHITECTURE
IN
ARCHITECTURE

September 2023

Approval of the thesis:

**DISPOSITION TO RUPTURE: RESILIENCE THINKING AS A COPING MECHANISM IN THE FACE OF UNCERTAINTY OCCURRING IN THE URBAN SPACE**

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# ABSTRACT

## DISPOSITION TO RUPTURE: RESILIENCE THINKING AS A COPING MECHANISM IN THE FACE OF UNCERTAINTY OCCURRING IN THE URBAN SPACE

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Master of Architecture, Architecture
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September 2023, 157 pages

The systems which are dynamic, and ever-evolving, in which the variability and change is rich, tend to have a high amount of uncertainty. Constant changes, generating patterns of unpredictable movements and uncertainties, occur gradually and suddenly in the urban context. Thus, this study unveils uncertainty -rapid changes, paradigm shifts, displacements (i.e., migration of people, of program, and sometimes of the place itself), and alterations in programs- as urban rupture. Rupture refers to a shift corresponding to an unpredictable or uncertain change, causing significant remarks on different scales and contexts in cities. In other words, rupture may be defined as a disruptive event that fluctuates the built environment in unpredictable ways. On a broader scale, war/violence, pandemic/contagion, technological shift or failure, environmental disaster/global catastrophe, migration/massive displacement can be considered as ruptures. Even an unplanned change in the built environment program and its capacity to adapt can be identified as a rupture. Considering these, this study questions what kind of design thinking might be compatible with ruptures. It poses a critical position towards the static ways

of place-making through the lenses of resiliency and ecological understanding of space. It discusses resilience thinking as the coping mechanism in the face of uncertainty. While doing so, it is intended to figure out different means of rupture and resilience cases in terms of different mediums of spatial matters, such as resilience strategy guidelines, urban projects dealing with rupture cases that are offering resilience approaches, and finally the exhibitions that raise awareness. Moreover, this study necessitates the importance of alternative thinking while coping-up with ruptures. The need for the alternative thinking is caused by the political, economic, and ecological systems of the globe that are under rising pressure in a world of increased uncertainty which is opposing with the traditional approaches which are dealing with the observable challenges. In order to cope-up with ruptures and uncertainty, this study embraces the scenario matrix method which allows to design and think upon future uncertainties in a flexible and novel way. The flexibility of the method helps to develop narrations about the future that widens the perspective beyond the conventional approaches and helps to develop possible future strategies in the face of uncertainty while carving out a niche for the resilience strategies in the context. In the light of these, this thesis study investigated on the context of Gölbaşı Düzlüğü, Ankara to envision possible yet uncertain rupture cases and developed scenarios via scenario-matrix method.

Keywords: Rupture, Uncertainty, Urban resilience, Scenario matrix method in the urban space, Gölbaşı Düzlüğü

# ÖZ

## KIRILMA EĞİLİMİ: KENTSEL MEKANDA MEYDANA GELEN BELİRSİZLİK KARŞISINDA BAŞA ÇIKMA MEKANİZMASI OLARAK DİRENÇLİLİK DÜŞÜNCESİ

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Eylül 2023, 157 sayfa

Değişkenliğin ve değişimin zengin olduğu dinamik ve sürekli devinen sistemler, yüksek miktarda belirsizliğe sahip olma eğilimindedir. Öngörülemeyen hareketler ve belirsizlikler yaratan sürekli değişimler, kentsel bağlamda yavaş yavaş ve aniden meydana gelir. Dolayısıyla bu çalışma, belirsizliğin - hızlı değişimler, paradigma kaymaları, yer değiştirmeleri (yani insanların, programın ve bazen bizzat yerin göçü) ve programlardaki değişikliklerin - kentsel kırılma olarak ortaya çıktığını ortaya koymaktadır. Kırılma, öngörülemeyen veya belirsiz bir değişime karşılık gelen bir değişimi ifade eder ve kentlerde farklı ölçek ve bağlamlarda önemli etkilere neden olabilir. Başka bir deyişle kırılma, yapılı çevreyi öngörülemeyen şekillerde dalgalandıran yıkıcı bir olay olarak tanımlanabilir. Daha geniş ölçekte ise savaş/şiddet, salgın/bulaşma, teknolojik değişim veya başarısızlık, çevre felaketi/küresel felaket, göç/kitlesel yerinden edilme kırılmalar olarak değerlendirilebilir. Yapılı çevre programında ve uyum sağlama kapasitesinde planlanmamış bir değişiklik bile bir kırılma olarak tanımlanabilir. Bunları göz önünde bulundurarak bu çalışma, ne tür bir tasarım düşüncesinin kırılmalarla uyumlu olabileceğini sorgulamaktadır ve esneklik ve ekolojik mekan anlayışı

perspektifinden, mekan oluşturmanın statik yollarına karşı eleştirel bir konum almaktadır. Ayrıca, belirsizlik karşısında başa çıkma mekanizması olarak dirençlilik düşüncesini de tartışmaktadır. Bunu yaparken, dirençlilik strateji yönergeleri, kırılma vakalarını ele alarak dirençlilik yaklaşımları sunan kentsel projeler ve son olarak da bu konularda farkındalık yaratarak gündeme getiren sergiler gibi mekânsal meselelerin çeşitli örnekleri açısından farklı kırılma ve dayanıklılık vakaları tez çalışmasında incelenmektedir. Ayrıca bu çalışma, senaryo matrisi metodu aracılığıyla Gölbaşı Düzlüğü, Ankara örneğini ele alarak kırılmalarla ve belirsizliklerle baş ederken alternatif düşünmenin önemini de gerekli kılmaktadır. Alternatif düşünceye olan ihtiyaç, gözlemlenebilir zorluklarla mücadele eden geleneksel yaklaşımlara karşı çıkan, belirsizliğin arttığı bir dünyada artan baskı altında olan dünyadaki politik, ekonomik ve ekolojik sistemlerden kaynaklanmaktadır. Bu çalışma, kırılmalar ve belirsizliklerle başa çıkabilmek için gelecekteki belirsizlikleri esnek ve yeni bir şekilde tasarlamaya ve düşünmeye olanak tanıyan senaryo matrisi yöntemini benimsemektedir. Yöntemin esnekliği, perspektifi geleneksel yaklaşımların ötesine genişleten geleceğe dair anlatılar geliştirmeye yardımcı olduğu gibi, bağlamda dayanıklılık stratejileri için bir yer açarken belirsizlik karşısında olası gelecek stratejilerinin geliştirilmesine de yardımcı olmaktadır. Bunların ışığında, bu tez çalışması Ankara Gölbaşı Düzlüğü bağlamında olası ancak belirsiz kırılma durumlarını öngörmek amacıyla araştırma yapmıştır ve senaryo-matris yöntemiyle senaryolar geliştirilmiştir.

Anahtar Kelimeler: Kırılma, Belirsizlik, Kentsel dayanıklılık, Senaryo matris yöntemi, Gölbaşı Düzlüğü

Dedicated to the ones who go after their self-authentic paths rather than following the crowd.

## ACKNOWLEDGMENTS

The author wishes to express her deepest gratitude to her supervisor Assoc. Prof. Dr. Funda Baş Bütüner for her guidance, advice, criticism, encouragements, and insight throughout the research.

The author, also wishes to express her thanks to her family and her twin sister Heval Bingöl who are always supportive for her during the thesis writing process.

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# CHAPTER 1

# INTRODUCTION

In this chapter, disposition to rupture, problem statement and thesis structure are disccussed. Disposition to rupture aims to highlight the motivation behind the story, problem statement explains the essential questions of the study and thesis structure briefly summarizes the thesis framework.

## 1.1 Disposition to Rupture

Cities are one of the examples of complex, ever-evolving and changing systems. Cupers and Miessen (2018) indicates that one of the most profound facts in the urban space is change since cities are always evolving but never static. This ever-changing nature of the cities makes them prone to have uncertainty. According to Berkes (2007), environmental and social systems are complex and unpredictable. Unpredictability is caused by uncertainties, and those uncertainties are irreducible even though there is a great effort of research to find out them. Holling and Gunderson (2002) claims that the systems which are dynamic, ever-evolving, in which the variability and change is rich, tend to have high amount of uncertainty. Cities are one of the examples of dynamic and ever-evolving systems. This means that the cities are prone to have uncertainties which cannot be predicted beforehand. This study considers the uncertainty as the stressor of the future shocks, and these shocks cause rupture. Rupture is an unexpected change in the urban space and that is why it gains stress from the uncertainty. As uncertainty is inevitably existing in the complex systems, there is a disposition to rupture as well. Indicating that cities are complex socio-ecological systems, which are changing and evolving in a constant

way (Cruz, Costa, de Sousa & Pinho, 2013), requires an understanding of the internal and external forces behind the change. Cities are exposed to the internal and external forces by means of displacement of population, change in the programme, expanding and shrinking and so on, but the essential thing here is to understand that these processes are rarely able to be fully controlled (Cupers & Miessen, 2018). Those forces can merely be listed as complexity and uncertainty which result in rupture. In that sense rupture might be identified as a disruptive event happening in an uncertain way and causing a change in the built environment. This study aims to express the term rupture as a way of understanding the relation in between uncertainty and resilience, and how cities prone to have rupture as a result of uncertainty. That is why it is named as disposition to rupture. Besides these, resilience is being thought of as an approach so that the sytem can be flexible enough in front of rupture. Thus, rupture, uncertainty and resilience are examined as intertwining concepts in a changing system throughout this study because uncertainty drives ruptures and resilience is the coping mechanism of ruptures. Complexity and uncertainty about cities are highly reflected by social, economic, and environmental problems and difficulties, which underline the need to come up with new coping mechanisms (Stead & Taşan-Kok, 2013), and resilience can be considered as one of the coping mechanisms in such an environment. Resilience can be defined as the process of preparing the system to cope up with uncertain or unexpected events (Taşan-Kok, Stead & Lu, 2013) to increase the system's ability to function after rupture. Resilience increases the flexibility rather than fragility and being brittle (Godschalk, 2003). To cope up with rupture and uncertainty, resilience brings forth some principles which are redundancy, diversity, efficiency, autonomy, strength, interdependency, adaptability, and collaboration (Godschalk, 2003). Thus, this study investigates the resilience as a niche for flexibilities in the non-linear and ever-progressing socio-ecological systems. According to resilience theory, ecosystems are dynamic systems that continually regenerate and reorganize themselves instead of existing in fixed states (Berkes, 2007).

Disposition to rupture and bridging it with uncertainty and resilience formed the motivation of this study. First, being prone to change in an unpredictable way has motivated to disposition to rupture. Secondly, uncertainty is defined as the driver or stressor of rupture and got motivation from the complexity and unpredictability of the ever-evolving sytems such as cities. Finally, the resilience has the motivation of providing a coping mechanism in an environment that is unpredictable and tend to change. Thus, this study gains its motivation from these three intertwining and amalgamating concepts.

## 1.2 Problem Statement

How resilient today's cities and their communities are, and if they prepared to handle a variety of difficulties and uncertainties in the future or not (Jabareen, 2013). This question forms the foundation of the problem statement of this study. As being discussed in the several chapters, uncertainty is figured out as the main driver of rupture and inevitable in the complex and ever-evolving systems such as cities. In other words, the urban space is exposed to uncertain events. Thus, there should be a coping mechanism in the system in order to make the system less vulnerable in front of rupture. With the help of this motivation, resilience thinking is being based on as a coping mechanism in the face of rupture. Thus, one of the concerns is bridging these three intertwining concepts. According to Geltner and de Neufville (2012), design and growth of the built environment should be appreciated together with the value and need for flexibility because it would provide a major response to rupture and uncertainty. That is why resilience thinking is a compatible tool to provide flexible and major responses to rupture. That might explain why there should be a coping mechanism which can create a niche for the unpredicted events resulting in rupture cases. Moreover, bridging these concepts is not adequate for providing a method that can help to envision possible uncertain outcomes or rupture. There might be several possible events that can affect the built-environment. That is why this study also investigated on this subject by delving into scenario matrix method which

is acknowledged as one of the most suitable methodologies for uncertain cases. In the light of these, there are three research questions that this study aims to figure out.

Research Questions are:

1. What is the relation between rupture, uncertainty, and resilience?
2. How does resilience become a coping mechanism in the face of uncertainties?
3. Why and how is scenario-matrix method suitable for flexible and resilience thinking to cope up with uncertainties?

## 1.3 Thesis Structure

This study consists of four chapters which are Introduction, Literature review on bridging the rupture, uncertainty and resilience, rupture and resilience in practice, and developing resiliency scenarios to cope up with uncertainty and rupture via scenario matrix method.

In the first chapter called introduction, the motivation behind the study under the title of disposition to rupture, problem statement and the thesis structure are committed to paper.

In the second chapter, it is aimed to understand the interrelation of rupture, uncertainty, and resilience. The three notions of rupture, uncertainty, and resilience are meant to be bridged around the term rupture because uncertainty is the stressor of rupture and resilience is the coping mechanism of rupture according to this study. That is why the chapter begins with the definition of rupture, continues with its stressor which is uncertainty. Then, the chapter introduces different modes of resilience which is thought as a niche for the flexibilities to cope up with rupture. In short, the numerous types of resilience that are required to deal with ruptures are discussed throughout the chapter, along with what may be referred to as a rupture, how rupture and uncertainty are related and unavoidable, and what can be labelled as uncertainty. This chapter review includes a theoretical basis for the topic.

In the third chapter, it is aimed to bring forth concrete examples of resilience as city guidelines, urban projects, and exhibitions to comprehend its nested scale and variety in the practice, and the real-life scenarios in between rupture and resilience. This chapter looks at various scales, settings, and applications of resilience guidelines, projects, and exhibits. Understanding the layered scale of the notion of resilience and how it relates to rupture in real-life circumstances is the goal of this chapter. The phrase itself possesses both general and site-specific characteristics. Because of this, it is planned to look at numerous relevant research that has a range of scale, context, and solution aspects. First of all, this chapter starts with larger-scaled studies, such as resilience guidelines for the cities, by providing examples of tactics used in the guidelines at various scales in the relevant contexts. This chapter focuses on three different cities in three different continents as global points because cities are complex systems, and provide different urban systems, and spatial processes with distinct and numerous characteristics (Cruz, Costa, de Sousa, and Pinho, 2013). This can allow scholars to gain a diverse understanding of how various cities deal with uncertainties and ruptures and how those cities propose various solutions. France comes from Europe, New York comes from America, and Seoul comes from Asia. All of them are part of the 100 Resilient Cities programme, which is also mentioned in a detailed way throughout the chapter. Then, secondly, the chapter examines urban projects at different specific sites which require various solutions in terms of resiliency. Those sites are located in New York and Berlin, and each project reveals site-specific solutions and nested scale of resiliency. Finally, the chapter investigates various exhibitions that have been raising awareness in society with the help of activist and bold projects.

In the fourth chapter, under the title of developing resiliency scenarios to cope-up with uncertainty and rupture via scenario matrix method, resiliency scenarios are developed. Thus, this chapter mostly focuses on them and proposes several resilience scenarios with the help of scenario matrix method in the context of Gölbaşı Düzlüğü, Ankara while investigating the features of context.

# CHAPTER 2

# BRIDGING THE RUPTURE, UNCERTAINTY AND RESILIENCE

In this chapter, it is aimed to bridge three intertwining concepts which are rupture, uncertainty, and resilience. According to this study, uncertainty is the stressor of rupture and resilience is the coping mechanism, therefore the three concepts of rupture, uncertainty, and resilience are intended to be bridged around each other. Because of this, the chapter starts with a description of rupture and then on to discuss uncertainty as its stressor, and is finalized with different resiliency modes. Thus, throughout the chapter what can be called as rupture, how rupture and uncertainty are connected and inevitable, and what are the different modes of resiliency which is needed to cope-up with ruptures are being revealed. The review of the chapter is comprising a theoretical framework on the subject.

## 2.1. On Rupture

We live in difficult times with a heightened feeling of uncertainty and daily reminders of the unpredictability of what may be lying around the corner, whether it will be climatic catastrophes, wars, the economic crunch, youth riots, or mass layoffs (Davoudi, 2012). If there is an agreement concerning cities in the twenty-first century, it is that it is not possible to predict what they will look like in the future, and there is no common understanding of how this future will play out, beyond the trite assertion that "the future is urban", so governments and communities must both prepare for the unpredictable as visions of the urban future give way to hesitant attempts in managing what cannot be foreseen with certainty (Walker & Cooper, 2011, as cited in Ziederman et al, 2015). Ziederman, Kaker, Silver, and Wood (2015)

state that uncertainty looks prepared to be a defining element and focus of urban theory and practice given the widely held belief that we now live in unstable times, including ones that are turbulent economically, politically, and environmentally. In other words, it is comprehended that uncertainty is a phenomenon that can affect urban space in unpredictable ways. Its effects on the urban space may result in sudden/gradual, minor/bigger, and reversive/reverseless changes. This study considers those changes, which are basically the consequences of the uncertainty, as ruptures. As the uncertainty, its effect on urban space, and the ruptures as the results of uncertainty are figured out, rupture might be considered a spatial concept in this study.

In the light of these, it is essential to define the rupture and its relation to uncertainty and resilience. This study specify rupture as follows. Rupture is a paradigm shift that corresponds to the result of an important change or shock which happens when the usual way of being is changed by an uncertain way. Rupture is the result of uncertainty and mostly gives rise to dissipation. In other words, rupture may be defined as a disruptive event that fluctuates the built environment in unpredictable ways. Rupture is defined in this way to comprehend how cities are exposed to rupture as a result of uncertainty, what the relationship between uncertainty and rupture is, and develop a coping mechanism via resilience. This is all to say that rupture can also be defined as a point of change from old regime to new regime. That can be considered as the shock which is stressed by the uncertain events, and this is the connection point in between the rupture and uncertainty. In order to create the shock effect, there must be certain amount of uncertainty which will lead to rupture. The built-environment's capacity to bounce-back, adapt, or transform in the existence of rupture builds the connection with resilience. Therefore, rupture has an important role in the cities since it mostly occurs as a result of an unpredictable change.

In general, ruptures are mostly categorized under the greater events. War/violence, pandemic/contagion (current rupture), technological shift (i.e., Industrial Revolution) or failure, environmental disaster/global catastrophe (i.e., climate crisis, earthquakes), migration/massive displacement are few examples of broader scale

ruptures. However, it might appear on a variety of scales. Even an unplanned change in the built environment program and its capacity to adapt can be described as rupture. Thus, it can be said that its scale is nested or it is scaleless.



**Figure 2.1** Broader scale examples of rupture, such as war, pandemic, technological shift, earthquake, forest fires, migration. Created by the author, 2023. (Source: Google images)

One of the other characteristics of rupture is about its pace in time. There are gradual and sudden ruptures occurring in the urban space. Gradual ruptures such as climate change provide enough time for designers to come up with necessary adaptations. However, sudden ruptures such as earthquakes occur mostly in a rapid and an unpredictable way which eliminates all the progression. Thus, the necessary

adaptation for the sudden ruptures is related to the ability of the built environment itself to adapt them with the help of the essential flexibility provided by resilience. The need for flexibility, adaptability, or even transformability engages the term rupture with the term resilience. Resilience becomes necessary in the understanding of ever-changing and evolving systems. If the term rupture and uncertainty are considered without the term resilience, then the system becomes fragile and irreversible. In other words, rupture does not only figure out the gradual and sudden changes in the environment but also indicates the fragility of the built environment in front of changes. As a result, built-environment might not tolerate the uncertain changes if essential need for flexibility that is fed by resiliency which creates a niche to rupture is ignored. This is vital to reconsider since the built environment is one of the grounds that is exposed to inevitable and sometimes unpredictable changes and finally ruptures.

Mostafavi (2016) states that the city (built environment) cannot be considered as only a physical artifact anymore; instead, the dynamic relationships that exist among intrinsic cycles and processes of the urban should be taken into consideration as an ecological point of view. What is meant by ecology is very well specified by Latour. According to Latour (1998), it must be given up the delusion that ecology has anything to do with nature in general because it is seen as a novel approach to managing and understanding the elements of collective both human and non-human existence. This ecological point of view takes the relations and progression into consideration which contributes to the idea of resilience and rupture. That might be essential to think upon the inter-relation between the built-environment and other components which are certain or uncertain. All these carry the relations onto the surface in an ecological entity like cities rather than the mere understanding of stagnancy and certainty. The relation of the resilience and rupture seems like working well in an ecological entity where the relations, progression, transformation, and cycles are vital. Thus, rather than just imposing the imported form of planning, the progressive conditions and inter-relations should be carried out to the surface as an evolutionary, progressive process (Mostafavi, 2016). Considering these, this

study develops the term rupture within the context of an ecological point of view, and connects it with the idea of resilience by pointing out the existence of uncertainty.

### 2.1.1. Uncertainty as the Stressor of Rupture

In order to define the rupture properly, it should be well understood what uncertainty is since the rupture is defined as the result of uncertainty throughout this study. According to Moroni and Chiffi (2021), there are four different modes of uncertainty as certainty, risk, parametric uncertainty, and fundamental uncertainty. In a situation of certainty, the various outcomes may be listed and the decision-maker is fully aware of the effects of their choice. Each choice is clearly identifiable as producing a certain result. In a situation of risk, the decision-maker can nevertheless list the potential outcomes and give their (objective) probabilities (Moroni & Chiffi, 2021). The alternative outcomes are still somewhat listable in a parametric situation, but the decision-maker lacks "full information risk level regarding the values that individual variables inside a given problem structure would cause." (Langlois, 1994, as cited in Moroni &Chiffi, 2021). The decision-maker can even be unsure about the future conditions of events in a situation of fundamental uncertainty, which is sometimes referred to as radical, structural, real, profound, or severe uncertainty (Wubben, 1995; Dequech 2000 and 2001, as cited in Moroni & Chiffi, 2021). Moroni and Chiffi (2021) give point that in fact, the term "fundamental uncertainty" refers to a condition of uncertainty where probabilities are not easily defined or calculable. It would be particularly challenging to predict the initial odds of occurrences that have never been experienced or imagined. Moroni and Chiffi also give point to accepting the cities' complex structure under the title of fundamental uncertainty as follows

> "Recently, the complex structure of a city has been sometimes considered as something unknowable. More reasonably, we hold that things like cities are not unknowable, but fundamentally uncertain in the sense that we can gain certain kinds of new knowledge about them even if it is likely that we will

always face great uncertainty in dealing with them." (Moroni & Chiffi, 2021, p. 10)

There are other views on uncertainty, and it is defined as a perceived lack of understanding, by an individual or group, which is important to the aim or act being conducted, and its results (Abbott, 2019, as cited in Jabareen, 2013). Jabareen (2013) takes the uncertainty as an element of the cities and underlines that it should be accepted that environmental uncertainties today more than ever present new difficulties to our cities and their residents and those uncertainties call us into question how we have been managing and planning them. According to him, one of the ways to deal with uncertainty is comprehending and acknowledging the term resiliency. Jabareen states that various uncertainty scenarios that can impact our cities must be mapped and depicted. Cities now need to become more conscious of the need for measures that might perhaps improve resilience and lessen vulnerability to anticipated effects of climate change. As a result, resiliency has a significant influence on urban vulnerability and necessitates the study of environmental risks and hazards that are challenging to foresee but must be included in urban planning and risk management (2013). Also, according to Sennett and Sendra (2020), each design attempt in the city should be ready for dealing with uncertainty. Thus, it can be comprehended that the terms uncertainty, resiliency, vulnerability and finally rupture are intertwined and interconnected. In order to define one of them, there is a need for understanding them altogether within the city structure. In other words, the cities are challenged by uncertainty, as a result of this challenge, rupture occurs, the concept that can bring enough amount of flexibility to prevent rupture is resiliency, and as a result of being resilient, the vulnerability of the city may be lessen. Jabareen also emphasizes the importance of flexibility by claiming that the manner that cities are managed is challenged by uncertainty and unpredicted circumstances. Because of this, adaptive management necessitates innovative planning techniques and procedures that go beyond traditional planning approaches by including uncertainties, and plans should also be flexible enough to change with the continuously evolving environment (2013).

## 2.2. Different Modes of Resilience in the Face of Rupture

The term resilience might have different meanings, operations, and definitions in different contexts. Most specifically, resilience is an approach. It might be a site-specific tool while being a generic term at the same time. Also, the way of applying resilience into the projects, plans and other mediums may differ. That is why what the resilience is and in which modes it can be interpreted as a design device should be well comprehended. This study defines resilience as a niche where the cities have flexibilities for expected/unexpected, foreseen/unforeseen, certain/uncertain shocks which are primarily defined as rupture throughout the study. Resilience merely can be applied in the design as a physical attribute, it can be thought of as a form of policy making, it can be in the social inter-actions of the agents in a socially resilient model, it can reproduce itself during the emancipatory processes of the solidarity actions upon the society, or it can be a small intervention that can be easily adapted to the context just like tactical urbanism tools. In other words, resilience and rupture may occur in different modes in different circumstances. That is why it is aimed to comprehend different modes of resilience within this chapter.

### 2.2.1. Resilience as the Mode of Flexibility

Davoudi suggests a new point of view by claiming that the term resiliency is the new mode of sustainability as follows

> "Among the prescribed remedies for dealing with such a state of flux, the one that is rapidly gaining currency is "resilience." It appears that resilience is replacing sustainability in everyday discourses in much the same way as the environment has been subsumed in the hegemonic imperatives of climate change." (Davoudi, 2012, p. 299)

Davoudi describes the resiliency under three different titles as engineering resilience, ecological resilience, and evolutionary resilience. Engineering resilience can be defined as it is a system's capacity to resume its equilibrium or steady state following

a disruption (Holling, 1973, 1986, as cited in Davoudi, 2012). It might be a societal upheaval like a banking crisis, a war, or a revolution, or it could be a natural disaster like flooding or earthquakes. According to this viewpoint, resilience is determined by how well a system resists disruption and how quickly it recovers to equilibrium, so the system's resilience increases with how quickly it recovers (Davoudi, 2012). Ecological resilience, however, has a different definition as the size of the disturbance that can be absorbed before the system changes its structure is what is meant by ecological resilience (Holling, 1996, as cited in Davoudi, 2012). Thus, in ecological resilience the system can absorb the change before its cause on changing the system's structure fully. The focus of ecological resilience is on how persistent and adaptable the system is (Adger, 2003). In other words, ecological resilience means "in this clockwork universe, a resilient system is one which may undergo significant fluctuation but still return to either the old or a new stable state" (Davoudi, 2012, p. 301). Evolutionary resilience, on the other hand, extends the view on the concept resiliency by claiming that resiliency is the capacity of complex socio-ecological systems to alter, adapt, and most importantly transform in response to stressors and strains rather than as a return to normality (Carpenter et al, 2005, as cited in Davoudi, 2012). Systems have been described as complex, non-linear, self-organizing, surrounded by uncertainty, and filled with discontinuities (Berkes & Folke, 1998, as cited in Davoudi, 2012). Being complex, non-linear, and self-organizing can be considered as follows

> "What is new is the acknowledgment that such regime shifts are not necessarily the outcome of an external disturbance and its linear and proportional cause and effects. Instead, it sees that change can happen because of internal stresses with no proportional or linear relationship between the cause and the effects." (Davoudi, 2012, p. 302)

According to Davoudi (2012), this means that while massive interventions may have little to no impact, small-scale systemic changes have the potential to magnify and cascade into significant alterations. Everything is intertwined and bounded with complex interactions which also strengthens the uncertainty. What is derived here is

that the scale of the uncertainty may differ but it does not have to be integral with the consequences as smaller scale changes may cause bigger impacts on the system. This is vital to reconsider because when it comes to uncertainty people tend to think upon bigger changes and bigger impacts. Those changes accomplish their evolution across a wide range of sizes, from little to huge, at varied speeds, from slow to rapid, and over a range of times, from short to long (Davoudi, 2012). Such an understanding on the system alters the point of view about change and their consequences as ruptures. In other words, ruptures become nested and interactive. First off, the phases are not always sequential or constant, and secondly, systems do not work in a single cycle but rather in a collection of interconnected, layered, and nested adaptive cycles (Davoudi, 2012). Thus, all these bring forth the concept of evolutionary resilience once again as follows

> "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, 2012, p. 304)

In short, this understanding contributes to the idea of resilience as resilience is seen as a dynamic process rather than a static quality; as becoming rather than as a being. There are other supporting views on resilience in terms of considering it as a progressive process. Within the context of resilience, cities are viewed as complex adaptive systems because this makes it easier to think about the interconnectedness between communities and the environment as well as the many other subsystems and sub-cycles where all the interactions are just as significant as local ecology and habitat (Mehmood, 2016). This view considers the term resilience as a way of relationships in between the society and environment. Also, similar to the evolutionary resilience understanding, the interconnectedness of the socio-spatial units is emphasized, and it is reinterpreted that the evolutionary perspectives on the territorial dimensions of transition, resilience, and multileveled governance as interconnected complex adaptive systems marked by a certain degree of self-organization and emergence are notable approaches (Cooke, 2012, as cited in

Mehmood, 2016). The emphasis on self-organization and emergence in the thinking of resilience may create a bridge in between the uncertainty and resilience and finally the rupture. Uncertainty, which is a stressor in a system, results in rupture, and rupture is the reaction of the environment in accordance with how resilient this environment is. Those reactions mostly happen in a bottom-up manner that makes it self-organized. Thus, uncertainty and rupture are different from the risks and risk analysis methods in a resilient system. Taking them merely as being risk factors into account may cause to think through more linear processes rather than interconnected and adaptive systems.

Another contribution on the resilience thinking is about the state of equilibrium in the system. Those can be listed as such, equilibrium approach, non-equilibrium approach, and integrating approach. Mehmood explains them as follows

> "First is the notion of equilibrium which assumes that people (communities) and nature (ecosystems) respond in a sequential and predictable manner to the disturbances, such as change in the environment. Second is the non-equilibrium approach that considers the role of external elements such as climatic variability and episodic events to the effect that responses from society and nature are less predictable in the face of disturbance and change (change as a new constant). Yet, a third view considers the evolutionary and integrating role of society and nature in preventing adverse changes before ecological thresholds are reached, while building, maintaining, or enhancing the resilience of the respective social and ecological systems." (Mehmood, 2016, p. 410)

There are some similar connotations in between the understanding of Davoudi and Mehmood. Both consider the third understandings, which are evolutionary resilience and integrating approach, in their lists as the more suitable approach of resilience. Holling (1973), also contributes to the idea of resilience by taking ecological resilience into consideration. What is meant by the ecological resilience is about the persistence of relationships in a system. The relationships stay the same but the

variables, parameters may change. From this point on, the question is about whether the system should bounce back into the original form or should be transformable into a new mode. According to Davoudi (2012), the ecological and engineering components of resilience, which are two separate traits, help to decide whether an ecosystem can change into a new yet stable state or return to a previous state since ecological resilience describes the situation of multiple equilibria in which a system could adapt to the change by bouncing forth into a slightly different form, whereas engineering resilience gives the best design features in which an entity could recover back into its original form after a certain level of disturbance.

Taking into account all of these, it should be questioned how cities behave as a resilient system in face of uncertainty and finally rupture. In other words, is it possible for the cities to bounce back into the original form after facing with rupture as mentioned in the engineering resilience model, or is the evolutionary resilience model the best way to create a flexible and transformable model? If the engineering resilience model is considered as the essential one, then the system and the city become a vulnerable unit which makes it hard to evolve and adapt the situation, but rather to try to bounce back into the old regime. Urban resilience is far more than just the opposite of vulnerability, but it is rather more connected to the context of more comprehensive sustainable progression in which adaptation and transformation of complex systems play a key role (Chelleri, Waters, Olazabal, Minucci, 2015). The problematic in the engineering resilience model is that everything is considered as linear, such as the scale, the storyline, the reason, and the result. In other words, all these happen one by one in a linear time frame. This causes the elimination of the progression, nested scales and possible other outcomes caused by uncertainty. “Resilience thinking involves exploring interacting hierarchies of nested systems: higher-level systems are driven by slow variables and lower-level systems are driven by fast-changing variables” (Chelleri et al., 2015, p. 184). Thus, it can be deduced from that the smaller events can cause bigger outcomes while the bigger events can cause smaller outcomes or vice versa. The vital thing here is to comprehend the nested and intertwining systems in the cities. Chelleri et al. (2015) criticize the

tendency to standardize the engineering resilience model by claiming that at the moment, the majority of urban resilience research is concerned with how societies might react and adapt to natural catastrophic occurrences, and most frequently, these processes, which are focused on preserving stability, are connected to the perspective of short-term engineering resilience, which refers to the amount of time required for a system to bounce back to a stable equilibrium state. What Chelleri and his team (2015) suggest is focusing on temporal scale implications and interventions which they named as resilience trade-offs. Temporal scale implications may increase the pace of the responses after rupture. Beside the responses, temporality may also contribute to the resiliency of the system whether it will recover, adapt, or transform. Temporality may be considered as a flexible approach because of being non-stagnant, and that might increase the system's capacity to transform, adapt, or changing the regime. That is why resilience and temporality may be connected at some point. Temporality is a tool to increase transformability which makes it more suitable in the context of evolutionary resilience.

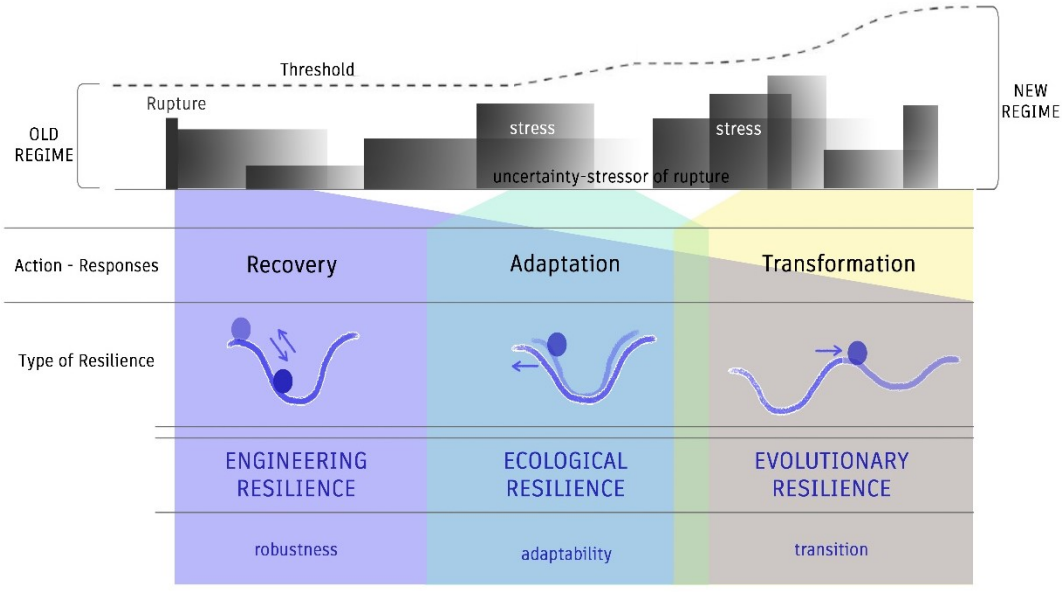



**Figure 2.2.** Different modes of resilience. Reinterpreted and redrawn by the author, 2023, (Source: Chelleri, L and M Olazabal, 2012). Copyright 2015 by Environment & Urbanization, International Institute for Environment and Development (IIED)

Figure 2.2.1.1 defines the relations between rupture, uncertainty, and resilience. Rupture is defined as a point of change from old regime to new regime. That can also be considered as the shock. The stress factor here is the uncertainty since it is the cause and stressor of the rupture, and this is also represented as such in the figure. After uncertainty and rupture, resilience is the behaviour of the system whether it will bounce back, adapt, or transform. All these are representing the different types of resilience, and the system will inevitably choose one of them if it is a resilient one. According to the reinterpreted figure 2.2.1.1, there are three different approaches. In the first approach, the recovery model is emphasized. In fact, recovery is primarily connected to system shocks, whether internal or external and it is based on the engineering resilience concept (i.e., returning to a normal state such as in the situation after a flood) (Chelleri et al., 2015). In the second approach, the adaptation model is emphasized. Adaptation refers to the idea which is defined as the processes of adjusting to real or anticipated changes and their effects while ignoring system limits by shifting thresholds to maintain the system within the same regime (Walker et al., 2004, as cited in Chelleri et al., 2015). The third approach is transformation which emphasizes the idea of longer-term structural transformations (transitions), which include changing the system's essential characteristics to enable it to enter a new regime (Walker et al., 2005, as cited in Chelleri et al., 2015).

