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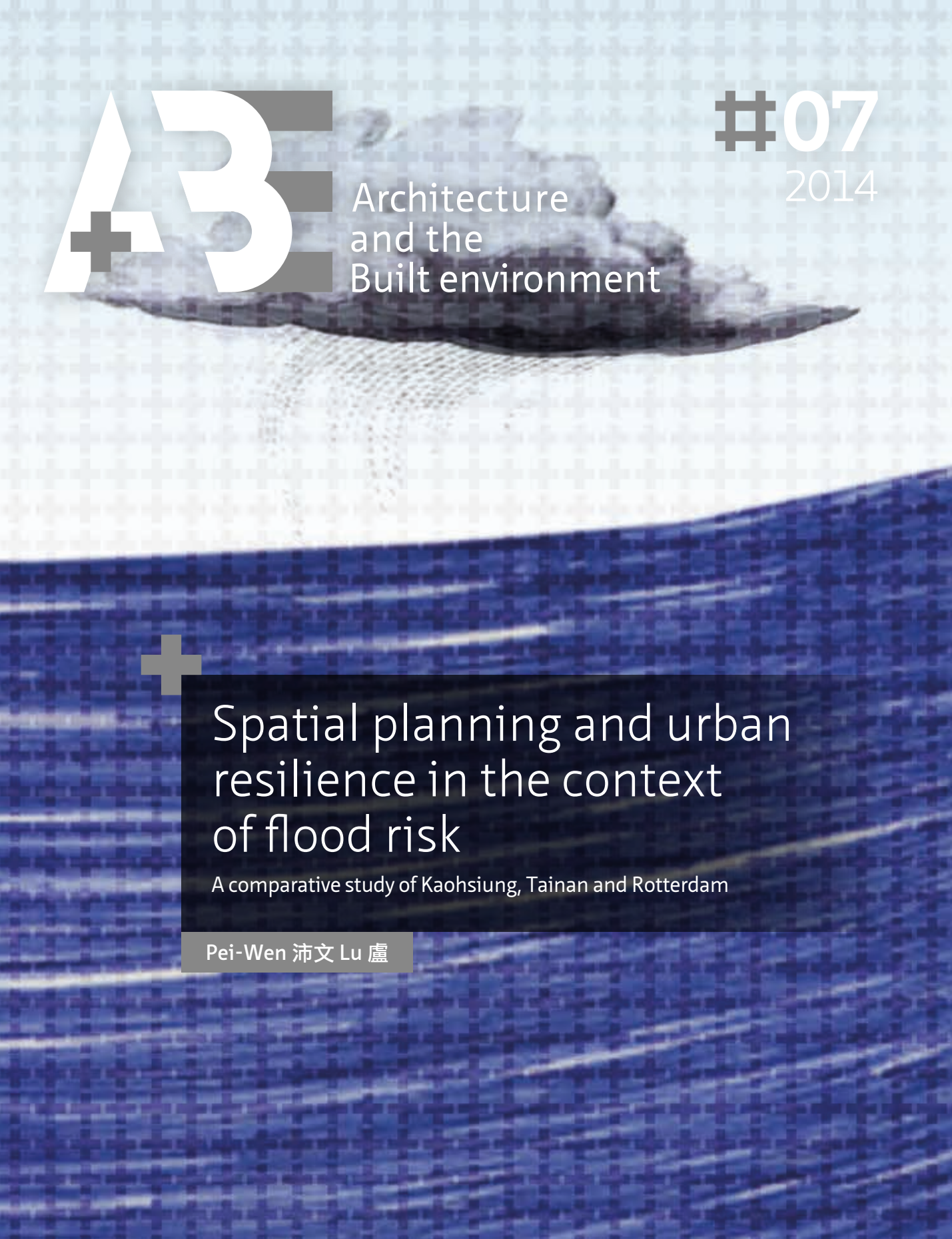

Spatial planning and urban resilience in the context of flood risk

A comparative study of Kaohsiung, Tainan and Rotterdam

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To my beloved families, Yang-Ting and my son

Contents

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Obtaining a PhD has been a journey that has trained me to be more resilient – to prepare in coping with things that are not in my plans, and to perform confidently when these changes occur. In spite of having some difficult moments, there is no doubt that I enjoyed the journey of my doctoral study in Delft, the Netherlands. I particularly appreciated those people who assisted, supported and accompanied me on this journey. I know in my heart that I could not achieve my standing without you all.

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Peiwen Lu, Taichung, April 2014

Summary

Spatial planning is increasingly being considered as an important mechanism in coping with flood risk due to climate change. One of the reasons for this is that engineering approaches are increasingly expensive and cannot provide complete certainty of protection against climate-related floods. The thesis examines whether and how spatial planning is used in urban areas to promote resilience to flood risk and climate change. In this study, planning is considered as the regulation of physical implementation as well as the process of policy-making that guides spatial development. This process mainly involves the interaction and collaboration between actors (both public and private).

The notion of resilience is being used more and more in discussions of complex issues like the impact of climate-related flood risks on spatial development. The interpretations of resilience can vary significantly depending on the local context, the focus of spatial development and the interests of the actors involved in decision-making. The study proposes six characteristics of planning decision-making that can help to promote the resilience of cities. These comprise: (i) considering the current situation, (ii) examining trends and future threats, (iii) learning from previous experience, (iv) setting goals, (v) initiating actions, and (vi) involving the public. The importance of these characteristics over time for policy and practice is examined according to empirical evidence from detailed case study analysis. Six case studies are presented, four in Taiwan and two in the Netherlands. In all of the case studies, the issue of flood risk and spatial development is considered important by policy-makers, but the planning strategies used to tackle climate-related flood risks are often different, as are the experiences of flooding and governance arrangements. The information gathered is primarily based on interviews and the review of planning policies, government reports and research documents.

Comparative analysis is a central focus of the study. The analysis has both a national and international perspective, comparing cases within Taiwan and between Taiwan and the Netherlands. The national comparison examines the way in which local planning governance is addressed in shaping decisions to deal with flood risks. This can vary among cases which share similar spatial development objectives and national institutional framework. The international comparison between Taiwan and the Netherlands examines the roles of planning to promote urban resilience in the context of flood risk and climate change.

Three conclusions can be drawn. First, the interpretation of resilience is dependent on the views and interests of the actors involved. These change over time and can be seen in different episodes of policy-making. Second, the importance of the different

assessment characteristics varies from one case to another. The interests of the leading actors, the interpretations of flood risks and the framework of local collaboration are all major factors that shape these differences. These factors are often associated with planning traditions and relatively stable in resistant to change. Third, when there is a collaborative framework for planning involving multiple actors, the result is a more comprehensive set of strategies in dealing with flood risk.

Samenvatting

Het concept veerkracht wordt steeds vaker toegepast in relatie tot ruimtelijke ordening en klimaatverandering. Een van de redenen hiervoor is dat technische benaderingen steeds duurder worden en niet zekerheid kunnen bieden voor bescherming tegen klimaat gerelateerde overstromingen. Ruimtelijke planning wordt vaak voorgesteld als een belangrijk mechanisme om strategieën te ontwikkelen die om kunnen gaan met deze onzekerheid van klimaatverandering en overstromingen. Dit proefschrift onderzoekt óf en hoe veerkracht wordt gebruikt in de ruimtelijke planning in de context van overstromingen die gerelateerd zijn aan klimaatverandering. In het onderzoek wordt het plannen gezien als het proces van beleidsvorming dat de ruimtelijke ontwikkeling stuurt. Dit proces heeft voornamelijk te maken met de interactie en samenwerking tussen de actoren. Het gebruik van veerkrachtigheid in beleidsmakende planning is vaak dynamisch en afhankelijk van de plaatselijke context.

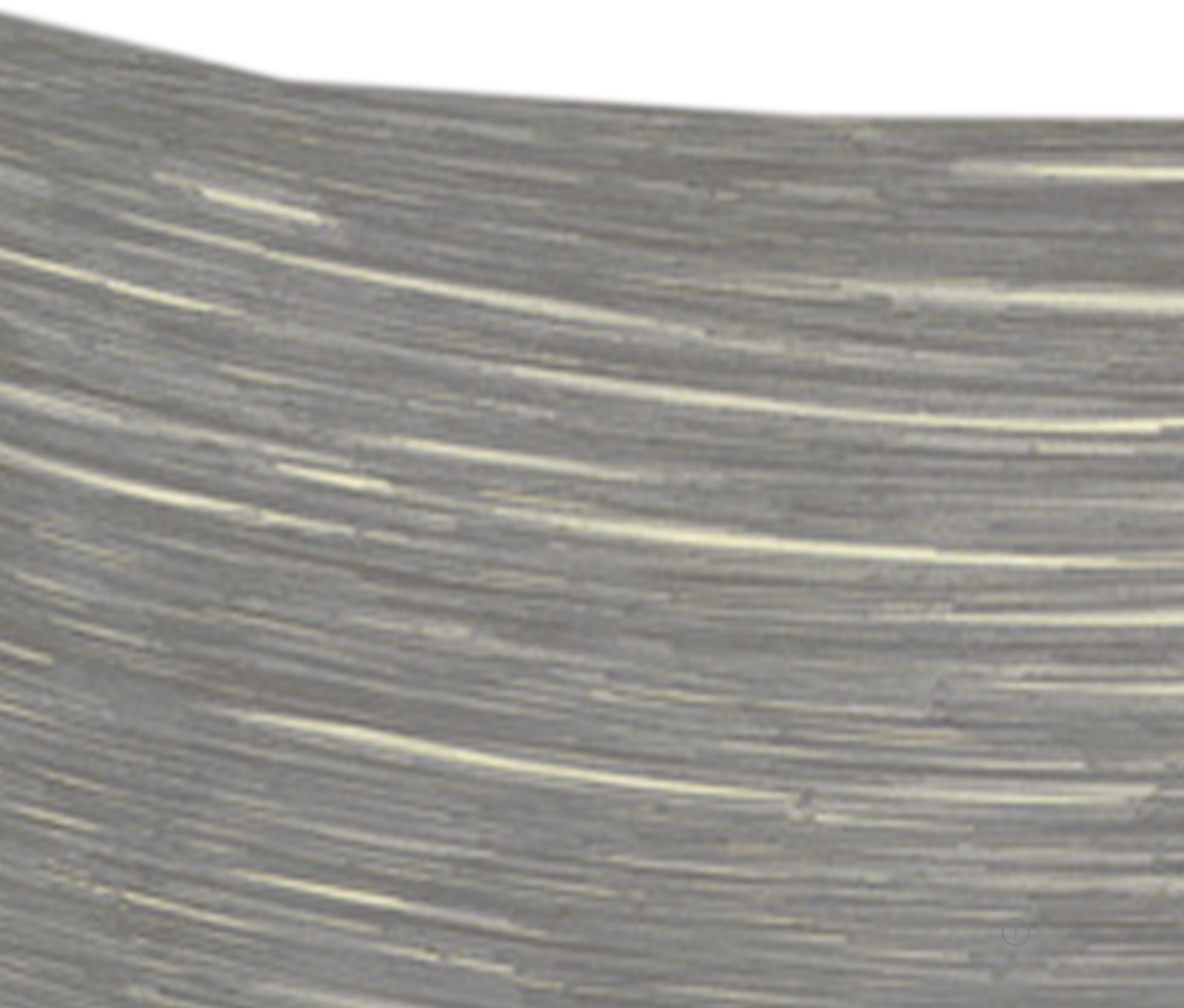
Het begrip veerkracht komt steeds vaker naar voren in discussies over ruimtelijk ordening, vooral in relatie tot complexe problemen, zoals de invloed van klimaat gerelateerde overstromingsrisico's in steden. Het begrip wordt op verschillende manieren geïnterpreteerd, afhankelijk van de doelen en belangen van de actoren die betrokken zijn bij het proces van besluitvorming. In deze studie worden zes karakteristieken van ruimtelijke ordening onderscheiden die het begrip veerkrachtigheid helpen bevorderen. Deze omvatten; (i) de huidige situatie overwegen, (ii) het bestuderen van trends en toekomstige bedreigingen, (iii) het leren van ervaring uit het verleden, (iv) het stellen van doelen, (v) het initiatief nemen om actie te ondernemen en (vi) het publiek betrekken. De studie overweegt hoe deze karakteristieken na verloop van tijd belangrijk zijn voor beleid en uitvoering.

Het onderzoek is gebaseerd op empirisch bewijs uit analyses van gedetailleerde casestudies. Er worden zes casestudies gepresenteerd, waarvan vier in Taiwan en twee in Nederland. In elke studie is het probleem van overstromingsgevaar en ruimtelijke ontwikkeling een belangrijk punt voor de beleidsmakers. De planningsstrategieën om deze klimaat gerelateerde overstromingsrisico's aan te pakken verschillen echter door uiteenlopende ervaringen met overstromingen en overheidsregelingen. De data is hoofdzakelijk gebaseerd op interviews en herzieningen van ruimtelijke planningsbeleid, overheidsverslagen en onderzoeksdocumenten.

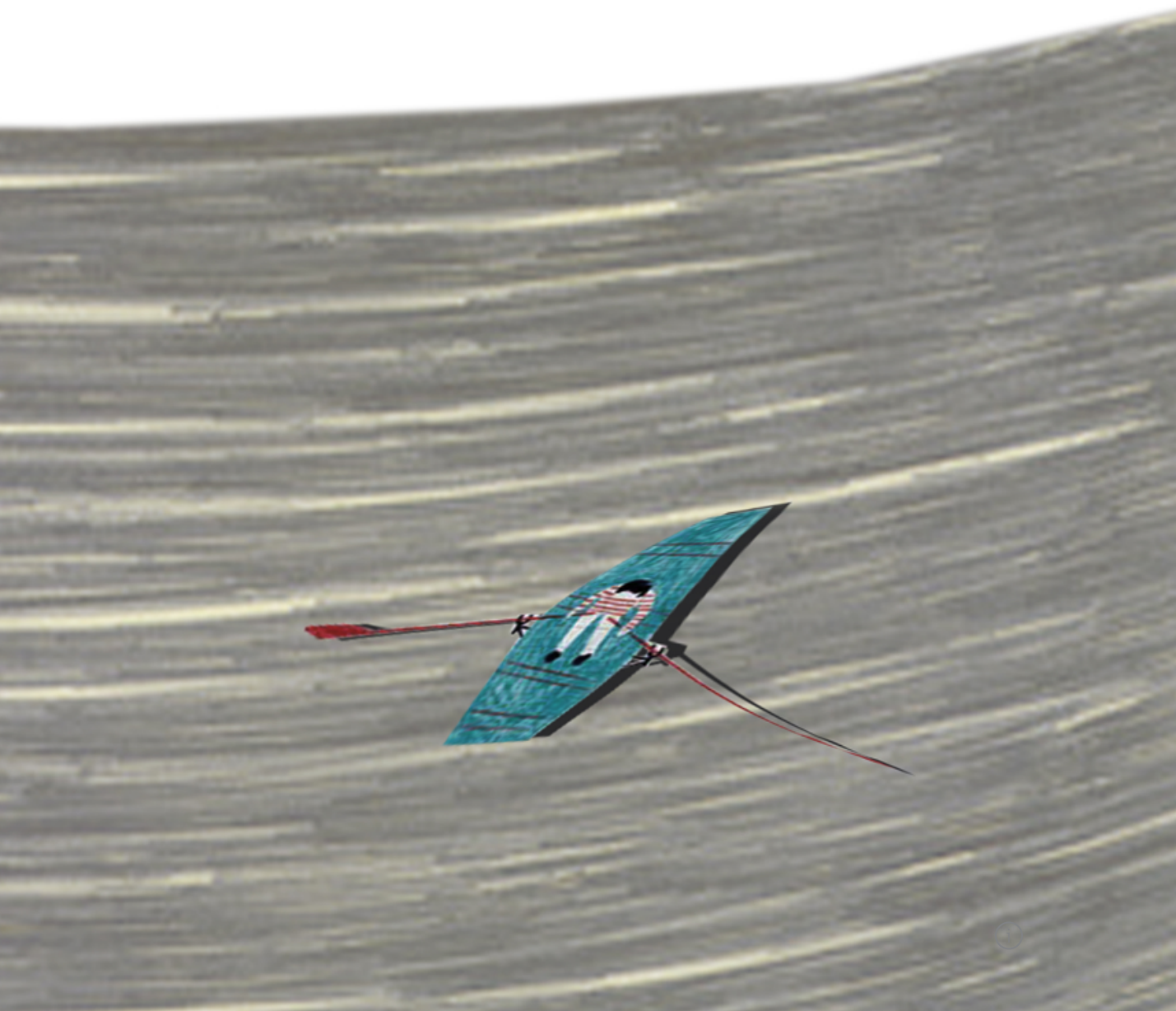
De vergelijkbare analyse is een centrale focus binnen het onderzoek. De analyse heeft een nationaal en internationaal perspectief, waarbij cases binnen Taiwan worden vergeleken en cases tussen Taiwan en Nederland. De nationale vergelijking onderzoekt of en hoe lokale beleidsmakers deze karakteristieken reflecteren waarbij elke casestudie binnen dezelfde nationale institutionele kader valt. De internationale

vergelijking tussen Taiwan en Nederland onderzoekt wat de kritische elementen van veerkrachtigheid zijn in relatie tot planning en het beheer van overstromingsrisico's.

Er kunnen drie conclusies worden getrokken. Ten eerste is de interpretatie van veerkrachtigheid afhankelijk van de denkbeelden en belangen van de actoren. Deze veranderen na verloop van tijd en kunnen gezien worden in bepaalde episoden. Ten tweede verschilt het belang van de verschillende karakteristieken van veerkrachtigheid per case. Het doel van de leidende actoren, de interpretaties van overstromingsrisico's en de betrokkenheid van niet-overheids actoren (NGOs) zijn grote factoren die diversiteit in planningsstrategieën veroorzaken. De gangbare manier van ruimtelijke planning is erg van belang bij lokale beleidsmaken. Deze manier van planning reflecteert de sociale waarden, de zwaartepunten van de ruimtelijke ontwikkeling en de algemene overtuigingen aangaande leiderschap. Ze zijn tamelijk stabiel en vaak moeilijk te veranderen. Ten derde is er, wanneer er een samenwerkingskader is voor planning waarbij meerdere actoren betrokken zijn, resulteert de situatie vaak in meer bevattelijke strategieën voor het omgaan met overstromingsrisico's. Bij strategieën met een samenwerkingskader komen de karakteristieken meer naar voren.



PART 1 Definition of the problem



1 Introduction

This thesis examines the way in which spatial planning can be addressed in promoting resilience to cities in coping with flood risks and climate change. Planning, in this study, is not only about the regulations of physical development but also the process of reaching binding agreements in policy-making. The research is based on case studies in Taiwan and the Netherlands. These two nations share a similarity in their willingness to develop strategies to cope with the disturbances of climate-related floods. However, the planning strategies they use to tackle flood risks are often different, as are their experiences of flooding and governance arrangements.

In Taiwan, typhoon Morakot in 2009 brought over three metres of heavy rainfall in the southern part of Taiwan within four days. Hundreds of people died as a result of mudslides and other flooding consequences. The economic loss of the flood was over five hundred million euros (National Science and Technology Center for Disaster Reduction, 2010). Storms with such extreme rainfall may occur more frequently and will likely result in more disasters in the coming decades. The situation is made even more vulnerable when considering that the sea level is expected to rise 0.18 metres by 2030 and 0.59 metres by 2090 (Water Resource Agency and Sinotech Engineering Consultants, 2010).

In the Netherlands, although no severe flooding disaster has occurred since the mid 1990s, policy-makers are increasingly considerate of the impact of potential floods on spatial development as a result of sea levels rising and more extreme water discharge in rivers draining into the sea (Zevenbergen et al., 2013a). Reports of scientific projections highlight that sea levels could rise by between 0.20 and 0.40 metre by 2050 and by as much as 1.30 metre by 2100 (van den Hurk et al., 2006, Royal Netherlands Meteorological Institute, 2006, Delta Commissie, 2008). If local ground levels are included in this estimation, the estimated sea level increase in 2100 will increase by a maximum of 5 metres (van den Hurk et al., 2006). This scenario would cause the chance of flooding in cities along the west coast to be much higher than it is today. The Maestlant and Oosterschelde surge barriers would no longer be an effective means of protection (van de Ven, 2004, van den Berg, 2010). The potential disasters could cause severe disturbances to the country.

A number of recent studies acknowledge that planning can play an important role in tackling uncertain disturbances of flooding related to climate change (Wilson and Piper, 2010, Knieling and Filho, 2013, White, 2010, Davoudi et al., 2012). One of the reasons for this can be explained by a fact that the traditional engineering approach, such as increasing the height of dikes, has become insufficient to provide complete certainty of protection against climate-related floods (White, 2010). Planning is

therefore considered to be a useful way to adapt to unexpected disturbances through land use management. This study takes a broad understanding of planning that considers more than just the regulations of physical development. It considers that planning also includes the process of reaching binding agreements in planning policy-making. This guides spatial development in terms of integrating and collaborating activities between actors involved in planning decision-making. The activities can be reformed continually, never reaching an end state.

Planning as an integrated activity is one of the ways that spatial development is conceived. According to Healey (1997), planning has been woven together out of three strands of thought. The first strand is economic planning that aims to form a welfare state by managing the productive forces of a place. The second is the management of physical development planning. This strand often focuses on urban settings that help to provide spatial development for economy, liveability and beauty. The third is the management of public administration and policy analysis. This strand often highlights the importance of the process of decision-making to achieve both effectiveness and efficiency in meeting explicit goals set for public agencies. Planning in real situations often takes one of the strands as a core direction and mixes the others for spatial development. The combination of these strands is related to the historic paths, the government interests and the traditions of debates (Stead, 2013a). This makes planning in one place different from another. For example, planning in Taiwan mainly follows the direction of economic development. The strand of economic planning is more influential in directing spatial development. In the Netherlands, spatial planning presents a stronger focus on public administration and policy analysis. Negotiation and communication is more central to spatial development (Woltjer, 2000).

In spite of having different planning traditions, policy-makers in Taiwan and the Netherlands seem to have a similar situation in which short- or medium- term projects have gradually replaced the original long-range approach of planning for physical development. This is because urban development does not completely follow the government rules but has to address the demands of a wider set of stakeholders involved in policy-making. As a result, the government becomes less influential and has less direct control over the implementation in plans. The development of a city has become more dependent on negotiation and collaboration in the process of decision-making and less possible to prepare in advance. Because of this, it is necessary to examine new concepts addressed in planning discussions. The notion of resilience has grown popular as a concept which can help in planning to address the increasing number of uncertain disturbances, such as flood risks and the impact of climate change. Urban resilience is often considered as the ability to respond to a contemporary sense of complexity, uncertainty and insecurity, and to set up new approaches or priorities for adaptation and survival (Christopherson et al., 2010). The discussion of urban resilience has also been addressed in studies of physiology and other non-environmental fields, for example, the security issues from potential attacks

of terrorism (Coaffee, 2009, 2008). The study of resilience in planning began in the late 1990s. At that time, the discussion of resilience focused on developing strategies to mitigate environmental threats. This was often related to physical and infrastructure improvements to prevent the occurrences of disturbances. The focus of resilience in planning was developed further during the late 2000s when the environmental threats caused by climate change had become more prominent and more difficult to prepare in advance. Resilience, in this respect, is about the capacity of a city to respond, recover and reform from unforeseen disturbances that may eventually become the opportunities for spatial development (Lu and Stead, 2013).

Resilience is often addressed implicitly in planning decision-making. Policy-makers may use the underlying ideas of the notion in shaping decisions without using the terminology directly. Policies for resilience are often embedded in and mixed with other approaches, such as adaptation, mitigation or sustainability (Stead and Tasan-Kok, 2013). Strategies that guide spatial development toward resilience can vary from one place to another in relation to the interpretation of the concept and the core values, the strands of thought, in planning. For example, the adaptive strategy, *Room for the River (Rumite voor de Rivier)*, was developed in the Netherlands to offer more space for water by changing current river conditions, engineering infrastructure and land use strategies (Ruimte voor de Rivier afdeling Communicatie, 2007). Around the same time, the mitigation project, *Regulation Project for Flood-prone Area*, was implemented in Taiwan to facilitate flood-vulnerable areas with a more defensive infrastructure for water protection (Water Resource Agency, 2006).

The implications of the notion of resilience in a place can vary depending on the focus of decision-making. However, the broadness and the fuzziness of the notion can also be advantageous in policy-making for spatial development by forming a more comprehensive framework of collaboration that includes different groups of interests (Eraydin and Tasan-Kok, 2013). This is important in dealing with complex issues, such as the uncertainty of climate change and flooding.

Based on the existing knowledge of urban resilience in planning thinking, the discussion of the study examines how local planning is addressed or transformed to promote urban resilience in cities in coping with flood risks and climate change. Studying urban resilience in local planning practice in relation to water, climate change and flooding is particularly crucial at this moment when the theoretical discussions of resilience are being widely presented in planning studies while the practical implications are less frequently addressed.

Because the use of urban resilience in practice is highly dependent on policy-making in the local contexts, a more comprehensive finding can only be unveiled by multiple cases and by comparative studies. The empirical study will present local planning stories in Kaohsiung (Taiwan), Tainan (Taiwan) and Rotterdam (the Netherlands)

that have occurred since the 1990s in relation to spatial development and flood risk management. Two cases are presented in each city, one in the city centre and another on the edge of the metropolitan region, so that the evidence can more accurately portray the real situations. The data was collected between 2009 and 2013 primarily by interviews and supplemented by investigation of planning policies, government reports and research documents.

The comparative analysis contains two parts. The first part is the national comparison between the Taiwanese cases. It examines the way in which local planning decision-making is addressed in coping with flood risks. This may differ from the directions of spatial development focused at the national level. The international comparison between Taiwan and the Netherlands examines the critical elements of planning in promoting urban resilience in the context of flood risk and climate change. It aims to unearth the role of planning in shaping planning strategies to face the complexity of flood risks.

This introduction presents the foundation of the study. It is structured in three parts. The first part explains the understanding of planning in this study, which is not just the exercise of control over land use but also a process of negotiation and collaboration. Next, it illustrates the notion of resilience that has been increasingly used in guiding planning decision-making in relation to the issues of uncertainty, such as climate change and flooding. This presents a suitable status to evaluate local decision-making to promote resilience. Finally, the structure of this book is presented. This gives a brief overview of the study.

§ 1.1 Situating the study in spatial planning

The history of contemporary planning ideas and practices shows various focuses of planning thinking in developing organisational mechanisms for spatial development. This can be explained by Healey (1997)'s argument considering the three main lines of planning focuses: economic planning, physical development planning and policy analysis planning. The line of economic planning highlights the importance of a continuing growth in a city and a fair distribution of the benefit of growth. Policies following the line of economic planning often show a close link between spatial development and economic growth. The line of physical development planning has a primary focus on material and functional concern for the qualities of urban development. These concerns often led to interest in building regulations and in the strategic regulation related to the location of development. The line of policy analysis planning highlights the importance of having a more efficient and effective way in managing public administration. This often results in framing a rational planning process that sets legal rules for administration. The study

focuses on case studies in which different lines of planning have been addressed. The Taiwanese cases showcase the places where economic planning is primarily emphasised in policy-making, and the Dutch cases present the examples where the focus of policy analysis planning is more evident.

Within the different lines of planning thought, planning is mainly considered as a process to resolve disputes, to release tensions, to negotiate among different interests and to develop guiding actions for the environment (UNECE, 2008, Mastop and Faludi, 1997). Typically, it is mainly related to a group of technocratic professions, mainly government authorities, to join together and make decisions of land use control. In planning practice, non-government groups are seldom involved in decision-making or can only be heard after a plan is practically adopted in a place. Measures and analyses are an important part of the profession in formulating strategies of land use control for long-term development.

The formalised groups of planning professions have been challenged in managing the complexity and widening diversity of urban development since the late 1980s. Market-oriented development has become increasingly dominant in shaping the way cities are formed and function. This is addressed both in Taiwan and the Netherlands. The power of planning professions was therefore weakened and became less capable in controlling the development. In some cases, the development power from the market is so strong that it causes governments to offer an exception to the rules. The rigid control type of plans has therefore become lack of conformity in directing spatial development.

This situation is causing scholars to rethink the meaning of planning in managing spatial development. In Europe, scholars have had a broader understanding of planning that involves a conformity between policies and physical developments as well as the process that stakeholders address together and initiate a certain decision for spatial development (e.g., Healey, 1997, 2006, 2007, Albrechts et al., 2003, Albrechts, 2004, 2010, Mastop and Faludi, 1997, Faludi, 2000, Nadin, 2007, 2010, Nadin and Stead, 2008, Allmendinger and Haughton, 2010). The term spatial planning was introduced in this context during the late 1990s to refer to this broader understanding of planning. Studies of spatial planning often focus on the importance of the process of decision-making that leads to a consequence of physical development. In the studies of spatial planning, a wider set of actors involved in decision-making and their arguments are crucial in shaping or reshaping a planning decision. It is important to examine the process of collaboration and negotiation that forms general agreements in dealing with a specific issue or a conceptual direction for future development.

The assessment of spatial planning cannot just consider the conformity between plans and physical development. It is also critical to examine factors addressed in the process of policy-making, such as the coalitions and the shared agreements among the actors. This is discussed in the theoretical study of *conformance and performance* (Mastop

and Faludi, 1997, Mastop, 1997, Faludi, 2000). The discussion of conformance and performance is based on a realisation that planning has become more complex and dynamic in today's context. The assessment of conformance is about measuring the relationship between plans and physical development, and the examination of performance is more related to the process of decision-making that has becoming increasingly crucial in directing spatial development.

Although the term spatial planning can be increasingly found in studies addressed in the non-European contexts, spatial planning is still typically presented as a continental European concept (Allmendinger and Haughton, 2010). The importance of collaborating and integrating activities is increasingly emphasised on policy-making in places outside of Europe. However, policy-makers seem to remain the traditional understanding of planning as governmental tools for land use management. For example, planning in Taiwan is mainly considered as a governmental implementation, even though spatial development in a real situation is deeply influenced by the coalitions of a wider set of actors involved in policy-making. A major contribution of this study is the examination of the coalition addressed in local planning decision-making, which has not yet been emphasised in the Taiwanese context. This presents a challenge in designing the study. This study has a specific focus on examining spatial planning in the Taiwanese context that considers the relations between the process of decision-making and physical development in local practices. The comparative analysis in Taiwan and the Netherlands can therefore form the discussion of spatial planning more comprehensively.

§ 1.2 Setting the study in the notion of urban resilience

The notion of resilience in the study indicates a planning concept referring to the capacity of a place in coping with outward disturbances, such as flood risks and the impact of climate change. Resilience has a variety of disciplinary origins, including ecology, business studies, material science, engineering and psychology (Holling, 1973, Gunderson, 2000, Hyslop, 2007, Downing et al., 2012). The issue of change often plays a critical role of illustrating the notion of resilience, both in terms of resistance to change and recovery from it. Some of the early resilience literature originates from ecological studies in the 1970s (e.g., Holling, 1973). Social scientists applied the term resilience in the 1980s to analyses of the capacity of a self-organising system (e.g., a person, settlement or society) to withstand impacts (e.g., disaster, disease, crisis or natural hazard) without being destroyed (Vayda and McCay, 1975, Zimmerer, 1994). The ability to 'learn' from previous experiences was particularly highlighted in social studies.

The notion was firstly introduced in the field of urban planning in the 1990s to help define how planning can be addressed in society to withstand disturbances and to reorganise following disturbance-driven changes (Walker et al., 2002, Mileti, 1999). The literature on resilience in this time often puts emphasis on preparation and mitigation actions (Godschalk, 2003). This closely coincides with a general understanding of planning as a means of minimising existing disturbances (e.g., avoiding 'bad neighbours' through the separation of certain land uses) and reducing the risks and negative effects of possible disturbances (e.g., locating developments away from ecologically sensitive or flood-prone areas). A decade later, the literature on resilience in planning had widened to encompass mitigation strategies, in addition to adaptation, such as reducing greenhouse gas emissions and addressing climate change (Newman et al., 2009). Moreover, the literature focuses on adaptation with the realisation that mitigation is often not sufficient to prevent some disturbances from occurring.

The notion of urban resilience is becoming increasingly prevalent in urban policy documents considering the uncertainty, such as climate change and flooding (Jabareen, 2013, Wardekker et al., 2010). One of the advantages of this concept in planning decision-making is related to its efficacy to understand, manage and govern the uncertainty between people and nature created by disturbances (Folke et al., 2004). This provides a broader consideration to sustain spatial development in facing the unstable circumstances.

Among many discussions of the notion of resilience in planning, this study focuses on the scope of the resilience notion in managing climate-related flood risks. Flooding caused by the impact of climate change may occur as disruptive events, such as extreme rainfalls, as well as gradual trends, such as rising sea level. Both may heavily damage a city if decision-makers do not take the circumstances into account. The discussion of resilience is often addressed in places where policy-makers are keen to develop strategies in tackling the extreme events. This provides a suitable status to examine how spatial planning is addressed in promoting resilience to tackle the issues of flood risks in local practices.

§ 1.3 Structure of this book

This book is divided into five parts with eleven chapters. They are: Part I: definition of the problem, Part II: conceptual and empirical framework, Part III: exploring resilience in local practices, Part IV: assessing planning performance from a resilience perspective and Part V: synthesis and conclusion. The structure and the contained chapters are

shown in Figuur 1. Chapter 1 in Part I presents an introduction of this book. This chapter describes the problem statement and the objectives of the study. It also briefly summarises the understanding of spatial planning and the notion of resilience. More discussions of these two ideas are presented in Chapters 2 and 3.

Part I: Definition of the problem	Chapter 1: Introduction
Part II: Conceptual and empirical framework	Chapter 2: Toward a comprehensive understanding of planning Chapter 3: Applying resilience: planning as preparation for flooding and climate change Chapter 4: Methodology
Part III: Exploring resilience in local practices	Chapter 5: Planning in Taiwan and the Netherlands Chapter 6: Kaohsiung, Taiwan Chapter 7: Tainan, Taiwan Chapter 8: Rotterdam, the Netherlands
Part IV: Assessing resilience in local collaborative networks	Chapter 9: National comparison of two cities in Taiwan Chapter 10: International comparison between Kaohsiung, Tainan and Rotterdam
Part V: Synthesis and conclusion	Chapter 11: Summary and conclusion

Figuur 1
The structure of this book

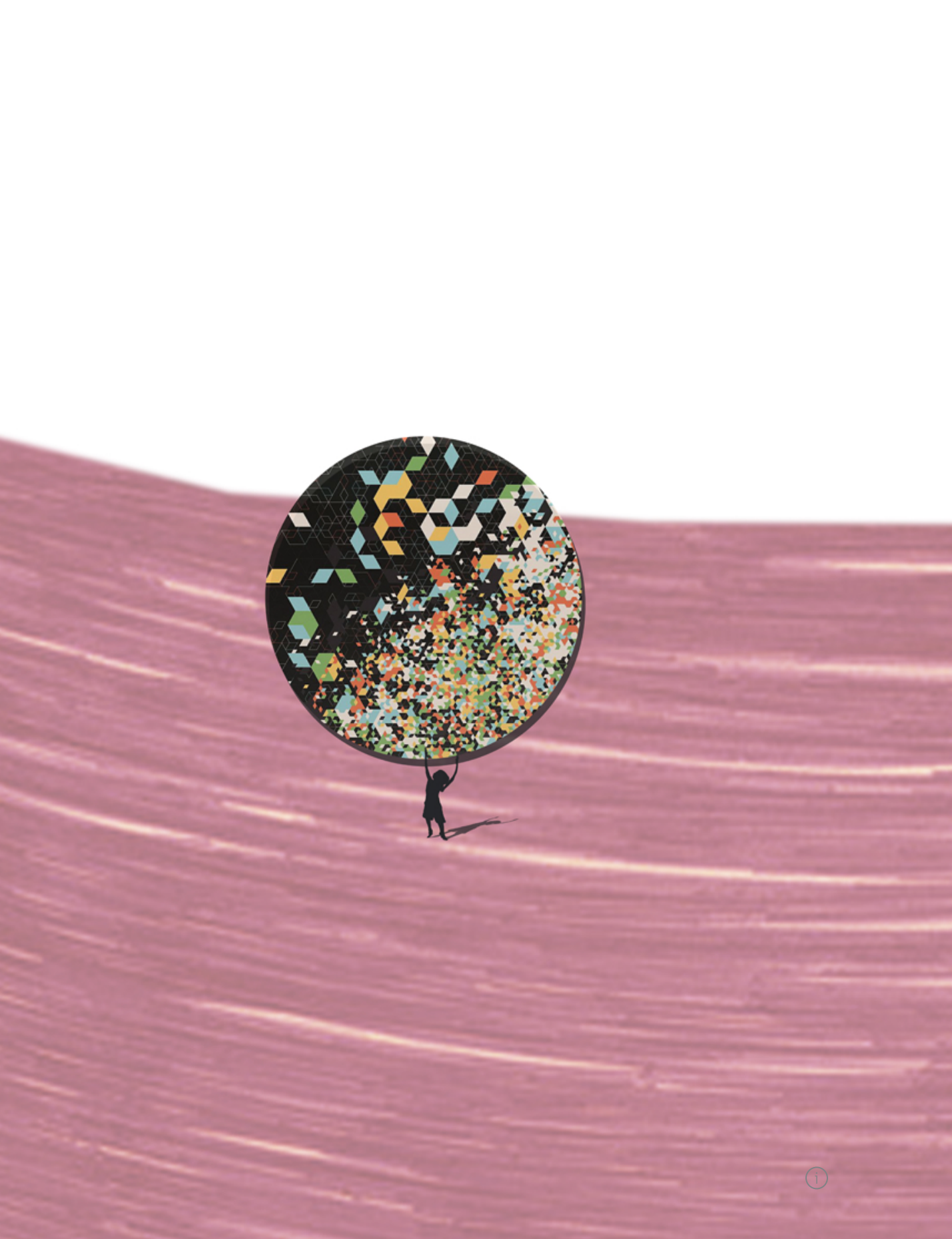
Part II contains three chapters. Chapter 2 presents the understanding of planning and governance and the relations between these two. This chapter concludes by outlining the four dimensions of spatial planning as collaborative frameworks, discourses, plans and policies and spatial development. These dimensions are used in the empirical studies as a framework to understand local planning stories in the study areas. In Chapter 3, a historic overview of the notion of resilience and its importance in framing strategies to tackle uncertain disturbances of climate change and flooding is presented. The review of the literature helps to define six planning characteristics especially relevant to resilience. These comprise, considering the current situation, examining trends and future threats, learning from previous experience, setting goals, initiating actions, and involving the public. These characteristics form a framework for comparative analysis of the case studies. Chapter 4 presents the analytical framework

of the study. It also contains the discussions considering the research design, research questions, assumptions, expected results and the limitations.