In short, what can be derived from these different approaches is that the most flexible and transformable one is the evolutionary resilience approach while the most non-progressive one is the engineering resilience approach. Moreover, uncertainty is interpreted as the stressor of rupture, and this study tries to develop the term rupture as a spatial term to comprehend the components of the ever-changing environment.

### 2.2.2. Resilience within the Scope of Urban Ecology

Ecology is one of the fields that is exposed to different interactions of both human and non-human beings (Latour, 1998). The interaction between different agents turns the cities into a complex ecology. According to Reed and Lister (2014), adaptation, appropriation, and flexibility concepts have turned into important concerns in the understanding of complex ecologies in order to be considered as successful systems, and it is now considerably recognized that the success of a complex system is through an ecosystem's ability to respond to the changing environmental conditions. Thus, it can be said that if the built-environment is considered as a complex system in which different agents and processes are inter-acting, overlapping, and encompassing, then the system becomes an ecological entity, and to respond to the dynamism or the rupture that the environment will be witnessing, the system should be resilient at some degree. Moreover, Reed and Lister (2014) point out a shift in the ecological thinking and research which offers a process orientation. The need for flexibility and its inter-relation with the ecology were also discussed by Gregory Bateson, and his argument upon ecological aesthetic and ecology of mind suggested to comprehend how complex systems like cities behave (1972). According to these discussions, he considers the flexibility as a more essential term than efficiency for an ecological point of view.

> "Bateson opened the discussion by defining an ideal relationship between human civilization and the rest of the planet as a single system of environment combined with high human civilization in which the flexibility of the civilization shall match that of the environment to create an ongoing complex system, open-ended for slow change of even basic (hard-programmed) characteristics. Bateson affirmed in this statement that he was talking about an advanced human culture, as opposed to the naive rejections of modernity that can be found in some environmental thinking. He insisted that to meet this criterion a very great flexibility will be needed." (Goodbun, 2012, p. 54)

Beside the need for flexibility, ecology or ecological resilience also emphasize the relations, exchange points for interactions. In order to adapt, there should be exchange in a resilient system. Sennett (2018) creates an analogy for those exchange points under the title of porous edges, and he states that porous edges are the interaction points of different groups, exchange zone of the organisms, and because of being permeable, porous edges are rich in terms of relations which makes them ecological. Considering these, porous edges might be analogical to the ecotones in nature. Urban ecotones and their role in creating fluid, dynamic and flexible environments are the topics also emphasized by Van der Ryn and Cowan.

> "By designing ecotones rather than hard edges, we intensify interactions. We bring together a greater diversity of life in an ecological ecotone, and we encourage greater cultural and economic diversity in an urban ecotone. In doing this, we facilitate the flows of materials, energy, and information that can catalyse self-designing processes." (Van der Ryn and Cowan, 2007, p. 155)

Khan (2020) states that urban sites are dynamic rather than static, porous (permeable) rather than contained, messy rather than neat, and he claims that there is a need for a new habit of mind which is supported by the metaphor of the ecotone. Ecotone is a thickened edge which is a concrete boundary space rather than an abstract boundary line (Khan, 2020). Thus, it is not a separation point, rather, it is a transitional area where distinct ecologies come together. Ecotones can be defined as zones of interface in which the interactions between systems are open and provide dynamic qualities, such as altering in position over time and responding to changes in the environment (Khan, 2020). This notion of ecotones called edge effect. Edges are porous, dynamic, and open places where unplanned encounters and transitions naturally occur. All these turn ecotones into a mobile ground that is never stabilized and closed. Ecotones naturally have the dynamic, porous, and messy characteristics which contradicts the static understandings of the ecologies and finally the urban space as well. One of the ecotone places are the coasts where the land and see meet. Those places are also exposed to the ruptures like see level rise, hurricanes, or

climate change effects. Also, they are not just part of the nature but also part of the built-environment. That is why those ecotone areas are highly inter-connected with cities which makes them ecological. The ruptures mentioned above need a certain amount of resilience within the system of the environment. The questions are how it could be resilient and how it could operate some responses in front of ruptures.

Besides being at the centre of interaction points, urban ecology and resilience are intertwining concepts as well. The principles of urban ecology and resilience are viewed as being essential to transformational change since the two ideas are inextricably linked, and indeed the concept of resilience was born out of ecology and the idea that cities are complex and individual systems (Habitat III, 2016). Urban ecology considers the interactions between different systems that exist together. In the Habitat III Policy paper 8 (2016), urban ecology is defined as it is the study of biotic and physical factors that exist in urban settings from a systems perspective, and it acknowledges, among other things, the interactions between social and cultural systems and natural systems since urban ecology emphasizes the interconnectedness of important resources, such as food, water, and energy, and how these factors affect the cities. Also, based on the dynamic interactions of humans and natural environments, urban ecosystems develop through numerous and diverse processes within the understanding of ecological systems (Cruz, Costa, de Sousa, and Pinho, 2013). This view also lays a special emphasis on the role of natural systems in supporting resilience. The interconnectedness of the relations makes the system an ecological entity. Thus, ecological systems are nested, complex, and interconnected systems progressing within spatial and temporal scales (Folke et al., 2002, as cited in Feliciotti, 2015). Considering the resilience as a way of understanding the uncertainty, complexity and non-linearity in the ever-evolving system's dynamics can alter the views on urban ecology. Urban ecology can be thought as the part of a socio-ecological system since the urban environment contains both physical and living attributes. In that sense, the interactions between those attributes and intertwinement of the systems increase the complexity. Wilkinson (2011) puts emphasis on socio-ecological resilience by claiming that it is a system's ability to

absorb rupture (disorder) during experiencing change so that the system can still function. In other words, such an understanding on resilience perceives the change or rupture, whether external or internal, gradual or sudden, smaller or bigger, as a positive attribute rather than a negative input since it is necessary for growth and renewal (Marcus & Colding, 2014, as cited in Feliciotti, 2015). Thus, it can be derived that urban ecological resilience can provide a problem-solving tool for the designers in front of relational urban dynamics which are non-linear and ever-evolving. As mentioned earlier, urban ecological resilience behaves as a niche where the future shocks and ruptures can be absorbed.

### 2.2.3. Resilience within the Scope of Community Engagement

Berkes (2007) emphasizes the importance of building resilience and reducing vulnerability by accepting how change (rupture) and uncertainty are necessary parts of life and how they are irreducible and inevitable in complex systems, and he adds that social and ecological systems are so complicated, so we can never fully understand them or be able to foresee how they will develop in the future. The complexity of social and ecological systems is also related to the complex interdependent interactions in between the different agents. One of the agents in the system is people living in there. That is why social and ecological systems cannot be separated, and to build up a comprehensive resiliency strategy, social initiators should be included as well. If the bridging connection between ecological and human (social) systems can be comprehended, then the future uncertainties (problems) can be prevented and it may help to see how the interactions are happening (Cruz, Costa, de Sousa, Pinho, 2013). That is why social beings in the complex socio-ecological systems are agents creating interactions that mostly happen in a bottom-up way. They perform various functions and exist in variety of groups in the same system (Folke et al., 2002, as cited in Cruz et al., 2013). According to Cruz et al. (2013), the multiple components in the system increase the protection and reinforce the system in the face of external forces such as uncertainties, and the inclusiveness and

diversity of the urban create multiple nodes and network which are the key to become less vulnerable. In other words, interactions and interdependencies develop a network in which

> "…the interconnections and interdependences between the different components, involving the exchange of knowledge, combining different ways of knowing and learning, facilitate support between the parts and contribute to a strengthening of the system. A stronger and more coherent system, in social as well as in physical terms, is more able to deal with external forces and threats. Collaboration among the different stakeholders involved in the urban development process also plays an important role as integrated and flexible approaches foster both opportunities and incentives." (Cruz, Costa, de Sousa, Pinho, 2013, p. 54)

Community resilience becomes one of the key system dynamics in the comprehensive understanding of the resilient systems since "resilience theory deals with system dynamics and envisions ecosystems as continuously changing, sometimes abruptly and unpredictably" (Berkes & Ross, 2013, p. 7). Thus, within the fact of uncertainty, coevolving of social and ecological systems should be taken in consideration together in that sense. There are several community strengths beneficial for resiliency that studies have identified, and these are including leadership, an ability to embrace change, social networks and communications, collaboration, social support, a sense of belonging, and education (Berkes & Ross, 2013). Sense of belonging might be one of the agents that creates the appreciation of space which will lead people to take active place in the community resilience studies. Besides these, community characteristics are also affecting the community resiliency. For example, community resilience is facilitated by factors specific to a given area, such as local knowledge, expertise, and educational opportunities; a diversified and dynamic economy; active government; and social networks (Berkes & Ross, 2013, as cited in Budowle, Krszjzaniek, and Taylor, 2021). The necessity to learn how to live with uncertainty and rupture in the community level makes the communities inevitably dynamic human systems that endure via ongoing adaptations

to change and the increase of the capacity to flourish in changing situations (Magis, 2010). Thus, community engagement in resilient systems is an essential point in different perspectives which are dealing with uncertainty, and understanding the complex socio-ecological interactions. Communities that are resilient can also become more resilient in responding to disasters (Costello & Johns, 2006, as cited in Magis, 2010). Engaging community resources in a self-resilient system to establish collective effort promotes community resilience, which in turn promotes the capacity to withstand and adapt in the face of disruption and change/rupture (Magis, 2010). In short, community resiliency is as important as the other means of resilience to build a comprehensive and inclusive resiliency strategy. The first thing needed to be done by the community is accepting the uncertainty and change, and be prepared to live with them while engaging with the resiliency strategies. The second thing is involving in the community actions via planning, collective activities, and learning more via trainings and lectures (Magis, 2010). The third thing is developing resilience through the diverse community resources as being agents in the community. Community capacity is one of the factors affecting the community resilience as well. Community capacity is defined according to research on community development as the capability of the community to take part in collective action and to solve a range of situations by utilizing several community resources (Magis, 2010). Thus, community capacity is one of the measures in the community to deal with uncertainties, ruptures and engaging with the resiliency strategies.

> "Community resilience emerges from systems theory and socio-ecological studies regarding systems change. It shares commonalities with community capacity. Both utilize the notion of developing and utilizing community resources for the community's well-being." (Magis, 2010, p. 407)

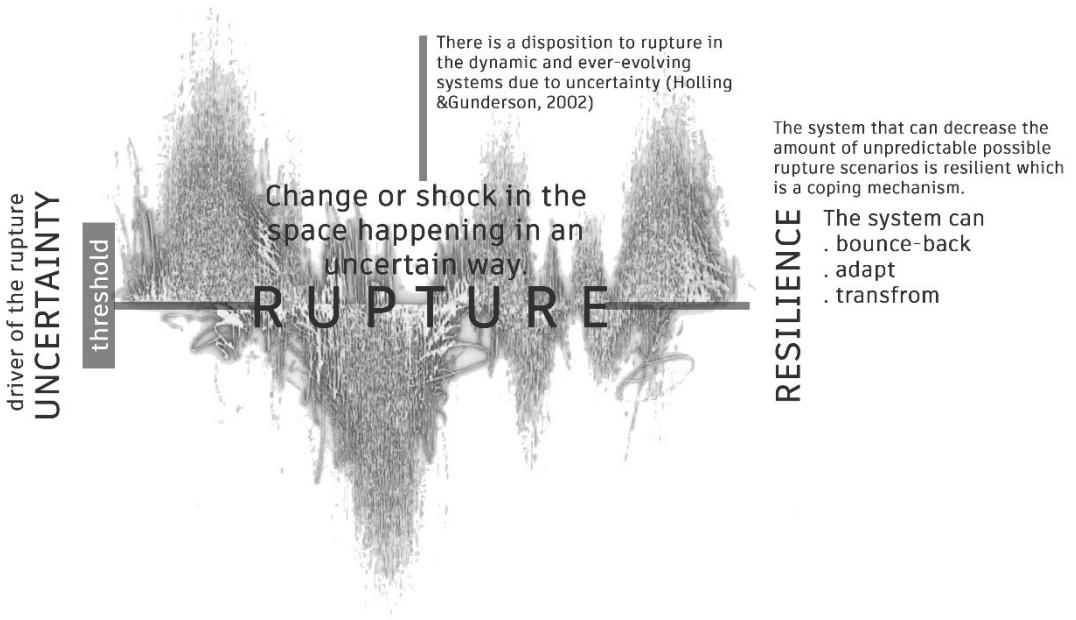



**Figure 2.3.** The relation between uncertainty, rupture, and resilience. This figure shows how these concepts are inter-linked. Author, 2023.

In short, the term rupture is driven by uncertainty which inevitably occurs in ever-evolving and complex systems. That is why this study names it as disposition to rupture. Rupture is a nested term whose impact area, scale, and time length might differ according to the context. Because of that, there should be a systemic mechanism that can carve out a niche in the urban space for the uncontrollable, unpredictable rupture scenarios. One of the suitable coping mechanisms is resilience thinking which offers alternative approaches, which are bouncing-back, adapting, and transforming, to the system in the face of uncertainty, and rupture. Therefore, this chapter investigated the bridge between the inter-connected terms of rupture, uncertainty, and resilience. Also, this chapter aimed to indicate different modes of resilience which is needed to be well comprehended in the face of uncertainty. In the next chapter, the real-life examples within the group of various approaches related to these three concepts will be examined.

# CHAPTER 3

# RUPTURE AND RESILIENCE AS SPATIAL MATTERS

In this chapter, different scales, contexts, and applications of resilience guidelines, projects and exhibitions will be examined. This chapter aims to understand the nested scale of the term resilience and its relation with the rupture in the real-life scenarios. The term by itself has both generic and site-specific qualities. That is why it is intended to investigate various related studies which have diverse qualities in terms of scale, context, and solution. This chapter begins with larger-scaled studies, including resilience guidelines for cities, by giving illustrations of the strategies employed in the guidelines at different sizes in specific settings. Because cities are complex systems that offer various urban systems and spatial processes with distinct and diverse features, this chapter focuses on three different cities on three different continents as global points which are Seoul from Asia, New York from America, and France from Europe. This can help academics develop a more varied knowledge of how different cities respond to rupture and uncertainty and how those places suggest different answers or if there are any similar, generic solutions in a variety of contexts.

## 3.1. Resilience Guidelines for Cities and 100 Resilient Cities Programme

Resilience guidelines offer a framework for the expected and unexpected shocks for the cities (Paris Resilience Strategy, 2018). Unexpected shocks are equivalent to uncertainties which are defined as the stressors of the rupture throughout this study, and resilience guidelines mention the strategies that can cope up with rupture scenarios. Within the scope of resilience, Rockefeller Foundation pioneered the 100 Resilient Cities programme by the definition of “Resilience is 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" (Spaans & Waterhout, 2016, p. 110). Indeed, this definition was developed by ARUP's International Development Team together with the resilience indicator framework. 100 Resilient Cities programme aims to develop resilience strategies for the communities in a wider scope including climate change, vulnerability, economy, disaster risk reduction and so on (Spaans & Waterhout, 2016). The challenging part here was integrating the strategies for all different contexts. The term resilience has both generic and site-specific features which makes it hard to operate in each region in the same way. Also, there is the risk of being deterministic by providing one specific framework for all the context without understanding the internal-interdependencies. That is why the team preferred to develop a framework which is to give a comprehensive, integrated collection of categories, indicators, and variables on the basis of literature study, case studies, and fieldwork (Spaans & Waterhout, 2016). The team explains this as follows,

> "The purpose of the City Resilience Index is to provide cities with a robust, holistic, and accessible basis for assessment so that they are better placed to make investment decisions and engage in urban planning practices that ensure people living in cities, particularly the poor and vulnerable, survive and thrive no matter what shocks and stresses they encounter." (ARUP, 2014, p. 21, as cited in Spaans & Waterhout, 2016, p. 110)

Another challenge was about the uncertain events. For developing such a broader framework, there is a need to know what is next, but such an orderly linear framework is not available for uncertainty. What is crucial is that building resilience is seen as a far bigger problem than reducing the probability of disasters and the associated risks, and resilience, on the other hand, according to ARUP, acknowledges the potential that a wide range of disruptive events, including stressors and shocks, may happen but are not always predicted (Spaans & Waterhout, 2016). That is why uncertainty should always be acknowledged as a fact in such scenarios. ARUP (2014) acknowledges the resilience as a way of enhancing the performance of a system in front of ruptures rather than trying to guess what will happen in an

uncertain way. By doing this, such a resilience viewpoint may be seen as an effort to close the gap between abstract theoretical ideas of resilience and a tool that can be used by their primary individuals which are 100 cities that want to become (more) resilient (Spaans & Waterhout, 2016).

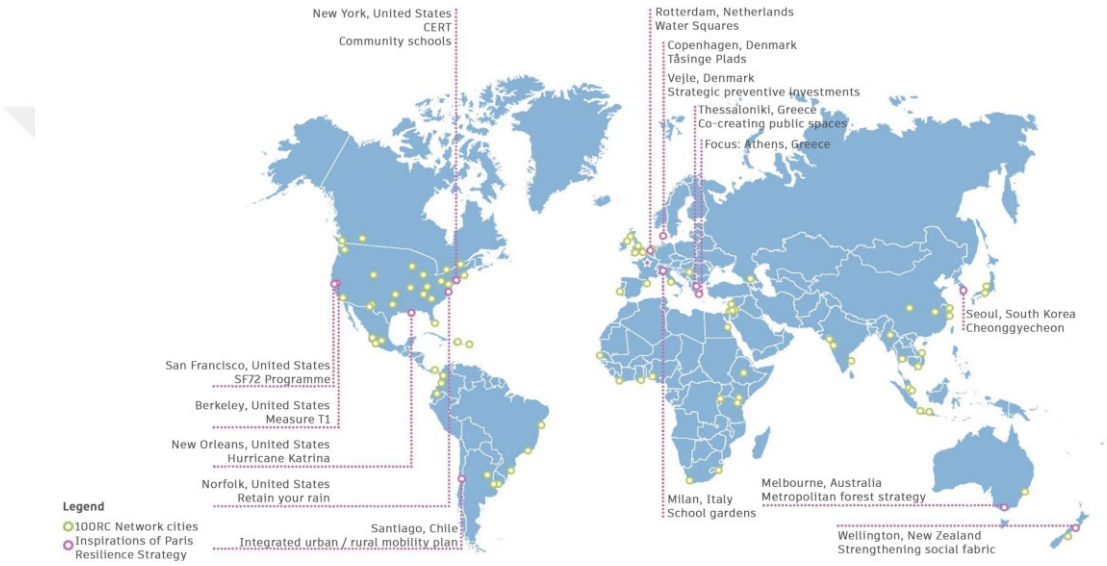



**Figure 3.1.** 100 Resilient Cities Network showing some of the participant cities with the highlight points of resilience. (Source: Paris Resilience Strategy, 2018), edited by the author. Copyright by 2018 Paris Resilience Strategy.

The map clearly shows the network's broader scale since the programme has at least one country in every continent all around the world. Also, some of the highlight points in the countries clearly depict how each context specifically deals with resiliency. For example, Rotterdam, Netherlands offers Water Squares, Vejle, Denmark provides Strategic preventive investments, New York, the US gives importance to the Community schools, Melbourne, Australia develops a

Metropolitan Forest Strategy, Seoul, South Korea focuses on building Cheonggyecheon, and so on. The framework of 100 Resilient Cities programme mostly focuses on the understanding of **ecological resilience**. Theoretically, this framework is in line with ideas of resilience that are derived from an ecological viewpoint as opposed to an engineering one, and ecological systems are anticipated to shift from one equilibrium into a new, distinct stable state following a change because cities are seen as complex, constantly evolving systems rather than as being static (Spaans & Waterhout, 2016). Observing the cities as complex adaptive systems requires a self-organising system as well.

> "Here, among others, the complex adaptive systems approach is reviewed with specific attention to understanding a system by analysing the role of feedback loops between various elements of the system, its diversity, and modularity. The key element, however, is the degree of self-organisation and self-organising behaviour, which leads to a continuous introduction of 'novelty' and innovation into the system. Functioning complex adaptive systems with self-organising behaviour and properly working feedback loops that generate constant innovation are in a state of constant flux." (Spaans & Waterhout, 2016, p. 111)

Thus, it can be said that complex adaptive systems' behaviour may lead to adaptability or transformability inevitably because of being in a state of constant flux (Spaans & Waterhout, 2016). Martin-Breen and Anderies (2011) put emphasis on the transformability of the system by asking what makes complex adaptive systems resilient, which the resilience features of complex adaptive systems are, and if they experience unavoidable regime shifts by transforming or not. Transformability and resilience can share a common ground in that sense. However, when a system should transform or adapt might differ. The idea of transformability, which is defined as "the ability of a part of a complex adaptive system to assume a new function," holds the key to the solution because transformability and adaptability are inextricably linked, so in terms of temporal issue, adaptability refers to short-term behaviour while transforming into a new system (sometimes as a consequence of several

adaptations to this system) is seen to occur over a longer time frame (Spaans & Waterhout, 2016).

Considering all these, 100 Resilient Cities programme figured out seven qualities of a resilient system. These are seven adjectives defining the qualities. The adjectives are reflective, robust, redundant, flexible, resourceful, inclusive, integrated (ARUP, 2014). Reflective systems are tolerant of the inherent and constant change and unpredictability of the modern environment. because they have mechanisms for ongoing evolution and will change standards or norms in response to new information rather than looking for long-term fixes based on what is known (ARUP, 2014). Thus, in such an understanding, the system can learn from the past experiences and reflect upon them. Robustness corresponds to well-designed, built, and maintained physical assets which are a component of robust systems because they can survive the effects of hazard occurrences without suffering significant damage or losing their functionality, or it can be said that a robust design makes provisions to guarantee that system failures are predictable, safe, and not disproportionate to the cause (ARUP, 2014). Redundancy is the term for extra capacity that has been intentionally added to systems, which involves diversity: the availability of several solutions to meet a certain requirement or carry out a specific function, to provide for disruption, extremely high demands, or fluctuations in demands, and redundancies should not be an unintended consequence of inefficient design; rather, they should be deliberate, economical, and given top priority across the whole city (ARUP, 2014). Flexibility indicates that a system may alter, develop, and adapt to new situations which might encourage decentralized and modular ways of managing the ecosystems, and it might entail taking novel approaches into account and integrating them with traditional knowledge and practices (ARUP, 2014). Resourcefulness refers to the capacity of individuals and institutions to quickly devise new means of achieving their objectives or satisfying their demands under shock or stress, and this might entail spending money to improve one's ability to foresee future circumstances, determine priorities, and respond, for instance by mobilizing and organizing more extensive human, financial, and material resources

(ARUP, 2014). In other words, resourcefulness is a tool that shows the capacity of the city in restoring the functionality during severe conditions. An inclusive strategy helps to create a feeling of shared responsibility or a common goal to strengthen community resilience which is important in extensive community interaction and consultation, particularly with the most vulnerable populations, is emphasized by inclusion because the idea of resilience in an inclusive system forbids addressing the shocks or stressors experienced by one industry, region, or society in isolation from others (ARUP, 2014). Integration is visible both inside and between resilient systems, as well as at various operational sizes because it is related to consistency in decision-making which is encouraged through system integration and alignment in cities, which also guarantees that all investments are mutually beneficial to a single goal (ARUP, 2014). In short, in an integrated approach, the system can work together with its variables and react quickly thanks to exchange mechanism and feedback cycle.




**Figure 3.2.** The seven qualities of resilient systems. Copyright by 2014 ARUP

According to Spaans and Waterhout (2016), 100 Resilient Cities programme's novelty comes from its broad approach, and the inclusive strategy of having diverse communities. The aim of the 100 Resilient Cities programme is not predicting the next catastrophe or disaster since they are uncertain, but rather preparing a base for the further adaptations to ruptures. Also, "the City Resilience Framework was presented to the participating cities as a source of inspiration rather than a requirement to elaborate" (Spaans & Waterhout, 2016, p. 112).

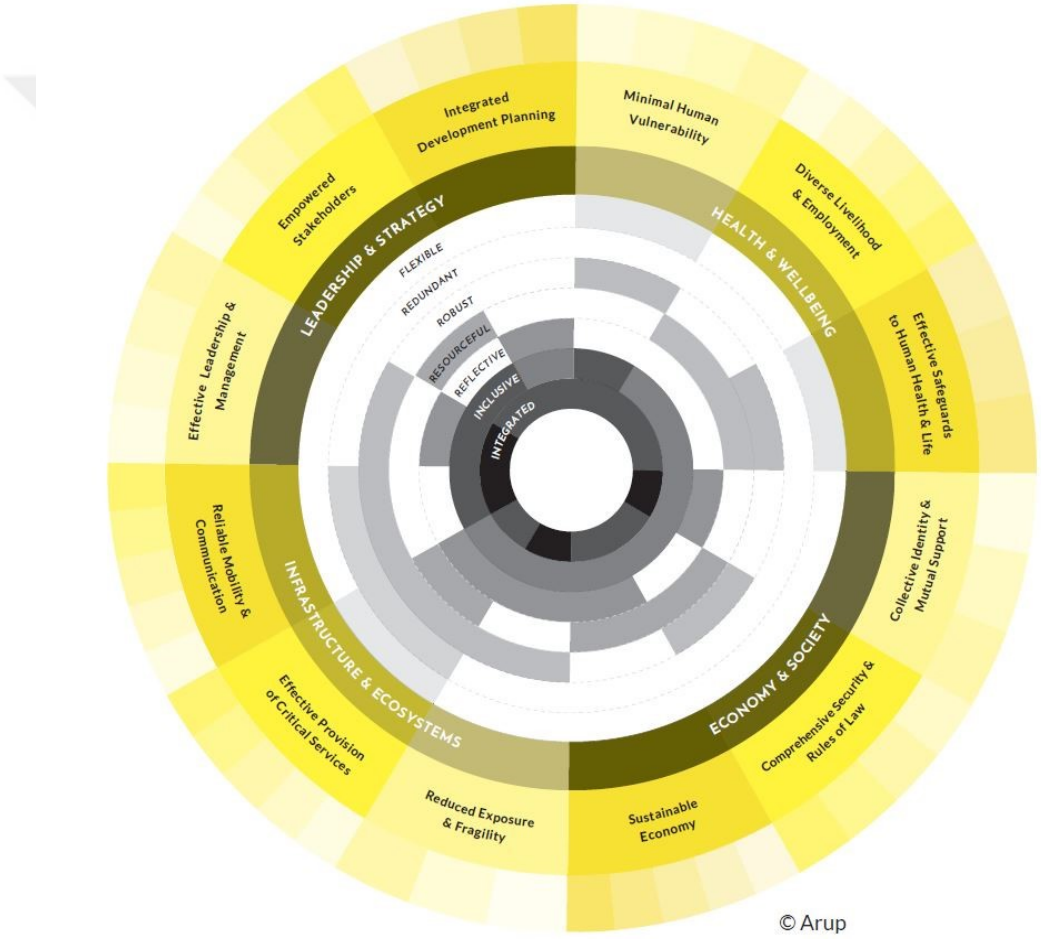



**Figure 3.3.** ARUP's City Resilience Framework that 100 Resilient Cities programme is getting inspiration and developing strategies from the core seven qualities. Copyright 2014 ARUP

## 3.2. Resilience Strategy Guidelines

Based on the research of 100 Resilient Cities programme, this study has selected three case cities, which have developed resilience guidelines and strategies, from different continents. These cities are respectively Paris from Europe, New York from America, and Seoul from Asia. Selection criteria is based on comprehending various approaches on totally different contexts in terms of scale, tactics, and site-specific requirements. Moreover, resilience has both generic and site-specific qualities. Thus, it is intended to figure out these qualities while understanding the variety in the city structure and the need in several solutions to cope up with uncertainty and rupture via resilience strategies in different contexts.

### 3.2.1. Paris Resilience Strategy

One of the cities applied for the 100 Resilient Cities programme is Paris, France. Basically, Paris Resilience Strategy is composed of 3 Pillars. Each pillar represents different features of a resilient city. Starting with the first pillar, it is emphasized that "an inclusive and cohesive city, which builds on the strength of its residents to become more resilient" (Paris Resilience Strategy, 2018, p. 38). The first pillar has three different objectives. These are preparing the community in all ages to handle acute shocks and ruptures, creating suitable conditions for more inclusive neighbourhoods to increase goodwill, and finally enabling the residents emancipate and co-create for the tomorrow city (Paris Resilience Strategy, 2018).

Getting prepared for the acute shocks and ruptures is one of the topics that is about community resilience. Resilience is not only about making a space robust, adaptable, or transformable, it is also about sustaining and preparing the society by educating them. That is why Paris Resilience Strategy's first focus is about this issue. Getting prepared is a way of collective resilience in which each individual person becomes ready for facing acute shocks (Paris Resilience Strategy, 2018), and ruptures. Paris Resilience Strategy (2018) tries to achieve the collective resilience by increasing the

voluntary involvement and spreading them with the help of a citizen network. One of the ways of doing this is wide-ranging and free training courses, programmes that is available for all ages, genders, and divergent types of people, and in case of an emergency, those programmes are available for the psychological assistance as well (Paris Resilience Strategy, 2018). In short, Paris aims to inform, train, and increase the involvement of citizens in the process of building a more resilient city.

For the first strategy of the first pile, which is getting prepared, Paris developed some actions. One of the actions is deploying first aid, and risk management training in an interactive way. Paris Resilience Strategy (2018) underlines that risk culture is not well developed in France in comparison to the other countries, and mostly administrations take care of risk situations. That is why Paris plans to increase the numbers of defibrillators in common spaces, and to expand risk management training for informing major climatic events, developing education on environmental risks and health under the title of ‘’Paris Saves’’ (Paris Resilience Strategy, 2018). It is aimed that by the year 2030, 90% of the citizens will be trained about risk management and first aid. Besides, Paris intends to develop a specific training programme for adults and children for the actions that can be taken during the greater events like disasters. For doing that, simulation exercises called ‘’serious game’’ will be developed for interactive training (Paris Resilience Strategy, 2018). Also, the schools will have extra-curricular programmes for education the children in the prime space for the city in transition, and the Ministry of Education will support these programmes with the help of the Participatory Budget (Paris Resilience Strategy, 2018).

The second issue in the first pile is creating suitable conditions for more inclusive neighbourhoods to increase goodwill. For this issue, Paris Resilience Strategy developed some actions as well. One of the actions is about increasing the solidarity by facilitating the link between who needs help and who wants to get involved (Paris Resilience Strategy, 2018). The focus here is creating new local networks by encouraging the community networks, and businesses to connect supply and demand of food, basic needs, and products. By doing so, a platform will emerge that connects

social and community involvement and practices, and an interactive mapping study of geo-localised attempts will train people to know about solidarity guides, services map, access to support and health (Paris Resilience Strategy, 2018). The facilitators will be local municipalities and voluntary networks. Another action is about supporting the creation of community based local jobs. It is intended to increase the community interaction and social inclusion for setting up neighbourhoods for leading the social and climate resilience targets even at the local level (Paris Resilience Strategy, 2018). There are two supported programmes which will be developed as the best practice models. And these are as follows

> "1. The creation of an eco-administrator position, shared between a tertiary building, a social landlord, an apartment co-ownership building and its facilities, whose role will be to communicate with technical service providers, to support stakeholders in achieving energy consumption targets, and to aggregate environmental and energy objectives. 2. The Paris Housing ("Paris Habitat") study on the evolution of the concierge profession. A pilot project with the Paris Fire Brigade is proposed to involve concierges in risk prevention and the dissemination of risk education (first aid training, defibrillator use, the assistance to vulnerable individuals in case of a major event, etc.). The concierges will also coordinate local gatherings and community-led actions." (Paris Resilience Strategy, 2018, p. 53)

The final issue in the first pile is about enabling the residents emancipate and co-create for the tomorrow city. One of the actions taken place is supporting initiatives, implementing and co-funding of resilience solutions by local and individual stakeholders (Paris Resilience Strategy, 2018). Paris established ''the green permit'' which enables individual volunteers to manage green public spaces independently and this means that citizens can directly involve in the process of place-making, and implementation solutions which becomes a civic duty and resilience even at the local scale (Paris Resilience Strategy, 2018). This is essential to increase the sense of belonging as well. Sense of belonging may help to have more volunteers and individuals making effort to attend trainings, programmes, and social resilience

actions. That is why Paris aims to facilitate, support and co-finance the participation of the resilience solutions which is related to the climate and social resilience (Paris Resilience Strategy, 2018). The local scale attempts are making private individuals to take care of some spaces, such as walls, roofs, balconies, inner courtyards, ground floors, parking areas and so on. By doing so, it is thought that urban heat island effect mapping and rainfall zoning kind of stuff can be easily installed and supported (Paris Resilience Strategy, 2018).

In the pillar two, focus is meeting the challenges of the 21st Century for a city. The main aim is adapting the city to expected/unexpected possible resilience challenges. There are some municipal actions including the response to social and climate issues, promoting mature based approaches with the help of biodiversity and new water uses (Paris Resilience Strategy, 2018). The key words are adapt, multiply benefits and explore. By adapting, it is meant to adapt the infrastructure. It is claimed that Paris will inevitable experience significant and major environmental risks, such as increase in the intensity of heatwaves, dangerous floods, unexpectedly intense rainfall. By multiplying benefits, it is aimed to prepare the infrastructure in the long run, and making the infrastructure multifunctional by means of being modular, flexible, and redundant to make the infrastructure more inclusive. By exploring, it is aimed to explore the resources by means of vacant spaces, underground and other secondary spaces. For the vacant or temporarily vacant spaces, the Paris Resilience Strategy (2018) offers to implement temporary urbanism to increase adaptation. The second pillar also has three different objectives, and these are anticipating risk and adapting infrastructure, designing infrastructure for multiple benefits, and finally promoting resilient urbanism in a dense city (Paris Resilience Strategy, 2018).

Towards anticipating risk and adapting infrastructure, there are various actions. One of them is transforming the schoolyards into cooling islands. The team uses the word oases for describing it. This action has routed back the Climate Adaptation Strategy of Paris, and it is launched that adapting the urban spaces into high temperatures is crucial. In that manner, creating cooling islands, paths, and green open spaces both including natural and artificial ones become vital. Paris Resilience Strategy (2018)

claims that this will help to protect biodiversity and initiate a cooling network in the city. According to the analysis of the team, more than 600.000m2 area is covered by schoolyards which are made up of impermeable asphalt and not open to the common public. That is why with the help of regulations, the schoolyards can be transformed into the oasis for increasing the cooling effect. One of the ways of doing this replacing the asphalt with a natural and permeable material, and opening some walkways supported by green, trees and vegetation even including edible vegetables like orchards (Paris Resilience Strategy, 2018). Also, the schoolyards will become places of interactive learning by experiencing the transition in the real life. For the community resilience, schools and some installation, applications there could be beneficial. Another action is anticipating the risk's possible impact on infrastructure including the cost. When it comes to major shocks, changes or ruptures, the pressure is upon the cities to return to normal rapidly and repair the infrastructure which is much more a similar way of understanding the resilience in engineering way as mentioned earlier. However, "resilience thinking does not solely aim to reinstate what was destroyed but it looks at how disasters can turn into an opportunity to reconstruct more robust infrastructure capable of withstanding similar shocks in the future." (Paris Resilience Strategy, 2018, p. 68). Understanding the risk and possible outcomes may help to build more suitable infrastructures. That can be done by various tools, such as flexible infrastructures, mobile infrastructures, easily reconstruct-able infrastructures and so on. Build Back Better approach is one of the tactics in that sense, and it is aimed to anticipate and reconstruct the major infrastructures (Paris Resilience Strategy, 2018).

Second objective, which is designing infrastructure for multiple benefits, also focuses on multiple actions. One of them is about initiating the transformation of the ring roads and the motorway network (Paris Resilience Strategy, 2018). This action takes inspiration from Seoul, South Korea. Cheonggyecheon is the main source of influence, and it is an urban pathway whose name is the name of a river which is covered by an elevated road in 1960s. Then, the road covering the river was demolished and the almost dried river was saved. Now, this place is completely

public and can be used for multiple activities. The infrastructure of the previous road and the saved river enabled to create this urban space in a dense city. That is why Paris tries to transform some of the ring roads into multifunctional infrastructures. For this purpose, Paris Resilience Strategy team wants to offer a multidisciplinary international competition to decide how to transform the entire ring road. Another action is about adapting the public facilities to develop flexible, modular, and multiple uses. The essential point here is about integrating the multi-use criteria. Another action is developing integrated green spaces for both climate and social challenges in a resilient system. The inspiration here is Copenhagen, Denmark. Tåsinge Plads are known as the first resilient green space in Copenhagen. They are made up of autonomous water and energy system. Rainwater is collected with the help of an intelligent mechanism and collects energy through the kinetic activity with the help of a kinetic floor. Besides being an autonomous system, Tåsinge Plads are the places of social interactions, experiencing the resilient uses in a city. Thus, Paris wants to design two resilient parks with the features of being energy efficient, collecting rainwater, being biodiverse and so on. Automatic and intelligent re-use of rainwater and developing energy by a kinetic floor that produces energy by the activity of children are some of the inspired elements.

In the final objective, which is promoting resilient urbanism in a dense city, multiple actions were developed as well. One of them is about mainstream temporary urbanism. Temporary urbanism is seen as an essential tool for the cities in transition.

> "Temporary urbanism has many advantages. It can raise the profile of an area and maintain a degree of vibrancy while waiting for redevelopment to begin, which can sometimes take years. It also provides additional space for a host of activities such as providing temporary shelter for refugees, vulnerable and homeless people; working spaces for technology companies and resources centres; or venues for cultural events with a high local impact, urban agriculture, etc." (Paris Resilience Strategy, 2018, p. 85)

In other words, such an approach offers a systematic use in the vacant areas and re-use it for responding the various needs. More particularly, this activity will consider methods of establishing connections between project owners, possible occupants, or temporary users and land owners and developers in order to promote solutions that encourage urban resilience (Paris Resilience Strategy, 2018). Paris selected Saint-Vincent-de Paul as a redevelopment place for the temporary occupation. The aim is understanding the short-term impacts on the area to comprehend the needs and demands for the legal framework of the occupation of such areas (Paris Resilience Strategy, 2018). For the final objective of the pilar two of Paris Resilience Strategy, there is another action taking place in Saint-Vincent-de-Paul. It is called as developing the first resilient and climate sensitive neighbourhood there. Today, there are around 2,000 residents and workers., and along with housing for those in need, the location also has offices for social entrepreneurs and cultural organizations, so "Les Grands Voisins" becomes a test-bed for resilient urbanism and transitory urbanism (Paris Resilience Strategy, 2018). Because of being a test-bed, the neighbourhood is thought of remaining as a place of novelty and urban resilience even in the future. While advancing the social resilience practices, such as participatory in housing, local management of sources, local production, urban agriculture and modularity, the site also aims to adapt environmental events, such as water and energy use, and advancing the green (Paris Resilience Strategy, 2018). One of the actions taking place in this objective is involving resilience solutions through regulatory documents (i.e., specifications). According to Paris Resilience Strategy (2018), Paris has to change certain local, federal, or international laws and regulations to become more resilient. For instance, in order to make Paris more receptive to the impacts of climate change, the "inorganic character" of urban design, as established in urban and heritage legislation, will need to change. For achieving this, the most vital step is identifying the current regulatory obstacles in the mainstream urban resilience understanding, and developing or introducing new approaches especially in terms of strategic urban planning (Paris Resilience Strategy, 2018). In other words, regulations and specifications can be planned as a strategy or

tactic to lessen the challenges to urban resilience. According to Paris Resilience Strategy (2018, p. 88), those specifications should allow or encourage "…constrain a flexible, adaptable, or even reversible programming, from the design stage, thereby enabling buildings to evolve according to different uses during their lifetime."

In the pillar three, the focus is "a city in transition that mobilises collective intelligence, adapts its operations, and cooperates with its surrounding territories" (Paris Resilience Strategy, 2018, p. 92). Resilience is a way to transform transitions into opportunities. Those transitions may help to adapt policies, governance, and other uncertain challenges. Mobilising may help to spread the training and spatial data, organising may ease the adaptation process of continuous operations in policies that contributes to the resilience, and collaborating may help the organization at a wider scale network. By doing so, the rural, and other territorial administrations like municipalities can attend to the network and create their own interdependent metabolism in a greater system. The third pillar emphasizes three various objectives which are mobilising collective intelligence together with resources, ensuring the continuity of public services together with the resilience of administration, and finally cooperating with other territories to encourage transitions (Paris Resilience Strategy, 2018).

The first objective, which is mobilising collective intelligence together with resources, offers different actions. One of them is developing new finance systems for resilience operations in Paris which are in transition from sustainability bonds to resilience bonds. What is meant by this action is financing the resilience actions. Sustainability bonds are used to diversify both the type and quality of the investors, and by transiting them into resilience bonds extreme climate events will be targeted as well (Paris Resilience Strategy, 2018).

The second objective focuses on ensuring the continuity of public services together with the resilience of administration, and develops some actions. One of the actions is ensuring the continuity of municipal activity during an emergency, and it claims that the City's whole management team must be mobilized and working toward the

establishment and/or updating of the Business Continuity Plans. About 100 retired City of Paris employees who make up the on-call reserve are already active in programs that were implemented during earlier heatwaves (Paris Resilience Strategy, 2018).

The final objective of the third pile underlines cooperating with other territories to encourage transitions. One of the actions developed for achieving this is taking inspiration from Melbourne's Metropolitan Forest strategy, and the Paris team titled it as supporting the watershed's climate adaptation programme to protect water resources and decrease the measure of floods by collaborating with rural municipalities. From the title, it can be comprehended that the action focuses on adaptation strategies for the environmental events and this a way of embracing the ecological resilience while focusing on the partnership strategies with the local administrations as a way of social resilience. Melbourne's Metropolitan Forest strategy introduces the need for urban scale greening and revegetation strategies, and this is achieved through a coordination by local councils, community and regional agencies, and water authorities (Paris Resilience Strategy, 2018). The Paris team wants to limit the risk of flooding in the Seine River and achieve the goals of

> "…ensuring the permeability of soils and renaturation where possible of the riverbed of the Seine and its tributaries, drastic limitation of polluting discharges in the rivers through the creation of new positive partnerships with towns, farmers, and industries of the watershed." (Paris Resilience Strategy, 2018, p. 110)

Moreover, Paris Water Authority will aim to keep buying farmland and assisting local farmers in establishing sustainable agricultural techniques in the regions where clean drinking water is supplied, and other projects include expanding freight transit along the Seine and through canals and enticing large-scale catering businesses to get their food from regional farmers in the Paris region (Paris Resilience Strategy, 2018).

**Figure 3.4.** Showing action plan of Paris Resilience Strategy in a detailed way. (Source: Paris Resilience Strategy, 2018), Copyright by 2018 Paris Resilience Strategy

To conclude, Paris Resilience Strategy focuses on both ecological and social aspects of short-term and long-term resilience with the help of nested scale tools, urban interventions, temporary urbanism tools, environmental adaptation strategies, social emancipation, and solidarity projects and so on. Also, the attempt towards creating adaptable and multifunctional infrastructures is a way to cope up with uncertainty, and its result which is the rupture. Thus, it can be said that Paris Resilience Strategy is an inclusive study that brings lots of different aspects together. All these may create a collective and efficient effect on resiliency, or at least can carve out a niche in the urban sphere for the unknown, uncertain events which includes the rupture scenarios as well.

### 3.2.2. New York Climate Resiliency Design Guidelines

New York city is also part of 100 Resilient Cities network, and produces resiliency guidelines. The focus of New York Resiliency Design Guidelines is rapidly changing climate and the challenges that the city face. The most vital and frequent environmental events are flood and excessive heating in New York city. Similar to most of the other cities, those events gained pace and density during the 21st century (Climate Resiliency Design Guidelines, 2020). One of the flood reasons is sea level rise. Sea level rise is a common problem in other cities as well such as cities in Netherlands and Denmark. That is why the primary function of this guideline is providing step-by-step instructions to alter the basic codes and standards. Uncertainty is one of the topics discussed through the guideline, and it is a topic that is investigated through this study as the stressor of rupture. The guideline underlines that even though all the analysis are done with all projections, there will still be uncertainty at some points (Climate Resiliency Design Guidelines, 2020).

> "Given uncertainty, adaptable design is a specific kind of resilient design that provides a useful, iterative approach for managing uncertainty and designing resilient facilities. An adaptable facility is one that can be engineered with a flexible protection level which reduces risk to acceptable levels for part of its

useful life and can be re-evaluated as risk levels change." (Climate Resiliency Guidelines, 2020, p. 9)

In other words, this approach may help to provide managing operational and maintenance restrictions, it offers a mechanism to control uncertainty and expense.

The guideline listed specific considerations as well. These considerations are financing requirements, interdependencies, existing hazard mitigation projects and risk studies, agency-specific resiliency design standards, operations and maintenance, and limitations (Climate Resiliency Design Guidelines, 2020).

One of the focus areas is sea level rise. First step is assessing the tidal inundation due to se level rise which means determining the possible affected areas under the risk of sea level rise. For doing that, it is offered to use flood hazard mapper which shows the risky areas. Second step is addressing tidal inundation risk which means that if the areas like primary access roads are under the risk, the projects should not be built on the future inundation zones (Climate Resiliency Design Guidelines, 2020). The next step is identifying appropriate design interventions. These interventions might be permanent barriers, deployable flood barriers, natural system-based approaches (ie., living shorelines-Kate Orff's Living Breakwaters, restored wetlands, protection of electrical and mechanical equipment, dry floodproofing, wet floodproofing, shoreline improvements and so on) (Climate Resiliency Guidelines, 2020).

In the Coastal Climate Resilience-Urban Waterfront Adaptive Strategies guideline of Department of City Planning City of New York, Burden (2013) the commissioner of the project gives point to the strategies for the sea level rise, and call them as reach strategies which are more suitable resilience approach for the larger scale adaptation situations. Reach strategies are meant to maintain coastal climate resilience including both land, shore, and in-water tactics (Burden, 2013). Upland strategies do not have a direct effect on water or the shore, but mostly take care of the inland areas of the shore, shoreline strategies are coastline strategies which aims to reinforce the shore for the protection from storm and wave events, in-water strategies are taking place in the seaward to protect both shoreline and upland areas (Burden, 2013).

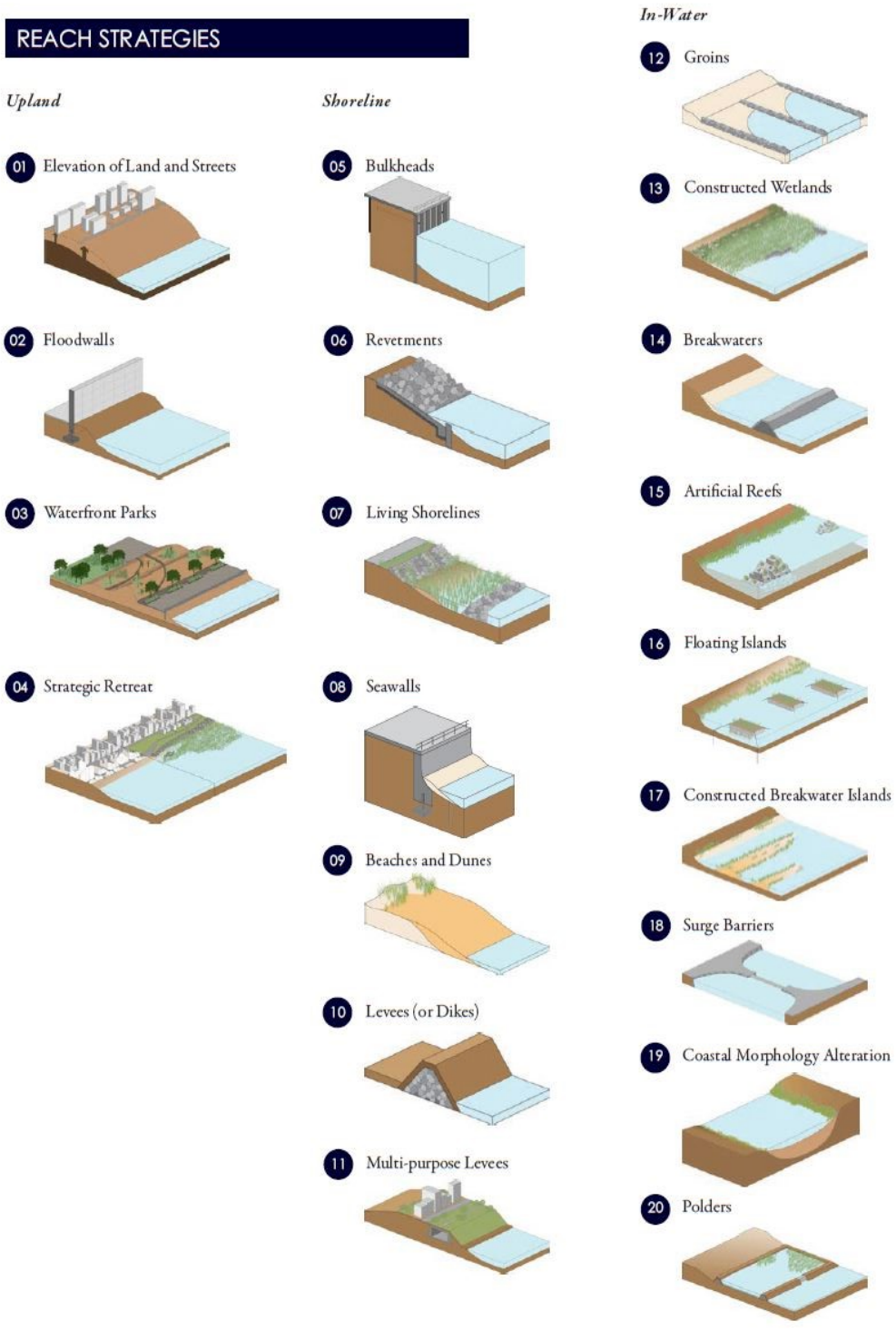



**Figure 3.5.** Reach strategies for upland, shoreline, and in-water areas. (Source: Coastal Climate Resilience-Urban Waterfront Adaptive Strategies, 2013), Copyright by 2013 Department of City Planning City of New York

### 3.2.3. Seoul Resilience Strategy

Seoul Resilience Strategy considers two important categories under the title of urban resilience, and these are about gradual and sudden ruptures. For the gradual ones, economic crises, demographic changes including migration and low fertility rates can be exemplified which are also defined as chronic stresses (Seoul Resilience Strategy, 2019). For the sudden ones, the acute shocks which are sharp and unexpected events, such as environmental disasters, unexpected rainfalls, earthquakes, the change in the infrastructure can be the examples (Seoul Resilience Strategy, 2019). The urban resilience definition is done by Seoul Resilience Strategy as follows

> "Urban resilience is the capability of all entities within a city, including individuals, communities, institutions, and businesses, to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience. In a resilient city, all the entities can quickly go back to the normal condition or even be better in the face of challenges. Its level of resilience determines how the city can withstand and emerge stronger from the impact of the crises." (Seoul Resilience Strategy, 2019, p. 12)

Seoul also takes guidance from the City Resilience Framework developed by ARUP similarly Paris Resilience Strategy. The other similarity between Paris and Seoul is having three major focus points. Seoul Resiliency Strategy calls them goals. The first goal is governing resiliency through collaboration, the second goal is community which is stronger and connected, the final goal is inclusive growth. All these are feeding different means of resiliency in the city. Seoul puts emphasis on collaboration, community engagement and the inclusiveness because these are individuals taking place on the nonlinear transition of the city. Depending on the agents, individuals, and forces at play, the evolution of the urban system into various phases through time is a highly complicated and nonlinear process (Cruz, Costa, de Sousa, and Pinho, 2013). Because of complexity and ever-evolving resilient understanding of the city, there is a need for such agents. According to Stead and

Taşan-Kök (2013), developing tactics for the resiliency purpose is gaining pace since a growing feeling of complexity, uncertainty, and insecurity about cities is also reflected by social, economic, and environmental crises and problems (ruptures), which underline the need to come up with fresh adaptation and survival tactics. That is why those strategies developed by the several cities might be beneficial for such an aim.

The first goal of Seoul is governing resiliency through collaboration. This goal's primary aim is providing safe and fast communication tools during an emergency. For doing that, there is a need for a comprehensive disaster management programme from both public and private supporters to make ready the citizens for preparedness (Seoul Resilience Strategy, 2019). One of the programs taking place under the first goal is safety governance. Safety governance becomes crucial during an emergency and that is why Seoul has been developing and providing safety app and emergency safety call system. This is a part of the people cantered resilience approach according to Seoul team. One of the other programs is providing a climate change response system. In that system, there are some actions towards the climate change conditions. One of them is providing five-year development plan for solar energy use even in the homes by motivating people to attend. Green neighbourhoods are one of the attempts that aims to create green forest areas in pedestrianized places with materials that can absorb the dust (Seoul Resiliency Strategy).

The second goal is making the community stronger and connected. This is essential to build a sense of belonging and appreciation of a place, a changing situation, differences in the community and so on. According to Wildavsky (1973), planner cannot supply all the aspects of encompassing dimensions since planning and the city is part of a much more complex entity. In that manner, self-organization and inclusiveness of the community becomes significant. One of the ways of doing this enabling the community to become stronger and more connected in a resilient way as mentioned in Seoul Resiliency Strategy as well. Seoul will operate a variety of "Local Labs" around the city to identify any social issues and create a solution team made up of residents, the general public, specialists, and local companies to address

the issues so that this project can be spread to other districts after initially being tested in the impoverished area where social cohesiveness is rather well-established (Seoul Resiliency Strategy, 2019). Thus, it can be said that the team is a socially inclusive one where bottom-up and participatory actions can be taken as well. All these helps to raise an awareness among the society and motives them to take place in collective actions so that the society can become more resilient.

The final and the third goal is inclusive growth. The focus area here is the resiliency of the economic structure. When something is called as a disaster, the first thing coming to mind is physically destructive events like earthquakes and floods, but economic prosperity is also as vital as those events (Seoul Resiliency Strategy, 2019). For the long-term resiliency, the economic structure must be resilient and reliable. Having a stable and resilient economy model in the urban environment, the possible or even uncertain events effects may be much more easily adapted or changed. The economic resiliency may also help to sustain the economic balance among the society to lessen the vulnerability and increase socially supportive structures in the policy. For example, "Seoul has implemented an employment security policy, allowing all Seoulites to thrive together. Irregular workers in public institutions were turned into regular workers, and labour-related measures were adopted to protect vulnerable workers whose labour rights are easily denied" (Seoul Resiliency Strategy, 2019, p. 82).

After investigating various cities' resiliency strategies, the projects developed for the resiliency purpose and activist exhibitions in the globe, it is derived that one of the significant points is engaging with the community for both raising awareness and creating local and wider networks of individuals and local people. This will lead to have a more resilient community in terms of social resilience, and the solidarity might be strengthened. Solidarity and emancipation among the civic people encourage the collective actions which are vital for environmental, economic, and social resilience models. Another point is that the environmental resilience models can be in nested scales. It can start from a small plot like in the case of Tåsinge Plads, and can be in a wider and comprehensive scale of resiliency guidelines. That is why

each context needs both various and common implementations. The resilience term is both generic and site-specific in that sense, and this is one of the reasons that forces it to become more inclusive in different perspectives.




**Figure 3.6.** Seoul Resilience Strategie's three goals explained in a detailed way. (Source: Seoul Resilience Strategy, 2019), Copyright by 2019 Seoul Resilience Strategy

## 3.3. Urban Projects Having Resilience Approach

There are several urban projects dealing with different uncertainties and rupture. Some focuses on the use of vacant space by encouraging the temporary use while some others give voice to environmental unpredictable hazards such as sea level rise and hurricanes. Thus, this sub-chapter has a focus on various urban scaled projects in New York and Berlin to comprehend the diversity of the ruptures and solutions.

### 3.3.1. Kate Orff and Scape's Coastal Resilience Projects: Oyster-Tecture and Living Breakwaters

Kate Orff's two different projects called Oyster-Tecture and Living Breakwaters are examples of shoreline and in-water strategies' applications in New York. Kate Orff (2010) proposed a project called ''Oyster-Tecture'' in New York that can be an example of how an environment can work in a resilient way. Oyster-Tecture is a project that focuses on one of the ruptures by handling the see level rise. The project aims to activate an oyster reef in New York to diversify both marine life and recreation potential in the New York Harbour. Oyster-Tecture is considered as a lead to develop flexible and resilient adaptation strategies for New York in the presence of climate change and sea level rise, which are initially identified as examples of ruptures within this study. In order to develop resilient adaptations to the existing context, the project proposes a living reef that is made up of a web of ropes which supports marine growth with its 3D landscape. Moreover, 3D landscape is able to clean the water by harvesting the biotic filtration process with the help of oyster mussels. 3D landscape also aims to slow down the speed of waves. As a result, the harbour's water becomes cleaner and slower which enables neighbourhood fabrics

to create new channels in the canal, and a waterfront park emerges to envisage the city's return to the waterfront as an adaptive and resilient strategy for this century. By doing so, with help of a relatively small urban intervention, a new climate-proofing infrastructure in the form of an artificial oyster reef could be adapted by the harbour in a resilient way. Oyster reefs function as filter feeder since they produce and host the oysters. When the water passes through the reefs, it will be cleaned. The structure is a literally a living habitat and it enables the self-growth and maintenance of the infrastructure which increases its adaptive capacity.

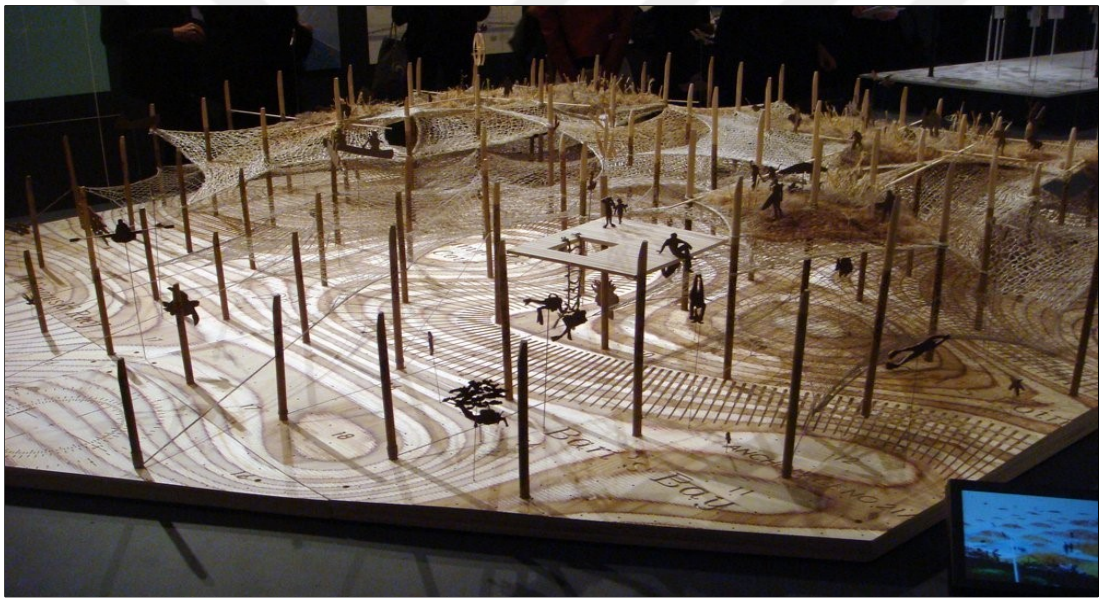


**Figure 3.7.** Model of the web of woven ropes for supporting the reef life. Copyright by 2010 Kate Orff, Scape

At first, in 2010, when Oyster-Tecture was designed as part of a display at the Museum of Modern Art called Rising Currents, the proposal was considered as a speculative and hypothetical approach which aroused many discussions. However, the Hurricane Sandy in New York altered this point of view with a new attention towards sea level rise, uncertainties, and required adaptability for coastal resilience

projects in front of ruptures. In 2013, the federal government called for an action for Hurricane Sandy Rebuilding Task and opened an architectural competition under the title of Rebuild by Design. Kate Orff and her team SCAPE submitted again an oyster-centric design proposal called Living Breakwaters similar to Oyster-Tecture. Currently, the firm is designing the artificial oyster reef breakwaters for the south coast of Staten Island. Basically, the design is evolved from the original web of ropes. Just like the oyster reefs, Living Breakwaters aim to slow-down the speed of waves rather than building a wall. Building a wall is problematic since the uncertainty around climate change makes it difficult. Seas continue to rise and other climatic conditions like storms affect it badly, so it is hard to predict exactly where a wall should be built and how high it requires to be. Also, a wall can really become a rupture in the city. It may block the natural flow of water and interrupt human's access to the shoreline. That is why it is better to slow down the water and creating a space for cleaner, calmer water along the site. Within such an approach, the uncertain emergencies' results are accepted as ruptures and then, flexible, and resilient ways of design tactics are developed as a response to ruptures. While developing these tactics, the ecological layers are mostly taken into consideration not to cause another rupture. With the help of flexible and self-growing interventions in the form of an infrastructure, the greater possible uncertainties can be defeated in the coastal area. In short, the project's amalgamation with the ecological circumstances and required flexibility and resilience increase the adaptive capacity and develop a response in front of ruptures.

When the project is realized, it is also aimed to have self-sufficient oyster harvesting scapes since oysters are edible. It exemplifies how relatively small urban intervention can encourage many different processes altogether at the very heart of the urbanized portion of land. Suddenly, harbour turns into a self-sufficient, resilient, and vital environment in which different events take place at the same time. Supplying edible oysters from a living infrastructure may also help to provide a resilient approach in the food supply mechanisms of the highly urbanized areas. It may also develop a local network of such so-called agricultural activities. The importance of having a

local network fed by the voluntary individuals has already been discussed through the Paris Resilience Strategy. Thus, encouraging such kind of action is essential for making a place resilient in terms of various aspects.

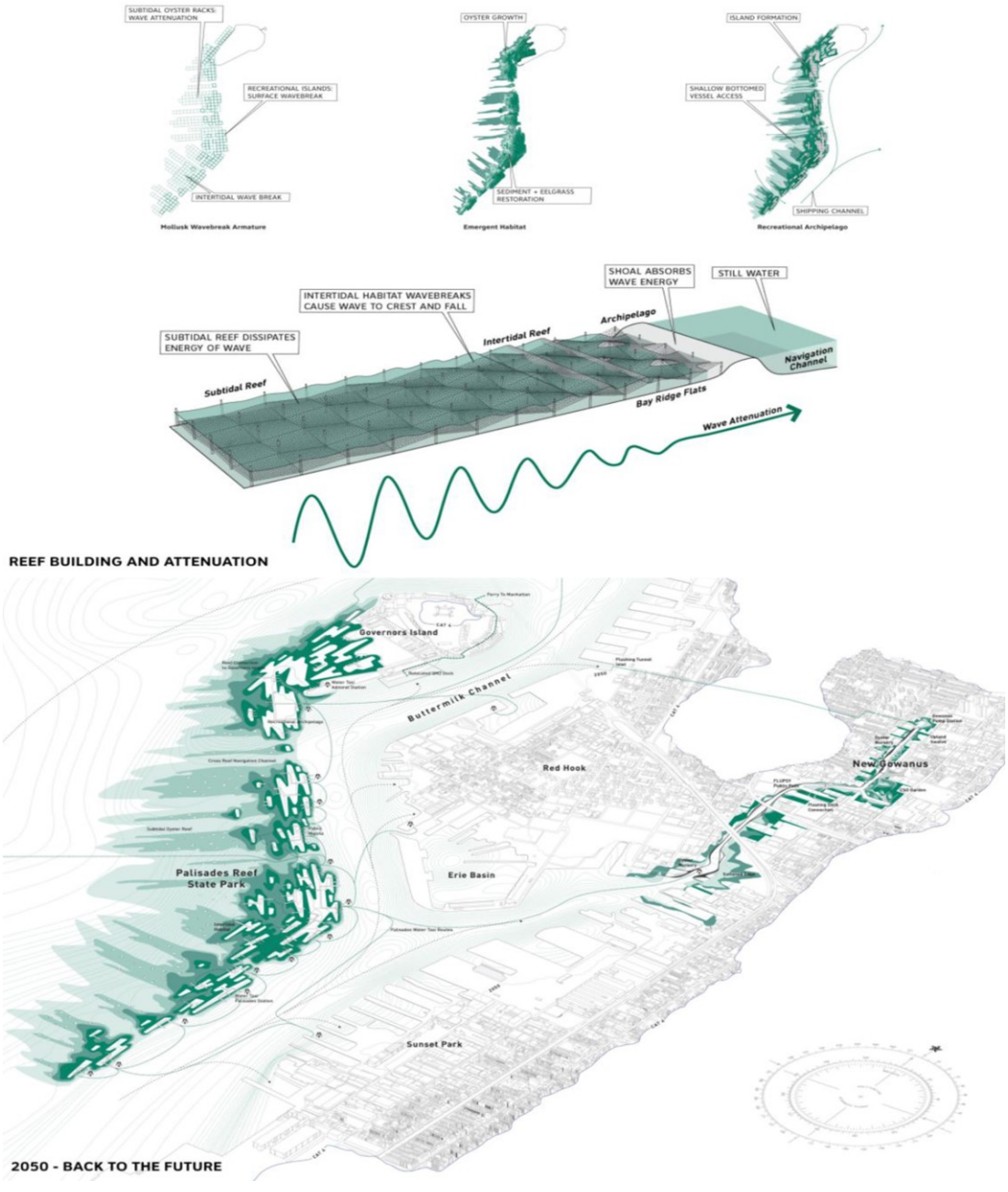



**Figure 3.8. (top) & Figure 3.9. (bottom)** Oyster reefs and amalgamation with the ground scape, Copyright by 2010 Kate Orff, Scape



**Figure 3.10.** Oyster-Tecture section view, Copyright by 2010 Kate Orff, Scape

Another example of a resilient system for the rupture cases might be the Living Breakwaters by Kate Orff and her team Scape. This project is also considered as being a resilient approach because Living Breakwaters project is as an ecological design which encompasses the ecological and social resilience in the south shore of Staten Island (Scape, n.d.). The project is composed of 2400 linear breakwater units that are made up of stone and ecologically developed concrete and partially submerged near the shore (Scape, n.d.). Those units' primary function is breaking the waves along the shore and reducing the erosion with the help of enhancing the oyster reefs there. The oysters will be able to hold onto the surface of the ecologically enhanced concrete units, and this will lead to enhance other marine life as well such as fin fish. The project is a competition winner that is opened after the Superstorm Sandy, and the U.S. Department of Housing and Urban Development launched the competition (Scape, n.d.). In order to develop a resilient shore project after the rupture, such a real case was taken into consideration and that created the basis of the project.

In other words, the breakwaters are the part of a design system in which they are designed specifically for reducing the impact of the climate-intensified weather events since the place called Tottenville experience the most damaging waves in the area and got affected badly during the Superstorm Sandy (Scape, n.d.). Besides having the ability of breaking the waves as the primary function, those breakwaters also have reef ridges and reef streets which enables them to have a diverse marine life and habitat there (Scape, n.d.). Rather than being a mere concrete block to break the waves, those Living Breakwaters have a sustaining and organic life there as it is also underlined by the name of the project, so it is a kind of a living installation. This might be another point of the resiliency there since such an understanding also enhances the adaptability of the life by adapting itself to the place. Hickman (2021) designates Living Breakwaters as being coastal resiliency and marine biodiversity project. This is essential because a real-life uncertainty caused a superstorm and it created a rupture in the area, so such things are hard to foresee and eventually rupture occurs. In other words, such resiliency projects are becoming necessary to cope of with uncertainty and rupture. Kate Orff (n.d.) considers it as a collectively produced infrastructure by saying

> "Living Breakwaters represents years of teamwork, research, shore walks, oyster pilots, hydrodynamic modelling, and community planning meetings. So many people over so many years have provided valuable input. It is inspiring to see this model of coastal blue-green infrastructure and community protection now being realized in Raritan Bay." (as cited in Hickman, 2021, n.p.)

Besides being both physically and ecologically resilient, the project also gives importance to the social resilience as well. In order to achieve the social resilience in Tottenville, the team wants to provide educational programs for local schools together with the Billion Oyster Project (BOP) and years of engagement through the Citizens' Advisory Committee (CAC) which is basically a coalition of local

stakeholders. Thus, the design team SCAPE and BOP aims to developed an open-access Living Breakwaters Curriculum (Scape, n.d.).