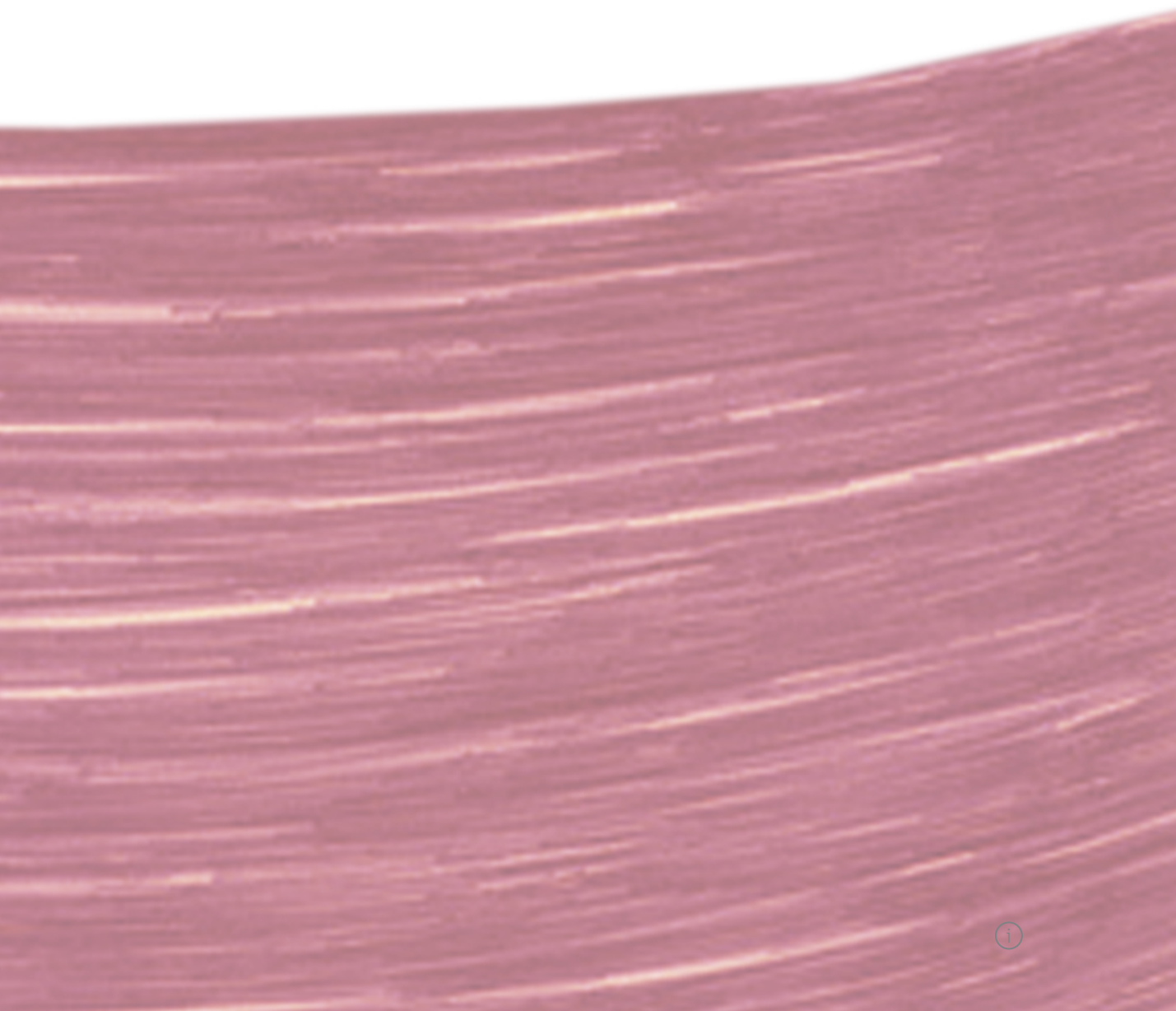
The four chapters in Part III form the empirical study. Chapter 5 introduces planning in Taiwan and the Netherlands according to the specific focus on the four planning dimensions. It also illustrates the background of local planning in the three cities and describes the impact that climate-related floods have had in the study areas. The following chapters are the case studies in the three cities: Kaohsiung (Chapter 6), Tainan (Chapter 7) and Rotterdam (Chapter 8). In these chapters, I present six local planning stories that have been addressed since the 1990s in relation to spatial development and flood risk management. Two separate cases are presented in each city in order to provide more reliable evidence for discussion. One case is in the city centre and another is on the edge of the metropolitan boundary.

The two chapters in Part IV are studies of comparative analysis. The discussions in these chapters focus on the collaborative framework of local policy-making. The six planning characteristics presented in Chapter 3 are used for structuring the assessment. The analysis of the national comparison is addressed in Chapter 9. It contains the four cases in Taiwan. The national comparison evaluates the way in which local planning governance is addressed in shaping decisions to deal with flood risks. This can vary between cases where share similar interests of spatial development at the same national institutional framework. Chapter 10 presents the assessment of local policy-making in Rotterdam and the discussion of the international comparison of the six cases in Taiwan and the Netherlands. The intention of the international comparison is to discover the critical roles of planning to promote a resilient city in facing flood risks and climate change.

Chapter 11 in Part V is devoted to the conclusions and evaluation of the outcomes of this study. This chapter is presented under the three headings: the conclusion of the study, the reflection of the methodology and a critical reflection with an outline of future research. The discussion in this chapter puts specific emphasis on the focus of planning addressed in local decision-making to promote urban resilience. This helps to understand the importance of spatial planning in coping with the issues of flood risks and climate change.



PART 2 Conceptual and empirical framework



2 Toward a comprehensive understanding of planning

The literature on contemporary planning ideas and practices refers to different strands of spatial planning and development. According to Healey (1997), there are at least three interpretations of spatial planning: economic planning, physical development planning and policy analysis planning. The focus of economic planning highlights the importance of a continuing growth in a city and a fair distribution of the benefit of growth. Policies following the line of economic planning often show a close link between spatial development and economic growth. The focus of physical development planning has primary concerns on materials and functions that can improve the qualities of urban development. This often leads to interest in building regulation and strategic regulations related to the location of development. The focus of policy analysis planning has grown out of the search for ways to make public administration more efficient and effective.

Planning in real situations is often based on one of the three strands, sometimes in combination with the others. The combination of these strands is related to the historic paths, the government interests and the traditions of debates in a given location. This makes planning in one place different from another. For example, planning in Taiwan mainly has an economic development focus. The importance of economic planning is strong and directly influences spatial development. Meanwhile, in the Netherlands, spatial planning has a stronger focus on public administration and policy analysis. Negotiation and communication is central to spatial development.

In spite of having different focuses, there is a general agreement that planning represents a way of guiding spatial development for the future (Faludi, 2000). This is traditionally considered to be land use planning that initiates plans and policies for the implementation of physical development. The approach of land use planning often has a clear task that requires regulations to be fulfilled. For example, by separating residential areas from industrial land use according to zoning regulations, the negative impact of industrial development can be reduced. Plans and policies in land use planning are often made by a small number of actors, mainly the government authorities. Measures and analyses are used to support the argument of the development policies. Non-governmental groups are seldom involved in decision-making or can only speak out after a plan is practically adopted in a place.

Strategies of land use planning have been challenged in managing the complexity and widening diversity of urban development since the late 1980s when market-oriented development in most countries became increasingly influential in shaping

the way cities were formed and function. The power of land use control was therefore weakened. In some cases, the development power of the market is so strong that it forces the government to offer an exception in planning regulations for the development. Another challenge of land use planning presented more recently is related to the ability to cope with uncertain disturbances. This is particularly critical in facing the recent combination of the increasing vulnerability of populations due to climate change. Planning regulations can neither ensure the safety of the cities nor manage the social and economic impact caused by the disturbances. As a result, regulations for land use development have become so fragmented that they can hardly control spatial development.

European scholars began to use the term spatial planning in the late 1990s to describe a newer understanding of planning that considers the process of decision-making to be as important as the implementation of spatial development. Cullingworth and Nadin (2006) pointed out that planning is about managing '*the problem of coordination or integration of the spatial dimension of sectoral policies through a territorially-based strategies*.' This highlights the consequence of collaboration and negotiation in framing planning decisions. UNECE (2008) also highlighted the importance of planning for resolving disputes, releasing tensions and developing guiding actions for the environment.

Although the term can be increasingly found in studies related to non-European contexts, spatial planning is still typically presented as a continental European concept (Allmendinger and Haughton, 2010). In places outside of Europe, although the importance of collaborating and integrating activities is increasingly emphasised in policy-making, policy-makers seem to remain in the traditional understanding of planning as a governmental tool for land use management. For example, planning in Taiwan is often related to government strategies for spatial development. It is a challenge to examine the process of a vision of spatial development being addressed, transferred and shaping coalitions between actors involved in decision-making. This may result in difficulty in managing spatial development under the considerations of complex issues that require a combination of different policies, disciplines and professions, such as climate change and flooding.

In this context of the continental differences of planning understanding, this study is keen to examine how spatial planning can be used in both the Dutch and the Taiwanese contexts to discover the relationship between the process of decision-making and the physical development in local practices. The chapter presents the theoretical framework of the study. Four sections are included. The discussion begins by reviewing the shifts of planning understanding from land use planning to spatial planning. Next, the discussion takes a specific focus on assessing spatial planning by considering the conformity between plans and physical development and performance in decision-making. The governance of planning is discussed in the third section. This

helps the reader to understand whether and how the integrating and coordinating activities are formulated to shape planning decisions. The chapter concludes by presenting the four dimensions of planning which are based on the existing studies of spatial planning. These dimensions are used to exhibit policy-making and local practices in the case studies.

§ 2.1 Shifts toward spatial planning

This section presents the shifts in planning consideration from land use planning to spatial planning. The term land use planning is used to represent the traditional view of planning that often had a clear physical task to achieve. For example, policy-makers would initiate a development plan to construct a highway for car transportation or to build dikes for flood protection. Typically, actors involved in decision-making were mainly government officials and experts who represented technocratic professions in their fields. Public participation was rare or occurred only after a plan was decided or practically adopted. Land use plans often had a clear timetable for implementation. The implementation might have taken decades to complete, while the sequence of each phase was usually separated and could be clearly defined. Projects of land use planning were mainly evaluated by the conformity between plans and practical outcomes. The process of policy-making was seldom considered in the assessment.

Various scholars in Europe began to criticise the approach of land use planning in the late 1990s (e.g., Healey, 2007, Albrechts, 2004, Mastop and Faludi, 1997, Faludi, 2000, Nadin, 2007, 2010, Haughton et al., 2010). A major criticism from them was that as cities developed it was becoming more difficult to follow the plans made by the government. Rather, it often depended on a network of collaboration between various actors involved in policy-making. Mastop and Faludi (1997) argued that this situation was particularly encountered in north-western European countries where more and more development plans were being made in collaboration with multiple actors and authorities that did not always represent the government.

The term spatial planning was introduced in this context representing a newer understanding of planning that considered the process of decision-making to be as important as the implementation of spatial development. The difference between the more traditional approach of land use planning and the newer approach of spatial planning has been discussed in many European planning studies. Discussions of spatial planning are often related to the integrating and coordinating activities between actors involved in policy-making. These activities formulate a continual process of collaboration to generate a shared agreement for spatial development. Discussions in

spatial planning do not always lead to a plan for physical development. The outcomes of the discussions can be a more specific understanding of the problems, a possible (but not prescribing) solution to tackle the issues or a conceptual vision for urban development.

Spatial planning understands planning as a continual process of negotiation and communication. This process is more open and flexible than land use planning, so the visions, actions and means for implementation can be produced to fit the needs of development (Healey, 1997, Albrechts, 2004, Albrechts et al., 2003). The process of negotiation may spend years in discussions before a development plan can be initiated. This process is continuous and has no end-state. For example, the discussion of urban regeneration may take years before physical strategies are implemented. This discussion may continue even after physical implementation has been completed.

The outcomes of spatial planning are seldom presented as clear plans or schedules for implementation. Rather, they are mainly agreements or visions that form a platform for collaboration between various groups of interests. Under the long-term visions, short- or medium- term activities for spatial development may be developed (Mastop and Faludi, 1997, Mastop, 1997, Faludi, 2000). This provides more opportunities to manage external changes or new challenges of cities, such as a change in government attitudes, a shift in the coalition between actors involved in policy-making, or an economic downturn.

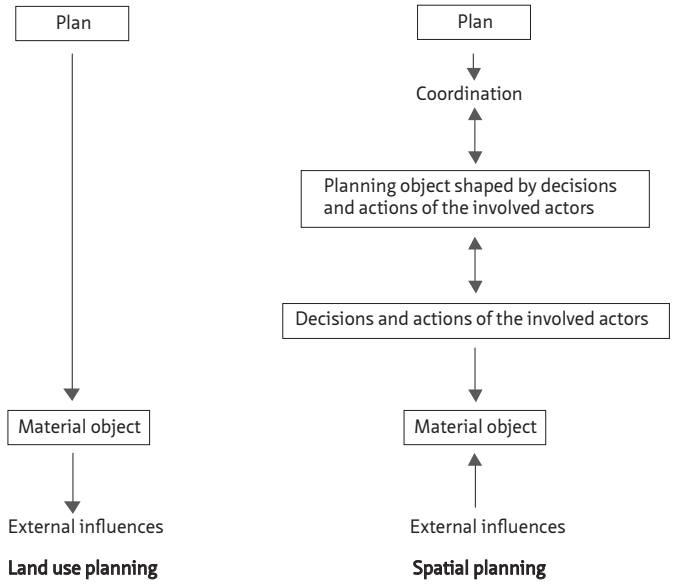
Actors and their coalitions are important for framing the collaborative networks of policy-making. Their collaboration is not just for making decisions of implementation but also for framing coalitions or networks to shape a more coherent agreement for spatial development. According to Haughton et al. (2010), spatial planning often has a wider range of actors involved in policy-making. These can be officials who represent the power of the government authorities, leaders of local NGOs, or private stakeholders who are interested in shaping the development of a city. Their coalitions are more flexible and may change over time depending on interests, resources and power of governance. A change of participants often leads to the necessity of reforming the original agreements of spatial development. However, some basic agreements, such as urban sustainability, may still be influential in shaping planning decisions in spite of having new actors involved in policy-making.

§ 2.2 Assessing spatial planning: conformance and performance

The assessment of spatial planning cannot just consider the conformity between plans and physical development. Other factors involved in the process of policy-making, such as the role of planning concepts and the networks of collaboration, are also important. This can be explained by using the theoretical discussion of *conformance and performance* (Mastop and Faludi, 1997, Mastop, 1997, Faludi, 2000). Mastop and Faludi (1997) pointed out the assessment of conformance is about measuring the relations between plans and physical development, and the assessment of performance is more related to the process of policy-making that has become increasingly crucial in directing spatial development. The discussion of conformance and performance is based on a realisation that planning has become more complex and dynamic. As shown in Figuur 2, there are various factors involved in the process that leads from the making of plans to material objects. The coordination that shapes the decisions and actions of the involved actors plays a critical role in directing spatial development. The coordination is often dynamic and may change overtime. This causes it to become more difficult to analyse planning by the traditional view of planning assessment that considers only the conformity between plans and physical development. As a result, the evaluation of planning performance, the process of decision-making, is necessary.

This highlight of assessing planning performance also presents a broader view in defining the positive or negative contributions of a plan on spatial development. From the perspective of land use planning, a mismatch between plans and physical development often considers a failure. However, from the perspective of spatial planning, this situation could only represent a change in priority or development interests.

The European spatial planning strategies provide an example of spatial planning. EU policy-makers offer general directions for spatial development, but leave the generating of the details to the member countries as they pursue their own goals. The criteria of planning assessment includes both the planning of practical development as well as the initiated framework of collaboration (Waterhout, 2008, Meijers et al., 2007, Faludi and Waterhout, 2006). For example, the issue of territorial cohesion has been presented at the European level as a multi-dimensional concept for spatial development. This task includes components to achieve, but does not have a clear schedule, practical regulations or implementation plans to follow (Nadin, 2010, Faludi, 2009).



Figuur 2
A different process of policy-making between land use planning and spatial planning (Source: base on Mastop and Faludi, 1997)

To summarise, spatial planning is not just about physical development. It also highlights the importance of having a continuous process of policy-making. This is mainly about planning performance – a critical part of spatial planning that is often abstract and hard to evaluate. The discussion in the next section reviews the literature of planning governance that considers the factors in the process of policy-making.

§ 2.3 Governance and spatial planning

Scholars often use *governance* instead of *government* to indicate the involvement of public and private sectors in decision-making (e.g., Healey, 2006, 2007, Albrechts et al., 2003, Albrechts, 2004, 2010 , Nadin, 2007, 2010, Nadin and Stead, 2008). Because planning is rooted in reconciling the interests of different actors and participants, governance has an important influence on planning outcomes. Planning governance requires cross-governmental activities to ensure integrated collaboration (Nadin, 2010). Sometimes, these activities lead to a change in institutions or the involvement of different actors. Under a spatial planning approach, the system of

government is less hierarchical. For example, sectors representing the municipal government can cooperate equally with national or regional level governments in spatial development decision-making.

Healey (2007) explained the levels of planning governance as specific episodes, governance processes and governance culture (Tabel 1). These levels of governance performance are not presented hierarchically but represent the different aspects of interests addressed in policy-making. The level of specific episodes represents a period of when agreements are made about spatial development. An episode lasts until a new configuration of actors and arenas opens a window of opportunity that drives policy-making into a new episode. A window of opportunity is the moment when new arguments are accepted in decision-making due to a change in actors, arenas or priorities (Kingdon, 1995). Typical examples include shock events (e.g., flood disasters) or the election of a new administration.

Levels of governance	Characteristics
Specific episodes	actors: roles, strategies, interests
	arena: institutional sites
Governance processes	networks and coalitions
	discourses: language, metaphor, derived from frames of reference
	practices
Governance cultures	range of accepted modes of governance
	range of embedded cultural values
	formal and informal processes of critique through which governing processes are rendered legitimate

Tabel 1
Three levels of governance performance (Source: adapted from Healey, 2007)

Actors and arenas are attributes in the dimension of episodes. Actors are policy-makers who are involved in shaping a planning decision. These include government sectors and private stakeholders. Arenas refer to the institutional sites where policy-making occurs. Actors and arenas shape the interactions between people, developments, agendas and concepts in framing decision-making. Changes in actors and arenas can lead to a paradigm shift from one episode to another.

The level of governance processes has three attributes: networks, discourses and development practices. Networks refer to collaboration that directs policy change to achieve the targets. According to Sabatier and Jenkins-Smith (1999), networks are about 'advocacy coalition,' indicating stakeholders who work collaboratively in

framing their interests into policy proposals. For example, an NGO may propose policy change with support from other NGOs that share the same goals of local development. Discourse (what is said) and practice (what is done) are two interrelated attributes that occur in parallel. Planning discourses and practices are not always coherent. This interaction continues and there is no end-state. For example, policy-makers may declare an intention to facilitate a climate-adaptive city but remain focused on mitigation strategies in spatial development until the demands of climate adaptability become more urgent in the decision-making process.

The level of governance culture indicates public responses to policy-making. It represents the assumptions hidden in society in relation to social values, appropriate modes of governance and beliefs about 'who' should be involved in policy-making. This level is relatively stable and not easy to change because it represents the system of meaning. The level of governance culture also reflects on critical debates about governance initiatives and processes. For example, people may assume strong government power and rapid development or implementation are positive for society and may consider collaborative decision-making and negotiation as unsatisfactory approach for urban development.

The study uses Healey's attributes of planning governance performance to develop a framework for assessing both performance and conformance. The study develops a typology of spatial planning with four dimensions: (i) collaborative framework, (ii) discourses, (iii) plans and policies and (iv) spatial development. In the first dimension, actor and arena are considered. Examining these two attributes can help to illustrate the interactions between people, developments, agendas and concepts. The second dimension, discourses, is important for understanding the visions of spatial development among a wider group of interests. It can represent the transition in policy-making overtime and the coalitions (or conflicts) among the actors. The third dimension, plans and policies, concerns the written agreements for spatial development. It includes government policies as well as agreements of multi-actor collaboration. The fourth dimension, spatial development, concerns the practical implementation of plans and policies. This is not illustrated in Healey's model of planning governance, but is critical for evaluating conformance.

Two of the dimensions are developed to evaluate planning performance, and the other two are for assessing planning conformance. The two dimensions, collaborative framework and discourses, are mainly concerned with planning performance focusing on the process of integrating and communicating activities addressed in policy-making. The two dimensions, plans and policies and spatial development, are used to evaluate planning conformance or, in other words, the relations between plans and physical development. The notion of planning cultures (i.e., the accepted modes of governance, embedded cultural values and processes of critique) is critical to all four dimensions. These dimensions are illustrated in Tabel 2 and discussed more details in the next section.

Theoretical discussion to evaluate spatial planning	The dimensions of spatial planning	
The performance of planning	(i) collaborative framework: the administrative structure of spatial planning	(ii) discourses: the directing objectives in spatial planning
The conformance of planning	(ii) discourses: the directing objectives in spatial planning	(iv) spatial development: the physical outcomes of spatial planning

Tabel 2
Four dimensions of spatial planning

§ 2.4 Summary: the dimensions of spatial planning

This chapter presented the shifts in planning consideration from land use planning to spatial planning, the theoretical discussion of conformance and performance that can be used to examine spatial planning, and the attributes addressed in planning governance. This section concludes the discussion by distinguishing the four dimensions of spatial planning.