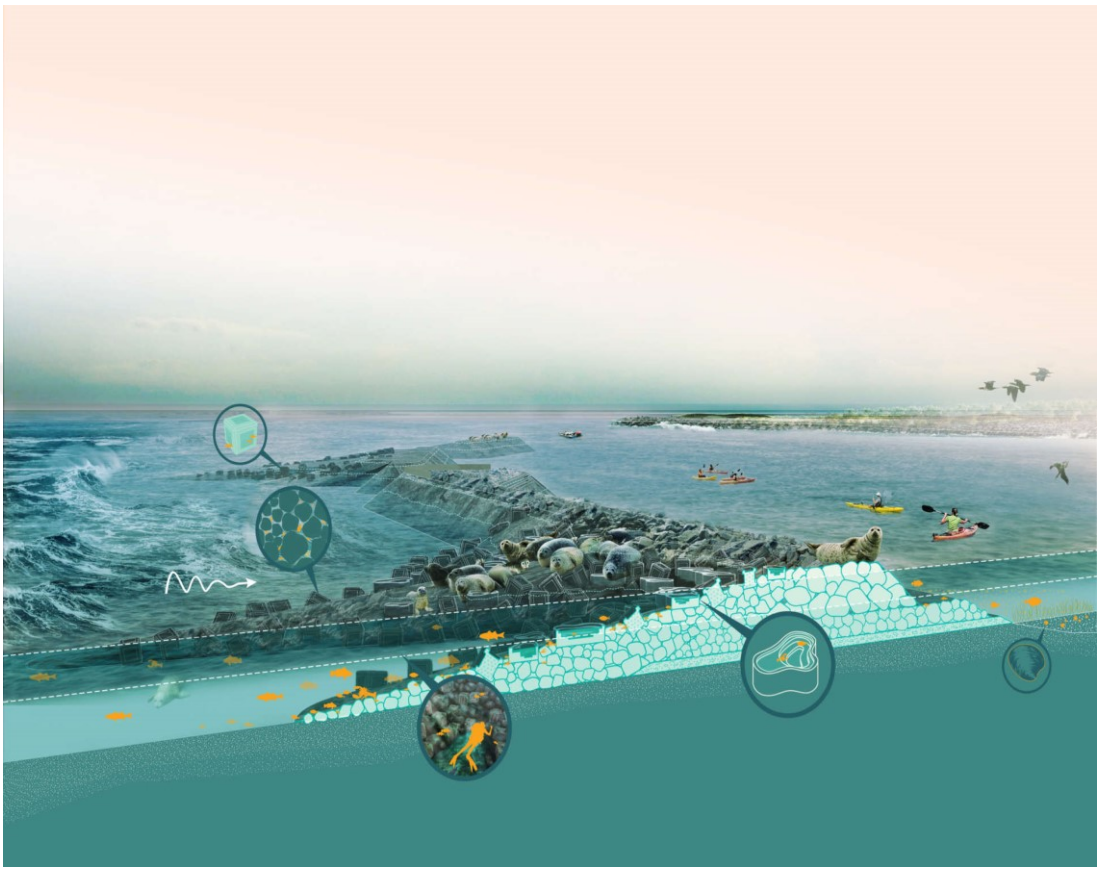


**Figure 3.11.** Section view of a wave-taming, biodiversity-fostering breakwater structure developed as part of the Living Breakwaters project for Lower New York Bay. Copyright by 2015-2019 Kate Orff, Scape

In short, the idea of the Living Breakwaters competition was to link ecological, social, and physical resilience, and it aims to connect locals and educators to Staten Island's southeast waterfront while lowering danger and reviving the environment. This structure will serve as a habitat for the diverse ecology of marine life in Raritan Bay, and a water hub on land will be built with space for visiting groups, leisure activities, and educational events. Working with the Harbour School and the Billion Oyster Project, the team will provide educational opportunities for neighbourhood

school groups, educating the next generation of environmental stewards about preserving Staten Island's vulnerable shoreline (Rebuild by Design, n.d.). Thus, this project achieves tree things in total. First one is providing ecological resilience by reducing the coastal risk and rupture, second one is creating and hosting the essential marine life and increasing the biodiversity, and the last one is developing social resilience through the design and construction of the breakwaters while having lectures about them in the local schools' curriculum.

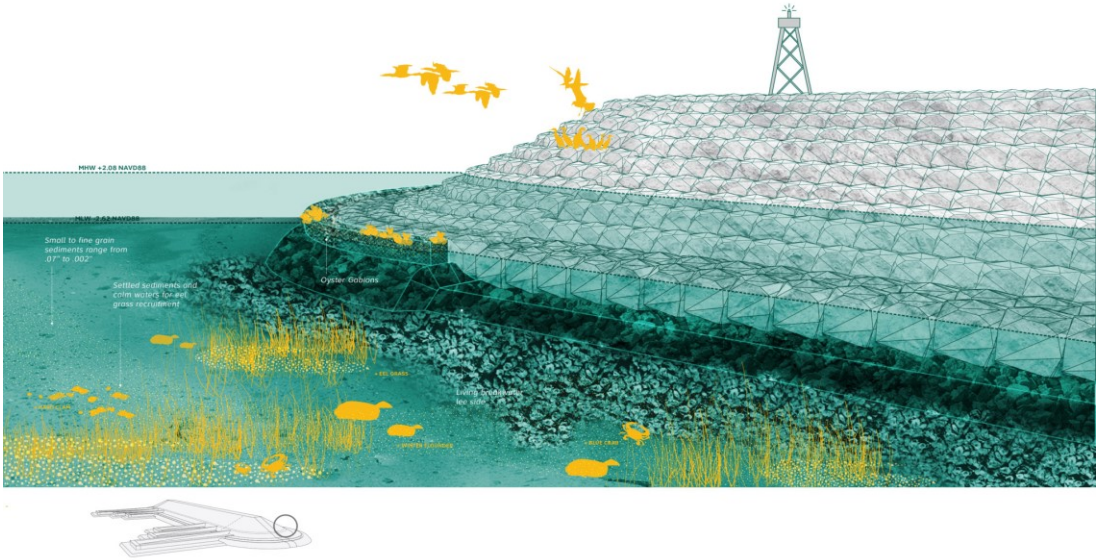



**Figure 3.12.** Breakwater details showing the units of the wall and its interaction with the living habitat. Copyright by 2015-2019 Kate Orff, Scape

### 3.3.2. Floating University, Berlin

One of the examples of the temporary use in a vacant area for the resiliency purposes can be Floating University Berlin. Floating University Berlin is a case where the temporary, flexible, and adaptive ways of place-making was achieved in a successful manner. It is considered as an unorthodox prototype for design education since it is speculative and proposes a new way of place-making which is much more flexible and temporary. The project site is on the north side of Tempelhofer Feld which is an airport turned into a park in Berlin. The site was almost lost and visited by only the ones who know it. Thus, the site can be described as a vacant area. One of the characteristics of the site is that it is a rainwater basin which means it can hold water inside when it rains. The site has been situated for many different design ideas after the destruction of the Tempelhof Airport in 2008. One of the attempts was turning the site into a housing site full of with residential blocks since the site is at the hearth of the city and building residents is a way profitable. Fortunately, this attempt was not realized due to a civic election. Then, it is decided to turn the site into a recreational area whose function is not pre-determined. In doing so, it is eliminated to create a rupture at the hearth of the city. If the area was turned into residential housing site, there would be a static, closed, and fragile environment which is hard to evolve and progress. Luckily, Tempelhof, a rainwater basin, gained its freedom for ever-evolving urban processes.

The team Raumlabor berlin designed the structure of Floating University Berlin in 2018 only for a limited time period from April to September which adds ephemeral qualities to the structure literally. Basically, the structure is composed of constellation of scaffolded volumes and floating platforms (Kafka, 2018). Scaffolded volumes have both modular system and fine grain texture which make them quite easy to operate for further changes (i.e., addition or removing of new volumes and programmes). Not only in spatial manner but also in terms of programmatic diversity and unscheduled events the structure becomes flexible and adaptive. Some of the programmatic elements are as such; a modular kitchen which is designed by

architecture students and other participants from all over the globe, an innovative water filtration system which interacts with its habitat of rainwater basin by containing biological filters, such as mushroom mycelium, zebra mussels and sand-biofilm which makes the system resilient in terms of biodiversity and ecology, an auditorium, and classrooms.




**Figure 3.13.** Site plan of the park transformed from Tempelhofer Feld, and the location of Floating University Berlin. Edited by the author, (Source: Archdaily, 2011)

The structure is correlated with Archigram's speculative approaches since it is a real-life example of plugged-in structures just like Archigram's imagination of the plug-in city. Having a modular plugged-in nature increases the flexibility and turns the project into a process rather than an end-product (Raumlabor, n.d.). Nobody knows

the final look since it is always evolving and adapting something new, so it is by itself in transition. If something is adaptive and transformable, it should be alive, ever-evolving. Within the constant change of flux, the structure re-adapts the conditions and continue to progress just like the ecological resilience approach underlines. Also, in some of the spots the students grow plants like tomato and potato in order to become much more self-sufficient and resilient in food production and supply as well. All these inter-actions with the environment, with the other bodies and with the human subject creates a platform for resilience in urban ecology as Guattari (2009) explained in his three ecologies which examine the inter-relational acts that subjects and the environment mutually have. According to Guattari, this view indicates our understanding of the environment in which we live as a part of it, and he defines it based on the three ecologies which are environment, social relations, and human subjectivity. According to the ecology of the environment, everything is possible because of the worst environmental catastrophes (i.e., natural imbalances depending on human interventions) and it might be only balanced with flexible developments. Ecology of the social refers to the human relationships and rebuilding them on all different layers of the social interactions. Ecology of human subjectivity aims to reinterpret the body's relationship as conscious and unconscious (Guattari, 2009). Besides the ecological interactions, the environment becomes a place for solidarity and emancipation activities which increases the appropriation of the space, and social resilience.

The complex inter-actions of both events, people and the structure remind the Synchronous Space definition of Richard Sennett (2018). Unscheduled, vital, and heterogeneous events may take place at the same time which encourages all types of encounters in and around the structure and site. Those encounters are also part of the social interaction, and resilience. Thus, in terms of program and bodily engagement, the whole site becomes flexible. Flexibility is also fed by the playful and process-focused approach to architecture and urban design to extend the rigid or exclusionary nature of education and campuses (Kafka, 2018). Thus, it can be said that the whole site is an open-system in a nested manner. It is an urban intervention which composes

an open schedule with the city, and it is an architectural example of flexible, modular, and ever-evolving structures which exemplifies a living-structure. In other words, Floating University Berlin might be considered as an urban-architectural case of ever-evolving, temporary, flexible, and resilient design approaches.

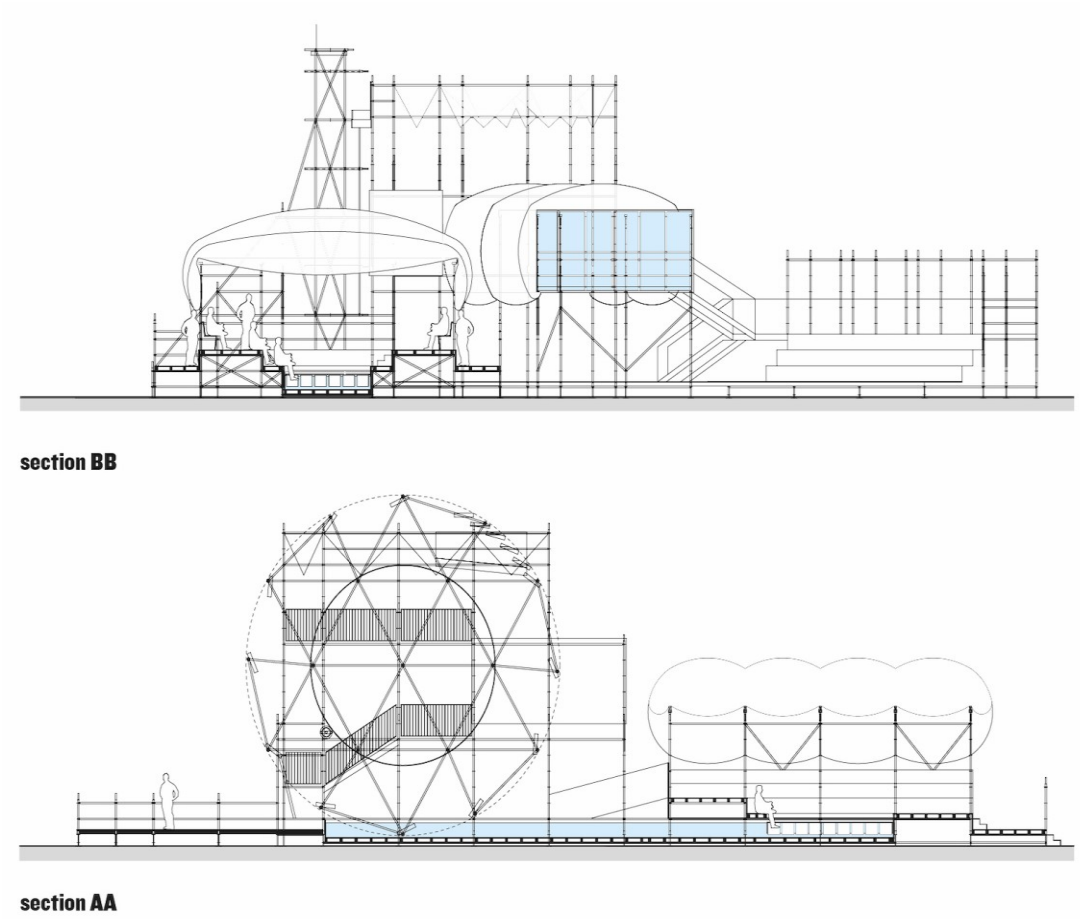



**Figure 3.14.** Section views of Floating University Berlin showing the modular and scaffolding structure. (Source: The Architectural Review, 2022)



**Figure 3.15.** Floating University Berlin's view when the rainwater basin is full. Copyright by 2019 Raumlabor



**Figure 3.16.** Floating University Berlin's construction process showing the emancipation and solidarity among the civic, and evolving structure. Copyright by 2019 Raumlabor




**Figure 3.17.** Floating University Berlin, Poster for the Introduction, An Offshore Campus for Cities in Transformation, 2018. Copyright by 2018 Raumlabor



**Figure 3.18.** Water filtration system of Floating University Berlin. (Source: katherineball.com, n.d.)

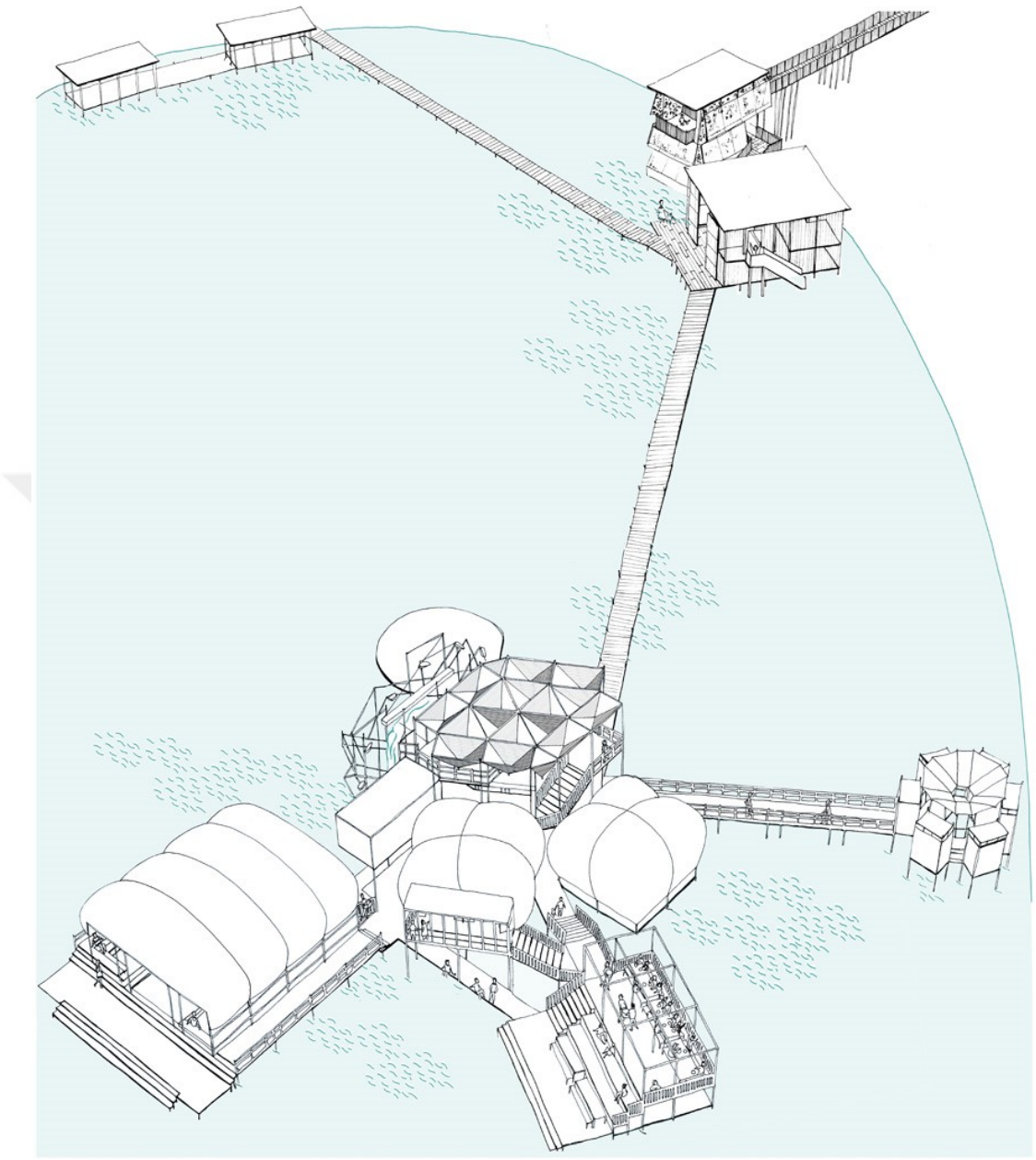


**Figure 3.19.** Floating University Perspective view, schematic drawing. Copyright by 2018 Jeanne Astrup-Chauvaux. (Source: Raumlaborberlin, 2018)

### 3.4. Exhibitions Raising Awareness About Resilience

Exhibitions are different than resilience guidelines and projects since they mostly tell a story in an outstanding way to raise awareness. The projects exhibited in the display environments can be more intriguing and extend the status-quo understanding. Besides that, they might turn into a learning environment for the citizens. That is why in this part, exhibitions related to uncertainty, rupture and resilience are figured out.

#### 3.4.1. Rising Currents at MoMa

An example for developing and understanding resilience might be an exhibition called ‘’Rising Currents’’ at MoMa in 2010 in the New York city. The exhibition is held by MoMa and PS 1 Contemporary Art Centre. There are five different projects being displayed throughout the exhibition and each of them develop a scenario, tactic, or strategy for the inevitable truth that New York Harbour will drastically change in the near future because of the environmental disasters. Rising Currents: Projects for New York’s Waterfront was organised by Barry Bergdoll who is the Philip Johnson Chief Curator of Architecture and Design at MoMa (MoMa, 2010). Bergdoll divided the harbour into five different pieces in accordance with their characteristics to split the area into manageable parts (Cilento, 2010). Bergdoll also put emphasis on the idea of not producing mater plans, but instead considering the sites as the test environments in which the teams can experiment (Cilento, 2010). Besides that, another essential point that the teams were supposed to consider is perceiving the climate change as a potential for the future development of the cities instead of a problem. Thus, it can be said that the curators of the exhibition see Rising Currents as a bold experiment (MoMa, 2010).




**Figure 3.20.** Five different zones in the New York Harbour. Copyright by 2010 MoMa

Bergdoll interprets Rising Currents as an activist exhibition by saying

> “With "Rising Currents" I set out to exploit the role of images as catalysts for a debate and for a culture in which the design professions recapture a place at the table of the most important national debates about everything from land use to infrastructure. "Rising Currents" was a very particular experiment to demonstrate that the design professions - planners, architects, landscape designers, engineers - need to be part of the ongoing experimental research and, more importantly, that visualization is fundamental to reacting to climate change even as we collate existing and future research from climate scientists.” (Bergdoll, 2010, p. 162)

Thus, it might be better to consider the projects displayed in the exhibition as a part of an activist experiment which tries to deal with one of the ruptures under the title of climate change rather than reading them as mere master-plans. However, even though the projects are part of an experiment, they are still dealing with real issues. Bergdoll also put emphasis on that issue by saying "Your mission is to come up with images that are so compelling they can't be forgotten and so realistic that they can't be dismissed" (as cited in Cilento, 2010, n.p.).

In the Zone 0, A New Urban Ground by Adam Yarinsky, Stephen Cassell, and Susannah Drake attempted to transform what is perhaps one of the most recognizable landscapes in the harbour. They investigated creating a fresh soft and hard infrastructure solution with Bergdoll as their mentor. The streets of downtown Manhattan are covered with a mesh made of cast concrete, artificial soil, and salt-tolerant vegetation. As a result, greenways are created that absorb rainfall like sponges. With the help of three interconnected high-performance systems (a network of parks, wetlands, and tidal salt marshes), the porous green streets address daily tidal flows and storm surges. These devices prevent sewage overflow, prevent rising sea levels, and lessen storm surges (Cilento, 2010). Those infrastructure-like interventions are functioning like the components of a system rather than a holistic master-plan. That is why they can be easily adapted by the other places as well. New Urban Ground extends the idea of texture further in a comprehensive way by focusing on the coastline and urban streets (MoMa, 2010). The texture is composed of transformed wetlands, and the coast which is a natural complex infrastructure to filter the tidal change and street runoff caused by storms. Also, the streets are greened with the help of surfacing that is made up of absorptive and open-mesh concrete tiles together with a layered filtering system (MoMa, 2010).



**Figure 3.21.** New Urban Ground perspective view. Copyright by 2010 MoMa

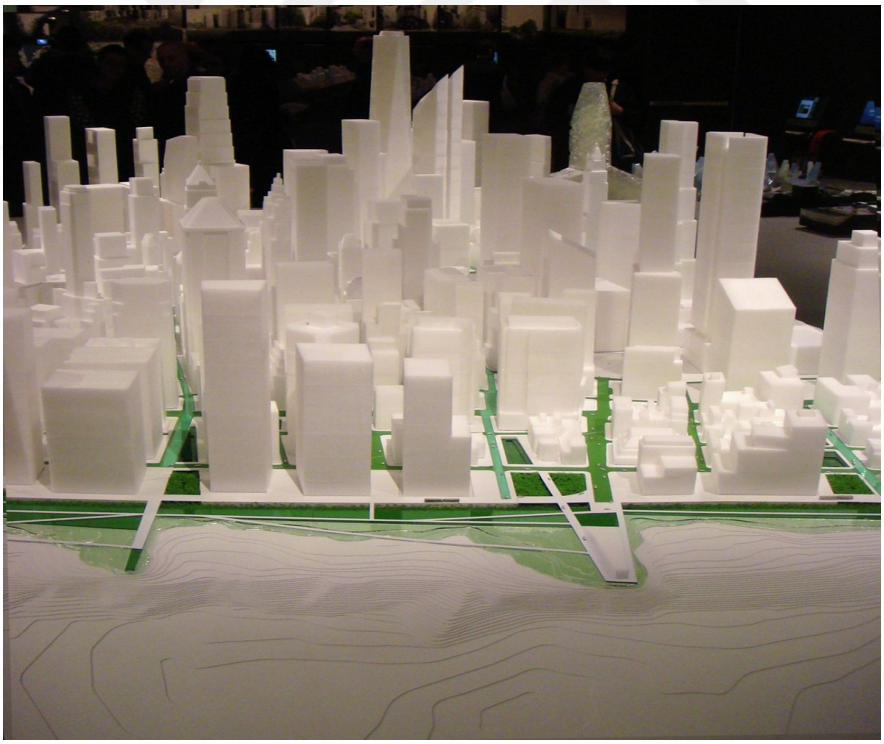


**Figure 3.22.** New Urban Ground model at MoMa Exhibiton. Copyright by 2010 MoMa

In the Zone 1, Water Proving Ground by Paul Lewis, Marc Tsurumaki and David J. Lewis decided to focus on sea level rise since the site will eventually be submerged if it is left alone. The project establishes a landscape characterized by water in order to save the site, which is home to Liberty State Park, Ellis Island, and the Statue of Liberty, from vanishing. The existing landfill has been shaped into four "fingers" that reach into the harbour to soften the site's rough edge. Future applications have a wide range of options because of the extended shoreline. The program that is spread over the fingers uses both land and water to accomplish a dual goal. As a result, the concept creates a hybrid landscape that connects the land and the ocean (Cilento, 2010). This site is characterized by being lost if no intervention is made. The team stepped back in time to reimagine the harbour as an in between space of land and sea with the help of blurred lines (MoMa, 2010). Then they focused on the landfills by cutting it into varied topography where the fingers lengthen through the coast. The lengthen manyfold of the coastline works as a natural filter system for the tides. The new topography also includes different programs that can serve to the urban life such as leisure, recreation, aquaculture, and commerce (MoMa, 2010).

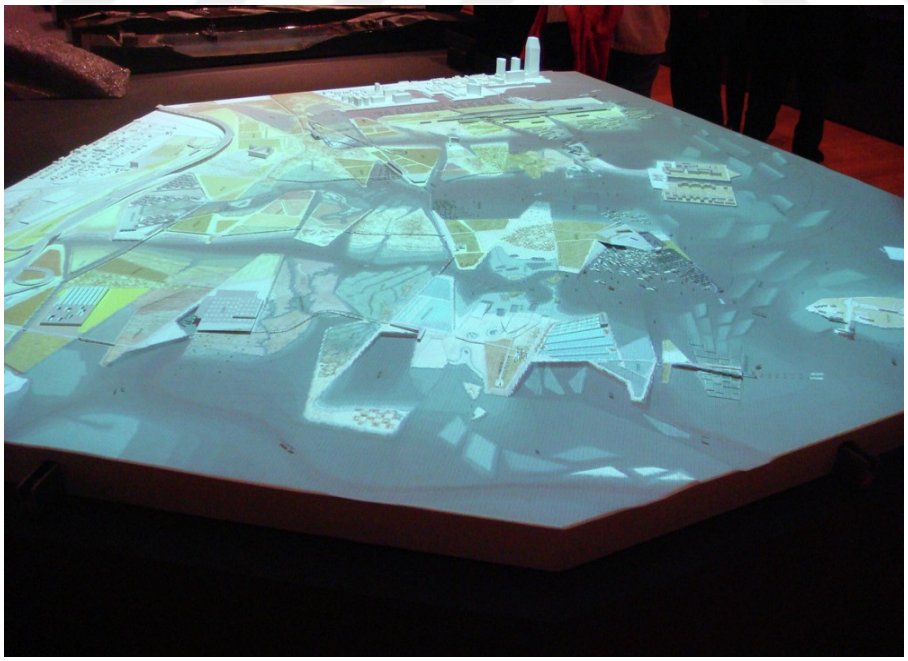


**Figure 3.23.** Model of the Water Proving Ground at MoMa Exhibition. Copyright by 2010 MoMa



**Figure 3.24.** Model of the Water Proving Ground at MoMa Exhibition. Copyright by 2010 MoMa

In the Zone 2, Working Waterline by Matthew Baird and Bayonne gives emphasis on the 600 oil tanks that are being used in the project to produce biofuel from algae fed by wastewater. Some parts are protected by a sinewy land barrier, while others are accessible to both cars and humans through an elevated roadway. The jacks, a modular design composed of used glass, are the focal point of reef-building units. The research also considers the proposal from an economic perspective, asking how the opening of Arctic shipping lanes would alter New York's role in global shipping (Cilento, 2010). In other words, the team uses recycled-glass jacks which are distributed in shallow areas of the water to rarefy the waves. This proposal is particularly focuses on the cases during the storms to protect the area from flooding.

"The berm and these aquatic reefs create new recreational opportunities but do not entirely transform the site's industrial character: the oil tanks are converted into a biofuel facility, and World War II-era piers and warehouses support a recycling operation. With the melting of ice in the Arctic, shipping routes have been opened in the last few years that will undoubtedly reshape the maritime economy of the New York/New Jersey harbour; the team's proposal envisions new natural and economic ecologies for the region." (MoMa, 2010, p. 21)

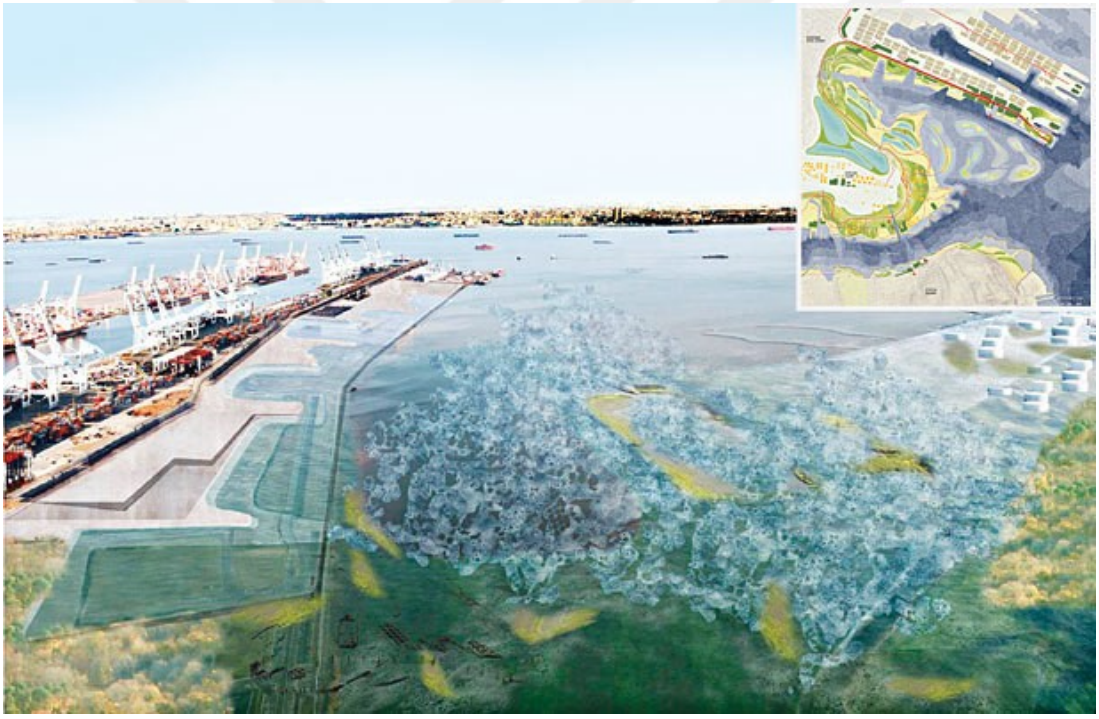


**Figure 3.25.** Working Waterline's Site Perspective and Plan. Copyright by MoMa 2010



**Figure 3.26.** Working Waterline's site models. Copyright by 2010 Mathew Baird Architects and MoMa




**Figure 3.27.** Working Waterline's site models at the Rising Currents Exhibition at MoMa. Copyright by 2010 Mathew Baird Architects and MoMa



**Figure 3.28.** Model of the Recycled Glass Jacks at MoMa Exhibition. Copyright by 2010 Mathew Baird Architects and MoMa

In the Zone 3, New Aqueous City by Eric Bunge and Mimi Hoang gives attention to The Staten Island coastline which is bordered by an archipelago of artificial islands. These islands will be programmed with specialized functionalities to support the anticipated population surge in addition to filtering storm waves. The team want to build a location that is not Manhattan but still has its own identity. The plan includes various routes for ferry services powered by biogas that will transport passengers to piers that extend from the beaches and resemble floating barges. The group came up with a fresh housing concept that turns the home on its side so the floors are farther from the sea. Several inflatable storm barriers, that can be deployed in under an hour and will only be inflated, when necessary, connect the islands (Cilento, 2010). In

other words, the network of artificial islands will work as nodal points in a connected system of inflatable barriers that will be able to lessen the impact of storm surges (MoMa, 2010). That can be considered as a form of urbanism where the city is able to extend through the water and the water penetrates to the city. In this scenario, an ever-growing population is accommodated by those new aqueous neighbourhoods in which suspended houses, wave attenuating piers, and biogas ferries will be functioning (MoMa, 2010).



**Figure 3.29.** New Aqueous City image showing the Installation. Copyright by 2010 MoMa

In the Zone 4, Oyster-Tecture by Kate Orff and scape focuses on oyster reefs as already mentioned in a detailed way throughout this chapter, the team proposed a project focusing on the ongoing restoration of a once-thriving oyster reef. This endeavour is not technology-driven, according to Ms. Orff. It is not supported by a multi-million-dollar budget. It should be a practical solution that can be implemented in the very, very near future. The oyster reef is made of woven "fuzzy rope" nets that encourage oyster development. Millions of gallons of harbour water will be cleaned by the reef, and the reef will also safeguard the nearby shoreline by attenuating the seas. The network of oyster nurseries, dubbed "Oyster-tecture," along with the underwater rope scaffolding for reefs, would create a new public landscape for the New York Harbour and make it possible for a new, more environmentally friendly Gowanus neighbourhood to emerge in the inland zone (Cilento, 2010).

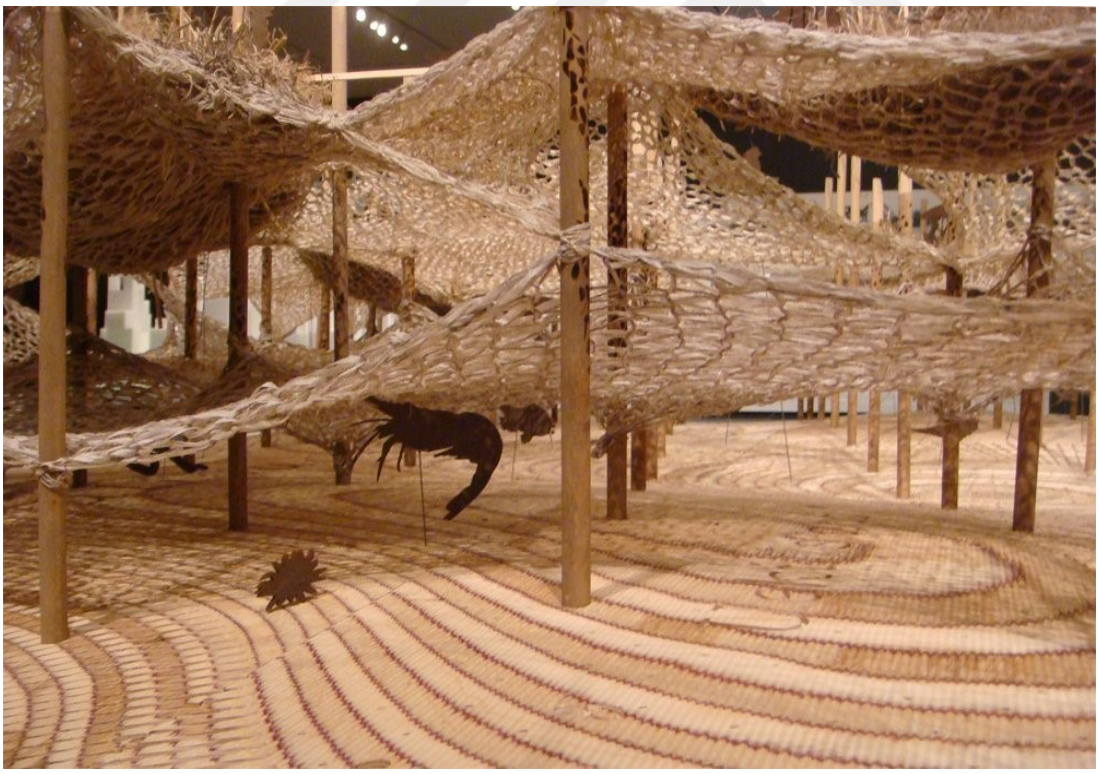


**Figure 3.30.** Model of the Ropes at MoMa exhibition. Copyright by 2010 Kate Orff, Scape

To conclude, Rising Currents exhibition brought a collection of different experimental ideas into the surface. Those ideas are both imaginative and realistic at the same time and they force the people to think upon uncertainty scenarios caused by the environmental events and ruptures. That is why all five zones, their characteristics and the proposal developed for them enlighten different approaches in a resilient way. What strategies can cities use to deal with the dangers, pressures, and opportunities posed by global warming, resource scarcity, and the pace of development (ruptures), and what tools do we need to live and work successfully in the future while conserving resources? (Raumlabor, n.d.) These are the questions that we should ask by designing with resiliency.