- collaborative frameworks
Collaborative frameworks refer to the administrative structure in planning. Actors and coalition networks are the key attributes to form collaboration. As representing the process of planning governance, the collaborative framework in planning may reform by considering newer focus of urban development. The reform can bring into a new specific episode in policy-making. For example, an extreme event of flooding may cause policy-makers to realise the limits of traditional approach of water protection and the impact of uncertain disturbances on spatial development. New actors, such as natural scientists, may be involved in policy-making. The framework of collaboration may be reshaped due to having newer interests in policy-making.

Planning collaboration can be a formal partnership as collaborative agreements made between groups of interests as well as informal relations between coalitions. Actors who have shared interests often gather to form a coalition network to increase their power base, so their interests may be more influential on directing the process of policy-making. Although the reform of collaborative framework can lead to a new system of planning governance, changes are often shaped and reshaped within the existing system of policy-making and gradually move the system into a newer state.

- discourses

Discourses represent the objectives that have priorities in directing policy-making and spatial development. These objectives can be conceptual visions, such as resilient cities and climate adaptation, as well as concrete requirements, such as the goal of CO_2 reduction. Discourses often indicate specific interests in policy-making. This is critical to frame and reframe collaboration in decision-making with a wider set of actors to participate. Discourses do not always remain constant. Some discourses, such as sustainable development, may remain important in shaping collaboration for a long time. Others may disappear and become less influential in policy-making once the objectives are accomplished or out of date.

Studying discourses is also important for identifying the episodes in policy-making. Changes in discourses can offer an opportunity to reconsider the efficiency of the existing approach in coping with a specific issue. This may cause a shift and drive policy-making into a new episode. For example, the discussion of 'working with nature' in the Dutch context implies a paradigm shift in policy-making to cope with flooding issues. More adaptive strategies are proposed and become increasingly important for flood protection.

- plans and policies

Plans and policies indicate the legal 'products' in policy-making, including planning policies, documents or formal agreements. Plans and policies often directly link to implementation. However, they can also be rationales or reasons that can be used later for developing strategies of physical development. This means a policy can be developed for issues that are crucial but not directly addressed in physical development, for example, to evaluate implementation, to illustrate a vision of future development or to promote multi-actor collaboration.

Plans and policies often represent the intention of policy-makers for spatial development. Policies initiated by different groups of actors may contradict to each other if lack of communication and collaboration. For example, planners may initiate a plan to develop an industrial development district in places where are vulnerable to flooding or have been designated by water engineers for water retention. The development plan can be difficult to put into practice and may even cause more severe damage to the city if flooded. Plans and policies developed in different time may conflict each other due to the changes of governance interests and priorities. Strategies made in the previous episode can lose the priority of implementation and gradually disappear in planning discussion of the new episode.

- spatial development

The dimension of spatial development is used to describe what physically occurs on the ground. The traditional view of planning often had a clear physical task to achieve. Because of this, the link between the initiated plans and the implementation is clear. For example, policy-makers would initiate a development plan to construct a highway for car transportation or to build dikes for flood defence.

However, spatial development has becoming increasingly complex and does not always follow the development plans and policies. It can be influenced by other factors, such as the socioeconomic development of the city, and become less direct control over the implementation in plans. The development of a city can therefore become more dependent on negotiation and collaboration with a wider set of stakeholders involved in policy-making. From the perspective of spatial planning, the mismatch of plans and practical development is not considered as a 'failure' but simply a 'consequence' of a change in priority or context in decision-making. For example, a defensive plan may be adjusted or even abandoned because newer development strategies are initiated and have more focus on climate adaptation.

These dimensions of spatial planning are used to examine local planning governance in facing flood risks and climate change. The discussion of the next chapter focuses on the notion of resilience considered in the context of spatial planning. These two chapters are important to structure the theoretical framework for assessment.

3 Applying resilience: planning as preparation for flooding and climate change

This chapter discusses the ways in which spatial planning is addressed in promoting resilience to cope with flood risks and climate change. Resilience has a variety of disciplinary origins, including ecology, business studies, material science, engineering and psychology (Holling, 1973, Gunderson, 2000, Hyslop, 2007, Downing et al., 2012). Across many definitions, the issue of change often plays a central dimension of illustrating the notion of resilience, both in terms of resistance to change and recovery from it. Generally speaking, the concept of resilience is referred to the capacity of a system to undergo changes and retain its basic function and structure in coping with external disturbances (Holling, 1987, Holling, 1973, Folke, 2006, Holling, 1961). For example, a species that survives from an environmental catastrophe, such as forest fire, may be described as resilient. A settlement that remains functional when experiencing disturbances, such as natural disasters or disruptions of telecommunication, also demonstrates resilience.

Social studies began to apply the notion of resilience in the 1980s to analyse the consequences of complexity, insecurities and uncertainty of the human societies. There is a wide range of interpretations of resilience in the fields of social studies and planning, including energy insecurities, terrorism and the variety of social-ecological disturbances (Coaffee, 2009, Newman et al., 2009, Folke, 2006, Walker and Salt, 2006). From the energy perspective, resilience represents an effective counter to cope with the vulnerability of energy insecurities that is highly related to the interacting factors of the societies. Such factors can be the availability of energy resources, the constraints of energy supply and political disruptions (O'Brien and Hope, 2010). Embedding the notion of resilience in this aspect is often referring to develop interdependent energy and transport infrastructures that can have a lower carbon pathway (Newman et al., 2009, O'Brien and Hope, 2010, Sircar et al., 2013). Studies of terrorism increasingly use the notion of resilience to describe how cities and regions attempt to embed security and risk management features into the system of governance and physical development (Coaffee, 2008, Coaffee and Rogers, 2008). Resilience in this context represents a broader drive that can promote a city to be safer and more sustainable. Practical strategies are often addressed in public transportation (e.g., metro systems) for an active emergency response to terrorist attacks (Bruyelle et al., 2014).

The notion of resilience is also increasingly used to discuss social-ecological disturbances that cause urban development becomes more complexity and hard to be managed in advance (Folke, 2006, Walker and Salt, 2006). Cities are facing disturbances of exposure such as global economic crisis, flooding, earthquakes, unclear emergency and the broader issue of climate change (Coaffee, 2009, Schelfaut et al., 2011, Kojima et al., forthcoming, Gomes et al., 2014, Wardekker et al., 2010). These disturbances can cause a rapid collapse in investment for spatial development, shock the existing network of collaboration and reform a strategy that is different or even conflicts to the origins. The realisation of uncertainty is important for studies of resilience in coping with the variety of social-ecological disturbances. Strategies in this context are often initiated according to scenarios of potential disturbances. Actions to promote resilience can be simulation exercises to minimise the disturbances of cities as well as changes in institutions that enable different groups of interests to collaborate and share responsibilities in coping with the uncertainty (Gomes et al., 2014, Kernaghan and da Silva, forthcoming).

In spite of having many of the interpretations of resilience in cities, the issue of changes in organisations and actions can be considered as a central thought of urban resilience that seems offering a way to cope with the complexity of the human societies and to increase resilience of a city. According to Foster (2006), the issue of changes in planning is often associated with preparation and performance. Preparation indicates a city's ability to assess and be prepared for uncertain disturbances, and performance is related to actions that can lead to a faster recovery after experiencing the disasters. Planning decisions for promoting preparation resilience are more focused on assessments, such as monitoring current conditions, producing future simulations and investigating possible solutions for future risks. Actions addressing performance resilience are more related to developing the capacities of response and recovery, so that a system may react and retain basic functions, rearrange key resources, and propose redevelopment strategies for recovery.

The notion of resilience and the resilient city have gained considerable attention in planning over recent years (Eraydin and Tasan-Kok, 2013). It is not just confined to academic discourses but also becomes increasingly prevalent in urban policy documents across the globe (White, 2010). However, the numerous interpretations of resilience also make the use of the concept questionable due to a lack of clear definitions and the difficulty to put into practice. A major critique of resilience is about its fuzziness that may cause ambiguity and represent no more than a hollow concept for planning (Davoudi et al., 2012, White, 2010). In a real situation, resilience may be carried out in a disjunctive and fragmental way. Policy-makers often use the implicit and underlying ideas of the notion in shaping decisions without using the terminology directly or embed resilience in and mix it with other concepts, such as adaptation, mitigation and sustainability. The implications of the notion can vary depending on the focuses, interests and training backgrounds of actors involved in policy-making.

Confusions may occur due to different interpretations of the notion. As a result, although the word resilience is more commonly used, how spatial planning is used to promote the concept seems still questionable. This is one of the main arguments discussed in this dissertation.

This chapter aims to discuss the notion of resilience in the context of spatial planning. The literature review focuses on urban resilience and its relation with flood risks and climate change. While the concept of urban resilience is broader than climate change alone, the discussion does not go into detail about all the other perspectives. The discussion is structured in four parts. The first part presents a historic overview of resilience that helps to make clear how the notion of resilience is absorbed and becomes important in planning thinking. The second part presents a more detailed explanation of how the notion is applied in planning. This is closely linked with the third part of the discussion that looks at the extent to which planning can play an important role in advancing a city's resilience in facing flood risks and climate change. The last part of the chapter concludes six characteristics of planning that are crucial to promote urban resilience in cities where are facing the challenge of flood risk and climate change. These attributes form an analytical framework to evaluate local planning in the case studies and to compare planning performance nationally and internationally.

§ 3.1 Urban resilience: a historic overview

Resilience is a concept incorporating a vast range of contemporary risks (Coaffee, 2013, 2008). It is often used to indicate how systems cope with shocks and surprises in order to remain stable (Gunderson and Holling, 2002). These systems could be urban systems, ecological systems or the systems of flood risk management. A simple understanding of resilience is the ability to absorb or buffer disturbance while remaining functional (Holling, 1987, Holling, 1973, Tasan-Kok et al., 2013, White, 2010). The notion of resilience often refers to the ability to initiate changes primarily in order to become robust enough to face the disturbances (Newman et al., 2009, Newman, 2009). The issue of change is a main consideration in resilience, both in terms of resistance to change and recovery from it. Resilience is concerned with both preparations to minimise disturbances (or change) and actions to deal with disturbances once they have occurred. As such, resilience represents an on-going process, a continual reshaping, reorganising and developing new adaptive strategies. For example, coastal settlements affected by periodic flooding may be more capable to adapt to flooding due to their flooding experiences throughout the centuries.

Some of the early resilience literature originates from studies of ecological equilibrium in the 1970s (e.g., Holling, 1973). Most of the empirical studies of resilience around this time focused on the management of large-scale ecological disturbances, such as forest fires, that can completely transform an ecological system for a certain period. After disturbances, some of the species in the system would move back to their original balance or to a new stable state. This self-organising or self-reorganising ability is a primary characteristic of resilience (Ludwig et al., 1978, Holling, 1978, Walker et al., 1981, Fiering, 1982, Walters, 1986). Another key dimension that illustrates the notion of resilience is related to the speed of return (Pimm, 1984). This is also called engineering resilience (Holling, 1996). Studies of engineering resilience focus on the efficiency, constancy and predictability of a system in facing a disturbance (Ludwig et al., 1997, Pimm, 1991). The notion of resilience is measured in terms of the speed in which a system returns to equilibrium. The faster the system bounces back, the more resilient it is.

In the social sciences, the growing interest in the notion of resilience can be seen as a consequence of increasing complexity, uncertainty and insecurity in which new approaches for adaptation and survival are being sought (Christopherson et al., 2010). A number of social scientists applied the term resilience in analyses of the capacity of a self-organising system, such as a person, settlement or society, to withstand impacts, such as disaster, disease, crisis or natural hazard, without being destroyed (Vayda and McCay, 1975, Zimmerer, 1994). The ability to 'learn' from previous experiences was particularly highlighted in social studies. For example, a fishery settlement would have more resilience than a modern new town in facing the disasters of flooding. This is because the population of the fishing settlement has learned to be water resistant through their experience of flooding throughout the centuries, while the population of new towns have less flooding experience and rely too much on the modern facilities of water safety (Lamson, 1986).

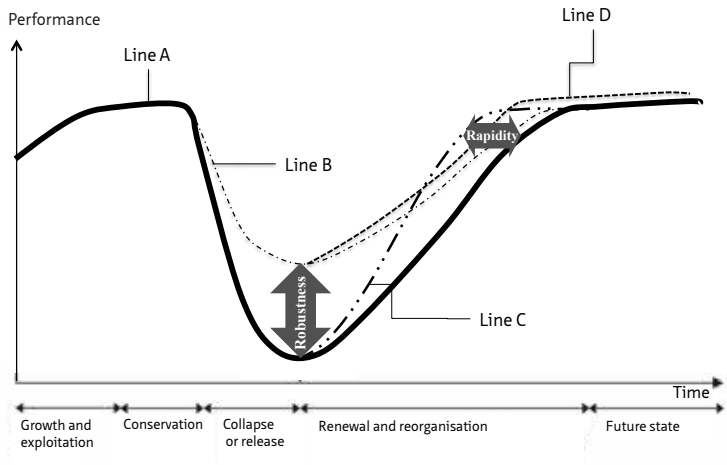
The notion of resilience was included in studies of urban planning in system to withstand disturbances and to reorganise following disturbance-driven changes (Walker et al., 2002). The literature on resilience in planning often puts emphasis on preparation and mitigation actions, especially at the local scale (Godschalk, 2003). The approach of resilient communities is closely related to the tradition of land use planning as a means of minimising existing disturbances. Land use planning is used to separate certain land uses to avoid 'bad neighbours' and to reduce the risks and negative effects of possible disturbances, such as locating developments away from ecologically sensitive or flood-prone areas. For example, policy-makers highlighted the importance of developing resilient communities in the late 1990s. These communities had technical facilities that were implemented in advance to enhance the robustness of the development sites (Mileti, 1999, Tobin, 1999, Stevens et al., 2010). This was to strengthen the capacity to deal with potential disturbances.

A decade later, the literature on resilience in planning had widened to encompass mitigation strategies. For example, Newman et al. (2009) linked the discussion of resilient cities with the global issue of oil dependence. Moreover, the literature did not just focus on mitigation but also on adaptation, with the realisation that mitigation is often not sufficient to prevent disturbances from occurring. The discussion of mitigation and adaptation is presented in later sections.

§ 3.2 Resilience applied in planning thinking

Many scholars use the *adaptive cycle* to illustrate resilience (Gunderson and Holling, 2002, Walker and Salt, 2006, Walker et al., 2004, Folke, 2006). Understood as the capacity to deal with risks and respond positively, the adaptive cycle focuses on the dynamics of systems (e.g., ecosystems, societies, and economies) which do not have a stable or equilibrium condition but repeatedly pass through four characteristic phases: growth and exploitation; conservation; collapse or release; and renewal and reorganisation. These shifts between phases are the result of either sequences of gradual changes (such as exploitation, conservation, and reorganisation) or rapid shocks (such as collapse). Endogenous disturbances are not just considered as threats but also as opportunities to enhance the overall health and self-organisation of the system (Gunderson and Holling, 2002, Walker and Salt, 2006, Walker et al., 2004). For example, a wetland ecosystem may collapse during an environment catastrophe. After disasters, some of the species in the system may return it to its original balance by shifting to a new stable state and becoming more robust.

Under the concept of the adaptive cycle, the notion of resilience can be expressed in terms of a system's robustness or strength (i.e., the ability to remain functional in an extreme shock) and rapidity or flexibility of response (i.e., the ability to bounce back). Figuur 3 presents an illustration. The curve shows the trajectory of a system through the four stages. Line A illustrates a possible response through growth, conservation, collapse or release, and renewal and reorganisation. Line B shows a more resilient system which does not drop so far in performance. The difference between Lines A and B is robustness. Line C drops as far but recovers quickly. This shows the different speeds of recovery. Line D indicates a system that drops less, recovers more quickly and achieves higher performance as outcome result. The increased performance that results may represent learning in the system, either the evolution of a natural system or changes in policy.



Figuur 3
Relationship between resilience, robustness and rapidity through four phases of the adaptive cycle (Source: based on Linnenluecke and Griffiths, 2010)

For example, in a flood-prone area, a city's resilience can be illustrated in terms of preparations before the occurrence of flooding and actions after the disturbances occur. Preparations made before the occurrence of floods can be the selection of building types in vulnerable areas, flood-control systems and administration of flood risk management. These represent an increase of robustness. Actions that result from the disturbances can be the development of city drainage systems, rapid response units, damage repairs, rescue services, financial support and future improvements. This may affect the speed at which a system may recover, or its rapidity. The new condition of a city may not necessarily be the same as its state before a disturbance occurred.

The capacity of robustness and rapidity are two crucial items represented in decision-making for the improvement of the resilience of a city. However, policy-makers may also overlook the multidisciplinary and complex nature of the notion and use the term with a limited understanding (Jabareen, 2013). Focusing on a single or small number of contributing factors to urban resilience can easily lead to the exclusion of important characteristics that affect the performance of a city. For example, strategies for flood risk management may only take into consideration improving the performance from line A to B by creating water retention ponds to minimise the disturbances in the neighbourhoods. This only increases the capacity of robustness. Strategies may also only be concerned with creating more capacity that shifts the performance from line A to C by adding pumping facilities in the neighbourhoods. This considers only the rapidity, the speed of return. Both strategies dismiss the possibility to increase the performance from line A to D.

Another difficulty in applying resilience in planning is related to the various understandings of the notion that result from the different focuses, interests and training backgrounds of decision-makers (Stumpp, 2013). Policy-makers may interpret the notion narrowly according to their background or interchange the term with other terminologies that are more familiar in their fields. This also causes a difficulty in increasing the performance of the urban systems from line A to D that represents a new paradigm to planning practices.

In spite of the obstacles in relation to the understanding of resilience, the notion has been increasingly adopted in policy-making. The notion of resilience has not been confined just to academic discourses – it is also increasingly prevalent in urban policy documents (O'Hare and White, 2013). This can be seen particularly in the context of facing the issues of climate change. The discussion of resilience and climate change is presented in the next section.

§ 3.3 Promoting urban resilience in facing climate-related flood risks

Climate change is an increasingly important issue for spatial planning (Campbell, 2006, Wilson and Piper, 2010, O'Hare and White, 2013, Coaffee, 2013, Davoudi et al., 2013). According to Wardekker et al. (2010), the impact of climate change is not only associated with disruptive events, such as storms or heat waves, but also with gradual trends (e.g. rises in sea level or increasing CO2 emission that will rise average global temperatures) that can still give rise to large disturbances if left unchecked. The notion of resilience is becoming increasingly important for policy-makers facing climate change and its environmental impacts. In spite of lacking clear definitions to put into practice, the notion of urban resilience is increasingly addressed in planning studies related to the impact of climate disturbances in cities. For example, Newman et al. (2009) argued that if a city is able to reduce its oil dependence it has a higher chance or remaining stable than cities that highly depend on fossil fuels.

One of the advantages of using this concept is to highlight the interactions between science and policy-making (McEvoy et al., 2013). This is based on a realisation that climate change requires new forms of engagement and collaboration between scientists, policy-makers and wider stakeholder communities. Single actors or professions can hardly manage the consequences of the complexity of climate change. A number of recent studies (e.g., Wilson and Piper, 2010, White, 2010, Davoudi, 2012, 2013, IPCC, 2007) indicated a fact that spatial planning can play an important role in promoting resilience in the face of climate change. Spatial planning can integrate different concepts sequentially and implement these ideas into local practices by organising land use change

or by requiring certain forms of urban development. Therefore, spatial planning provides a means of both adapting to the adverse impacts of climate disturbances and mitigating emissions that influence climate change. These discussions are increasingly prevalent in urban policy documents around the world, especially in places where decision-makers are keen to develop local-level adaptive strategies (Wilson, 2006).

Folke et al. (2004) acknowledged the efficacy of studying resilience in helping planners to understand, manage and govern the uncertainty between people and nature caused by the occurrences of disturbances. From this perspective, resilience can be considered as an advanced understanding of urban sustainability that focuses more on appropriate resource management and not much at all on managing unforeseen threats and unstable situations. Studies of resilience in facing risks associated to the impact of climate change often concentrate on uncertain situations that are more difficult to prepare in advance. Because of this, scientific projects are important for providing scenarios of future conditions that can be taken into consideration of policy-making to initiate strategies for urban development. For example, studies of rising sea level can help to define the areas where may become more vulnerable to floods in the future. Based on the information, decision-makers can regulate future development in places where are less influenced by potential floods, to strengthen flood protection in places where are critical to the cities, and to develop new typologies of spatial development that can adapt and remain sustaining in higher water periods.