### 3.4.2. Venice Biennale

Venice Biennale is one of the exhibition platforms that provide basis for the telling projects within a certain topic. Resilience is one of the topics that has been discussed and reflected through different mediums in Venice Biennale as well. During the 17$^{th}$ International Architecture Exhibition at Venice Biennale, a project called **Resilient Communities** designed by the Italian team focuses on the resilience of the communities. The Italian Pavilion was curated by Alessandro Melis, and he focused on issues that are put forth in a way that will appeal to young people and raise their level of awareness, and to do so the pavilion's design incorporates components and visuals that call to mind graphic novels' forms and gaming in tones that are inspired by cyberpunk to take visitors on a quest for solutions to the enormous problems that face architecture and people (Bifulco, n.d.). While the exhibition clearly presents mechanisms of resilience for communities and reinterprets the relationship between urban space and productive territory, it does not seek simplification but rather acknowledges the complexity surrounding us and the possibility that it may be the key to resilient communities (Bifulco, n.d.). The team aims to underline the important role of architecture in transforming the society into a more resilient one

and claims that the project evokes a radical thinking through the urban and transforms the community into a resilient system (Communita Resilienti, 2021). One of the ways of transforming the society is showing the transformation of the pavilion. The former project was created by Farronato for the Art Biennale in 2019, and the Resilient Communities project initially takes its shape through addition and subtraction of Farronato's project. The waste materials produced during the projects were reused and gain a second life-cycle there showing it in a resilience approach.

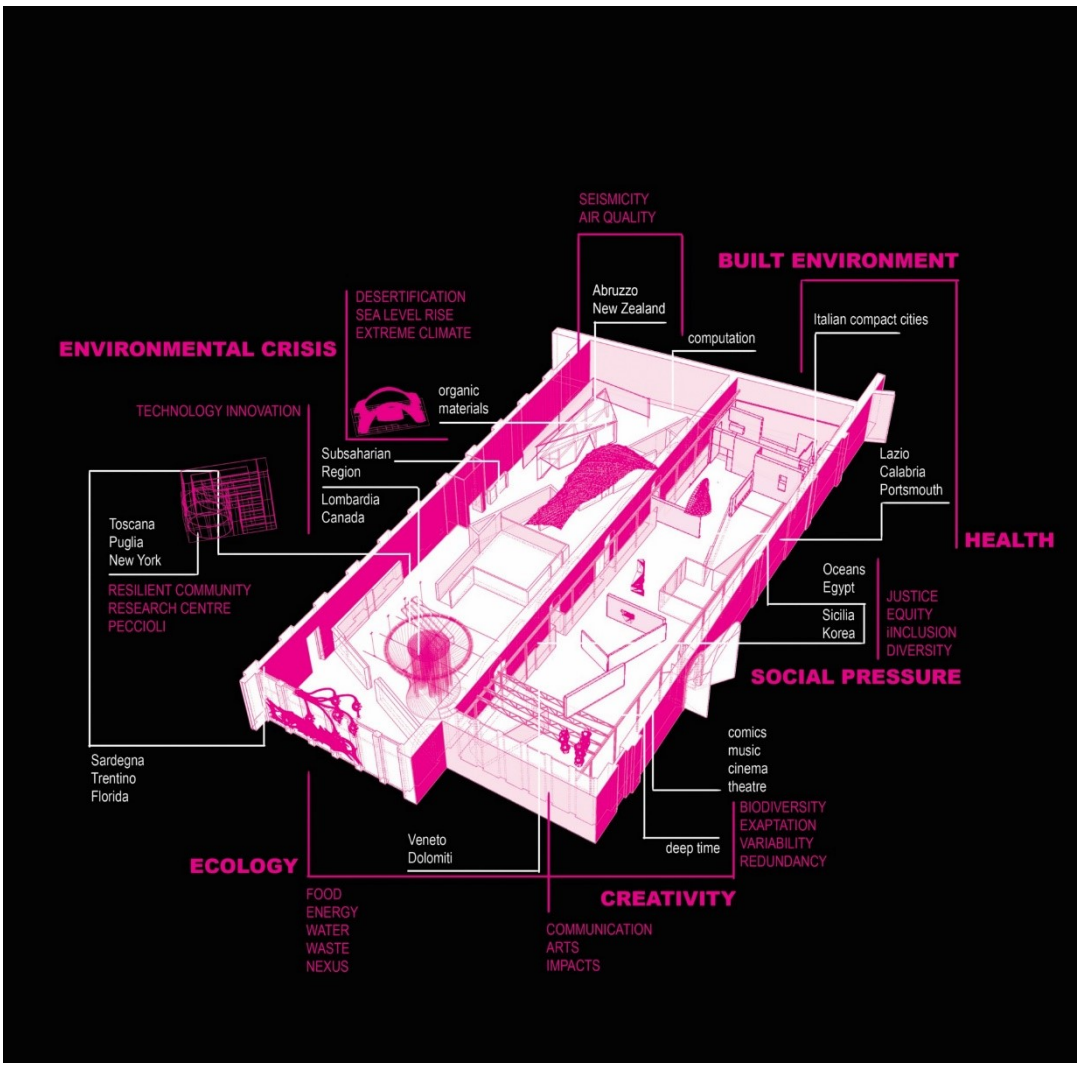



**Figure 3.31.** Schematic Drawing of the Italian Pavilion, Resilient Communities. (Source: Flownature Architecture Surfaces n.d.), Copyright by 2021 Italian Pavilion Venice Biennale

One of the aims of the on-going project at the 17th Venice Biennale is exploring the potential of transforming and adapting the Italian communities in front of the current global disruptions (Cutieru, 2021). Besides the community resilience, the pavilion searches for the role of architecture in transforming the built-environment into more adaptive one to respond the several difficulties especially related to climate change. Thus, what can be derived from that is the exhibition has two themes that complement each other, and these are investigating the Italian community and urban resiliency, and figuring out the future visions (Cutieru, 2021).

The idea and vision of the project was materialized by series of sections showing the interplay between the elements which are also part of several design and research agendas. The Italian Pavilion will function as a resilient community in and of itself, alongside fourteen sub-communities that operate as workshops, research centres, or case studies in alignment with two key tenets, which are a reflection on art in the field of urban resilience in Italy and the rest of the world through the display of works by renowned Italian architects, and a focus on methodologies, innovation, and research with interdisciplinary experiments that bridge the gap between arc and arctic (Melis, 2021, as cited in Cutieru, 2021). Thus, the pavilion is a showcase of a resilient community by itself with the help of art and architecture to investigate and reflect the ability of the Italian communities' adaptive capacity in the face of current environmental and social ruptures.

One of the topics that the pavilion puts emphasis on is the badly affected agricultural system in Italy. If the community is resilient enough, the people should operate accordingly. That is why the project also questions the ways of operations in which the new types of interaction in between the urban and productive spaces will take an important role (Design City, n.d.). According to The Plan (2021), the Italian pavilion's true objective is to encourage visitors to consider community resilience processes which are important for developing a new mode of interaction taking place between the urban and industrial environments that are fuelled by flexibility which is crucial in times of inevitable change.

Moreover, the pavilion might be considered as a jungle in which various strange things are occupying the space far away the deterministic homogenous art aesthetic. That is why there are several sections occupied by different artists and architects.

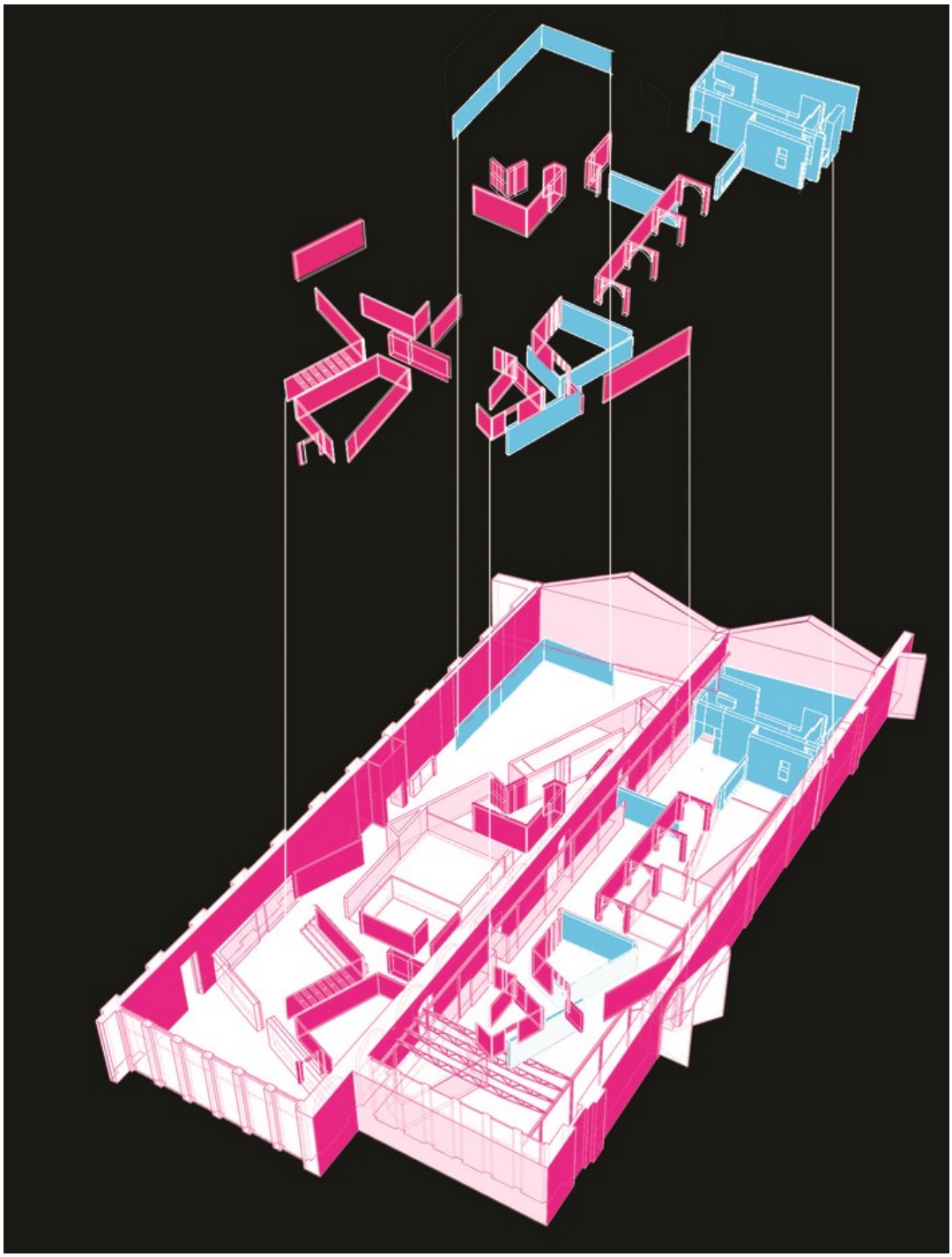


**Figure 3.32.** Schematic Drawing of the Italian Pavilion showing the display environment. (Source: ArchDaily, 2021). Copyright by 2021 Alessandro Melis

Another example of the resilience theme in the Venice Biennale is Irish Pavilion called **In Search of Hy-Brasil** which is thought as learning resilience by exploring the remote islands in 2023. The primary aim in the exhibition is showing of the integral role of architecture to built up resilient communities (Nair, 2023). The curators of the exhibition are five different architects whose names are Joseph Mackey, Peter Carroll, Elizabeth Hatz, Peter Cody, and Mary Laheen (Nair, 2023).

In Search of Hy-Brasil is an exhibition that looks at Ireland's isolated islands and renewable resources while also examining the variety of cultures, groups of people, and experiences that exist there in a self-organising and self-sufficient way (WA Contents, 2023). Thus, the self-sufficiency among the groups of people in the remote islands may give a better understanding to the resilient communities. With the help of the experience there, the interrelations between the social accumulation and the landscape which is both cultural and ecological will be carried out to the surface. All these make the islands self-sufficient and resilient, but also the renewable energy, biodiversity of the life, and the resilient food production adds other qualities to the sufficiency methods in the islands (WA Contents, 2023). The dense interaction between the culture and nature is an example of the socio-ecological systems. Berkes and Ross (2013) also underline this by defining the elements of resilient communities in the socio-ecological systems, and some of the elements are having social networks and communications, collaboration, social support, and a sense of belonging. That is why the cultural inclusiveness in the natural systems just like in the case of Irish Pavilion may help to increase the ability to have these elements which are vital to build resilient communities.

The show, which strives to raise an understanding of how the islanders utilize their resources and maintain the intricate balance between culture and environment, is accompanied by various sets of drawings, models, films, sounds, texts, and language as different mediums (WA Contents, 2023). Besides that, the exhibition utilizes the use of local materials to foreground the traditional and natural heritage of the islands and people. For instance, sheep’s wool, and sea sacks made up of fish ropes are some examples from the exhibition’s material selection (WA Contents, 2023). The

emphasis on the use of local materials, bringing forth the cultural assets, and natural ecologies is aiming to alter the perspectives of the current world order, and the preferred lives of people who almost lost the identity, community soul and self-organization skills, and remind the socio-ecological ways of existing is possible. The era of unending global growth, extraction, and exploitation needs to be over because the overwhelming weight of the data demonstrates that this strategy is incompatible with both the demands of the planet's life, environment, and our daily needs (Florian, 2023). That is why the team selected showing up the link between the human and nature which is drastically and originally intrinsic in Irland's culture. Myth, language, and the environment are inextricably interwoven in Ireland, so the profound resonances between humans and the natural environment are still being preserved in even the Irish language (Florian, 2023).

The curatorial team of Joseph Mackey, Peter Carroll, Elizabeth Hatz, Peter Cody, and Mary Laheen (2023) underlines that the future of the islanders is uncertain due to climate change, the need for renewable energy, moral and sustainable food production, and the need to preserve biodiversity to restore the lost balance between humanity and nature, so by adapting, the islands' resilience in the face of hardship and breakthroughs during scarcity may provide communities the skills and stories that are needed to encourage more resilient ways of life. Thus, it can be said that the needed community resilience in the face of uncertainty and rupture is one of the drivers of the exhibit.

> "In Search of Hy-Brasil derives from an intense engagement with the islands of Ireland and is a direct provocation to all of us to reimagine the vast combined territory of land and ocean we call our home. Geographically remote and mainly peripheral to contemporary discourse, our islands are by necessity robust, resilient, and inventive places." (Joseph Mackey, Peter Carroll, Elizabeth Hatz, Peter Cody, and Mary Laheen, 2023, n.p.)



**Figure 3.33.** Remote Island's model out of sheep wool and the other mediums showing maps, films and cultural items. (Source: Archilovers, 2023). Copyright by 2023 Andrea Avezzù



**Figure 3.34.** Sceilg Mhicil Monastery's ceramic model showing the interaction between the human artifacts and nature. (Source: Archilovers, 2023). Copyright by 2023 Andrea Avezzù

To conclude, such exhibitions are essential to raise awareness among the society. The striking models, images, projects, and other mediums can much easily take attention rather than the mere explanations of what resilience is, why it is needed, and the fact that we must live with uncertainty and rupture. Most of the projects exhibited in the international events like Venice Biennale and MoMa have a chance to be heard worldwide and get recognition by the public. Community resilience is as vital as the systemic resilience. That is why these exhibitions not only have an ability to attract but also train the people in some way. The engagement with the concept of resilience through such outstanding exhibits may help to tell a story for the people who are not the experts in the field, and can get necessary attention from them to build up a resilient community in the face of uncertainty. In other words, such kind of exhibitions are the places for experiencing and learning through it. This may create more durable effect on people's minds. To sum up, this study interprets such exhibitions as the places of both bodily engagement which is crucial for experiencing, and learning, and widening the perspective via alternative approaches. That is why such events can be evaluated as being more able to spread among the people unlike the written scripts, reports, and guides.

### 3.5. Evaluation

In the chapter 2 and chapter 3, it is comprehended that resilience approach might have various forms within different contexts and requirements. Observing rupture and resilience as both theoretical and spatial matters brought the need for understanding the context of required resilience. Chapter 2 unveiled that uncertainty, which unavoidably arises in constantly changing, complex systems, is what causes rupture. This research refers to it as a disposition to rupture because of this. The effect region, magnitude, and time period of the nested phrase "rupture" might vary depending on the situation. Due to this, a systemic mechanism should be able to create an approach in the urban environment for the uncontrollable, unpredictable rupture events. Resilience thinking, which gives different techniques that are

bouncing-back, adapting, and transforming to the system in the face of uncertainty and rupture, is one of the appropriate approaches as a coping mechanism. As a result, the chapter 2 examined the relation between rupture, uncertainty, and resilience. It is eventually derived that resilience is a required approach for the fact that there will be uncertainty and finally rupture in the urban space. Besides these, chapter 3 aimed to bring forth the spatial relations between resilience and rupture. Three different mediums which are resilience strategy guidelines, urban projects that have resilience approach, and finally the exhibitions that raise awareness about resilience were discussed. In the case of resilience strategy guidelines, the context is the city and the method is more generic with some site-specific and local urban interventions in relation with the context. In the case of urban projects, the context is a site in the urban space that can be both larger and smaller by means of scale. Thus, the resilience approaches in the projects were more site-specific in comparison to the resilience strategy guidelines. In the case of exhibitions, the idea of resilience was brought forth in a bolder way as an alternative thinking. However, each of the mediums has their own specific qualities and methods to approach the problem in accordance with the context and rupture case. Some of the methods are able to generate alternative approaches for the possible future scenarios in the face of uncertainty while some of the methods are more generic and deterministic to the problem. According to Hallding (2014), designing urban futures will not be possible with conventional approaches alone, given the difficulties and uncertainties the globe is currently confronting. Accepting the fact that there will be uncertain cases in the urban space, Sennett and Sendra (2020) acknowledges the need for flexible and dissimilar approaches. That is why the theoretical discussion in the chapter 2 and the spatial matters in the chapter 3 should be considered together with an alternative method to envision the future problems and create novel approaches besides the conventional ones to adapt the difficulties of uncertainty. In the following chapter, scenario thinking and scenario matrix method will be discussed to offer an alternative yet structured method for envisioning the future scenarios for resiliency in the face of rupture and uncertainty.

# CHAPTER 4

# DEVELOPING RESILIENCY SCENARIOS TO COPE-UP WITH UNCERTAINTY AND RUPTURE VIA SCENARIO MATRIX METHOD

Resilience scenarios are generated in this chapter by being titled as developing resiliency scenarios to cope-up with uncertainty and rupture via scenario matrix method. This is done by looking at various ways, including the contextual approach, normative approach, metabolic approach, and spatial approach. The best and most popular lenses for creating resilience scenarios are contextual and metabolic methods. As a result, this chapter primarily focuses on them and offers the resilience scenarios in the setting of Gölbaşı Düzlüğü, Ankara by using the scenario matrix approach in the face of uncertainty and rupture.

As Hallding puts emphasis on

> "Given the challenges and uncertainties the world is facing, traditional 'grand visions' will no longer be enough when designing urban futures. Scenario thinking as a structured tool for expanding the range of possible outcomes and zooming in on those uncertainties that will be defining for the urban entity underpins the Resources approach." (Halding, 2014, p. 48)

Thus, scenario thinking is a way to cope up with uncertainties and scenario matrix method is expanding the structured tool for designing the urban features in a resilient way.

## 4.1. Methods for Scenarios in Urban Planning

Scenario-based approach gains motivation from the future uncertainties. Indeed, scenario thinking offers an alternative in the narration of the city rather than imposing a fixed understanding. These scenarios propose a set of future narrations

which are shaped by a group of drivers (Hallding, 2014). The vital thing here is to comprehend the nature of process rather than the final image. Scenario framework can be understood as representations of alternative logics and patterns. The challenging nature of the scenarios enlarges the possible narrations in a given context. “A good scenarios framework should be challenging in the sense of being able to offer new perspectives” (Hallding, 2014, p. 51).

The need for the alternative thinking is caused by the political, economic, and ecological systems of the globe that are under rising pressure in a world of increased uncertainty which is opposing with the traditional approaches which are dealing with the observable challenges (Hallding, 2014). Creating scenarios is a tried-and-true method for dealing with uncertainties in the world that is changing so quickly nowadays (DHL, 2012, as cited in Sardesai, Stute, Kamphues, 2021). Therefore, the ideal strategy for cities would be to evaluate the variety of viable strategies to deal with and create resilience for, a future of increasing uncertainty. That underlines the need for flexibility in strategies which increases the opportunities while decreasing the rupture. Scenarios allow us to expand our thoughts in several, as opposed to just one, directions toward the unknown, and this goes against the conventional urban imagination and architectural thought (Palmer, 2014). Multiple scenarios allow variety in direction, results, and approaches. As a projection of potential future events, several scenarios must be taken into account (Fornasiero, Sardesai, Barros, Matopoulos, 2021). According to Hallding (2014) a scenarios method that examined the issues of a certain metropolitan area, which is facing in light of a wide range of unique driving variables, has had an impact on the diverse urban futures. For example, some of them have been genuine threats that were beyond the city's control, some of them are happening due to internal drivers. All these variables create a future that is hard to foresee fully. All these sources of uncertainty nevertheless indicate a dynamic environment with risks and chances for urban development. That is why this approach not only focuses on the risks caused by uncertainties but also derives opportunities out of the challenges. Thus, scenario matrix is a structured tool that

widens the possible outcomes while focusing on uncertainties having impact on the urban areas (Hallding, 2014).

Besides all these, one of the essential questions what the scenario is. Scenario is according to Hallding (2014) a way of storytelling about the future that widens the perspective beyond the conventional approaches and helps to develop possible future strategies in the face of uncertainty. The challenging part here is not knowing when, where and how a future shock will happen. That is why scenario focuses on multiple possible outcomes in the future. Scenarios are also useful to analyse and exchange between the possible, alternative complex socio-ecological interactions (Hallding, 2014).

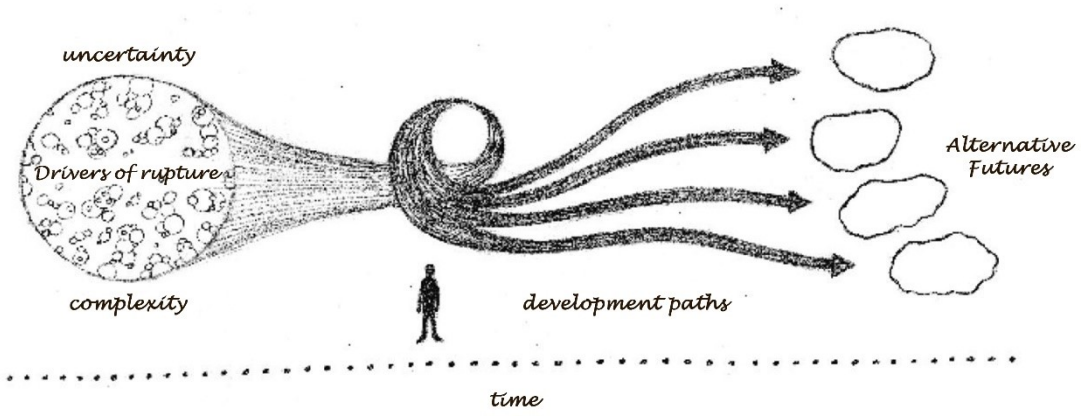



**Figure 4.1.** Scenario Thinking. By using scenario thinking, one may create order out of complexity and offer a variety of potential outcomes and viewpoints since it is not a linear and one way approach. Edited by the author. (Source: Hallding, 2014, *Access to Resources: An Urban Agenda*).

As Hallding (2014) states, to grasp the process' relevance to the issue, namely choosing the most beneficial routes to a healthy future, it is crucial to understand the nature of the process, including its techniques and assumptions. The nature of the process becomes as vital as the design itself. Because of giving voice to process which brings advantage to go beyond the final image, Sennett and Sendra (2020) perceives uncertainty as an opportunity rather than risk. In other words, it might be

seen as an open process with a room for uncertainty that encourages to expand beyond the known and certain (Sennett & Sendra, 2020). That is why scenario thinking encourages the orientation towards the process. Process and possible alternative futures can create more flexible approaches in front of the uncertainty and rupture which makes the system more resilient at the end. In other words, scenario thinking is a more intuitive approach yet a structured method. This makes it more focused on the working mechanism of the society and city. Moreover, the diversity in the scenario makes the method more inclusive and gives voice to intermediate possible futures (relatively smaller scale events) as well.

> "For each of the urban areas chosen the scenarios were designed to be realistic enough to be plausible, wide enough to be inclusive, yet also holistic enough to be logically consistent. The boundaries between them, while distinct, are also somewhat porous: they are closer to fences than walls, not sealed off or iron-clad in a way that would turn them into mere artifices." (Hallding, 2014, p.51)

The technique encourages the construction of multiple scenarios in order to be ready for a range of potential yet uncertain future events. It produces a collection of various scenarios, each of which asserts a different amount of likelihood. This technique offers several potential future directions while maintaining ambiguity as opposed to the fixed conclusions produced by conventional methods which enables an increase in variety from other approaches to future research, such as predictions and forecasts, in that it incorporates many combinations of future states, or 'scenarios' (Sardesai et al., 2021). Thus, scenario matrix is a tool for producing variety and alternative scenarios which is being examined as a compatible method in the face of uncertainties according to the scholars.

In short, scenario thinking widens the lenses of designing the future in the face of uncertainty and rupture by offering multiple outcomes at the same time.

In the following sub-chapters, four approaches of scenario thinking are being examined. These four different approaches are developed by Hallding as contextual approach, normative approach, metabolic approach, and spatial approach.

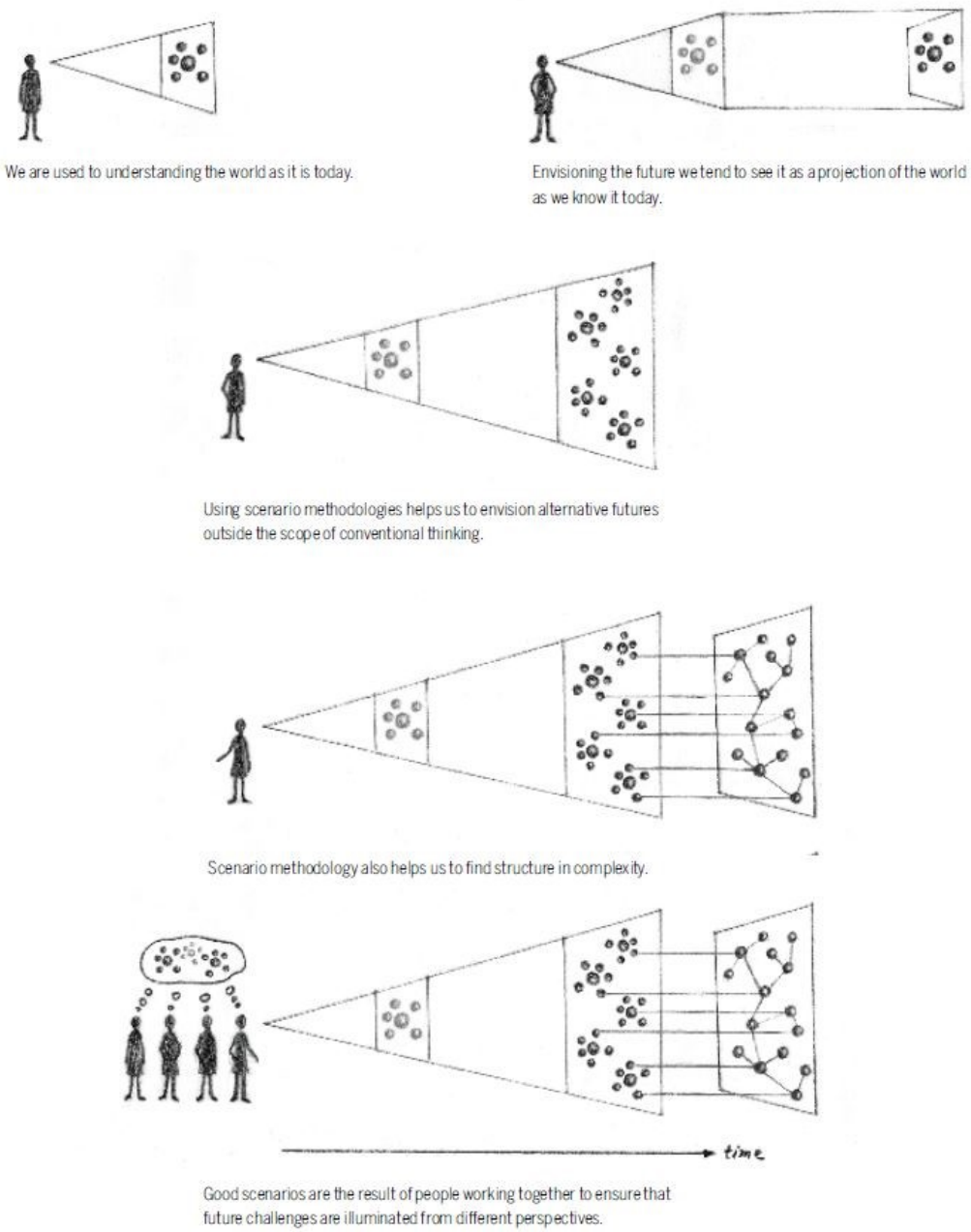



**Figure 4.2.** The reason for using scenarios to see further, deeper, wider and more inclusive futures. (Source: Hallding, 2014, *Access to Resources: An Urban Agenda*).

*Contextual Approach*

Contextual approach intends to understand external forces or drivers that are not included by the urban activities and not affected by the control mechanisms of the urban space directly (Hallding, 2014). Thus, contextual approach does not dive into the internal drivers of the city, but rather focuses on the conditions that develops beyond the control of city. Hallding (2014) considers the boundary conditions and the environment that the city is existing as the outline of the matrix. Thus, contextual drivers are more suitable to investigate robustness and resilience (Hallding, 2014). Examples of the contextual forces could be climate change, change in the economic structure, displacement of people, and technological shifts which are primarily listed as larger-scale examples of rupture within this study.

*Normative Approach*

Normative approach focuses on the alternative outstanding narrations to develop the ideal vision of the future. There are several examples of the normative approach developed in the history of urban design, such as village city, garden city, and plug-in city. According to Hallding (2014), normative approach is more suitable to design scenarios of back casts in which the alternative strategies can be explored.

*Metabolic Approach*

Metabolic lens could be considered as the opposition of contextual lens because the essential focus here is the internal drivers. The metabolic approach uses the metabolism as a metaphor to emphasize the flows of the components in the city which aims to understand the interactions between the human and environmental systems (Hallding, 2014). In that manner, the metabolic approach encompasses with the ecological thinking because both aim to figure out the complex interactions between the human and non-human systems. The scenario thinking through the

metabolic lens is related to the flow of things, such as material consumption, self-sufficiency, accessibility and so on (Hallding, 2014).

*Spatial Approach*

Spatial approach searches for the effects of spatial elements on the potentials and limitations for the future urban development (Hallding, 2014). That is why there is a need to know the physical attributes of the context including the location, geographical characteristics, existing structures, infrastructure, and so on (Hallding, 2014). Besides these, it also covers the overlapping spaces and the events.

In shorth, these four lenses propose a way to comprehend various drivers which are important to understand the future uncertainties, and act accordingly. It is also understood that for a more resilient approach the best lens is contextual approach since it offers robustness as a more suitable approach for designing the future and tries to deal with more external drivers such as environmental disasters. These four approaches provide a way to focus on various traits and factors that are critical to evaluating upcoming possibilities, dangers, and problems in the growth of an urban region, and luckily, they are not mutually exclusive, and a number of traits and drivers might exist altogether (Hallding, 2014).

## 4.2. Scenario Matrix Method

In the scenario's method, numerous variables, drivers, and traits that affect how an urban region develops, are examined, organized, and synthesized along two vertical dimensions which produce a cross shape with four different areas (Hallding, 2014). The approach is ideal for providing an in-depth examination of numerous, interrelated, and overlapping aspects of a possible future (Rhydderch, 2017). This is because the two dimensions were chosen to capture the most significant sources of uncertainty or rupture in the scenario space. In other words, each of the four areas of the scenario matrix represents the seeds and elements for a scenario narrative

(Hallding, 2014). The axes should be based on "high-impact, high-uncertainty" criteria to guarantee that the four spaces defined by their intersection have distinct parameters (Rhydderch, 2017). Scenario matrix method is useful to vary the outcomes and focus on the process rather than the end product. It is also a structured method, and because of that, there are steps that should be followed to produce a two-by-two scenario matrix.