As presented in section 3.2, a system's robustness (or strength) and rapidity (or flexibility) of response are both important to promote a resilient city in tackling uncertain situations. The issue of robustness is closely related to mitigation activities that strengthen the capacity of a city to remain functional in disturbances, and rapacity is primarily linked to adaptation activities that minimise the disturbances and recover the cities efficiently. For example, a city can sustain flooding disturbances by having mitigation facilities (e.g., storm surge barriers and dikes) and adaptive strategies (e.g., adaptive plans and new building topologies) that help the city remain functional during the high water level period.

Increasing resilience requires that most mitigation activities and many adaptation activities. Although both adaptation and mitigation efforts are important in dealing with the impacts of climate change, they are not necessarily integrated or complementary due to the traditional division, different actors of policy-making and the operation at different levels of government (Tol, 2005). High-density mixed-use settlements (compact cities) provide an example. Although urban consolidation can reduce energy demand and transport emission, it can also be in conflict with the adaptation approach. It may intensify the urban heat island effect and put pressure on urban drainage, or can have an indirect negative effect on the environment by things such as the increasing use of air-conditioning which cause additional emissions of greenhouse gases (Howard, 2009).

Policy-making for mitigation or adaptation often depends on the scale of planning: mitigation is often addressed at higher scales, and adaptation is considered at the local level (Howard, 2009). For example, coastal settlements need to strengthen sea defences and drainage facilities to cope with rising sea level and extreme rainfall caused by climate change, but these generally require more than action at the local or community level alone.

§ 3.4 Planning attributes especially relevant to promote resilience

Many studies have been made to discuss the ideas of resilience and the attributes of planning that can help to promote cities become more resilient (Tabel 3). Only the literature that is specific to spatial planning has been included in this review. There is a multitude of more general references to the resilience of cities, but these are often not specific to spatial planning (e.g., Jha et al., 2013, Baker, 2012, ICLEI, 2013, UNISDR, 2012).

Source	Planning characteristics especially relevant to resilience
Linnenlueeke and Griffiths, 2010 Wardekker *et al.*, 2010	robustness (or strengths, mitigation) and rapidity (or flexibility, adaptation)
Godschalk, 2003	redundancy, diversity, efficiency, autonomy, strength, interdependence, adaptability and collaboration
Fleischhauer, 2008	- to keep areas free of development under the threats of climate change - to initiate decisions of land use according to the intensity and frequency of hazards - to bind land use or zoning plans legally - to encourage the development be able to contribute on reducing the potential hazards
Davoudi and Strange, 2009	fluidity, reflexivity, contingency, connectivity, multiplicity and polyvocality
UK Cabinet Office, 2012	preparedness, subsidiarity, direction, information, integration, co-operation and continuity
Walker and Salt, 2006	diversity, ecological variability, modularity, acknowledge slow variables, tight feedbacks, social capital, innovation and overlap in governance and ecosystem services

Tabel 3
Summary of studies characterising planning relevant to resilience

Source	Planning characteristics especially relevant to resilience
Hutter, 2011 Hutter *et al*., 2011 Hutter, 2010 Bernhard, 2010	- the changes in organisational contexts - the perceived and unperceived threats - the attentions to analyse the consequences of the failures - the process of response and the (positive or negative) outcomes
van den Brink *et al*., 2011 Gupta et al., 2010	Variety, learning capacity, room for autonomous change, leadership, resources and fair governance

Tabel 3
Summary of studies characterising planning relevant to resilience

The general understanding of resilience in planning and social studies is about robustness (or mitigation) and rapidity (or flexibility, adaptation). This has been discussed in section 3.2. Godschalk (2003) presented the attributes of resilience in terms of redundancy, diversity, efficiency, autonomy, strength, interdependence, adaptability and collaboration. These attributes were further developed by Fleischhauer (2008) in referring to the four critical principles in spatial planning: (i) to keep areas under the threat of climate change free of development, (ii) to initiate decisions of land use according to the intensity and frequency of hazards, (iii) to legally bind land use or zoning plans, and (iv) to encourage development that is able to contribute to the reducing of potential hazards. These principles highlight the importance of using planning tools to develop goals and practical actions that guide spatial development toward becoming more resilient.

Davoudi and Strange (2009) illustrated the attributes of planning in promoting resilience in terms of fluidity, reflexivity, contingency, connectivity, multiplicity and polyvocality. Their argument highlighted the importance of collaboration and communication in planning. This also relates to studies that emphasise on a process of communication to make expert judgements, so that policy-making can be more systematic and transparent (Moss, 2011, Moss and Schneider, 2000, Willows and Connell, 2003). The UK government guidance of *Emergency Response and Recovery* offered the principles of promoting resilience as preparedness, subsidiarity, direction, information, integration, cooperation and continuity (UK Cabinet office, 2012, Coaffee, 2013). In addition to the focus of communication, these principles also highlight that scientific studies of future trends and potential threats can help to form a platform for communication by presenting scenarios of future situations (Bouwer et al., 2010).

Scholars from the ecological perspective often highlight the social dimensions of resilience in finding the dynamic equilibriums between humans and nature (e.g., Klein et al. 2003, Walker and Salt, 2006, Folke et al., 2004). Walker and Salt (2006) identified the 'qualities' of resilience in human society as diversity, ecological variability, modularity, acknowledging slow variables, tight feedbacks, social capital, innovation, overlap in governance and ecosystem services. These characteristics

mainly focus on a system's ability to consider the social-environmental relations and to learn from previous failures or collapses. A particular focus in this approach is the consideration of the consequences of adaptation in human society. For example, a settlement may learn from previous flooding experiences, develop adaptive solutions and therefore become more resilient in the future.

The organisational studies of resilience highlight the importance to a system of learning from previous disturbances and revealing the shifts in policy-making due to the experiences of the disturbances (Hutter, 2011, Hutter et al., 2011, Hutter, 2010, Bernhard, 2010). The word resilience, in this respect, often refers to a capability, a capacity or ability of an actor or a system (Hutter and Kuhlicke, 2013). This often refers to the changes in organisational contexts, the perceived and unperceived threats, the attentions to analysing the consequences of the failures, the process of response and the positive (or negative) outcomes. Recent Dutch research also highlights the importance of studying the power of governance in responding to the uncertainties. van den Brink et al. (2011) and Gupta et al. (2010) developed the attributes of planning governance in terms of variety, learning capacity, room for autonomous change, leadership, resources and fair governance.

Building on the existing knowledge of planning attributes in promoting resilient cities, the chapter concludes by proposing six characteristics of planning decision-making that can help to promote resilience for spatial development. These comprise (i) considering the current situation; (ii) examining trends and future threats; (iii) learning from previous experience; (iv) setting goals; (v) initiating actions; and (vi) involving the public. The conceptual link between the proposed characteristics and the existing studies in relation to resilience and planning is presented in Tabel 4. Illustrations of the characteristics are presented thereafter.

Proposed characteristics	Source
Considering the current situation	Walker and Salt, 2006 UK Cabinet Office, 2012
Examining trends and future threats	UK Cabinet Office, 2012 Bouwer et al., 2010
Learning from previous experience	Walker and Salt, 2006 Hutter, 2011, Hutter et al., 2011, Hutter, 2010, Bernhard, 2010 van den Brink et al., 2011, Gupta et al., 2010
Setting goals	Godschalk, 2003 Fleischhauer, 2008 van den Brink et al., 2011, Gupta et al., 2010

Tabel 4
Summary of the characteristics of planning decision-making especially relevant to resilience

Proposed characteristics	Source
Initiating actions	Fleischhauer, 2008 Hutter, 2011, Hutter et al., 2011, Hutter, 2010, Bernhard, 2010
Involving the public	Godschalk, 2003 Davoudi and Strange, 2009 UK Cabinet Office, 2012 Hutter, 2011, Hutter et al., 2011, Hutter, 2010, Bernhard, 2010 van den Brink et al., 2011, Gupta et al., 2010

Tabel 4
Summary of the characteristics of planning decision-making especially relevant to resilience

- considering the current situation

The characteristic of considering the current situation indicates the ability to understand and maintain the existing conditions of the environment. This helps to take the dynamic equilibriums between humans and nature into planning consideration. The characteristic of considering the current situation can be evaluated in two general aspects: first, the consideration of policy-makers in a specific issue that can cause damages of a city, such as the awareness of threats in flooding. Second, the practical actions that are made to assess the existing situations, such as flood-monitoring facilities.

- examining trends and future threats

The characteristic of examining trends and future threats indicates the need in policy-making to quantify future risks and their uncertainties both short and long term. Short term is often within an electoral period (e.g., four to five years). Long term is more than one or two decades. This is not just about information presented by scientific studies. The interactions and communication between scientists and policy-makers are also important. The characteristic of examining trends and future threats evaluates whether scientific studies of future risks are considered in decision-making and how collaboration and communication can be hosted on this basis. Planning strategies can therefore be initiated to manage or to redistribute resources from the current status so that the potential disturbances may become less severe.

- learning from previous experience

Most of the studies highlight the importance of learning from previous experience in policy-making to advance resilience in cities. The assessment of this characteristic draws on experiences from the past and the capacity in decision-making to utilise the knowledge to deal with similar conditions in the future. For example, a settlement may set up a framework of collaboration based on the previous flooding experiences. This framework is reformed continually and gradually learns to respond to the disturbances effectively.

- setting goals

The characteristic of setting goals assesses the ability to initiate objectives or visions of spatial development. It is strongly related to the interests of actors involved in policy-making, the awareness of the potential disturbances, and the leadership of the governance. A new goal can be initiated as a result of an awareness of potential disturbances. Although this may lead to a reform of coalitions in planning policy-making, it does not necessarily replace the original objectives of spatial development. For example, the intention of flood risk management may become more important after a city experiences a severe disaster of flooding. However, the objective of economic growth may still remain dominant in spatial development.

- initiating actions

The characteristic of initiating actions evaluates the power (and the resource) of governance that can be used to guide spatial development to achieve the development goals. Planning actions can be strategies for practical implementation, such as new dikes, storm surge barriers and retention ponds, as well as activities that contribute to form collaboration or to establish scientific projections of future threats and potential disturbances. For example, policy-makers may develop planning actions to formulate a new international collaborative network to share experiences and exchange knowledge of climate change.

- involving the public

The characteristic of involving the public measures the collaboration between actors involved in policy-making. Actors include individuals and organisations (e.g., NGOs). They can be involved in formal planning processes or in a more informal way via lobbying or protesting. The former is more prevalent in the Netherlands, and the latter is more common in Taiwan. Because public stakeholders are more involved in the planning process in the Netherlands, interviews were carried out with public officials only. Since public stakeholders are less involved in the planning process in Taiwan, separate interviews were held in addition to interviews with public officials.

These six characteristics will be used in the following discussions to examine local policy in the case studies. The assessment framework is presented in detail in the next chapter on methodology.

4 Methodology

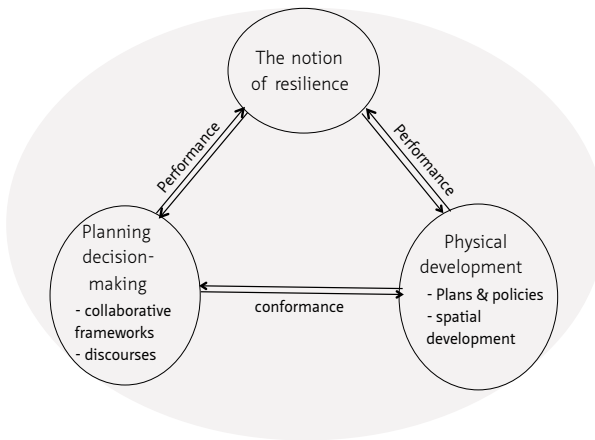
This chapter explains the analytical framework of the study. The analytical framework is designed according to the theoretical discussion of conformance and performance that highlights the importance of evaluating spatial planning in terms of the conformity as well as the performance of planning (Mastop and Faludi, 1997, Mastop, 1997, Faludi, 2000). The conformance assessment is to measure the technical process of producing material development, and the performance assessment is to examine the deliberation process in which a concept is absorbed in policy-making and used by actors involved in collaborating and integrating activities.

The chapter is structured in five parts. The first part presents the conceptual link between resilience and planning. The second part illustrates the main research question and the sub-questions of the study. The two following parts present the methods of case study and comparative analysis. These two methods formulate the analytical framework of the study. The fifth part of this chapter presents the expectation and limitations of the study.

§ 4.1 The conceptual link between resilience and planning

This subsection illustrates the conceptual link in the study between the notion of resilience, planning policy-making and spatial development. Figuur 4 diagrams the links of these three items in spatial planning. In the upper circle, the notion of resilience is a new concept in spatial planning representing the capacity of cities to tackle uncertain disturbances and to maintain basic functions. The left circle, planning decision-making, indicates the process of collaboration in shaping decisions for spatial development. This is related to the dimensions of collaborative framework and discourses. The right circle, physical development, represents the outcomes in decision-making. These include both plans and policies and the implementation of spatial development. The theoretical discussion of conformance and performance indicates the relations among the circles. Planning conformance examines the relations between planning decision-making and physical development, which is traditionally the major concern in assessing planning. The assessment of planning performance is addressed more conceptually. Mostly, it examines the relations between the notion of resilience and planning decision-making. This is related to the interpretation of the notion of resilience among various actors and the coalitions formed due to a shared agreement in policy-making. The assessment of planning performance can also be

addressed in considering the direct relation between the notion of resilience and physical development. This is more often shown in a place where planning decision-making has a more traditional understanding as a government power for land use management, while physical development has become more complex and increasingly influenced by the market and private forces. For example, private developers may use the notion of resilience to promote development projects by marketing the safety of the projects when subjected to extreme events of flooding.



Figuur 4
The conceptual link between the notion of resilience, planning decision-making and physical development in spatial planning

The notion of resilience is often implicit in planning decision-making. This means that the underlying ideas of resilience can be used in shaping decisions for urban and regional development even though the word resilience does not always appear in policy-making. For example, policy-makers may develop strategies to tackle flood risks in terms of previous experiences of flooding. These strategies contain some underlying ideas of resilience without directly using the terminology.

The use of resilience in planning policy-making is often dynamic and highly dependent on the local context. The coalitions and networks in policy-making can change overtime depending on the shifting interests of the actors, the changes of participants or the appearance of a new concept in policy-making. These changes can reshape planning strategies and therefore lead to an adjustment in spatial development. For example, the discussion of climate adaptation may change and reshape the existing collaborative network of policy-making. This can attract new actors to participate, cause new actors to become influential in framing agreements or marginalise others who have been involved previously. New strategies for spatial development may therefore be initiated.

§ 4.2 Research questions

The main research question of this study is: *how spatial planning can promote resilience in the context of flood risks and climate change?* To answer this question, the study starts with an assumption that the notion of resilience is addressed in policy-making implicitly and is instrumental in shaping decisions to cope with climate change and flooding. The notion of resilience can be interpreted in different ways in planning. Policy-makers may use the underlining ideas of resilience without using the term directly. The use of resilience in planning is not new. Some of the ideas of resilience have been used in planning decision-making for risk management throughout history, such as mitigation. The newly introduced ideas of resilience are mainly about adaptation that seeks to strengthen the safety of the cities through proper strategies for land use management.

Three sub-questions are developed in reference to the main question. The link between these sub-questions and the structure of the book is presented in Tabel 5. First, *what are the characteristics of planning which can help to promote resilience?* This sub-question highlights the importance of literature review in relation to planning (Chapter 2) and the notion of resilience (Chapter 3). The six characteristics of spatial planning that can help to promote resilience are presented in Chapter 3. These characteristics are used in the following chapters to examine local planning in the case studies.

Research questions	The structure of the study
Main question: how spatial planning can promote resilience in the context of flood risks and climate change?	
Q_1: what are the characteristics of planning which can help to promote resilience?	Chapter 2: Toward a comprehensive understanding of planning Chapter 3: Applying resilience: planning as preparation for flooding and climate change
Q_2: how has the notion of resilience been absorbed and become part of the reasoning of planning?	*Step 1 (four chapters)* Chapter 5: Planning systems in Taiwan and the Netherlands Chapter 6: Kaohsiung, Taiwan Chapter 7: Tainan, Taiwan Chapter 8: Rotterdam, the Netherlands *Step 2 (two chapters)* Chapter 9: National comparison of two cities in Taiwan Chapter 10: International comparison between Kaohsiung, Tainan and Rotterdam

Tabel 5
Link between the research questions and the structure of the study

Research questions	The structure of the study
Q_3: to what extent can planning policy-making help to promote the resilience of spatial development in coping with flood risks?	Chapter 9: National comparison of two cities in Taiwan Chapter 10: International comparison between Kaohsiung, Tainan and Rotterdam

Tabel 5
Link between the research questions and the structure of the study

The second sub-question is *how has the notion of resilience been absorbed and become part of the reasoning of planning?* This question is examined by doing the empirical study. The empirical study is developed in two steps. The first step focuses on examining the relations between plans and spatial development in the study areas. This is presented in the four chapters of the case study (Chapter 5 to 8). The second step assesses local collaboration in the study areas according to the six characteristics defined in Chapter 3. This assessment is presented in Chapter 9 and 10.

The third sub-question of the study is *to what extent can planning policy-making help to promote the resilience of spatial development in coping with flood risks?* This question requires a comparative analysis of the evidence from the empirical study. The defined characteristics of planning (Chapter 3) are used to structure the analysis at both the national level between the two cities in Taiwan (Chapter 9) and among the three cities (Chapter 10).

§ 4.3 Case study

The study is a qualitative research following the approaches of case study and comparative analysis. The approach of case studies is one of the qualitative methods that is often used in social sciences to investigate complex and dynamic issues in the original contexts of the study areas (Yin, 2003). The sources of case studies can be documents, archival records, interviews, direct observation, participant observation and physical artefacts. These sources can be done by qualitative as well as quantitative studies. According to Yin (2003), the source of case studies needs to be organised by the following three principles – the use of multiple sources of evidence, the creation of a case study database and the maintenance of a chain of evidence.

Research can follow a case study approach that has either a single case or multiple cases. The research of a single case study is often used to examine a particular issue which the study focuses on, or to provide a general understanding of an issue by using

a particular case. The research of multiple case studies is usually used in framing a general understanding of a specific issue by presenting a number of instrumental cases that can occur either on the same site or come from multiple sites. Both single and multiple case studies follow an order of the illustration that first presents detailed descriptions of the cases and then does cross-case analysis according to the theme of the study. A report of the lessons learned from the analysis provides the conclusion of the case studies.

This study uses multiple cases to increase the reliability of the empirical evidence. Sources of data collection in the case studies are multiple, including notes, policy reviews, interviews, and participating observations. The study investigates policies, government reports and research documents that were published in the past two decades and played critical roles in framing decisions to tackle flood risks. Key actors involved in local decision-making for flood risk management are invited for interview. In Taiwan, the interviewees include representatives from NGOs, whereas in the Netherlands interviewees were from government only (see section 3.4). They can be divided into four groups according to their occupation and interests: planners, water engineers, local specialists (including academics and NGO representatives) and private developers. The list of interviewees and the semi-structured interview questions are shown in the Appendix. Communication with the interviewees continues to exchange knowledge and to valuate the research outcomes.

The qualifications for case study selection were: (i) cities where policy-makers are aware of the impact of climate disturbances, (ii) cities which experience extreme rainfall or which may experience severe floods in the future. Three cities were selected as case studies: Kaohsiung (Taiwan), Tainan (Taiwan) and Rotterdam (the Netherlands). These two nations are different in terms of the geo-political contexts, administrative traditions and science-policy interface for flood risk management. This shapes various attitudes in considering flood risks and the socioeconomic impact for urban development. In Taiwan, although flooding has higher probability to occur, it has more moderate impact on shaping spatial development because flooding generally lasts for a short period. The situation in the Netherlands is different. In spite of having a lower probability of flooding, the impact on urban development is often significant and needs a longer duration for recovery. Over the past decades these differences have affected their capacity to recover from flooding and shape the way in which these countries are managing flood risks. In addition, planning policy-making in Taiwan is often shorter term than in the Netherlands (see section 5.1.2), which also represents a significant difference in approach between the two nations.

Although the difference of the two nations increases the complexity of the case study analysis, it helps to form a more comprehensive picture regarding how local planning is addressed in coping with the uncertainty of flooding and climate change by assessing and learning from cross-continental experiences. Within each city different locations

are examined. Two cases in each city are presented to illustrate different types of spatial development. In each city one case focuses on the city centre and another on an area near the edge of the metropolitan area (see Tabel 6). These cases have not necessarily experienced a change of planning policy or actors involved, although in some cases this has occurred and sometimes leading to more than one episode. This means that cases in the same city do not always have the same number of episodes.

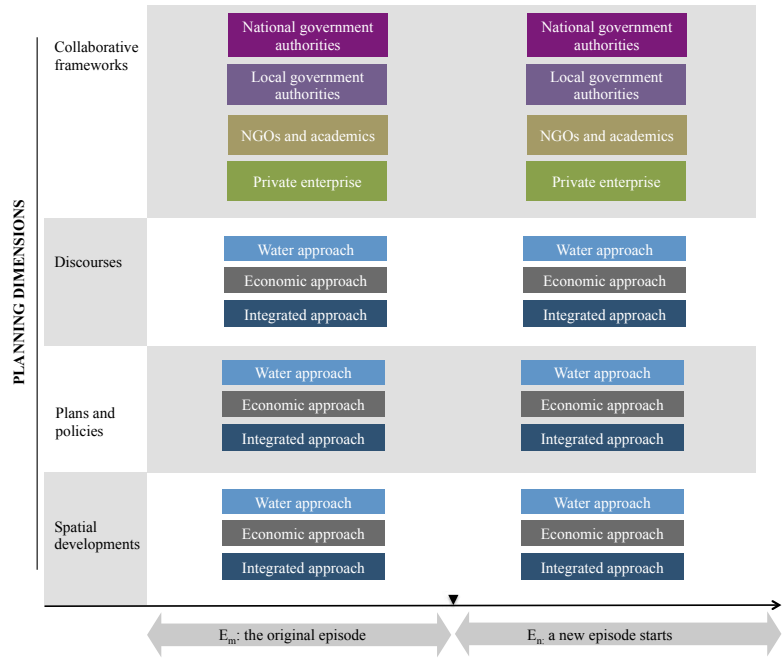
Cities	Case on the edge of the metropolitan boundary	Case in the city centre
Kaohsiung, Taiwan (Chapter 6)	Meinong: existing settlement in rural area (Case 1)	Kaohsiung city centre: an industrial port city (Case 2)
Tainan, Taiwan (Chapter 7)	Southern Taiwan Science Park (STSP): a new development project to support the ICT industry on the edge of the city (Case 3)	Tainan city centre: a historic city (Case 4)
Rotterdam, the Netherlands (Chapter 8)	Nesselande: a new development project on the edge of the city (Case 5)	Rotterdam city centre: an industrial port city (Case 6)

Tabel 6
List of the cases

The analysis of each case can be divided in two steps to discover how the notion of resilience is being used as part of the reasoning of local planning. The first step is to present local planning stories according to the four dimensions of spatial planning presented in Chapter 2. The second step focuses on examining local decision-making in each case. This assessment is formulated according to the characteristics of planning presented in Chapter 3.

- Step 1: local planning stories

The first step presents the local planning stories of the study areas that have occurred since the 1990s. As shown in Figuur 5, the term *episode* is used to explain the shifting paradigm (actors, objectives, policies and physical developments) of planning decision-making. An episode remains until new issues or events cause policy-makers to change direction in decision-making. A change in direction represents a new episode. The number and duration of the episodes may vary from one case to another. These differences represent the dynamics of decision-making in the case study area.



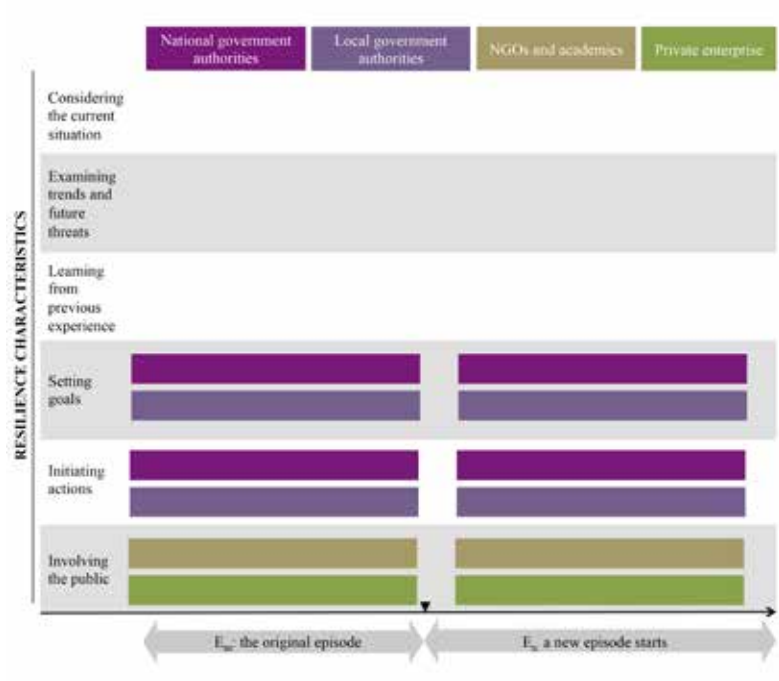
Figuur 5
The framework presenting local planning story in the cases.

The local planning stories in the cases are described according to the four dimensions of spatial planning presented in Chapter 2. This is shown in the left column of Figuur 5 as collaborative frameworks, discourses, plans and policies, and spatial development. The first two dimensions are more related to the process of policy-making. In the last two dimensions, the discussion is more related to the implementation of physical development.

Defining the episodes and the planning dimensions is important for understanding how well planning can and does apply resilience in specific phases. This is examined by considering the actors involved in shaping planning decisions. Actors involved in policy-making are divided into four categories: national government, local government, local specialists (NGOs and academics) and private enterprises. Issues addressed in the dimensions of discourses, plans and policies and spatial development are presented in terms of the water approach, the economic approach and the integrated approach. The first two are about sectoral approaches, and the third is inter-sectoral in nature.

- Step 2: collaborative frameworks of policy-making

The second step of case studies focuses on the collaborative framework of local policy-making in the case studies. As shown in Figuur 6, the six planning characteristics presented in Chapter 3 are used to evaluate. These characteristics are: considering the current situations, examining trends and future threats, learning from previous experience, setting goals, initiating actions and involving the public. The assessment is based on the episodes identified to explain the shifts of focuses in policy-making. Actors and their interests related to the characteristics can vary in each episode. The findings of the second step of the case study provide evidence for cross-case analysis. This is presented in the next section.



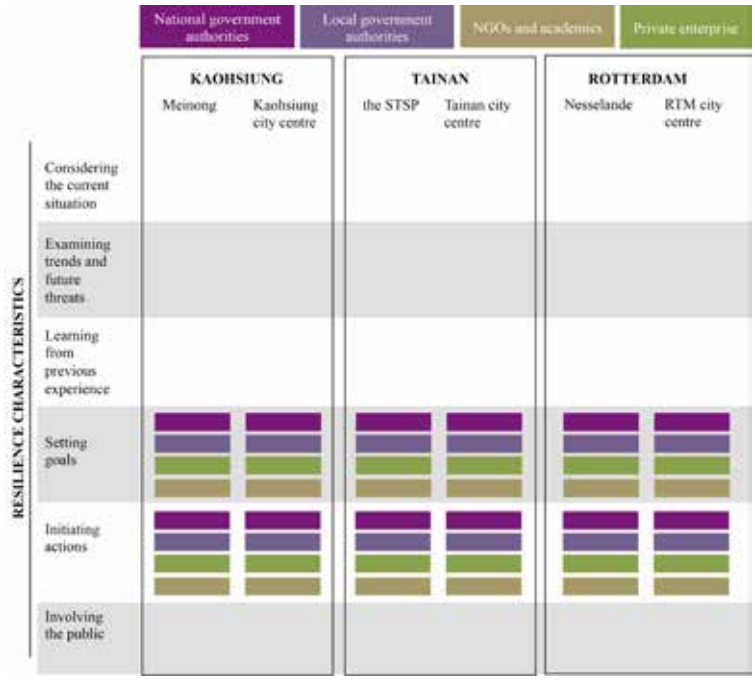
Figuur 6
The framework presenting local collaboration in the cases

§ 4.4 Comparative analysis

Comparative analysis is a central focus of the study to understand to what extent planning decision-making can help in promoting resilience in spatial development in coping with flood risks. It enables the study to find out more about the places we concern. According to Hague, R. and Harrop, M. (2013), understanding the way in which decisions are made in other systems not only can help to interpret new developments. It also helps to frame and reframe practical policiatl relationships in the original one. For example, policy-makers in Taiwan may be inspired and change the way in which planning was involved in coping with flood risks by the Dutch experiences.

The comparison is based on the findings of assessing the collaborative framework of local policy-making presented in the case studies. It is recognised that the contexts of the cases are quite different (see section 4.3), which makes comparison more complex. However, it is still possible to identify a number of common elements from the analysis. Figuur 7[1] shows a framework that presents a pattern of local policy-making examined by the characteristics of planning especially relevant to resilience. Actors involved in policy-making are categorised in terms of national and local government authorities, NGOs and academics and private enterprises. The participation of these actors in each case can be different. The collaboration of these actors may also change when a new episode occurs.

1 The diagrame is illustrative rather than suggesting that none of the actors are examine trends or learn from experiences (for example).



Figuur 7
The framework representing comparative analysis of the cases

The analysis has both a national and international perspective, comparing cases within Taiwan and between Taiwan and the Netherlands. The national comparison includes four cases in Taiwan. It aims to examine the way in which local planning governance is addressed in shaping decisions to tackle flood risks. This discussion is particularly crucial in cases which share the same national institutional framework, social values, development expectations and threats of flooding. The international comparison between Kaohsiung, Tainan and Rotterdam aims to discover the critical roles of planning in promoting a resilience city to cope with flooding and climate change. This reflects to the governance culture, institutional framework and planning tradition of each case study. The analysis compares both the current pattern of local decision-making in the latest episode and the transitional pattern in the last two decades.

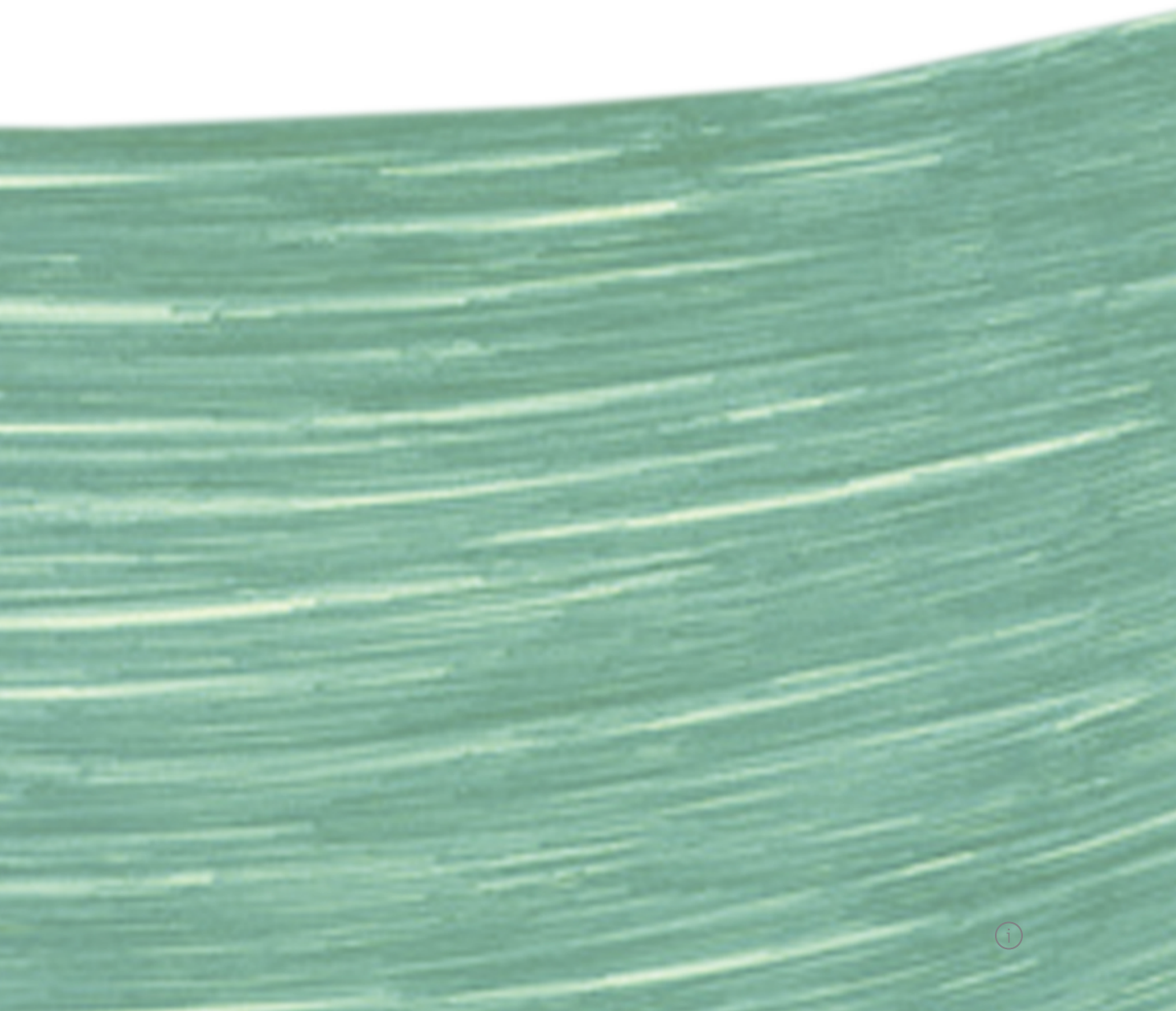
§ 4.5 Expectations and limitations of the study

The expectation of the study has four aspects. First, the study can clarify the characteristics of planning which can help to promote resilience for spatial development. This is based on reviewing studies related to planning and the concept of resilience. Second, the case studies are expected to present local planning stories in relation to spatial development and flood risk management. This provides the evidence for examining the process of policy-making in the study areas according to the defined characteristics. The third expectation of the study is to present the critical elements of planning in coping with flood risks related to climate change. Fourth, the empirical study is expected to reflect on the theoretical debates related to the relationship between the notion of resilience and spatial planning.

Three limitations of the study are important. First, the process of data collection in the case studies depends on the skills of the investigation including the ability to ask questions, to listen actively, to react to the situation, to understand the issues being addressed and to identify personal bias. The study has used multiple sources of data to minimise the occurrence of subjective evidence, although the source of evidence is not neutral. Second, although the selection of the case studies follows the principles presented above, it is also based on the personal network of the researcher. It is possible to develop the empirical study in other cities where the potential disturbances of flooding are high and where the increasing awareness of climate change and flooding in policy-making is prevalent. Third, the comparative analysis is based on interpretations of evidence from the case studies, and some descriptive details in the case studies have been generalised.

This chapter presents the methodology of the study. The following four chapters (Chapter 5 to 8) present the assessment considering the first step of the case study. The second step and the comparative analysis are presented in Chapter 9 and 10. The lessons learned from the assessment are presented in Chapter 11 for conclusion.

PART 3 Exploring resilience in local practices



5 Planning in Taiwan and the Netherlands

The third part of the thesis is about the empirical study in Taiwan and the Netherlands. It includes one chapter (Chapter 5) presenting a general understanding of planning and flood risks in the two nations and three chapters of discussion in Kaohsiung (Chapter 6), Tainan (Chapter 7) and Rotterdam (Chapter 8). Taiwan and the Netherlands are different in many aspects, including the geo-political contexts, administrative traditions and science-policy interface for flood risk management. This shapes various attitudes in planning and flood risk management. As shown in Figuur 8[2], Taiwan (臺灣) is a mountainous island state located in south-eastern Asia. The administrative area is around 36000 square kilometres. Around 23 million of inhabitants live in the island, mainly in the western plain area. The change in elevation is significant. The highest point of the central mountains is around 4000 metres, and the lowest point of the coastal area is around 2 metres below the sea level. River water often flows steeply into the sea and causes strong erosion to the riverbanks. This is often considered to be a major reason of flooding.

Figuur 8
Taiwan and the Netherlands

2 Taiwan and the Netherlands have similar size of territory. The population in the Netherlands is about two-third of population in Taiwan. v

The current administrative framework in Taiwan includes the national and the local level government. The national government is responsible for initiating development directions of the country, and the local government is considered to take critical roles in practical development to achieve the national goals. The current system includes 22 local administrative units: 5 special municipalities, 3 regional cities and 14 counties. The city of Taipei is the capital. Generally, the city government is more active in making plans for spatial development than the county government because cities often have more institutional resource in policy-making. The abolishment of the regional government, the Province of Taiwan, in the 1990s gave the local government more power to direct spatial development. However, it also caused difficulties to cope with issues that cannot be managed by a local government unit. A lack of regional land use management is particularly seen in issues such as water resource and natural landscape protection.

The Netherlands is a western European country located at delta areas, the end of major transnational rivers. The administrative boundary is around 41000 square kilometres – a little larger than Taiwan. Around 16 million inhabitants (about two-third of inhabitants in Taiwan) dwell in this lowland country. The Netherlands has almost a third of the territory located below sea level and another third has to be protected against river flooding (Stive and Vrijling, 2010, van de Ven, 2004). This makes the country vulnerable to flooding from both the sea and the rivers if lack of preparations. The lowland landscape also gives strong impact on integrating the considerations of water engineering with land use management to sustain urban development in the Netherlands. The polder landscape is probably the most distinctive feature of the Dutch delta to define development space by water engineering technologies such as dikes and embankments (Bobbink and Nijhuis, 2010).

The Dutch administrative framework includes the national, the regional and the local level (the municipalities). There are 12 provinces and 3 overseas public bodies in the current administrative framework. Amsterdam is the capital, and The Hague is the political and administrative centre of the country. The national government used to play a leading role in initiating development strategies. The regional and local government were more focused on implementation guided by national directions. However, a more open system of policy-making has been addressed since the early 2000s and transforms the centralised tradition to a more decentralised approach. The impact of this transformation is discussed in the following sections.

The chapter presents a general framework of planning and the issues of flood risk addressed in the two nations as well as in the city of Kaohsiung, Tainan and Rotterdam. The discussion is important for examining local planning in the case studies. The chapter is divided into three sections. The discussion begins by examining planning in Taiwan and the Netherlands according to the four dimensions of spatial planning presented in Chapter 2. They are: the dimensions of collaborative frameworks,

discourses, plans and policies and spatial development. The second section presents the important features of planning in the three cities. The impact of flood risks and climate change on planning decision-making is discussed in the last section, including the lessons gained from previous disasters and the potential threats that are addressed according to scientific projections.

§ 5.1 Planning in Taiwan and the Netherlands

Planning in Taiwan and the Netherlands are fundamentally different in culture, mechanisms and the ways of decision-making. Planning in Taiwan has a clearer focus on economic development. The principal responsibility of planning decision-making is often restricted vertically within government sectors. Horizontal collaboration between the government and private stakeholders is less evident or only addressed at the local level. Planning authorities can be spread out over the national and local levels after the only regional government, Taiwan Province, was abolished in the late 1990s and left more room for local administration (Chen and Shih, 2010b). The national government is mainly responsible for initiating visions and providing supports for implementation when necessary. The local government is more in charge of making plans for physical development. In spite of having authorities to form regional plans of spatial development, policy-makers at the local level often concentrate on urban development of the cities and have fewer interests in framing regional strategies. The situation is particularly clear in managing issues such as environmental protection and flood risk management. In fact, planning sectors in the government are hardly involved or only take supplementary status in policy-making to cope with these environmental issues. A lack of cross-sectoral collaboration sometimes causes difficulties to spatial development. For example, government planners may propose an industrial development project in a place where is easy to be flooded. Implementing the project may not just causes conflictions between officials at planning and water engineering sectors. The development may overload the capacity of the environment and make the area become more vulnerable to flooding.