**Table 4.1.** Steps of scenario matrix method

| | |
|---|---|
| **1st Step: Finding the Main Questions** | In order to have a point of arrival in the scenarios space, there should be a main question that initiates the development of the matrix. |
| **2nd Step: Defining the Boundaries** | The definition of the boundary may differ according to the case. It might be defined via time, geography, conceptual approach etc. |
| **3rd Step: Deciding the Impactful Drivers** | There are lots of variables and complexities that drive the space from inside and outside. The bottom-up (internal forces), and external forces should be decided and discussed. |
| | Each type of driver is distinct because while the growth of some is happening uncertainly, others are more likely to go in a certain manner. Again, some are likely to have major impacts on the urban future, but others may be perceived as having less of an impact. |

| | |
|---|---|
| **4th Step: Categorazing the Drivers** | Thus, drivers may be divided into "major drivers" that are highly impactful and have high certainty, and "critical uncertainties" that are highly impactful and have low certainty. Using "uncertainty" and "impact" as criteria can categorize the drivers (Hallding, 2014). |
| **5th Step: Constructing the Scenario Matrix** | In order to construct a scenario matrix, there should be two uncertainties running through two vertical dimensions. The essential thing here is to understand the process and the variety of the scenarios that can come up from the matrix. In the end, the most essential and critical combination of the scenarios can be selected for designing the uncertain future. |
| **6th Step: Scenario Narratives** | After establishing a two-by-two scenario matrix of uncertainty, there will be four different areas that have seeds of four various scenarios. The narration of the seeds will be formed by the combination of the two uncertainty dimensions on the matrix. From this point on, the development of the narration depends on the context and circumstances that need quantitative or qualitative approach. |

| | |
|---|---|
| **7th Step: Developing a Method for the Selected Analysis** | As mentioned above, the analysis could be either qualitative or quantitative. This study focuses on the narration itself via illustrating them rather than aiming the quantitative calculations. |
| **8th Step: Evaluating and Revising** | Scenario matrix is a craft and alternative approach rather than mathematics. That is why it produces scenarios that are base points for the process and possible futures in the face of uncertainty (Hallding, 2014). |

Thus, scenario matrix method is a structural approach that develops narratives for the possible future outcomes in the face of uncertainty. Besides being a structural approach, it also offers a generic approach that can be applied in many circumstances with the help of specified combinations of uncertainties that goes along two dimensions in the matrix. The drivers, circumstances, uncertainties, and finally the combinations of all these may differ, but the structural methodology of the scenario matrix approach is applicable for all. Moreover, the reason for being compatible with the uncertainties is scenario matrix method's ability to produce four different possible future outcomes rather than proposing one stagnant end-product. In the following part, there is an example of a generic scenario matrix, which is designed by Hallding in 2014, and it shows how the methodology is working.

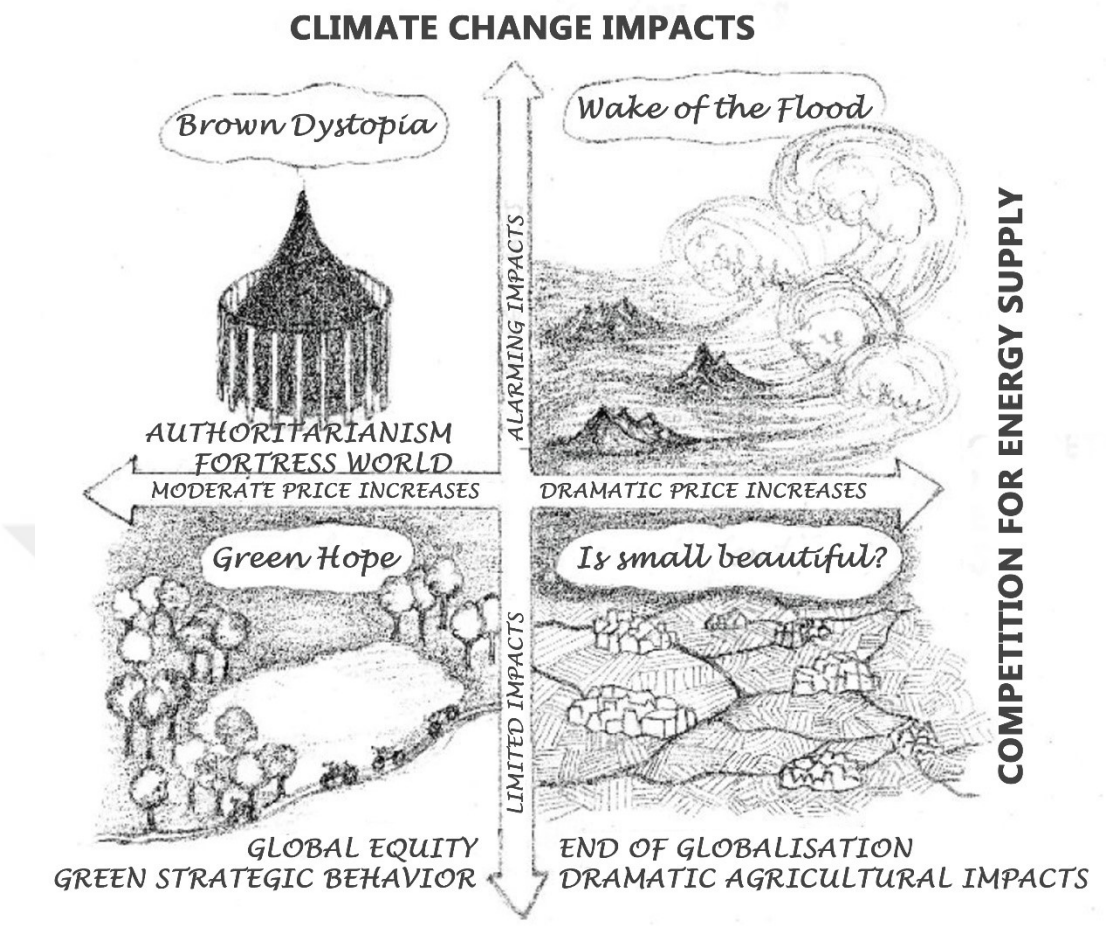



**Figure 4.3.** The working mechanism of scenario matrix with two vertical dimensions of uncertainty and the four areas of possible future narrations derived from the combinations of two intersecting dimensions. Edited by the author. (Source: Hallding, 2014, *Access to Resources: An Urban Agenda*).

**Table 4.2.** Elements of the scenario matrix example in Figure 4.3.

| | |
|---|---|
| **Meta Scenario** | Meta Scenario occurs at the intersection of energy securities and the climate change in the Figure 4.3. The illustration shows this real-life situation, and creates a generic scenario matrix in which four alternative scenarios occur eventually. The |

| | |
|---|---|
| | uncertainties here are the 'climate change' and 'energy supply' which goes along the two dimensions of the matrix. According to this meta-scenario, the growing uncertainties are related to the climate maintenance and energy supply which are the challenges of the urban. The meta-scenario does not try to estimate the quantitative results, but rather tries to span the possible outcomes in the forms of narrations. |
| **Green Hope** | The Green Hope is one of the scenarios emerged in the matrix. It exemplifies the intersection of limited climate impacts and moderate energy price increases. It embodies the naive optimism that permeates the majority of global climate and energy policies (Hallding, 2014). |
| **Brown Dystopia** | Brown Dystopia is one of the scenarios out of four, and it represents the intersection of alarming climate impacts and moderate energy price increases. This means that the climate impacts will be drastic and create pressure on cities. While the wealthy countries have the chance to cope up with the global inequities, the poor |

| | |
|---|---|
| | countries will not be able to do that which might mean that the authoritarian regimes may take the lead in such countries to cope up with the pressures (Hallding, 2014). Thus, different combinations create different possible narrations. |
| **Is Small Beautiful?** | Is small beautiful is another scenario emerging from the matrix. It is the result of the intersection of limited climate impacts and dramatic energy price increases. According to this scenario, the problem is the highly globalized world which causes the high energy prices (Hallding, 2014). Thus, the high increase in the prices would cause the serious impact on agriculture especially in the areas that are vulnerable and poor. |
| **Wake of the Flood** | Wake of the Flood is the last scenario narration occurred in the matrix, and it combines the uncertainties of alarming climate impacts and dramatic energy price increases. According to this scenario, there is the risk of the collapse in the energy systems and the people have a huge problem to cope up with the climatic events. The world depicted here is the most dystopic one in which almost everything is disconnected and |

| | |
|---|---|
| | the food supply, shelter supply, energy supply kind of things almost become extinct (Hallding, 2014). |

In short, what can be derived from the scenario matrix method, and the example of Figure 4.3. and Table 4.2. is that the cities are prone to have uncertainties which have either less or more impact on the urban. If two main and most impactful uncertainties are intersected as done in the scenario matrix method, there will be four possible outcomes highlighting the future scenarios for the cities. Each of the scenario has its own characteristics according to the intersection of the two uncertainty dimensions in the matrix and as a result each narration tells a different yet essential story in the form of a map of possible future trajectories rather than mere narrations. According to the example, the Wake of the Flood scenario portrays the complete collapse of the world while the Green Hope scenario is the one that most people would choose as it is the most habitable one, according to the scenario matrix (Hallding, 2014). The two scenarios in between show what may happen if only one of the two crucial uncertainty emerges. This might be helpful to foresee the possible outcomes caused by uncertainty or even rupture, and then to design accordingly by carving out a niche in the urban space via different tools such as resilience approach. That is why scenario matrix method can be seen as an intermediate way that bridges the uncertainty, rupture, and resilience in a structured way.

## 4.3. Scenario Matrix Method's Application in Gölbaşı Düzlüğü, Ankara

This study searches upon the case of Gölbaşı Düzlüğü, Ankara in order to find out the uncertainty dimensions in the scenario matrix and then to use scenario matrix method to create four different scenarios in the context in front of rupture. The selected area is chosen due to being an in between area which stays in the borders of a water basin that connects Eymir Lake to Mogan Lake.




**Figure 4.4.** Current aerial photograph of Eymir Lake, Mogan Lake and Gölbaşı Düzlüğü showing their locations. (Source: Google Earth, 2023)



**Figure 4.5.** Gölbaşı Düzlüğü. The water body above is Eymir, and the water canal goes through below is connected to Mogan. (Source: Yeşil Gazete, 2021)

Mogan and Eymir Lakes were formed almost 8000 years ago in the same basin which are alluvial set lakes in terms of formation, and the hydrological connection between the lakes is still alive today (ODTÜ, 1995; DSİ, 2007, as cited in Apaydın & Ocakoğlu, 2021). The hydrological connection is formed through Gölbaşı Düzlüğü naturally, and artificial canals today. The area is known as being a water basin that sometimes causes flood in the area in an uncertain way which might even cause rupture. It is known that during the heavy-rainfalls, the water level in Mogan Lake is increasing in a level that can create flood, which can pass out the alluvial set, and flows through Eymir Lake (ODTÜ, 1995; DSİ, 2007, as cited in Apaydın & Ocakoğlu, 2021). There are multiple flood records happened in the basin of Mogan and Eymir Lakes dating back to 70 years ago, and these years are 1951, 1957, 1969 2011, and 2012 (ODTÜ, 1995; DSİ, 2007, as cited in Apaydın & Ocakoğlu, 2021). What can be derived from these records is that within 70 years, the basin had five big flood events. Thus, Mogan and Eymir Lakes' basin has been exposed to multiple

historical flood events that make the basin an essential area needed to be protected against the risk of flood (Ministry of Environment and Urbanisation, 2020).

Besides these, the basin which includes Mogan and Eymir Lakes has wetland areas, and one of them is Gölbaşı Düzlüğü. Wetland areas are important to protect the biodiversity of the habitat since some of them are located in between the lakes, and some others feed the lakes (Ministry of Environment and Urbanisation, 2020). Gölbaşı Düzlüğü is one of the wetlands in the basin that is in between the lakes with the size of 35 hectare (TMMOB The Chamber of City Planners, 2020). 35 hectare is almost equal to the total size of 49 football ground which is a huge area indeed. One of the important features of this huge wetland area is that it feeds Eymir Lake and filtrate the discharge water coming from Mogan with the help of wetland plants (TMMOB The Chamber of City Planners, 2020). Because of these, the biodiversity of the area in terms of wetland formations is quite high (see in Figure 4.9.). Also, the waterfowls prefer to stay in the area seasonally to habit and feed themselves which makes the biodiversity of the area richer (see in Figure 4.9.) (TMMOB The Chamber of City Planners, 2020).

Gölbaşı Düzlüğü is also an area where floods occur and flood traps are located due to being in the same water basin with Mogan and Eymir Lakes (TMMOB The Chamber of City Planners, 2020). It is also reported that during the 1957 great flood of Ankara, these two lakes are connected and formed one bigger lake. According to the 2020 report of TMMOB The Chamber of City Planners in Ankara, the water basin area is not just limited with Mogan and Eymir Lakes and Gölbaşı Düzlüğü. The basin ecosystem offers integrity along the İncesu Valley and is complemented by the İmrahor Valley. It is necessary to perceive the Mogan and Eymir lakes in the whole ecosystem of the south and southeast Ankara region, starting from the İmrahor Valley system and extending to the Salt Lake. It is even emphasized that this system forked from Salt Lake and extended to Göksu and Sultan Marshes Wetlands. The valley where the lakes are located is even connected to the İmrahor Valley and Elmadağ Valleys system. Apart from the water regime, it is of great importance for the city of Ankara in terms of air pollution and climate stabilization such as providing

microclimate areas due to its air corridor characteristics (TMMOB The Chamber of City Planners, 2020).

This huge connected water basin area may explain why 1957 flood in Ankara affected the region of Mogan and Eymir Lakes even though the reason behind the flood was the melted mass of snow in Elmadağ. The connectedness between the basins creates a bigger water body in the area that is exposed to possible floods. What can be derived from all these statements that Gölbaşı Düzlüğü is not only under the possible flood risk due to the floods in Mogan and Eymir Lakes, but also the possible floods in the larger basin may affect it. The streams and valleys are shown in the Figure 4.6. This figure shows the connection between Eymir and Mogan Lakes which is mostly done by Gölbaşı Düzlüğü, and other streams that are parts of a larger ecosystem. Gölbaşı Düzlüğü has a role of discharging point between the two lakes that has a thickness of 10-15 m of alluvial layer which feeds Eymir Lake together with streams and creates a discharge point to Eymir from Mogan (Gölbaşı Özel Çevre Koruma Bölgesi Yönetim Planı, 2015-2019).

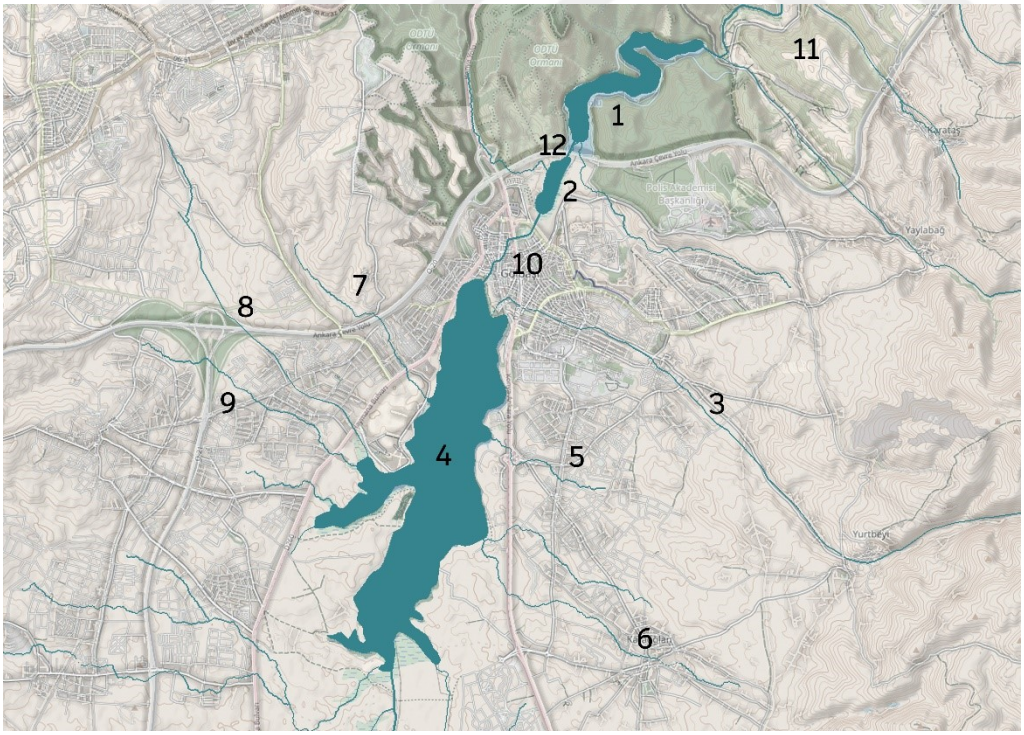



**Figure 4.6.** Map of the streams and valleys connected to Eymir and Mogan Basin. 1. Eymir Lake - 2. Gölbaşı Düzlüğü - 3. Sukesen Stream - 4. Mogan Lake - 5. Kepir

Stream - 6. İğdeli Stream - 7. Bağırsak Stream - 8. Gölcük Stream - 9. Tatlım Stream - 10. Canal between Mogan and Gölbaşı Düzlüğü- 11. Imrahor Valley - Mogan Stream. Author, 2023.

According to DSI data, due to heavy rains especially in the spring season, it is known that the lakes overflow and damage the environment. Because of the heavy rains on 17.02.1969, 5.7 m3 of water came to Mogan Lake in per second and the lake's water level increased about 4 m (Ministry of Environment and Urbanisation, 2020). This flood which is in Gölbaşı flooded the area and caused property damage. Also, during the flood, Eymir, the nearby area, and İncesu Valley experienced great destructions (Ministry of Environment and Urbanisation, 2020). As it can be understood from these reports, the basin can have multiple flood points like the flood of 1957 due to connectedness between the water bodies. After these events, the excessive water of Mogan Lake was started to be discharged to Eymir Lake via a canal and Gölbaşı Düzlüğü, and the excessive water of Eymir Lake was started to be discharged to Imrahor Valley with the help of water regulators (see in Figure 4.7) located at the end of the lakes by DSI (Ministry of Environment and Urbanisation, 2020).



**Figure 4.7.** The canal that discharges Mogan Lake Waters to Gölbaşı Düzlüğü and from there to Eymir Lake and Water Control Structure. (Source: Gölbaşı Special Environmental Protection Area Management Plan, 2015-2019).




**Figure 4.8.** 8th page of Zafer Newspaper showing the flood disaster happened in Ankara on 11th of September, 1957. (Source: Kaynar, 2017, Journal of Ankara Studies)

Moreover, there are several streams feeding the lakes. These streams mostly dry during the summer season while they gain a high flow rate during the spring season due to high rain-fall in the area (Ministry of Environment and Urbanisation, 2020).

Another water body formation in the area are wetlands. One of them is Çökek Wetland area located at the southern side of Mogan Lake with its huge size, and another one is Gölbaşı Düzlüğü located in between the lakes. These wetland areas are important to filtrate the discharge water between the lakes and habitat a range of species, especially bird species (see in Figure 4.8.) (Ministry of Environment and Urbanisation, 2020). Unfortunately, Gölbaşı Düzlüğü has partially been covered by construction materials and the area has been opened to construction and settlement which unnaturally harmed the wetland area (Ministry of Environment and Urbanisation, 2020). However, still the area has its primary function that provides an intermediary discharge area between the lakes, and Gölbaşı Düzlüğü still filtrates the water coming from Mogan and feeds Eymir, especially during the dry seasons (Ministry of Environment and Urbanisation, 2020). In the wetland areas, there is a great importance for conservation because there are many animal species, especially waterfowl besides being an ideal shelter and breeding area for them. Therefore, the constructions harm the ecological relations in the area. Thus, they must be protected against any possible interference. According to the Gölbaşı Special Environmental Protection Area Management Plan (2015-2019) (see in Figure 4.8.), Gölbaşı Düzlüğü is defined inside borders of Mogan and Eymir basin which is primarily located inside the borders of large urban green spaces of Ankara, and Gölbaşı düzlüğü is defined mostly as a wetland area that has the wildest reed fields in the area. Due to that, it becomes one of the most suitable places out of three different places for bird feeding, habiting, and protecting. Also, Gölbaşı Düzlüğü has an important role on protecting Eymir Lake’s existence as being one of the biggest feeding points of the Lake (Gölbaşı Special Environmental Protection Area Management Plan, 2015-2019).

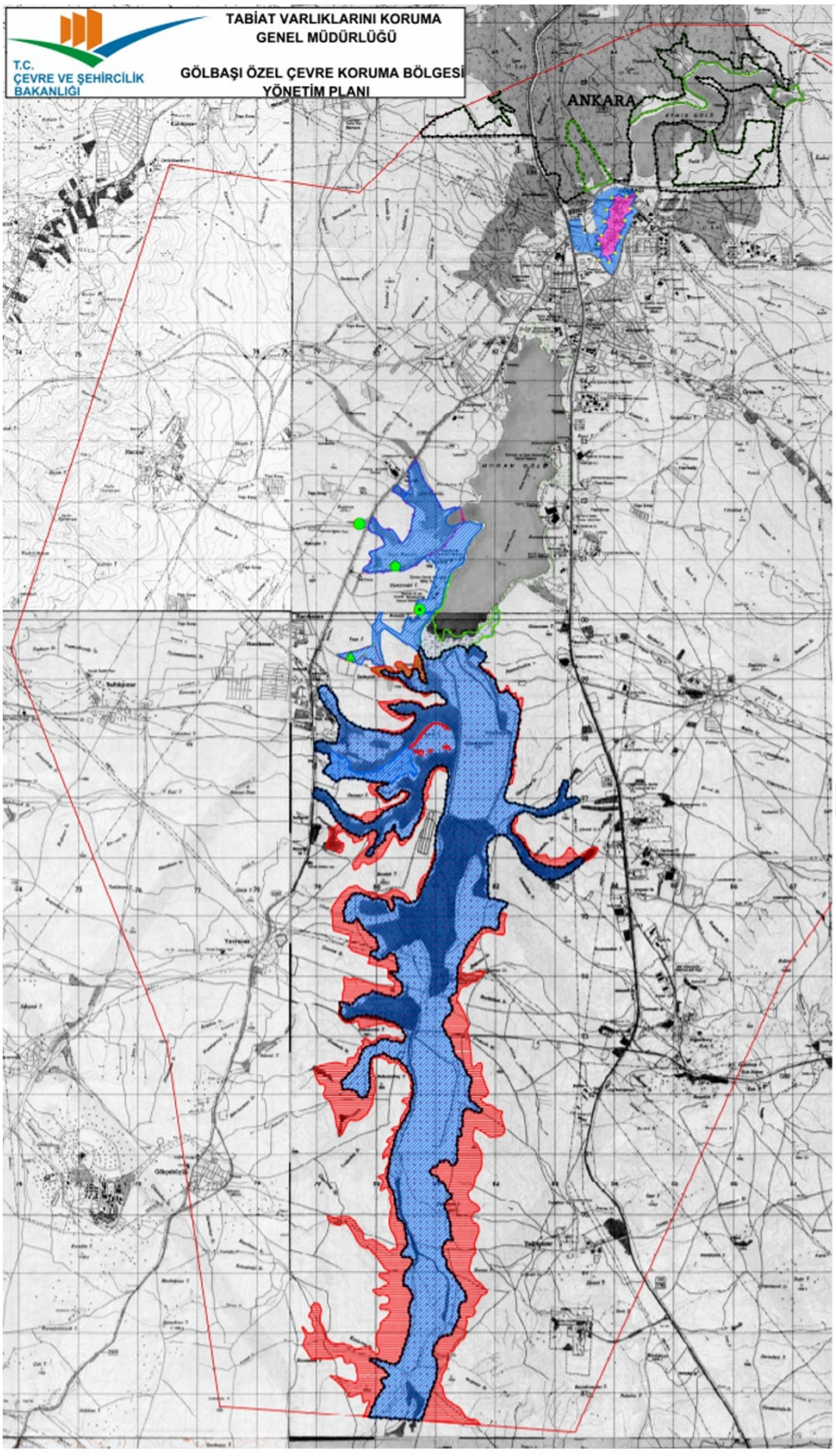



**Figure 4.9**. Gölbaşı Special Environmental Protection Plan

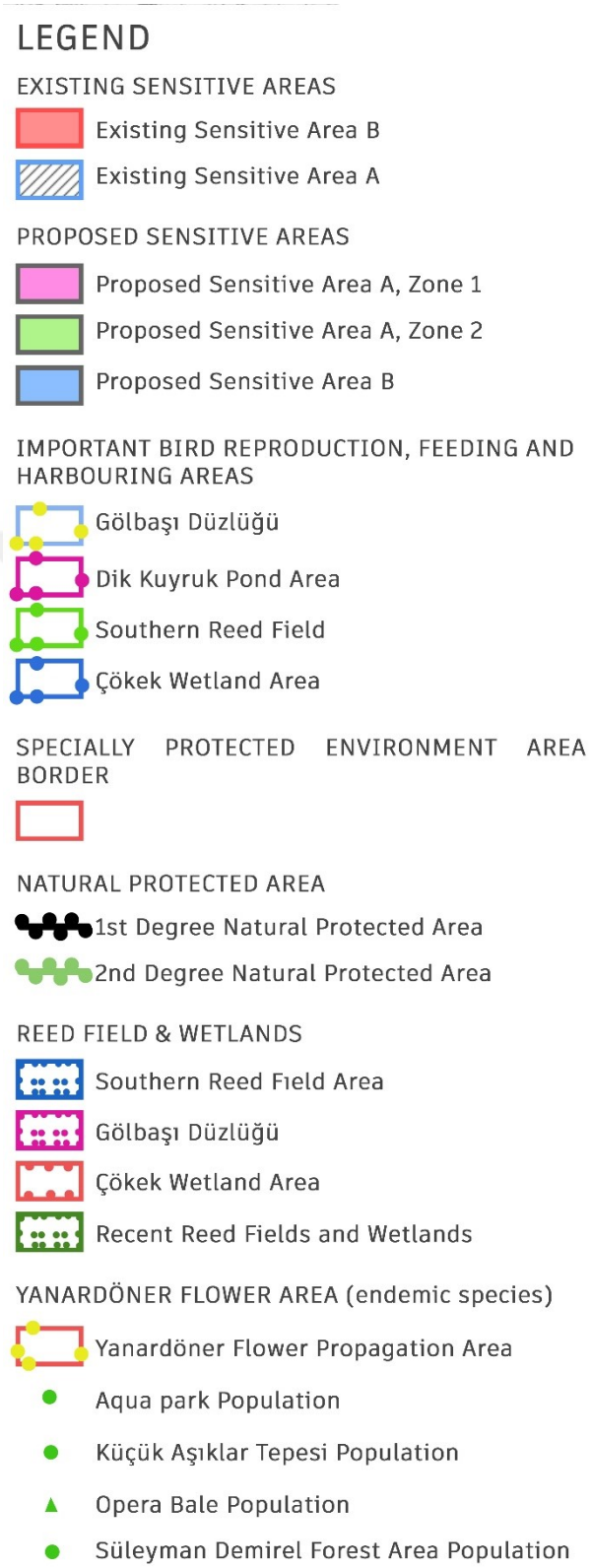



**Figure 4.9**. Gölbaşı Special Environmental Protection Plan's Legend.

Figure 4.9. indicates that Gölbaşı Düzlüğü is inside the borders of specially protected environment area, also right next to the first- and second-degree natural protection areas. Besides these, Gölbaşı Düzlüğü is inside the borders of proposed sensitive areas which are proposed sensitive area A-Zone 1, and proposed sensitive Area B. The reason for being needed to be protected is also visible from the map because Gölbaşı Düzlüğü is inside a special protection zone which habits different both endemic and non-endemic species such as waterfowls and other bird species. These two lakes as Ankara's important wetlands are high ecosystems, which are one of the most essential areas of biodiversity because it is a habitat providing appropriate nutrition, reproduction, and treatment for many species and varieties such as Alaca Balıkçıl and Erguvani Balıkçıl, and other amphibians, reptiles, and mammals (Ministry of Environment and Urbanisation, 2020).

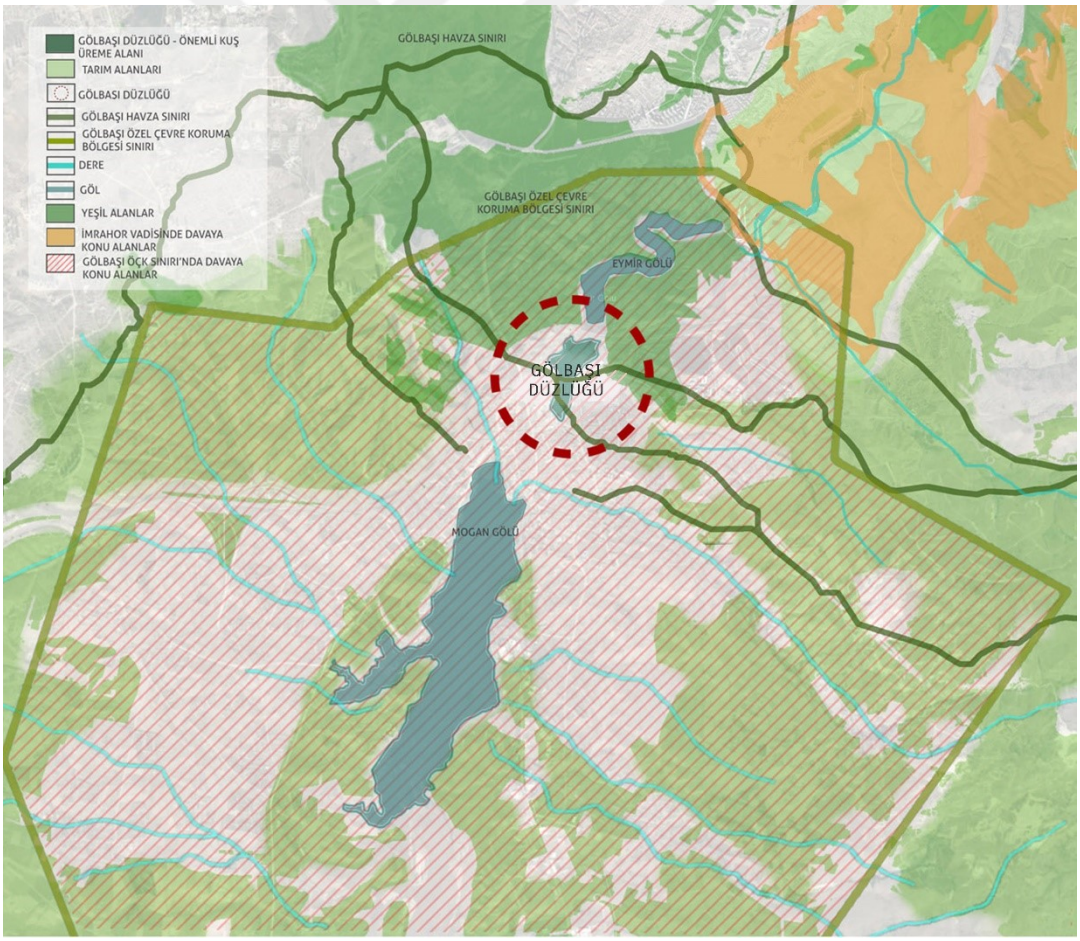



**Figure 4.10.** A map showing the border of Gölbaşı Special Environmental Protection Zone in which Gölbaşı Düzlüğü is also located due to being a natural

water basin and biodiverse area. Edited by the author. (Source: TMMOB, The Chamber of City Planners Ankara, 2020).

Therefore, it is comprehended that Gölbaşı Düzlüğü's wetland characteristic, and its ability to hold and discharge water are vital for the area. In the contrary case, the area may experience the loss of its habitat, uncontrollable water body displacements which can cause flood events, drought, or high construction in the area.

Another discussion topic about Gölbaşı Düzlüğü is an observable increase in the settlement area. There are multiple events that make the area vulnerable in front of the constructions. First of all, this area is partially covered by clinker in order to dry the wetland in a nonlegal way which opens the way for the settlement (Gölbaşı Özel Çevre Koruma Bölgesi Yönetim Planı, 2015-2019). Some of the studies has showed that the area has been exposed to an increase in the settlement area.

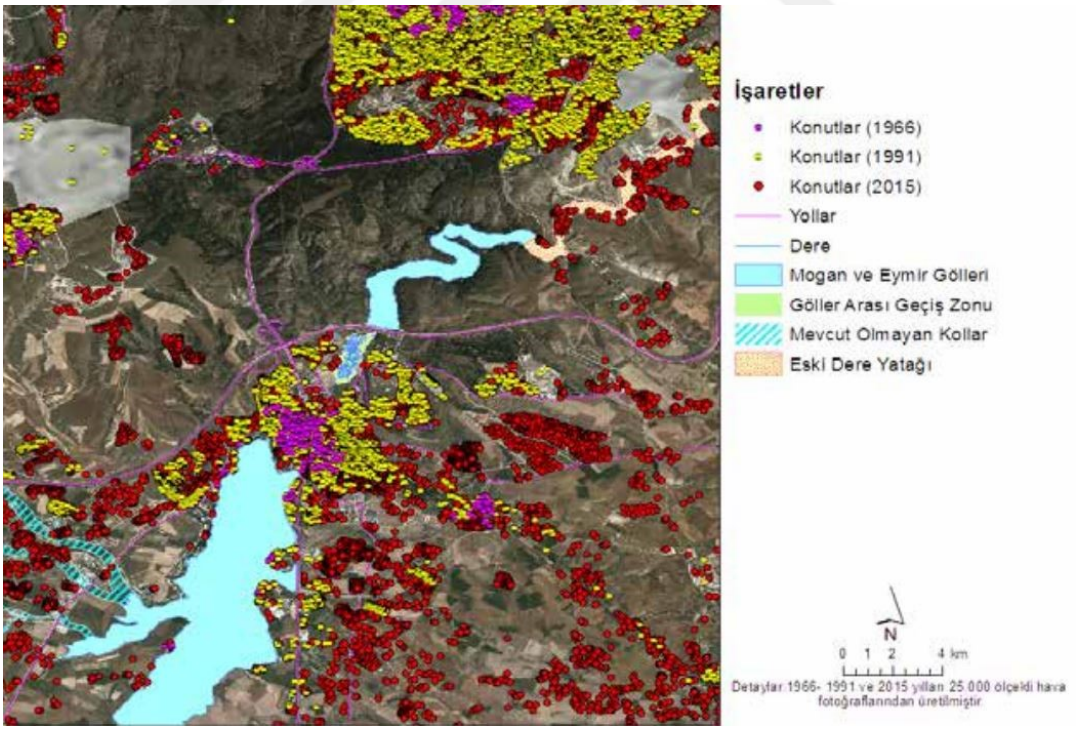



**Figure 4.11.** Development of construction around Mogan and Eymir Lakes. (Source: Uğurlu, 2020). Copyright by 2020 Uğurlu

> “In the region, the housing needs of the growing population cover the area due to the growing popularity of ‘Lake view’ villas and high-rise buildings. The increase in buildings has led to a change into the region's formation as it is covered by highly concrete areas. Ankara's urban development in 1966 shows that the settlement was a small cluster especially on the shores of Mogan Lake. By 2015, Mogan Lake has been surrounded by construction from the east and west. With the effect of this structuring, there are changes in the lake waters and area which can be seen especially in the west side of Mogan Lake as some arms seem to dry out over time.” (Uğurlu, 2020, p. 38)

What can be derived from the Figure 4.11. is also about the in-between area which is Gölbaşı Düzlüğü. This area is one of the most settled parts in the region which explains why Gölbaşı Düzlüğü is one of the proposed sensitive areas (see in Figure 4.9.).

Besides the increase in the settlement, there are other concerns about the natural habitat there. The first part of the Mogan Lake area, which was used by birds in the past and is not actively used today, is the wetland area on the eastern shore of the lake which is very close to the reeds in the region. It is the environment where a highway passes through and it is actively used at all hours of the day (Uğurlu, 2020). Infrastructure works on this road has been causing damage to the reed areas in the region, and the bird species in the region to be adversely affected (Uğurlu, 2020). Also, active use of vehicles at all hours of the day on that road creates stress on the other species in the area.

The increase in the settlement area and how the place became occupied throughout the time can be observed through the comparative maps below (see in figures between Figure 4.12 and Figure 4.18).




**Figure 4.12.** 1957 Map of Ankara showing the situation of Gölbaşı Düzlüğü which is covered by water body as a connection between the two lakes and has no settlement. Edited by the Author.



**Figure 4.13.** Reinterpreted map of 1957-Ankara showing the situation of Gölbaşı Düzlüğü which is covered by water body as a connection between the two lakes and has no settlement, but the place is accessible via roads. Author, 2023

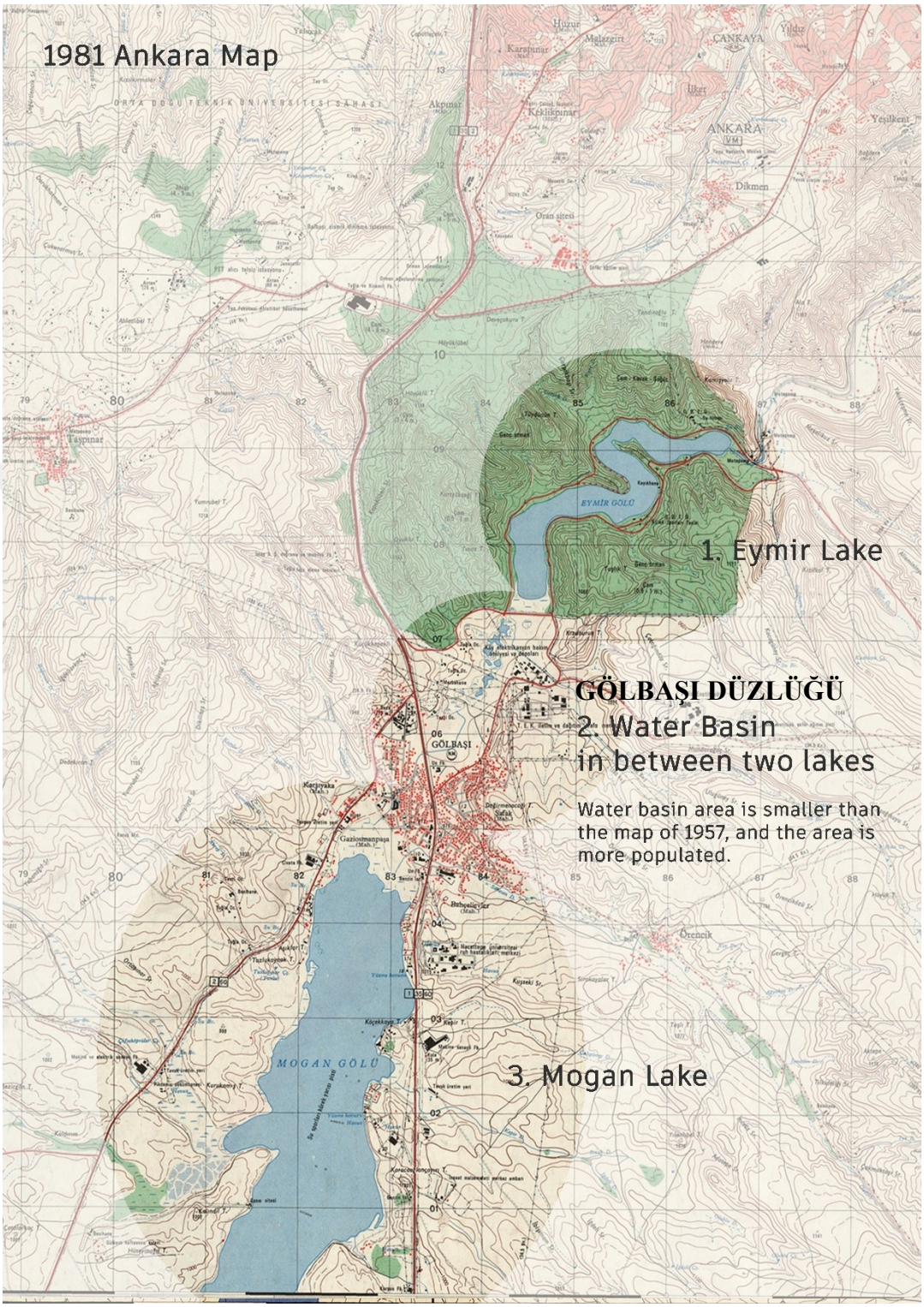



**Figure 4.14.** 1981 Map of Ankara showing the situation of Gölbaşı Düzlüğü which almost has lost more than a half of its water body and started to be covered by settlement. Edited by the author.



**Figure 4.15.** Reinterpreted map of 1981-Ankara showing the situation of Gölbaşı Düzlüğü which almost has lost more than a half of its water body and started to be covered by settlement. Author, 2023

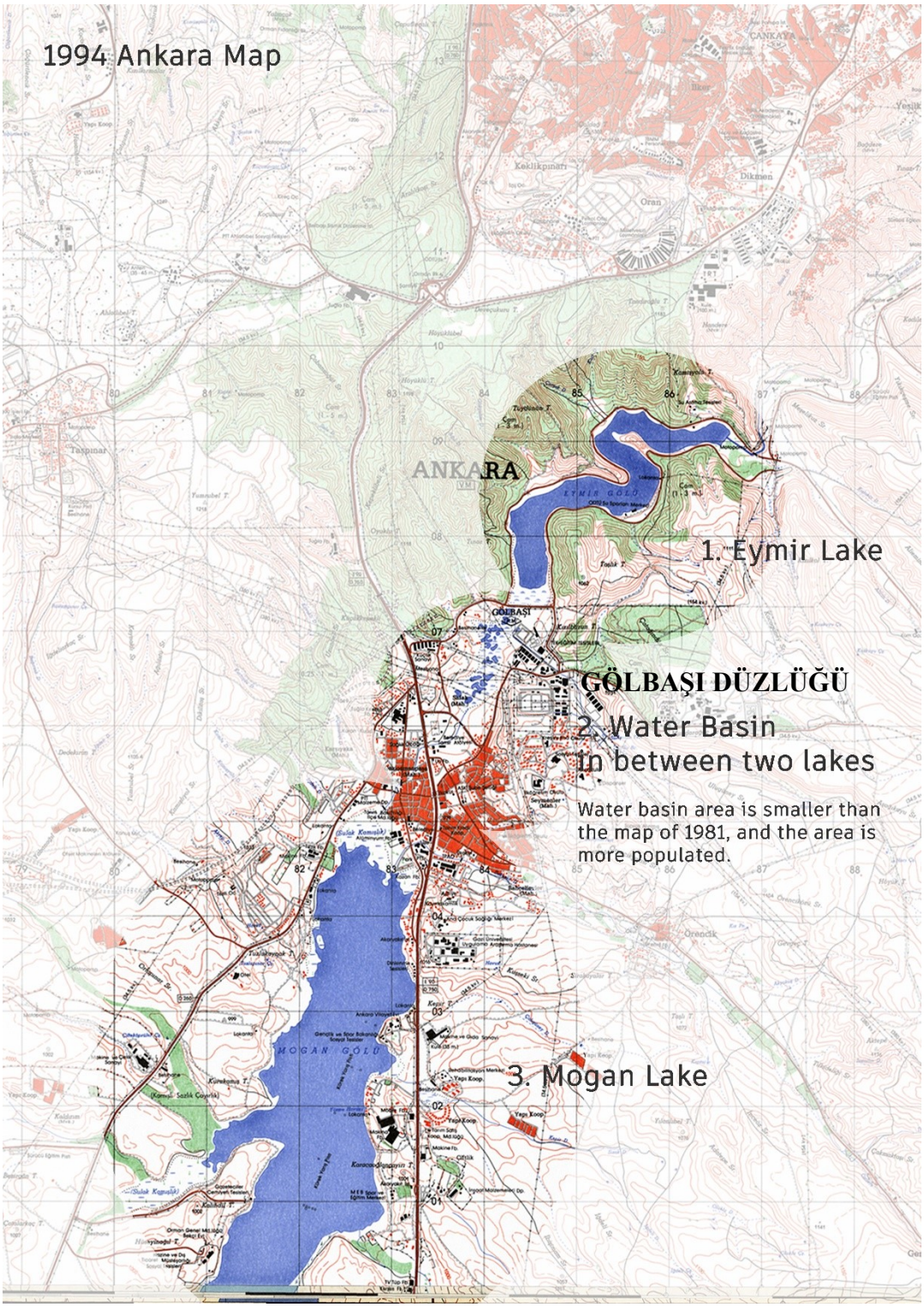



**Figure 4.16.** 1994 Map of Ankara showing the situation of Gölbaşı Düzlüğü which has less water body than the year of 1957 and more covered by the roads and different means of settlement. Edited by the Author.



**Figure 4.17.** Reinterpreted map of 1994-Ankara showing the situation of Gölbaşı Düzlüğü which has less water body than the year of 1957 and more covered by the roads and different means of settlement. Author, 2023.



**Figure 4.18.** Reinterpreted map of 2023-Ankara showing the current situation of Gölbaşı Düzlüğü which has less water body than the year of 1957 and more covered by the roads and different means of settlement. The water basin between the lakes has the densest settlement in comparison to other maps. Author, 2023.

*Competitions*

There is a competition focusing on Gölbaşı Düzlüğü held in the year of 2001. The description of the competition is as such: The Presidency of the Conservation Authority established Gölbaşı Regional Park Surroundings Urban Design and Landscape Project Competition in the area of T.R. Ministry of Environment Special Environment which is Gölbaşı Special Environmental Protection Area, located in the south of the Ankara metropolitan area. The area is defined as a Regional Park in the 1/25 000 scale Environmental Plan for the Region. Landscape architecture, urbanism, urban planning, and design for the wetland and its immediate surroundings connecting Mogan and Eymir lakes are the key elements of the competition. It is intended to obtain projects that include architectural and infrastructure solutions. One of the aims of the competition is the development of other uses around the Natural Park that will serve Ankara and Gölbaşı while considering environmental and natural protection, existing spatial values, and creating an environment suitable for the natural flora and fauna of the region by determining the negativities regarding environmental values.

It can be comprehended that the competition values the existing structure of the area and natural protection of the already existing habitat there while seeking for socio-ecological solutions that are brought forth via interdisciplinary professions.

The project that got the 1st place in the competition was designed by B. Haldun Erdoğan and A. Oktan Nalbantoğlu. It has a focus of ecological understanding of the space beyond the current planning approaches of the time. The team underlines that there should be environments that can host natural habitat and the elements of it. That is why the proposal focuses on being located on the specially protected environment area. The decisions taken during the design process mostly follow the conservation of the area. The physical relations between the parts, planning decisions, design principles and other elements were developed along the ecological understanding of the space and context. Conservation, ecological restoration, socio-economic benefit, training about nature and environment, cultural heritage,

biological repairing, and recreational programs are some elements of the proposed project that are separately functioning yet composing an integrated approach.




**Figure 4.19.** Proposal of the winning project. Copyright by 2001 Erdoğan & Nalbantoğlu

*Current Situation*

Gölbaşı Düzlüğü is one of the areas that has been being discussed in the current years as well. During the year of 2020, Provincial Directorate of Environment and Urbanisation had approved the 1/50.000 scaled project of Gölbaşı Millet Bahçesi that is planned to be located on Gölbaşı Düzlüğü. TMMOB Chamber of City Planners opposed the proposal by indicating the importance of the conservation of the area. TMMOB Chamber of City Planners' opposition also includes the location of the project as follows

> "Gölbaşı Düzlüğü is a wetland area, which is planned to be a Millet Bahçesi, is located in between Mogan and Eymir Lakes with the size of 35 hectare. The wetlands here have an essential role to feed Eymir Lake, and they provide qualified water to the lake by filtering the discharge water. Moreover, these wetlands are natural and safe habitats for birds to accommodate, nourishment, and reproduction. That is why Gölbaşı Düzlüğü has an important role for providing a habitat for water fowls and protecting the water quality of Eymir Lake." (TMMOB Chamber of City Planners, 2020, n.p.)

In other words, Chamber of Planners rejected the interference that will affect the water basin and natural habitat in the area that might be caused by the Millet Bahçesi proposal. They also emphasized the connectedness of the body bodies in the region such as Imrahor Valley, Elmadağ Valley, Eymir and Mogan Lakes as being investigated throughout this study as well.

Moreover, one of the other current situations about the context is the stone sellers that occupied the nearby area of Gölbaşı Düzlüğü. In addition, this area is partially covered by clinker in order to dry the wetland in a nonlegal way which opens the way for the settlement (Gölbaşı Özel Çevre Koruma Bölgesi Yönetim Planı, 2015-2019). Such interference and attempts in the area caused the increased risk in the loss of the natural habitat and wetland structure which can be seen as both internal and external drivers of uncertainty that will eventually cause future ruptures in the area.

After searching about Gölbaşı Düzlüğü, what can be derived from the context are that the area is supposed to be a naturally protected area since Gölbaşı Düzlüğü is a part of the larger habitat as being a connection body in a water basin together with both endemic and non-endemic species which experiences real environmental disasters in the form of flood due to being part of a continuous water basin area, and the area is continuously exposed to construction which is visible from the maps showing the expansion in the built-environment. These two agents are considered as two drivers of uncertainty and rupture as two vertical dimensions of the scenario matrix. The first uncertainty dimension is considered as the change in the water level of Gölbaşı Düzlüğü caused by flood events. The second uncertainty dimension is the change in the settlement area as an expansion in the built-environment caused by construction in the area. Gölbaşı Düzlüğü's natural location in-between the two lakes make the place vulnerable to the floods, but the vulnerability is also caused by the closeness to the settlement areas. Moreover, in the current map of the area (see in Figure 4.18.) the interaction zone between the settlement area, Gölbaşı Düzlüğü and two lakes is clearly visible. The settlement is in its densest and closest formation in comparison to earlier maps which demonstrates the vulnerability of the area in front of two uncertainties, which are flood and increase expansion in built-environment. That is why this study considers these factors as the vulnerable parts of the context that might experience rupture. For example, an unexpected flood can turn into rupture due to being close to the settlement areas. In other words, the area is more prone to have vulnerability in front of uncertainty and rupture because of the size of the settlement in comparison to the year 1957. 1957 flood in Ankara was too big to connect the two lakes as one, but there were no settlements which makes the area less vulnerable although the size of disaster is great. However, today the area cannot be tolerant to such a big flood because the there is a settlement even though the size of Gölbaşı Düzlüğü is getting smaller by human-made applications. All these demonstrate that the area is vulnerable in terms of two uncertainties which are flood, and expansion in built-environment.

These two uncertainties define the two dimensions of scenario matrix in space. That is why this thesis focuses on the area through such aspects, and develops the scenario matrix method on Gölbaşı Düzlüğü with the help of these uncertainty dimensions. 1st uncertainty dimension is flood, and it is an external driver in the city. In that manner, it is classified under the contextual approach according to Hallding (2014). Contextual approach and external drivers need a more resilient approach in the uncertainty matrix. 2nd uncertainty dimension is expansion in built-environment, and it is an internal driver in the city. In that manner Hallding (2014), classifies it under the metabolic approach which focuses on the flow and displacement of things such as people.

In the light of these, eight steps of constructing a scenario matrix are done below in the case of Gölbaşı Düzlüğü, Ankara.

**Table 4.3.** Scenario Matrix methods' steps in the case of Gölbaşı Düzlüğü, Ankara

| | |
|---|---|
| **1st Step: Finding the Main Question** | What would be the possible outcomes of the intersection of flood, and the expansion in the built-environment? |
| **2nd Step: Defining Boundaries** | The boundary in the case of Gölbaşı Düzlüğü can be defined via geography which is the area in between Eymir and Mogan Lakes. |
| **3rd Step: Deciding the Impactful Drivers** | Flood (the external driver from the contextual approach), and expansion in the built-environment (the internal driver from the metabolic approach). |

| | |
|---|---|
| **4th Step: Categorizing the Drivers** | Categorization can be done by the characteristics of impact and certainty. Flood can be the major driver that can also be highly impactful and uncertain because flood is relatively different than an increase in the water level. Expansion in the built-environment can be less impactful in comparison to flood unless there will be a huge people displacement to the area. Because of that, expansion in the built-environment might have both certain and uncertain aspects. |
| **5th Step: Constructing the Scenario Matrix** | For constructing the scenario matrix, two uncertainty dimensions should be figured out. Two uncertainties running through the two vertical dimensions are flood, and the expansion in the built environment. |
| **6th Step: Scenario Narratives** | Two-by-two scenario matrix of uncertainty forms the intersecting areas out of two vertical dimensions, and scenario narratives derive from those intersecting areas. |

**6th Step: Scenario Narratives and Scenario Matrix**

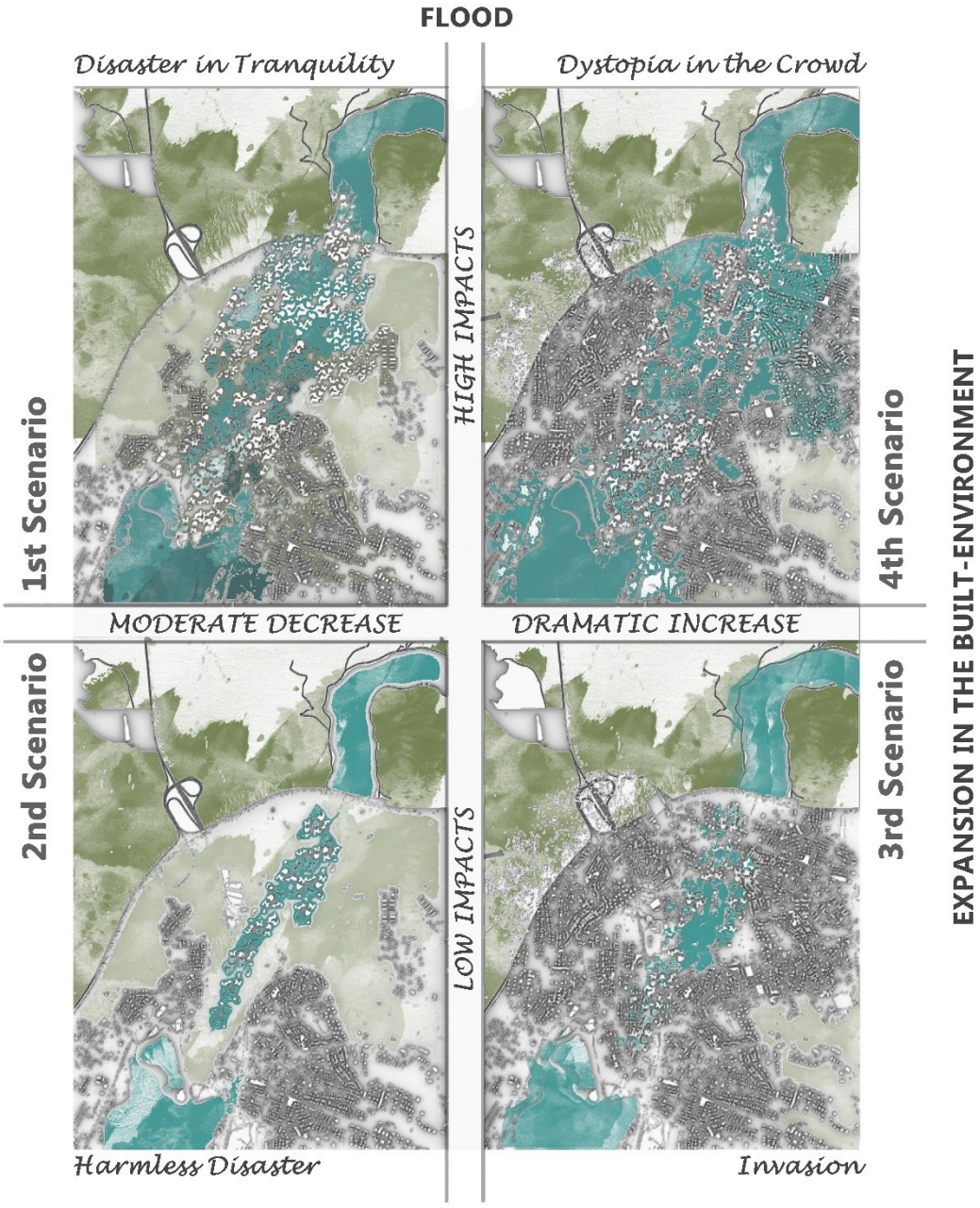



**Figure 4.20.** Scenario Matrix of Gölbaşı Düzlüğü showing the 6th Step's Scenario Narratives in a schematic illustration. Each scenario is explained in the scenario figures below. The intersections of each uncertainty dimension created four different scenarios that might be possible in the future. Author, 2023.

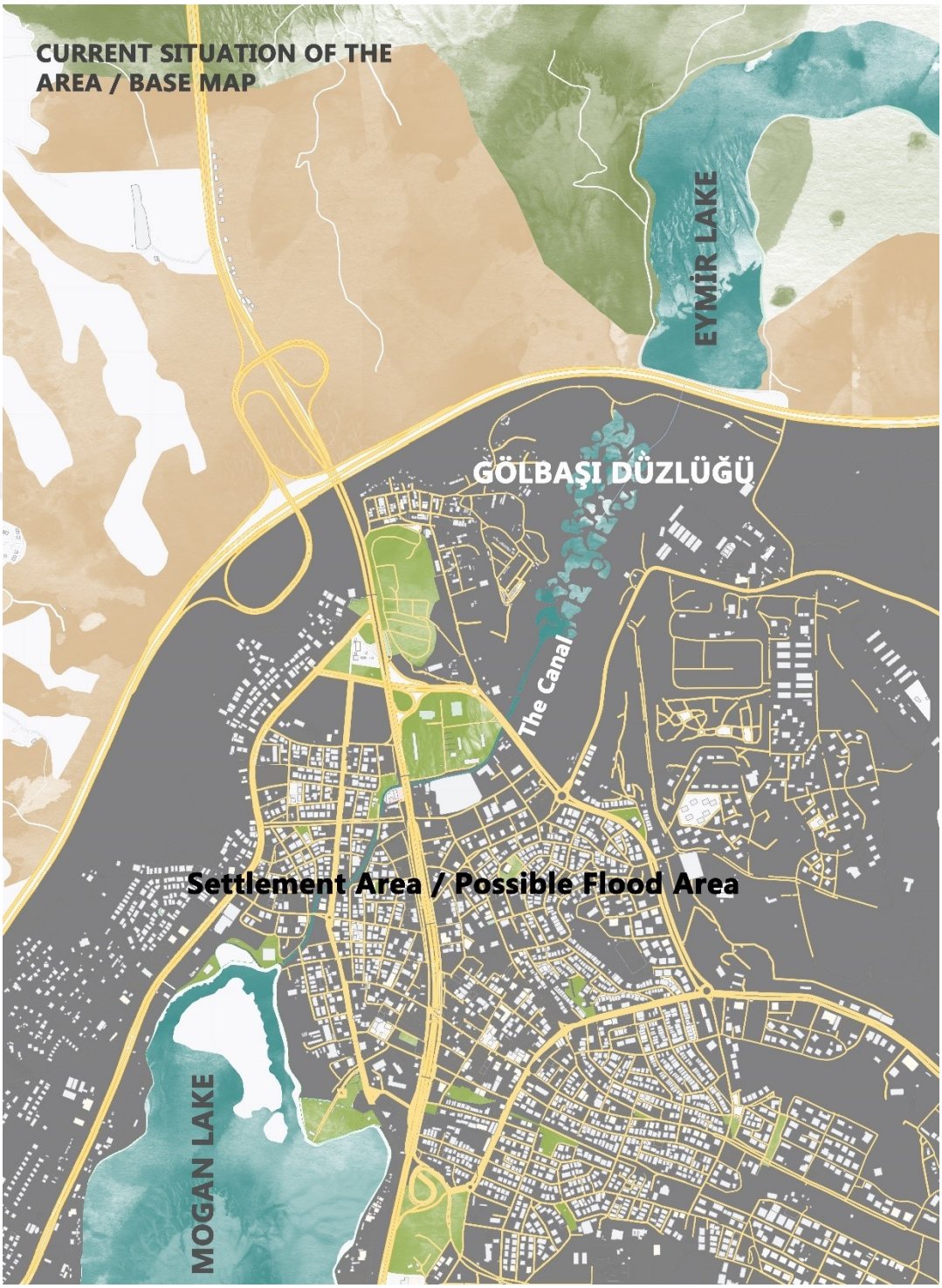



**Figure 4.21.** Current Situation of Gölbaşı Düzlüğü showing the water body in the basin, two lakes, connection between the lakes, and the size of the settlement area. This map was drawn to compare the maps of different scenarios in the scenario matrix with the current situation. Author, 2023.

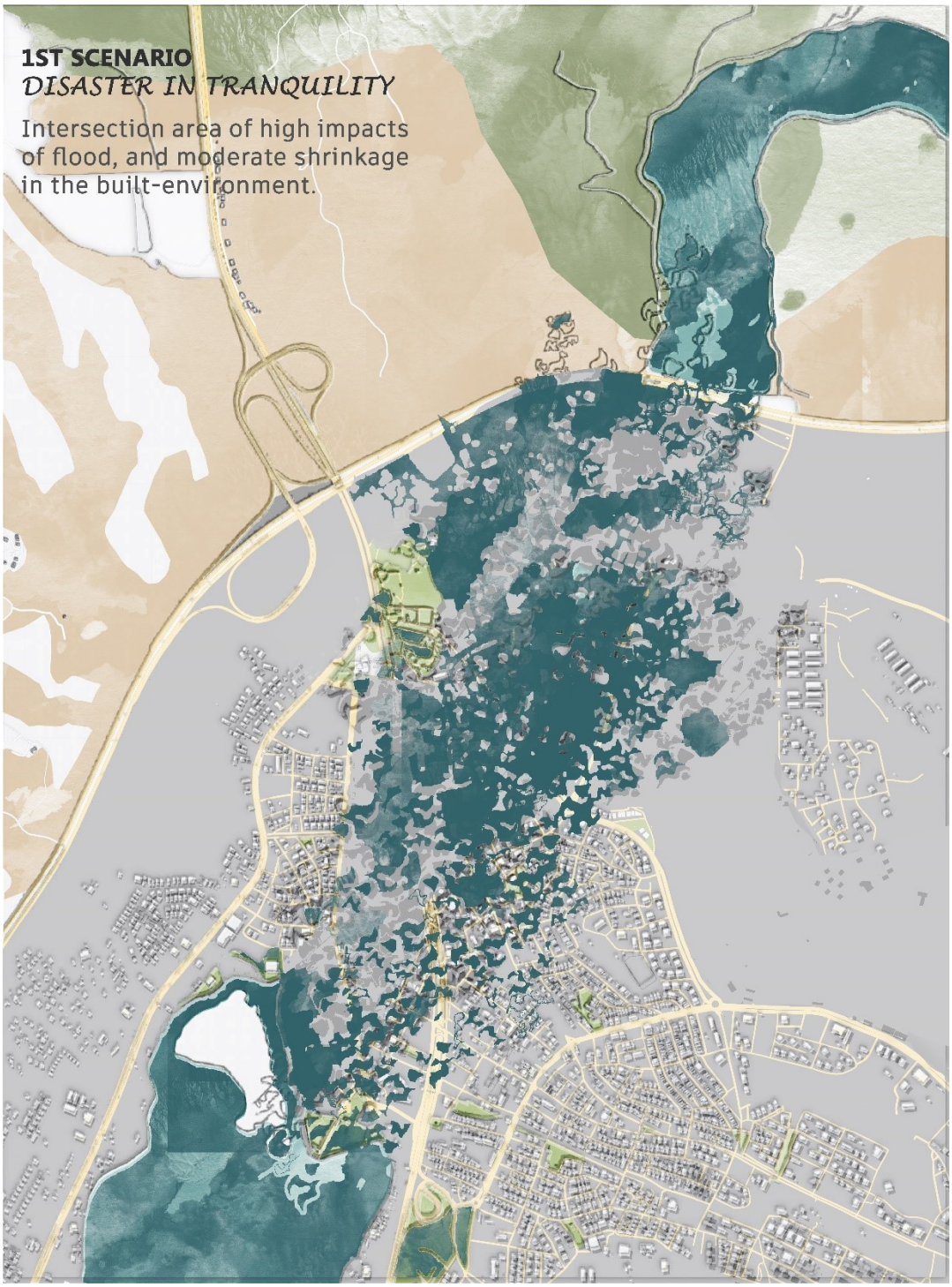



**Figure 4.22**. 1st Scenario, Disaster in Tranquillity in the context of Gölbaşı Düzlüğü showing the scenario case of the intersection area of high impacts of flood, and moderate shrinkage in built-environment. Author, 2023.



**Figure 4.23**. 1st Scenario, Disaster in Tranquillity's model. Author, 2023.

The first intersection region is made up of a mix of a moderate shrinkage in built-environment, and significant flood damage (environmental rupture). Disaster in Tranquillity is the name of the first intersection area, where the environmental effects will be severe and have a significant impact on the context. However, because of the shrinkage in the built-environment, fewer people will be affected by the disaster similar to the less populated but severe flood case of the 1957 flood in Ankara. Despite the flood's significant effects, it is simpler to build a more resilient community in this instance. Also in such a case, it is much easier to bounce back to the original state as mentioned in the engineering resilience approach since the built-area is relatively smaller. However, in that scenario, still there should be temporary resilience tools that can be developed to make the space more adaptive in front of high impacts of flood, and rupture. Floating University Berlin's temporary space formation and resilience understanding of temporarily occupying the space according to the water level change might be an example for the 1st scenario.

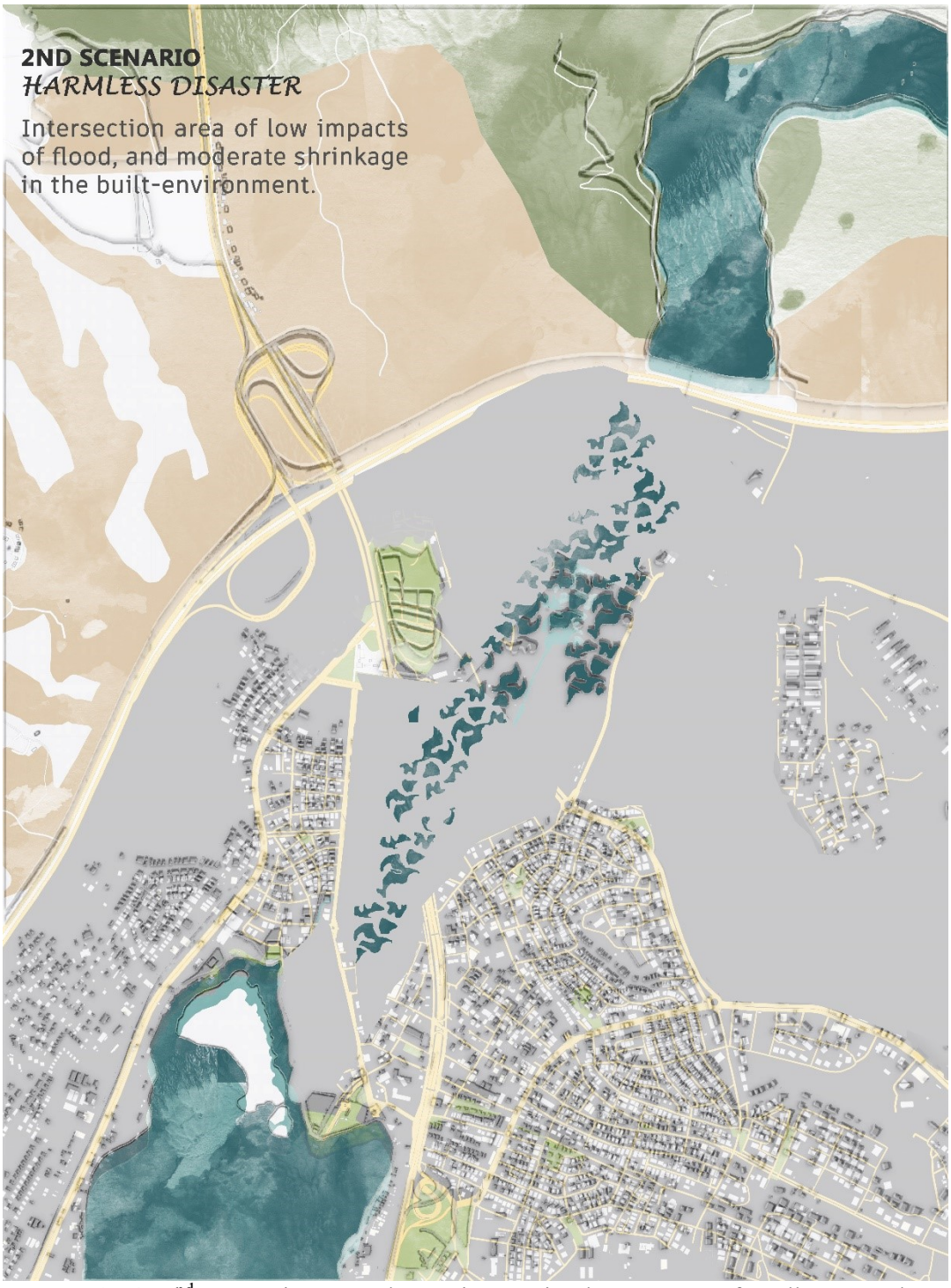



**Figure 4.24.** 2nd Scenario, Harmless Disaster in the context of Gölbaşı Düzlüğü showing the scenario case of the intersection area of low impacts of flood, and moderate shrinkage in the built-environment. Author, 2023.