Planning in the Netherlands has a tradition of negotiation and communication, including vertical collaboration among different levels of government and horizontal collaboration between the government and the private stakeholders (Gerrits et al., 2012, Zonneveld, 2010). The collaboration is particularly shown in managing water issues and spatial development. The Dutch administrative framework includes the national, regional and local levels. The national government is mainly responsible to initiate development directions and to negotiate with forces outside of the country, such as the EU directions that operates with the consent of the member states. For

example, the Rijkswaterstaat, a water-engineering sector of the Dutch Ministry of Infrastructure and the Environment, plays an important role in collaborating with regional and local authorities to develop spatial planning policies in the context of water safety. It is also an important actor in framing collaboration with other EU member states to promote transnational flood risk management.

The tradition of collaboration has also been addressed at regional and local levels throughout centuries. Zonneveld (2010) used the term 'cogovernment' to indicate the underlying principle of collaboration. This is especially clear in framing integrated strategies to cope with flood risks and urban development. Administrative cooperation to manage water between local communities in the Netherlands can be traced back to the middle ages. The Dutch water boards (waterschappen) have been formed since the 13th century. They played an important role for negotiating and collaborating different groups of interests (e.g., landowners, residents, wastewater dischargers) to ensure water safety and accessibility for spatial development (Stead, 2013b). According to Zonneveld (2010), water boards can be describe as 'functional governmental bodies' that take responsible for water management, which is different from the provincial and municipal governments. For centuries, they were responsible for constructing waterways, earthworks and barriers, including polders, canals, dikes, dams, locks, windmills and sluices. Not all could withstand the tests from floods and storms, sometimes with disastrous consequences (Nienhuis, 2008). Although most of the water boards have been integrated into the government system under the supervision of the regional government, they remain independent in coping with the issues of water management. The responsible territory of each water board is different from the local administrative boundaries. Water boards are important for initiating local strategies of spatial development. In the city of Rotterdam, the *Water Plan 2 Rotterdam* was initiated by the municipality and three water boards to direct spatial development becoming more adaptive to flood risks (Rotterdam et al., 2007).

The following discussion evaluates planning in the two nations according to the dour dimensions of spatial planning presented earlier in Chapter 2. This structures the subsections as collaborative frameworks (5.1.1), discourses (5.1.2), plans and policies (5.1.3) and spatial development (5.1.4). Taiwan is always presented first in the discussion, followed by the Netherlands.

§ 5.1.1 collaborative frameworks

- Taiwan

The principal responsibility of planning in Taiwan is often restricted to a small number of critical players in the government. According to Chen and Shih (2010b), the Council

for Economic Planning and Development (CEPD) and the Construction and Planning Agency of the Ministry of Interior (CPAMI) are two key sectors responsible for planning at the national level. The CEPD is responsible for defining the vision and role of long-term development, and the CPAMI is a sector authorised to conduct national planning policies for land use management. Other national authorities may participate in policy-making when they are related to the planning issues. For example, the Ministry of Transportation and Communication often collaborates with the CEPD and the CPAMI to initiate strategies in relation to public transportation. The National Science Council is involved in science park development. The Industrial Development Bureau is important in promoting the development of industrial parks. The Council of Agriculture shares responsibility for managing agricultural land use, and the Water Resource Agency is crucial in framing strategies for water and flood risk management.

At the local level, the bodies responsible for initiating plans for spatial development are the Urban Development Bureau in the cities (urban areas) and the Department of Urban and Rural Development in the countries (rural areas). They often collaborate with economic development administrative sectors to make plans and to guide spatial development for economic growth. The development is also supported by the land administration sectors and the public work sectors. The land administration sectors are especially important for land use redistribution in urban renewal areas. The public work sectors are mainly responsible for physical implementation of the development plans.

Policy-makers in the urbanised area are generally more active in framing strategies for local development. In the rural areas, decision-makers are often conservative in shaping planning policies for new development and more likely to maintain the existing land use unless a particular focus of spatial development arises. For example, the benefits of an industrial development project may interest the county governments and change their attitude of land use management from passive to active. Planning strategies can therefore be initiated to support the development project. Collaboration between the national and the local government often depends on the capacity of the local government. Generally speaking, the municipalities are more active to take a leading role in framing strategies for local development. National authorities are less involved in policy-making or take only supplementary positions to provide financial and technical supports. Planning collaboration in the counties is more hierarchical. The lack of institutional resource of the county government causes the necessity of national authorities to involved or sometimes takes a leading position in directing spatial development.

- the Netherlands

Dutch planning has a long tradition of negotiation and communication. Policy-making in the past century often led by the national government in collaborating with the provinces, the municipalities and actors outside of the administrative system. Regional and local governments acted by implementing the strategies guided by the national

directions. For example, the national direction of spatial development in the *Fourth Report on Physical Planning (de Vierde Nota, VINO)* and the *Fourth Report on Physical Planning Extra (de Vierde Nota Extra, VINEX)* put particular emphasis on providing sufficient housing units in and around major cities to support urban development (Needham and Dekker, 1988, Priemus and Spaans, 1992). The regional and local government were responsible for implementing the strategy to fulfil the national intention of spatial development.

However, this centrally controlled approach of spatial development has been transformed to a decentralised approach since the early 2000s in order to form a more open system of policy-making. The reform of national planning authorities can present an example. According to Vink and van der Burg (2006), the Dutch national planning traditionally included three government sectors: the Ministry of Housing, Spatial Planning and the Environment (VROM) was responsible for making plans in the urbanised areas; the Ministry of Transport, Public Works and Water Management (V&W) was in charge of spatial development related to water; and the Ministry of Agriculture, Nature and Food Quality (LNV) was responsible for managing landscape development and environmental protection. This framework was changed in 2010 with the reformation of these authorities into the Ministry of Infrastructure and Environment and the Ministry of Economic Affairs, Agriculture and Innovation. Gerrits et al. (2012) highlighted a fact that the reform encouraged national planning strategies to focus on a vision for spatial development and offered more room for collaborative decision-making to the lower-level planning authorities for practical development.

In spite of not having directly reform of the administrative sectors, the impact of this decentralised approach is specifically apparent at the local level. The urban development sectors often have close relationships in collaborating with the economic development sectors. The public work sectors are responsible for implementing projects of public infrastructure. The water boards are involved particularly to cope with the issue of water management. By providing limited strategies of practical development at the upper levels, the local government has more opportunities to initiate development plans in collaboration with private enterprises, local associations and stakeholders (Hajer and Zonneveld, 2000, Priemus, 2007). The influence of this approach at the local level can vary depending on the intention of local decision-making.

The impact is positive for Dutch cities where policy-makers have already constructed a clear direction and governance networks for development. However, for places where the legal frameworks, zoning policies and legal procedures generally follow the directions of national government, this approach can be risky. This is because planning in this way would likely increase the competitiveness of some cities and weaken others.

§ 5.1.2 discourses

- Taiwan

Among the many issues addressed in the discussion of planning in Taiwan, the topics of economic development, political influences, administrative reform are particularly critical. The topic of economic development has been deeply rooted in planning for decades. This is greatly influenced by the fact that Taiwan needs to keep its international status by remaining competitive in its economy. This bias can easily be seen in the national government that places the highest planning authority, Department of Urban and Housing Development, as a part of the Council of Economic and Planning Development (CEPD). At the local level, the sectors of economic development often have a close relationship with urban planning sectors in promoting projects for urban development. The emphasis of economic development is important for initiating coalitions among different parties. For example, private stakeholders may be more willing to collaborate with government authorities to develop an industrial park and to share the economic benefits from the development. The focus of economic development has also negative impact especially on long-term development. For example, some critical issues, such as environmental protection, may be hardly paid attention in policy-making because they do not have direct impact on economic development. Rapid growth in the 1980s caused the environment to become more vulnerable. Today, the potential occurrence of environmental disasters deeply challenges the development of the cities.

Political influences is another critical issue in planning in Taiwan. According to Bristow (2010), planning in Taiwan is particularly sensitive to issues related to the relations between China and Taiwan. In a real situation, Taiwan is difficult to be involved in discussing international issues or can only partly participate in the discussions of economic development. This is also reflected by a lack of visions of spatial development within the broader context of South-eastern Asia. The tensions between the two major political parties in the nation also heavily affect to spatial development, sometimes can delay or even shift a development strategy from its original direction. For example, the open-market strategy to China can be hardly implemented due to the political concern of national safety. A consequence of the political sensitivity causes policy-makers focus mainly on strategies that can be managed before the next election in order to get political credits. Strategies of longer-term development are difficult to carry out.

The issue of administrative reform is also important in planning policy-making. According to Hua (2010), the national government proposed a newer administrative framework in the 1990s. This was because of a realisation of the political fact between Taiwan and China and of a necessity to focus on urban development in Taiwan. The newer framework proposed changes in two ways. The first was to abolish the regional government, the Province of Taiwan, so that the institutional system of the government

could become simpler. The second was to reform the administrative framework from considering the levels of urbanisation to considering the capacity of spatial development (Chen and Shih, 2010b). The institutional changes are summarised in Tabel 7. Further discussion of the reform is addressed later in section 5.1.3 in relation to the new national planning policy, the National Land Planning Law (NLPL). The newer framework was generally welcomed by scholars of urban planning and by politicians who had specific focus on promoting environment protection through land use management. However, it was heavily criticised by those who considered the reform as a political strategy to gain administrative power. As a result, only a part of the ideas were approved for implementation. The discussion of administrative reform continues while becomes more fragmental.

Planning institution	The original framework	The newer framework
The newer framework	Three levels: national, regional and local	Two levels: national and local
Regional administration and metropolitans	Taiwan province and two metropolitans (Taipei and Kaohsiung City)	Five metropolitans: Taipei, New Taipei, Taichung, Tainan and Kaohsiung
Local administration	Five provincial cities and sixteen counties	Three regional cities and fourteen counties

Tabel 7
Major changes of the administrative reform in Taiwan (Source: based on Chen and Shih, 2010a)

- the Netherlands

Two critical issues were highlighted in the Dutch planning context during the past decades. The first is about the decentralised approach of spatial development, and the second is about the shifting paradigm of water management from fighting against to working with nature. As discussed in section 5.1.1, Dutch planning used to be mainly dependent on national authorities to frame collaboration with a strong set of planning concepts to direct spatial development. The housing development addressed in the *Fourth Report on Physical Planning (de Vierde Nota, VINO)* and the *Fourth Report on Physical Planning Extra (de Vierde Nota Extra, VINEX)* presents an example (Needham and Dekker, 1988, Priemus and Spaans, 1992). In the 2000s, however, the direction of planning decision-making was gradually moved away from the centralised approach to the decentralised approach by reemphasising the necessity of multi-actor collaboration for urban development. This opened the possibility for a wide set of actors to be involved in policy-making (Hajer and Zonneveld, 2000, Priemus, 2007). Part of the consequence of this change is related to the influence of the EU spatial planning strategies that encourage multiple EU members to form collaboration in developing cross-national development plan (Needham, 2005). The Rhine river basin

management plan is an example. This plan reorganised water management according to the boundaries of the watersheds rather than the historic nations (Zonneveld, 2010). This increases the necessity of collaboration and negotiation. In this context, policy-makers become more difficult to fully determine but merely guide or direct (Gerrits et al., 2012, Needham, 2005).

The discussion of working with nature is another critical issue that has been addressed in planning. This can be explained by two periods of policy change in coping with flood risks. The first period of policy change happened in the 1950s in response to a severe storm in which over two thousand people died and around 200,000 hectares of agricultural lands were affected (Meijerink, 2005). The Delta Commission was established to prepare a new plan (the Delta Plan) that could provide greater protection from the sea (van de Ven, 2004, van den Berg, 2010). This led to large-scale engineering and infrastructure projects including the Dutch Delta works. However, this was not free from controversy and was challenged by various interest groups (including the fishing industry, environmentalists, and later on politicians in regional and national governments) due to the overemphasis on economic development and the disregard of environmental impacts (Meijerink, 2005). In the 1970s plans for a dam in the Eastern Scheldt, which could be opened to keep the existing tidal regime in the estuary but could be closed in the event of unusually high water levels, were revised. This marked a shift in decision-making processes to include social and environmental impacts alongside the economic impact.

The second period of policy reframing was related to flood events that took place in 1993 and 1995 when extremely high river discharges in the Meuse and Rhine rivers tested the durability of the dikes. While no serious floods occurred in the end, the shock of the events prompted heated debates about the Dutch tradition of fighting with water. Decision-makers proposed new planning strategies to 'give water more space'. Related planning strategies, like the *Room for the River (Ruimte voor de Rivier)* planning document and the *2008 Delta Programme - Working together with Water*, were established in the 2000s to offer more space for water by changing current river conditions, engineering infrastructure and land-use strategies. Regional and local governments also developed adaptive water strategies.

Issues of climate change raised new challenges when dealing with flood risks. Since the impacts of climate change are deeply uncertain, being adaptive to different circumstances becomes more and more important. This will be discussed in section 5.3.

§ 5.1.3 plans and policies

- Taiwan

Plans and policies are often considered as institutional tools for spatial development. In Taiwan, several national policies are particularly critical in framing the planning system and the core directions for urban development. The *Comprehensive Development Plan for the Taiwan Area (CDP)* was formerly the highest legal framework for planning in Taiwan. The national government developed the first *CDP (CDP-I)* in the late 1970s. The *CDP-I* covered many aspects of planning, including: population growth, urbanisation, regional development and spatial structure, housing, agriculture, industry, communication, water resources and energy. It also structured a twofold framework of land use management that regulated local land use according to the division between urban and rural areas, which rooted the approach of framing local plans and strategies for spatial development (Hua, 2010). The *CDP-II* was published in the late 1990s by the CEPD as a revision of the original document. However, the *CDP-II* was hardly functional in framing land use strategies. According to Hua (2010), this was because the society at that time was experiencing major challenges with political tensions as well as the disastrous earthquake of 1999 that stirred up fresh demand for the development of a new framework for land use management.

The *National Land Planning Law (NLPL)* was proposed in the late 1990s as the highest institutional framework of land use management. The *NLPL* had two major purposes: to simplify the system of institution, and to form a more comprehensive framework of land use management (see section 5.1.2). The first is addressed in rearranging the institutional system from three-fold (national, regional and local) to two-fold (national and local). The second is shown by having a newer approach that distribute land use according to the capacity of spatial development rather than the division of urban and rural areas designated by the *CDP-I* (Chen and Shih, 2010b). The first intention was addressed in the late 1990s when the provincial government was abolished and left more room for the local government to formulate localised development strategies. It was also a part of the reasoning of the local-level administrative reform addressed in the late 2000s, which provided more freedom for localised development in the five special municipalities (i.e., Taipei City, New Taipei City, Taichung City, Tainan and Kaohsiung City). The administrative reform offers more administrative power for the local governments to initiate and interpret strategies for spatial development according to local demands and therefore leads to a more decentralised, local-oriented decision-making. The impact of this administrative reform in Tainan and Kaohsiung is addressed in the discussion of the case study.

Another intention addressed in the *NLNP* is to have a newer approach of land use management. According to Hua (2010), three types of land use were consisted according to the sensitivity of the environment and the capacity of spatial development. These

comprised: conservative areas (to protect the areas from development), agricultural areas (to allow negotiation for development) and development areas (to encourage urban development). Although this newer approach would provide a more comprehensive framework for land use management, it was criticised and hardly implemented in local practices. Politicians were hesitant to support the *NLPL* because the change would likely reshape land profits. As a result, the *NLPL* has been awaiting approval by the national legislative authority for decades and remained in the process of discussion. In spite of having some ideas been addressed in other policies for implementation, changes of the system of land use management are hardly addressed. This means policy-makers remain framing land use strategies according to the division of urban and rural areas.

Policies for flood risk management are often initiated by water engineering sectors of the national government. Planners are hardly involved or take only supplementary status in policy-making due to the divided responsibilities between the government sectors. The national strategy, *Regulation Project for Flood-prone Area,* was initiated in 2006 after surge storms and extreme rainfall affected the western coast and cased severe floods (Water Resource Agency, 2006). By facilitating flood-vulnerable areas with a more defensive infrastructure for flood protection, this project shaped local landscape significantly, especially in rural areas where the local government was lack of institutional capacity and led by the national authorities in local decision-making.

- the Netherlands

The development of plans and policies in the Netherlands represents the Dutch planning transition during the past two decades. Needham (2005) points out that prior to the 1990s, the Dutch planning had a clearer framework to direct spatial development by the national report of spatial development. The *First Report on Spatial Planning (de Eerst Nota Ruimtelijke Ordening)* was developed in the mid 1960s. This report (de Notas) was revised regularly to provide national development direction. This guiding approach was changed during the 1990s to facilitate a more open framework in policy-making (Needham, 2005, Healey, 2007). The *Fourth Report on Spatial Planning (de Vierde Nota)* and its *extra document (de Vierde Nota Extra, VINEX)* could be considered as the last national documents that had a direct influence on physical development. In the fifth Nota, National Spatial Strategy, policy-making at the national level has been mainly conceptual and leaves room for the regional and local level governments to initiate strategies for spatial development (Ministry of Housing Spatial Planning and the Environment et al., 2004). The decentralised approach becomes more important (see discussion in section 5.1.1 and 5.1.2).

Within the decentralised approach of *practicing local when possible, national if necessary* (Zonneveld, 2005), the national government can still be important for framing collaboration in policy-making, especially in coping with the issues such as water management and knowledge economy. The integration of knowledge and research for flood risk management is probably one of the most significant examples

that indicate the success of multi-level collaboration. The Delta Project (see 5.1.2) could be considered as the first example that scientific knowledge was addressed to integrate environmental consequences, ecological concerns and the importance of water safety for economic development coherently. This resulted in a solution that reached most of the demands (Stive and Vrijling, 2010). The *Room for the River (Ruimte voor de Rivier)* project was another example showing the importance of knowledge integration in policy-making to form a more comprehensive strategy in coping with flood risks (Ruimte voor de Rivier afdeling Communicatie, 2007). Policy-makers realised the difficulty to provide completely water safety by mitigation strategies alone. Because of this, the project aimed to minimise the potential disturbances of river floods by providing more space for the river. Strategies for practical implementation were initiated according to the scientific studies in both planning and water engineering.

The *Knowledge for Climate (Kennis voor Klimaat)* programme is important for promoting multi-level collaboration in coping with the issues of climate change and flood risks. The programme is a national-funded scientific initiative with intentions to develop applied knowledge of climate impacts and to ensure climate adaptability will be taken into account in governance decision-making. The collaborative network includes the Dutch national government, local municipalities, business communities and scientific research institutes. The *Living with Water* programme is another example that focuses on integrated spatial development under the consideration of flood risk management. These two programmes both focus on concepts of knowledge-based planning and collaborative decision-making processes. Scientific studies and investments also address in coherent spatial water policies such as the *National Spatial Strategy* and the *National Knowledge and Innovation Agenda for Water* (Ministry of Housing Spatial Planning and the Environment et al., 2004, Ministry of Transport Public Works and Water Management et al., 2010). Local documents also indicate a fact that the *Knowledge for Climate* project could provide the research framework for increasing the city's climate adaptability (Rotterdam Climate Initiative, 2009, 2010).

From the methodological perspective, the layer approach was developed in the 2000s to understand both the relative autonomy of the complexity in the delta areas and the environmental and socioeconomic relations. According to Meyer et al. (2010), the layer approach considered the spatial environment as a composition of three layers. The bottom layer is the natural environment, including soil, water and rock. The middle layer is made up of infrastructural networks that facilitate the development of the settlement. The top layer is about human occupation, urban patterns and economic activities. In principle, the first two layers should provide a sustainable and stable foundation for the development of the top layer, and the top layer represents the complexity of the delta environment. Studying these layers can help to examine the existing patterns of urban development and to initiate more comprehensive strategies for long-term development. This approach was adopted in the *National Spatial*

Strategy as a guiding principle and required more studies to evaluate the impact of this approach in facing the complex issues addressed in the Dutch delta (Ministry of Housing Spatial Planning and the Environment et al., 2004).