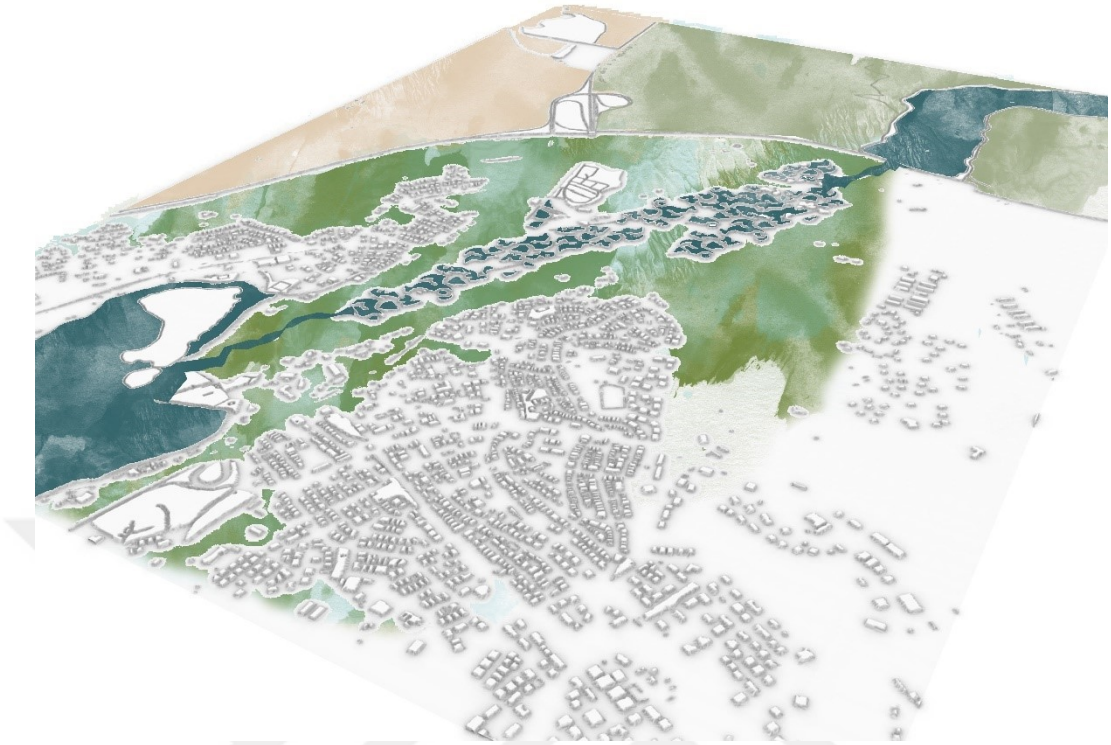


**Figure 4.25**. 2nd Scenario, Harmless Disaster's model. Author, 2023.

The least susceptible and most naive scenario in the matrix is represented by the second intersection area, which is made up of the combinations of a moderate shrinkage in the built-environment and low flood damages. The second scenario is called Harmless Disaster since there will be fewer people in the impacted area and less damage from the flood. The real-world illustration of this situation is the gradual, less significant rise in the water level of Gölbaşı Düzlüğü and the sparsely inhabited area near to the link to the basin. In this case, it would be simple to train and teach the community resilience due to being less crowded. Also, it is the safest scenario according to the matrix, but safety can still be increased via resiliency tools. For example, the area which will be exposed to minimal flood can be covered by soils that are absorbent to minimize the impact. Also, the minimal and harmless flood can be used for temporary activities in the area to maintain resilience. This scenario is the one whose bouncing-back ability is the highest.

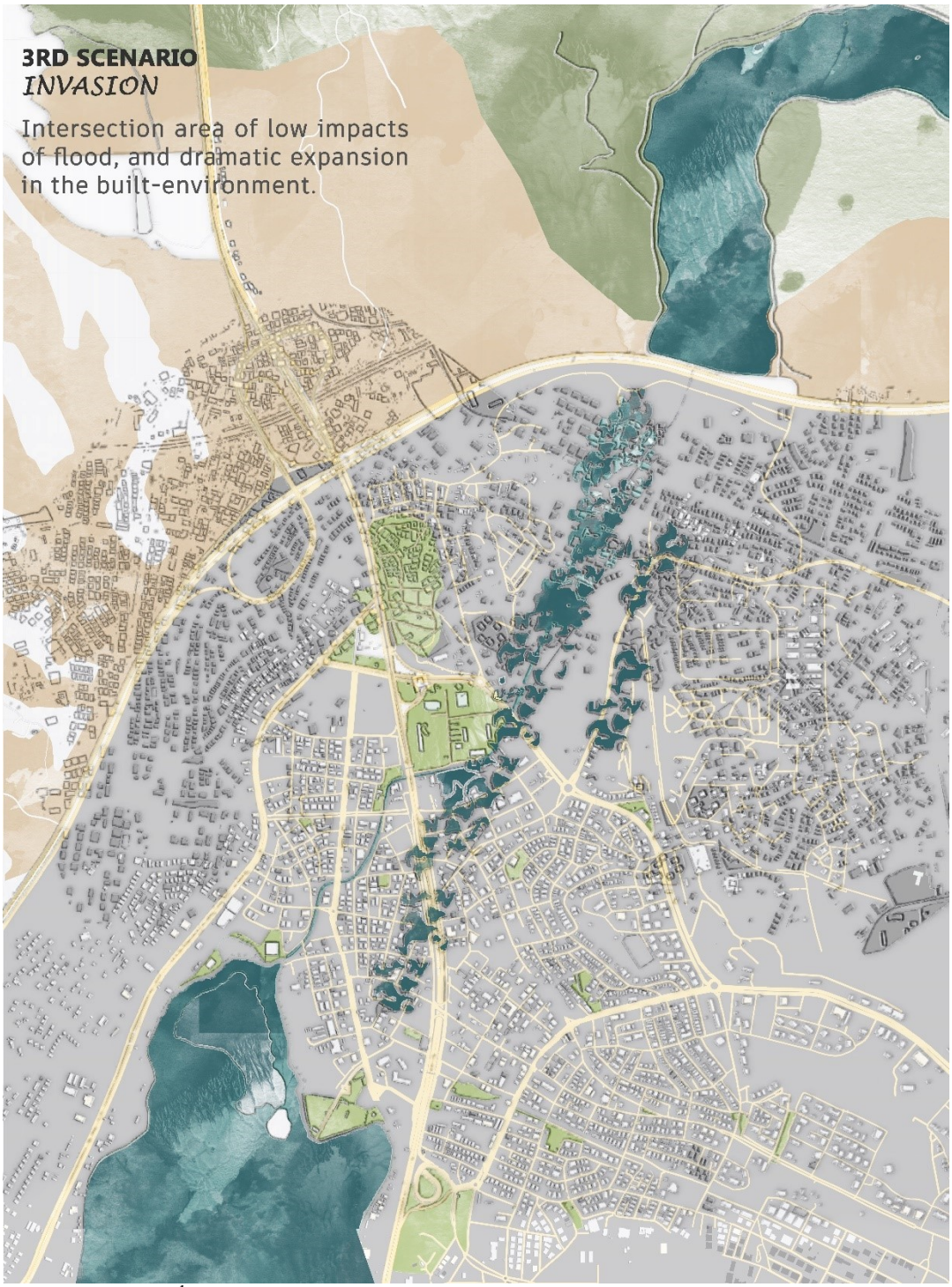



**Figure 4.26.** 3rd Scenario, Invasion in the context of Gölbaşı Düzlüğü showing the scenario case of the intersection area of low impacts of flood, and dramatic expansion in the built-environment. Author, 2023.

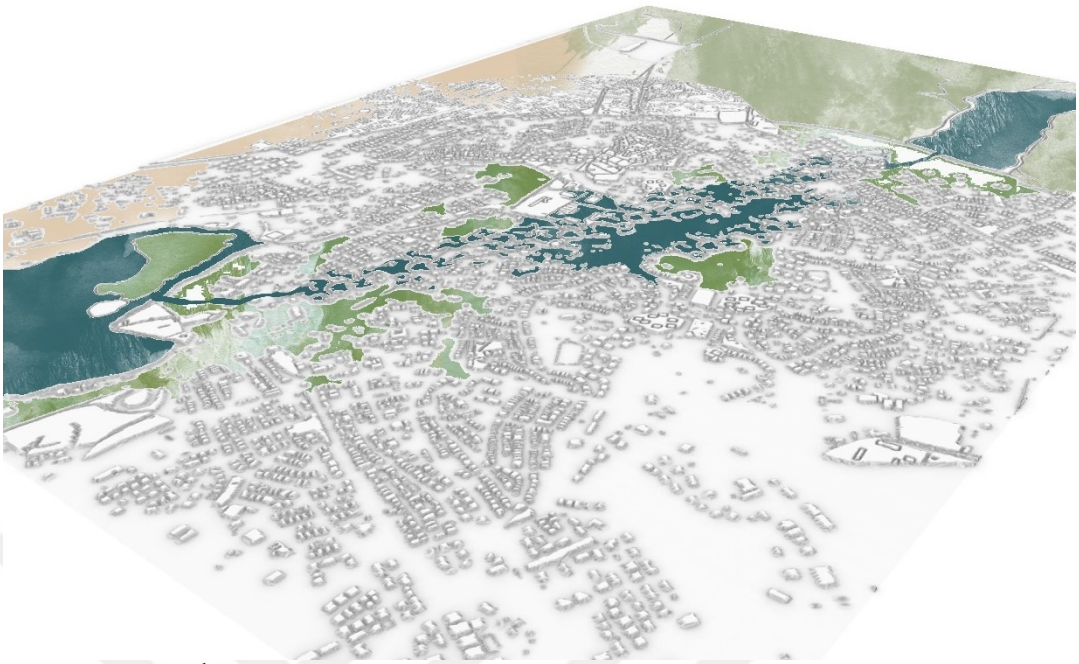


**Figure 4.27**. 3rd Scenario, Invasion's model. Author, 2023.

Low flood impacts and a dramatic expansion in the built-environment are combined in the third intersection area. The third scenario is called Invasion, and in it, Gölbaşı Düzlüğü would be nearly entirely covered by high-density built area. High-rise buildings will even be constructed to meet the demand for shelter in the expanding built-environment. Even if the effects of the flood are minimal, the high-density community might nevertheless suffer since it will upset the balance of the environment, and the soil will most probably be covered by hard surfaces (i.e., concrete) which will cause less absorption of water even though the flood impact is low according to the scenario. That is why low-impact environmental events may be impactful in densely covered areas. Moreover, one of the worst-case situations is this one since even relatively moderate quantity of rain fall might create flooding because water cannot be transferred from one lake to another because Gölbaşı Düzlüğü will be covered by structures and other amenities. Furthermore, the region may draw new residents and business ventures as a result of the expansion, which would undoubtedly make the neighbourhood more vulnerable and less resilient. If the area was affected badly even in a low-impact disaster, bouncing back would be harder in comparison to the first and second scenarios because of having high settlement.

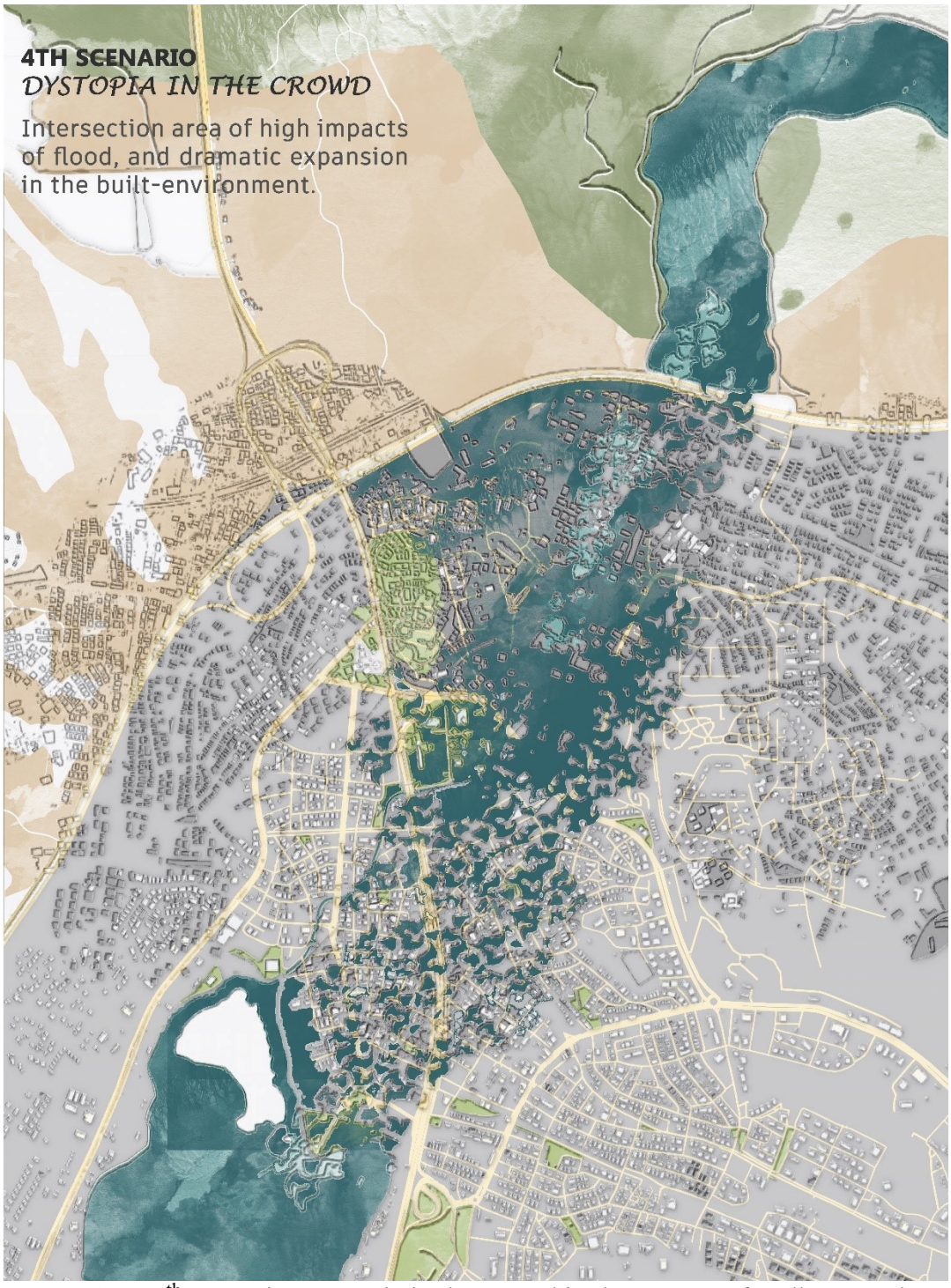



**Figure 4.28.** 4th Scenario, Dystopia in the Crowd in the context of Gölbaşı Düzlüğü showing the scenario case of the intersection area of high impacts of flood, and dramatic expansion in the built-environment. Author, 2023.

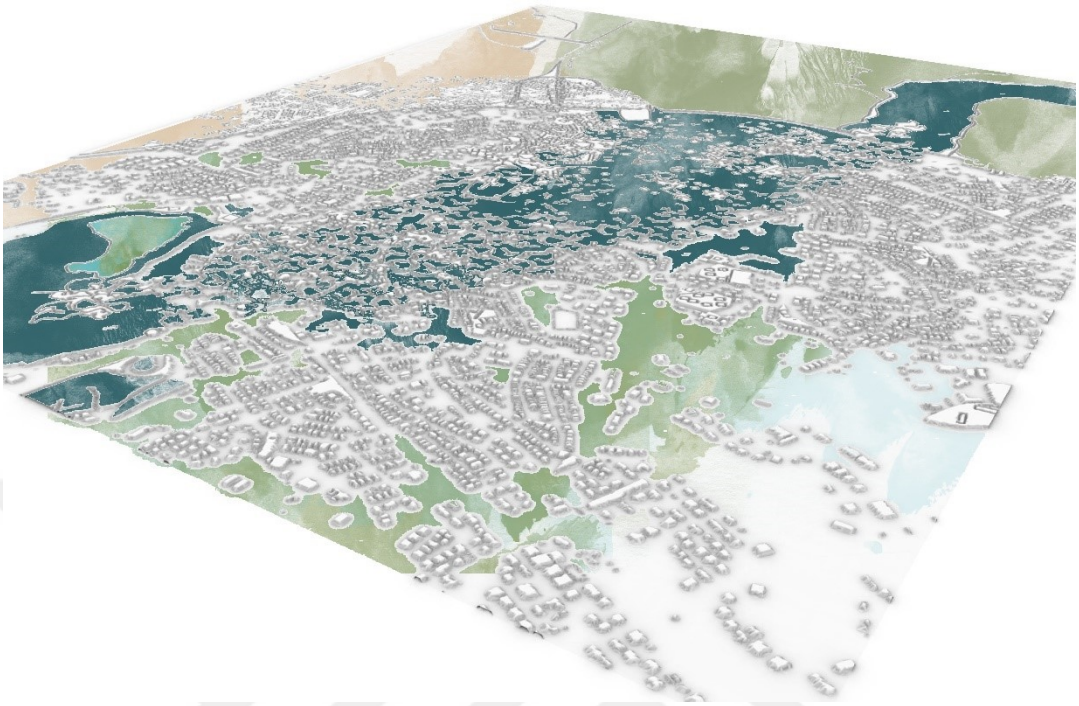


**Figure 4.29**. 4th Scenario, Dystopia in the Crowd's model. Author, 2023.

High flood impacts along with a significant expansion in the built-environment make up the fourth intersection area. Dystopia in the Crowd is the name of the fourth scenario, in which the disaster would unavoidably touch the majority of the people since the scenario matrix's most severe uncertainty drivers are the sharp rise in the size of the built-environment and the strong effect of flooding. In this scenario, there will be a rupture that emerges as a bigger event and a significantly damaged community. Since it will be more difficult to recover as predicted by the engineering resilience model, the robustness concept of resilience will not be effective in this situation. However, in this situation, the ecological resilience and evolutionary resilience models might be useful. While the evolutionary resilience model proposes a system that can evolve into something new when necessary, the ecological resilience model provides to construct a system that is able to adapt. Therefore, it is likely that this scenario will go beyond the cutoff and necessitate a change in the way the system is understood. Despite the fact that building community resilience in that

situation is the most difficult, society should be well-trained. The fact that both human and non-human entities must interact in such a setting makes it the most socio-ecologically interactive scenario at the same time. Therefore, the worst-case scenario is the one that best illustrates the rupture, uncertainty, relationship to resilience models, and requirement for creating a resilient community. According to this study, the instance with the greatest degree of uncertainty and influence might be regarded as the most instructional case.

| | |
|---|---|
| **7th Step: Developing a Method for the Selected Analysis** | This study focuses on the narration itself via illustrating them rather than aiming the quantitative calculations. It should be understood that scenario matrix is a craft and alternative approach rather than mathematics. It produces scenarios that are base points for the process and possible futures in the face of uncertainty as an alternative approach. |

### 4.4. Evaluation

This study has produced four alternative scenarios. 1st scenario is Disaster in Tranquillity which is the intersection area of moderate shrinkage in the built-environment and high impacts of flood as the uncertainty dimensions. 2nd scenario is Harmless Disaster which is the intersection area of moderate shrinkage in the built-environment and low impacts of flood. 3rd scenario is Invasion which is the intersection area of drastic expansion in the built-environment and low impacts of

flood. Finally, the 4th scenario is Dystopia in the Crowd which is the intersection area of drastic expansion in the built-environment and high impacts of flood. All the four scenarios are driven by two dimensions of uncertainty which are flood as an external driver, and shrinkage-expansion in the built-environment as an internal driver by means of rupture cases. By using the scenario matrix method, possible outcomes of the uncertainty scenarios were figured out. This method helped to think upon various scenarios at the same time while creating numerous narratives out of them. All scenarios have seeds from the real-life situation of the context, and provided an alternative thinking through scenarios. Each scenario was examined in a detailed way, and different possible features were detected according to the matrix. It is important to note that uncertainties cannot be fully foreseen, and there are always possibilities that might or might not happen. That is why scenario matrix method offers an alternative yet structured pathway in the face of uncertainties and rupture. According to the findings of this study, scenario matrix method is a beneficial tool to cope up with uncertainties and providing narrations. These narrations were depicted in the forms of maps and texts within this study, and different possible outcomes, various needs in resilience practice in terms of both community resilience and systemic resilience came out to the surface. These maps are the results of scenario matrix method that offered four pathways and four narratives accordingly. The second and the fourth scenarios are the extremes in the matrix as being the lowest and highest impact scenarios while the first and the third scenarios are more moderate ones. However, scenario matrix method does not figure out the most possible scenario, rather it offers the narrations which are bringing forth the most and least extreme scenarios. Besides these, the matrix can also be used in the comparative studies since there will be four different comparable scenarios at the end. Thus, scenario matrix method is compatible with the uncertainty thinking in front of ruptures and it is a craft that is able to create alternatives.

# CHAPTER 5

# CONCLUSION

Throughout this study the main concept of rupture was being brought forth. In order to have a sophisticated understanding of rupture, uncertainty as the driver of rupture, and resilience thinking as a coping mechanism with rupture and uncertainty were discussed in chapter one and two. Resilience thinking, which is primarily defined as an approach in the urban space that creates the less vulnerable and less fragile systems in front of uncertainty and rupture, was thought as a coping mechanism. Those three bridging and intertwining concepts are forming the core understanding of this study. One of the novel aspects of this study is bridging them and then revealing the relations in between. Rupture is primarily defined as an unexpected change in the urban space that causes a significant remark on it. Rupture is derived by uncertainties and causes to pass the threshold in the time and space and it puts an impact on the urban space eventually. That is why resilience thinking is thought as one of the coping mechanisms of rupture and its deriver which is uncertainty. Those three bridging concepts carried the discussion on a level that both uncertainty and rupture are unavoidable due to complex interactions in the ever-evolving systems such as cities because future cannot be fully predicted in the complex systems like cities. Therefore, this study claimed and found supportive ideas from other scholars that there is always going to be uncertain aspects in the urban space and some of them will cause ruptures that creates a disruptive impact on the space. Disposition to rupture is the core definition of these aspects and it titles the study in a way. The question of how system works or should work if rupture happens was found in the resilience thinking which has different approaches by itself, too. The system may bounce-back to the initial form if it is possible according to the understanding of engineering resilience model. The system can adapt the rupture and can create an alternative way according to the understanding of ecological resilience model.

Finally, the system can completely pass the threshold which is the point that is impossible to bounce-back or adapt, and as a result, the system transforms itself into a new mode according to the understanding of evolutionary resilience model. All these models can cope up with different modes, scales, pace of rupture happening in the urban space. Resilience may also have different modes in respect to the context. For example, it might relate to the urban ecology defining the relations in between the parts of the whole as primarily discussed in the chapter two. Also, it might appear in the forms of community organisation which offers a resilient society model that puts importance to being prepared in front of ruptures. This chapter has answered the first research question which is what the connection between rupture, uncertainty, and resilience is. The answer is that the connection between rupture, uncertainty and resilience is spatial, intertwining, and non-linear. Uncertainty drives rupture and a disruptive event occurs in the urban space. Then, the system's capacity to bounce-back, adapt, or transform is going to be formed by the resilience approach.

In the chapter three, the spatial matters of rupture, uncertainty and resilience were being discussed to comprehend the variety of rupture events, and resilience approaches towards them. To have a sophisticated understanding on the broad approach of resilience applications in front of rupture, different scales, contexts, and projects were investigated. The broadest scale examples were the resilience strategy guidelines that were developed for the cities which are attendees in the 100 Resilient Cities programme. The selected cities were chosen according to their contexts that are completely located in different regions of the globe to observe the generic and site-specific approaches if there are any. Paris, New York, and Seoul were the chosen cities, one from Europe, one from America and one from Asia. There were both generic and site-specific qualities in all the resilience strategy guidelines. Another layer of chapter three was formed by the urban projects which are more site-specific and smaller scale projects in comparison to resilience strategy guidelines. In that part, various urban projects from Kate Orff and his team Scape were investigated while some other site-specific projects like Floating University Berlin were discussed as well. Those projects were helpful to understand the real-life rupture

cases and the alternative site-specific resilience approaches to cope up with rupture. Variety of rupture cases in terms of scale and scenario and severally developed approaches by means of resilience were the essential outcome of the chapter three. It was found out that the context difference in the enquired projects is causing different rupture scenarios and requires different resilience approaches. For example, the rupture case in Floating University Berlin is about the temporary use of a vacant area in the urban context and regenerating a new urban program there that serves for the resilience thinking while the idea behind Oyster-Tecture is providing a living infrastructure that can both occupy several urban programs together, and provide a threshold that can adapt possible future environmental ruptures like sea-level rise. Also, the scales of the projects are different. Floating University Berlin has small interventions and alterations in program while Oyster-Tecture serves as a part of the harbour. Thus, each context and rupture case require different resiliency approach by means of structure, program, scale, and tactics. Besides the broader scale resilience guidelines and site-specific projects, couple of outstanding international exhibitions were examined to comprehend how resilience is handled in another medium. Those exhibitions were both offering alternative, speculative yet structural approaches to rupture cases in a resilient way, and gaining attention by raising awareness in the public eye. This is essential because community resilience might be strengthened in such a way more properly. Other mediums like resilience strategy guidelines might not be that catchy for the public eye. That is why Rising Currents at MoMa, and two pavilions from 17$^{th}$ and 18$^{th}$ Venice Biennales were discussed throughout the chapter. The second research question how resilience can be a coping mechanism in the face of rupture and uncertainties was tried to be found with the help of spatial examples, and it is found out that there could be variety in approaches in terms of resiliency tools for the rupture cases to cope up with them. This variety comes from the differences in scales, site-specific qualities, the medium and so on. Thus, it can be said that resilience and rupture cases can appear in various forms in different projects and it is found out that resilience provides flexibility by decreasing

the vulnerability of the space which can be thought as a coping mechanism in front of rupture and uncertainties.

In the chapter four, the last research question of this study was figured out. The question is why scenario-matrix method becomes suitable for flexible resiliency thinking to cope up with rupture and uncertainties. Scenario-matrix is a method that is being used for creating alterative scenarios where it is hard to foresee what will happen next due to uncertainties. That is why it is a method that tries to attach and go along with uncertainty rather than trying to supress it. Thus, scenario matrix is a bridging methodology or a way of thinking in the uncertainty cases which is the driver of rupture according to this study. In that manner, this study used scenario-matrix as a method in the case study. The selected case was Gölbaşı Düzlüğü due to its ever-progressing characteristic. As primarily investigated in the chapter four, the area is located in a water basin in between Mogan and Eymir Lakes which has been exposed to flood events for years and expansion in the built-environment. These are the two concerns about the area because of not being able to fully foresee when and how these two events are going to happen. It is known that the area is prone to have flood, but it is hard to foresee the exact details of the event as primarily discussed. This makes the area more vulnerable in the face of possible flood events. That is why flood is considered as one of the ruptures driven by uncertainty in the area. Secondly, the expansion in the built environment cannot be fully predicted due to being in a non-stable pace. The construction in the area seems like expanding throughout the years, but it is not fully known when and in which density the expansion is going to happen. Also, Gölbaşı Düzlüğü and the nearby areas are inside the borders of Gölbaşı Special Environmental Protection Plan as proposed sensitive areas. This means that the area might be chosen as a natural protection area in which the construction will be limited or even forbidden. Thus, there is also the possibility of a moderate shrinkage in the built-environment. After all these findings, this study selected the flood and expansion-shrinkage in the built environment as uncertain dimensions in the context. These findings were essential to be able to use the scenario matrix method for the context of Gölbaşı Düzlüğü. Flood and expansion-shrinkage in the

built environment were aligned to the two vertical dimensions of the matrix as primarily shown in the figures of the chapter. These uncertainty dimensions are essential to think through since they might generate rupture cases in the context. That is why generating possible rupture cases with the help of scenario thinking helped to envision possible outcomes and develop possible resilience approaches. As a result, this study has produced four alternative scenarios according to the scenario matrix method. 1st scenario is Disaster in Tranquillity which is the intersection area of moderate shrinkage in the built-environment and high impacts of flood as the uncertainty dimensions. 2nd scenario is Harmless Disaster which is the intersection area of moderate shrinkage in the built-environment and low impacts of flood. 3rd scenario is Invasion which is the intersection area of drastic expansion in the built-environment and low impacts of flood. Finally, the 4th scenario is Dystopia in the Crowd which is the intersection area of drastic expansion in the built-environment and high impacts of flood. The scenario matrix method was useful to comprehend the possible outcomes in a context that is complex enough to foresee. That is why figuring out possible four different rupture scenarios and developing resilience approaches accordingly might be considered as a suitable and flexible method in the face uncertainties.

To conclude, this study has aimed to bridge rupture, uncertainty, and resilience concepts as a novel contribution while trying to comprehend spatial examples of them, and finally find out a compatible method via scenario matrix method in order to use them in the case study of Gölbaşı Düzlüğü.

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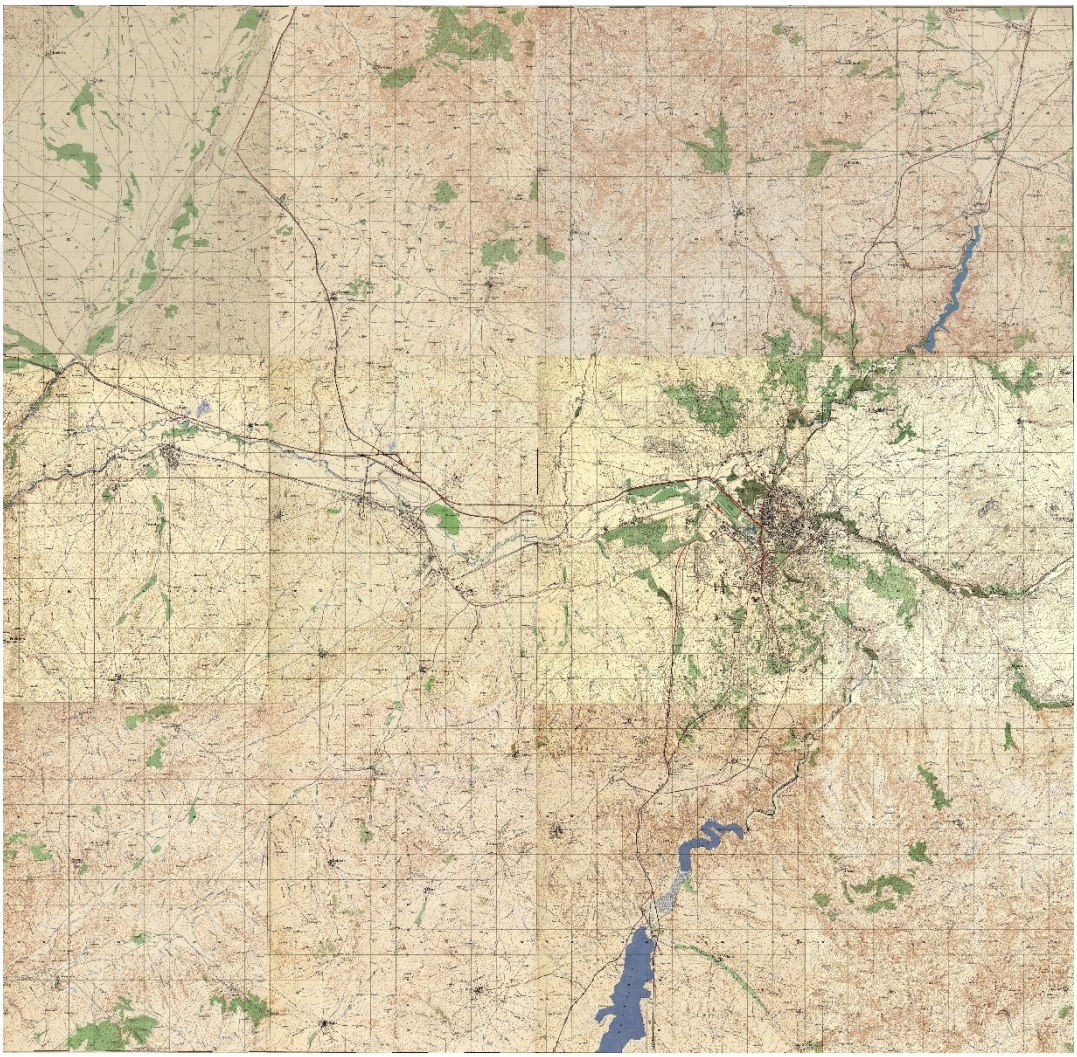
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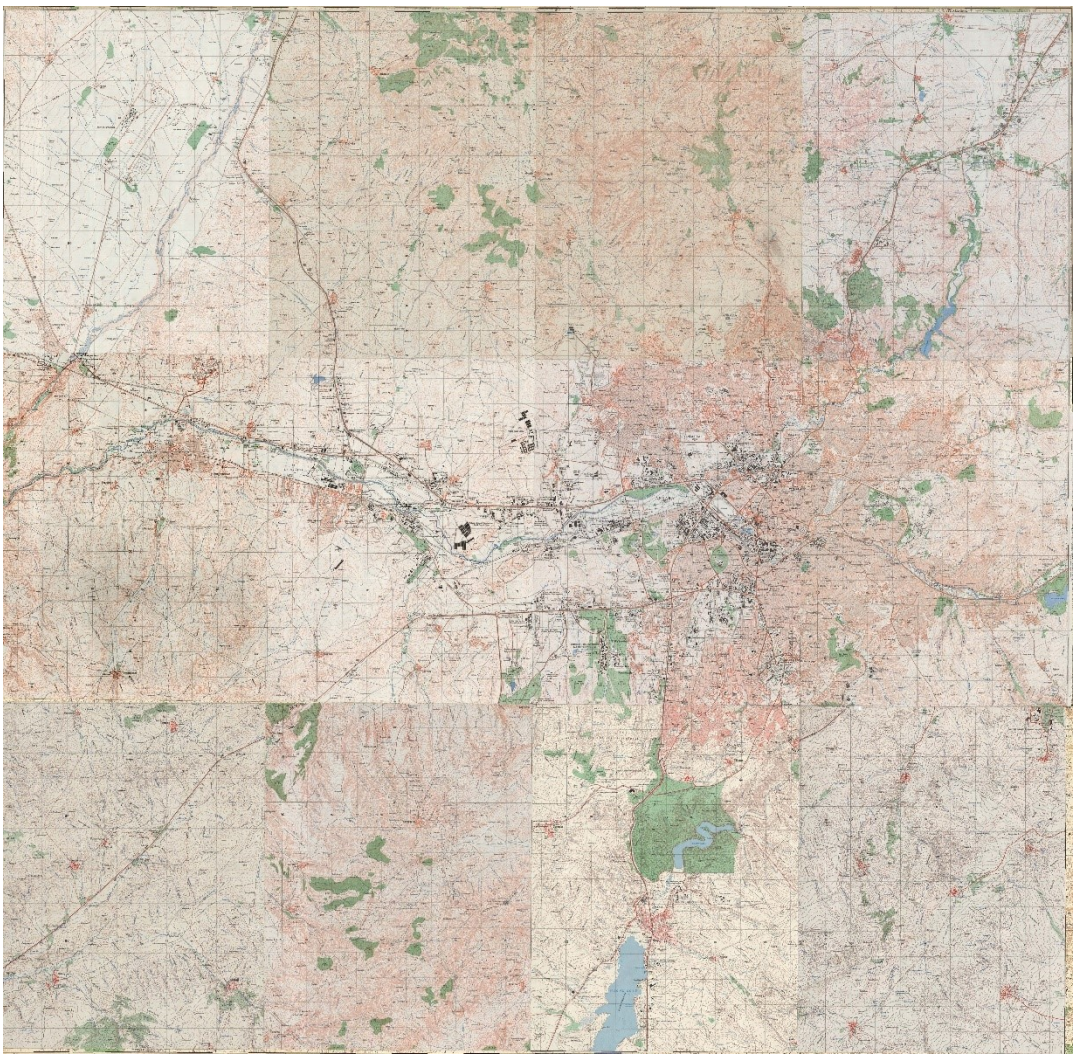
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# APPENDICES

## 1957 Map of Ankara



**1981 Map of Ankara**



**1994 Map of Ankara**