§ 5.1.4 spatial development

- Taiwan

Spatial development describes what is physically addressed on the ground. In Taiwan, it has a strong intention for economic development. The local government is often considered as the responsible sectors. The previous discussion shows the different considerations of spatial development addressed between the county and the city government. In the urbanised areas, the local government is more capable in initiating area-specific activities. In the rural areas, spatial development here is often directed by the national government with the financial and technical supports. This can be interpreted as a consequence of the lack of institutional capacity of the local government. The demand of national support is clearly shown in managing the flooding issues. The national project of water defence, *Regulation Project for Flood-prone Areas*, was more direct to implement in the rural areas than in the cities. The situation can be seen in the case of Meinong in Chapter 6 and the case of the Southern Taiwan Science Park (STSP) in Chapter 7. Further discussion is addressed in national comparison in Chapter 9.

The focus of economic development also causes spatial development to be heavily influenced by the investment of private stakeholders. This can be seen specifically in development projects such as new town development or urban regeneration. The local government often welcomes private investment by initiating special planning strategies that link to their interests directly, such as a special land use regulation in a district for industrial development. In this context, the local government (both the counties and the cities) is usually active in framing collaboration with national authorities and private enterprises. The STSP case in Chapter 7 can be considered as an example. Local protests may occur when the public is not accepted the strategies of spatial development. By using the political tensions and the administrative sensibility between the two major political parties, protest activities can delay or sometimes change the direction of spatial development. For example, in the case of Meinong, the proposal of the Meinong Reservoir was criticised and eventually abandoned in the early 2000s when policy-makers changed the plan to gain more support in the election.

- the Netherlands

Spatial development in the Netherlands is influenced by the decentralised approach that has been emphasised since the 2000s and offers more room for local-specific policy-making. The highlight of multi-actor collaboration causes spatial development to become more flexible and less possible to be completely directed by government authorities (Hajer and Zonneveld, 2000, Priemus, 2007). An example of this can be seen in the new housing development programme in Almere. The framework of the programme allows private stakeholders to develop housing projects according to the demand of the market. The municipal government carries only the responsibility to lease the lands and has few regulations for land use control.

The collaboration is also influential on coping with the issues of flooding. However, this is rather a new idea but a reconsideration of integrating water and land use management addressed in the Dutch planning tradition. In the city of Rotterdam, the awareness of climate change and flooding causes policy-makers to realise that spatial development in the city cannot be completely safe from flooding by government strategies. Local collaboration and negotiation become critical to increase the city's adaptability, especially as it relates to flood risk management. Some of its physical development projects has helped to market the city as a centre of expertise in dealing with flood risks, thereby stimulating international collaboration, exchange of experience and economic development. This is further discussed in Chapter 8 by presenting the case of the Rotterdam city centre.

A summary of this comparison is presented in Tabel 8. The comparison shows a clear variety of planning in Taiwan and the Netherlands due to the differences in geography, political contexts, administrative framework and the tradition of planning focus. Planning in Taiwan often links to economic development directly. Planning authorities hardly pay attention to the issues of flooding due to the division of government responsibilities. The involvement of planning sectors in coping with flood risks is seldom seen or only addressed when flooding may cause damage to urban development. For example, the national project of water defence, *Regulation Project for Flood-prone Areas*, was more considered as a water engineering strategy that provides infrastructural improvements in flood-vulnerable areas than as an opportunity for integrated spatial development (Water Resource Agency, 2006). Planning in Taiwan has been moved from centralised to decentralised approach after the regional government was abolished in the late 1990s and left more room for the local government to be responsible for spatial development. This is addressed in the *NLPL* that aimed to form a simpler administrative framework and to initiate a newer approach of land use management. This newer approach was criticised by considering the changes of land use profits and had not yet implemented in local practices. The administrative reform in 2011 offered more room for local-specific policy-making especially in the five special municipalities (see section 5.1.2). The impact of the reform seems not yet clearly addressed on spatial development. The tradition of

planning culture remains important to define actors who should bear responsibilities for policy-making. More studies of the reform are required.

Planning dimensions	Planning system	
	Taiwan	**The Netherlands**
Collaborative frameworks	mainly vertical collaboration	vertical and horizontal collaboration
Discourses	- economic development - political influences - administrative reform	- cross-actor collaboration - working with nature (for water management)
Plans and policies	- CDPs - NLPL (partly implemented)	- Notas (the Fifth Nota has a different approach)
Spatial development	- economic focus	- integration between planning and flood risk management

Tabel 8
A summary regarding the analysis of planning system in Taiwan and the Netherlands

Planning in the Netherlands has a long tradition of collaboration and negotiation. The national government used to play a leading role in framing collaboration with multiple actors. However, its status has been gradually moved from giving clear directions to providing guiding concepts of spatial development. The decentralised approach has become increasingly important for policy-making since the early 2000s. This looses the hierarchical system of government. The emphasis of local collaboration is also addressed in managing urban development and flood risks. This can be considered as a result of the Dutch planning tradition and the realisation of uncertain disturbances of climate change. For example, the national government can have more room to build direct collaboration with local authorities for specific issues, such as the programme *Knowledge for Climate (Kennis voor Klimaat)*. The cities are also encouraged to develop their own international collaborative network in order to remain competitiveness at the global market. Certain responsibilities for spatial development have been decentralised from the national government to the provinces. However, many responsibilities still lie with the nation or the municipalities.

In spite of having different reasons that cause the transitions in planning, the two nations share a similarity of being more decentralised in planning decision-making. This means planning at the local level has become increasingly essential both in Taiwan and in the Netherlands. The describing characteristics of local planning governance in Kaohsiung, Tainan and Rotterdam are presented in the next section.

§ 5.2 Planning in Kaohsiung, Tainan and Rotterdam

This section describes the focuses and preferences of local planning governance that have been initiated according to the development history of the city. For example, policy-makers may put more emphasis on the development of harbour industry in Kaohsiung and Rotterdam for the economic growth of the cities. This is different from the city of Tainan where the historic and cultural identity is more important for economic development. The discussion has the same order of the case studies. It begins by presenting Kaohsiung and Tainan in Taiwan and then Rotterdam in the Netherlands. A map to present the location of Kaohsiung, Tainan and Rotterdam is addressed in Figuur 9.

Figuur 9
Kaohsiung, Tainan (Taiwan) and Rotterdam (the Netherlands)

§ 5.2.1 Kaohsiung

The city of Kaohsiung is one of the first cities responsible for initiating local planning strategies for spatial development. The local government of Kaohsiung has been directly under the national government framework as a metropolitan-region since the 1980s. This administrative status is similar to the municipality of Taipei and the original regional government of Taiwan Province, which is higher than the original Kaohsiung County, Tainan City and Tainan County Government. The municipality is generally independent to initiate plans and strategies for urban development. National authorities are important for decision-making in promoting the development of the harbour areas. The administrative power is represented by the ownership of the Kaohsiung Port, the national cooperation's companies of heavy industry and the export-oriented industrial districts.

The development of Kaohsiung is highly dependent to its harbour industry. Industrial development has driven a rapid growth of the city since the early 1900s. However, it also has many negative effects on urban development, such as air pollution and poor quality of the drinking water. The pollution issues and environmental protection are therefore considered more urgent to other environmental issues such as flood risks. The city of Kaohsiung experienced an economic downturn in the 1990s when the harbour industry declined as a consequence of the rapid development of other harbours in China. Because of this, policy-makers have been keen to develop strategies that can transform the city from having an industrial-oriented development to having more focus on trade and services. This is discussed later in the case of Kaohsiung city centre in Chapter 6.

The administrative reform in 2010 merged the original Kaohsiung County and the municipality of Kaohsiung into one. This change massively expanded the geographic boundary of the city from around 154 km² to around 2946 km². Most of the expanded area consists of peripheral areas where agricultural settlements and high mountain areas are hard to access from the city centre. These are often considered as the hinterlands of the city. In addition to maintaining the economic growth of the existing urbanised area, the municipality is expected to deal with the challenges that come up in its new territory, such as the issues of flooding. However, the national authorities seem remaining important in framing strategies of flood risk management at the areas where were governed by the County of Kaohsiung. This is further discussed in the case of Meinong in the next chapter.

§ 5.2.2 Tainan

The city of Tainan has a long history of urban development. It was the capital city of Taiwan for centuries until the national administration was moved to Taipei in the early 20th century. The city of Tainan is unique in its richness of cultural resources. Large numbers of historic heritages make the city attractive for tourists. Spatial development in Tainan is generally slow, stable and calm. Policy-makers are generally satisfied with the existing state of the city. Development strategies are mainly focused on cultural economy and tourism industry.

The administrative reform in 2010 also merged the original Tainan County and the municipality of Tainan into one. This change caused the city to become more than ten times larger than the original territory (from around 176 km² to around 2193 km²). The new territory consists mainly of other parts of the Zengwen Delta which share geographic similarities with the original municipal area. Different from the situation in Kaohsiung, the administrative reform seems having less tension in policy-making. This can be interpreted as a consequence of a fact that both the original County and the City Government of Tainan were under the same authority of the regional government (the Taiwan Province) and had more collaboration between each other. In this aspect, the administrative reform may provide better opportunities for spatial development of the metropolitan-region. This is discussed in the STSP case and in the case of Tainan city centre in Chapter 7.

§ 5.2.3 Rotterdam

Spatial development in the city of Rotterdam is highly related to the industrial development of the harbour (Meyer, 2008, 1999). Similar with the city of Kaohsiung, Rotterdam has also experienced the negative impact of pollution due to the growth of the harbour industry. Although the city's development is deeply linked with the harbour, land use plans in the harbour area have historically separated it from urban living activities and concentrated on the development of logistics and heavy industry. This has segregated the city from its waterfront for decades. The economic dependency of Rotterdam Port caused difficulties in urban development firstly in the 1970s when the harbour business was gradually moved toward the seashore and later in the 1980s due to the occurrence of global economic crisis. Rotterdam-south, the original harbour area, was probably the most influential area where became problematic after the port industries left the riverbanks (Meyer, 2010). Since then, the city has looked for ways to make spatial development less dependent on the harbour industry. The *Kop van Zuid Regeneration Project* was initiated in this context to regenerate the southern part of the city. The decentralised approach of the Dutch national planning seems to have

had a positive impact on the city of Rotterdam. The municipality is active in promoting collaborative activities with the upper-level government, the Port of Rotterdam and private stakeholders for spatial development. The collaboration is especially addressed in coping with climate change and flood risks. The role of planning in local governance is further discussed both in the case of Nesselande and the case of Rotterdam city centre in Chapter 8.

The descriptions of the three cities help to facilitate the discussion focusing on the issues of flood risks and climate change, which has become increasingly important in planning policy-making. The next section presents both flooding disasters that have already occurred in the three cities as well as the threats of floods that are addressed in scientific projections.

§ 5.3 planning in coping with climate-related flood risks

The importance of tackling flood risks related to climate change has been highlighted in local policy-making in both Taiwan and the Netherlands due to the experiences of flooding disasters in the past and the estimated threats of flooding in the future. In Taiwan, two flooding disasters occurred in the late 2000s that shocked the existing system of planning. Typhoon Morakot in 2009 brought over three metres of heavy rainfall in the southern part of Taiwan within four days. Hundreds of people died as a result of mudslides and other flooding consequences. The economic loss of the flood was over five hundred million euros (National Science and Technology Center for Disaster Reduction, 2010). Typhoon Fanapi in 2010 brought over 0.6 metres of rapid rainfall within half a day. These extreme rainfalls crushed the drainage system and led to a serious flood in the Kaohsiung city centre.

Scientific studies indicate that cities will become increasingly vulnerable to flooding in the coming decades. The sea level is expected to rise 0.18 metres by 2030 and 0.59 metres by 2090 (Water Resource Agency and Sinotech Engineering Consultants, 2010). Storms with extreme rainfall may also occur more frequently, which would likely result in more disasters (Su et al., 2010). The southern part of Taiwan, where Kaohsiung and Tainan are located, may be the most vulnerable area in Taiwan due to the geographical conditions and the existing patterns of urban development (Taiwan Climate Change Projection and Information Platform Project, 2011).

In the Netherlands, the sea level is expected to rise between 0.35 metres and 0.85 metres in coastal areas by 2100 (Royal Netherlands Meteorological Institute, 2006). If local ground levels are included in this estimation, the estimated sea level rising

increases to 2.50 to 5.00 metres with 3.25 meters as the average (van den Hurk et al., 2006). This scenario would cause the chance of flooding in cities like Rotterdam to be at least ten times higher than today. This would mean that the Maestlant and Oosterschelde surge barriers would no longer be an effective means of protection for the city of Rotterdam or the greater Randstad region (van de Ven, 2004, van den Berg, 2010).

Although the two nations are both vulnerable to flooding, the previous discussion in this chapter indicates a fact that there is a fundamental difference in planning between Taiwan and the Netherlands in coping with flooding issues. Flooding in Taiwan is generally considered to be an issue that can be handled by engineering strategies, such as dikes or pumping facilities. Decision-making is often restricted to engineering sectors in the government. Planning sectors has very little involvement in framing strategies for flood risk management. In contrast, the Dutch planning system has a long history of coping with water issues and formulating integrated strategies for spatial development. Planning sectors are often involved or even take a leading role in framing collaboration to shape decisions for flood risk management.

This study uses the issue of climate-related floods as a context to evaluate planning decision-making in the empirical study. The empirical study is presented in the following three chapters. The comparative analysis of the case studies is then presented in Part IV.

6 Kaohsiung, Taiwan

The discussion in the following three chapters focuses on the empirical study in multiple cases. It aims to present the local planning stories of the study areas since the 1990s in relation to flood risk management and the impact of climate change. The discussion has a specific focus on planning in terms of the dimension of collaborative framework, discourses, plans and policies and spatial development (see Chapter 2). The illustration of local planning stories is divided into sections according to the water-related issues that impact spatial development.

The term *episode* is used to explain the shifting paradigm of planning in the case studies during the past two decades. A new episode indicates a change in actors, objectives, policies and physical development. Although a new episode often occurs due to a specific issue being addressed in planning decision-making, it is also possible that two or more issues are occurring within an episode. This means the discussions of these issues are addressed in a shared framework in policy-making. The number and duration of the episodes can vary from one case to another depending on the interpretations of the environmental changes, the governance resource, and the public debates that occurred in local decision-making. For example, an emphasis on climate adaptation in a city can be caused by a severe flooding event that changes the direction of spatial development and shifts decision-making toward a new episode. In another city, however, local decision-making may be less sensitive to the flooding disaster and remain in the original episode.

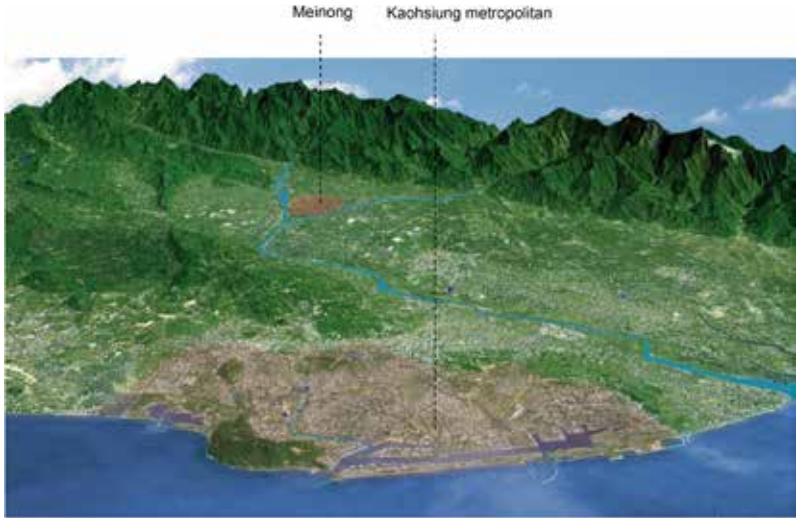
Another reason to define the episodes is to form the discussion of planning by applying resilience in specific phases. This is examined by considering who is involved in shaping local planning decisions and how the notion of resilience is promoted. The study presents the actors in terms of four categories: the national and local government, local specialists (e.g., NGOs and academics) and private enterprises. The six planning characteristics presented in Chapter 3 are used to assess if resilience is addressed in decision-making and how well. These characteristics are, considering the current situations, examining trends and future threats, learning from previous experience, setting goals, initiating actions and involving the public. This helps to make the collecting of local evidence more systematic for comparative studies.

This empirical study uses multiple cases to increase the reliability of the evidence. Sources of data collection are multiple, including interviews, policy reviews and participating observation. Six cases are presented in order to give a broad view of local planning in Kaohsiung, Tainan and Rotterdam. Two cases in each city are presented: one case focuses on the city centre and another on the edge of the metropolitan area. The collection of local planning stories is used as the resource for comparative analysis addressed in Part IV.

This chapter contains two cases located in the city of Kaohsiung. The first is the case of Meinong, and the second is the case of Kaohsiung city centre. Meinong is a rural village where strategies for spatial development are deeply influenced by the national policies of water management. The water issues in the city centre of Kaohsiung are often related to economic development to promote the city's competitiveness in the harbour industry and the quality of living.

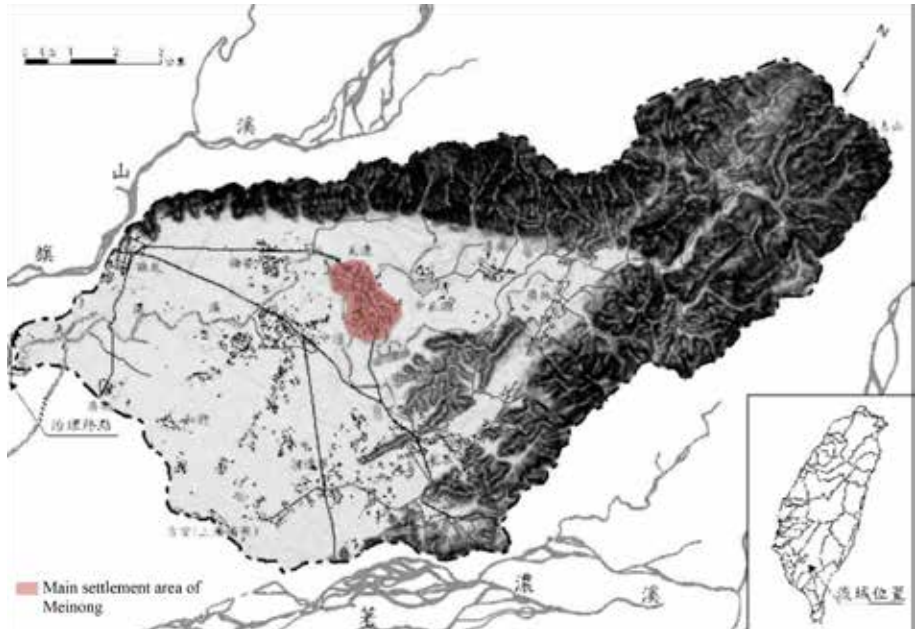
§ 6.1 Case study 1: Meinong

Meinong (also called Mei-long 美濃) is an agricultural settlement located in the peripheral area of Kaohsiung city, around seventy kilometres away from the city centre of Kaohsiung (Figuur 10). Meinong was a township of the County of Kaohsiung until it was merged into one unit with Kaohsiung City due to the administrative reform in 2010. Meinong has a particular flavour of Hakka culture. This unique characteristic is part of the reason that Meinong became a popular spot for tourists in the southern part of Taiwan.



Figuur 10
Location of Kaohsiung city centre and Meinong

The geographical features cause Meinong to have a critical position in managing both the issues of flooding and water scarcity. As shown in Figuur 11, the village is located at the top of the alluvial fan area of the Kaoping Delta where the water speed rapidly decreases and the slope of the river suddenly levels out. This makes the village vulnerable to flooding. The situation grows worse when the Meinong River has problems joining the Cishan River and causes floodwater to back up into the village.



Figuur 11
Geographical condition of Meinong

The discussion of water scarcity is more political in nature. It has been an important issue in policy-making for over decades due to a national development strategy that aims to ensure that the metropolitan region has sufficient water supply for industrial development. The Meinong Reservoir was proposed in the early 1990s. However, it was criticised by academics and local communities from the perspective of ecological protection. The reservoir proposal was abandoned in the early 2000s and replaced by two engineering related strategies. The first idea is to construct channels through the mountains to transport fresh water from the Zengwen Reservoir. The second idea is to dig artificial lakes in the farmlands for water storage. Both strategies are currently in different phases of implementation.

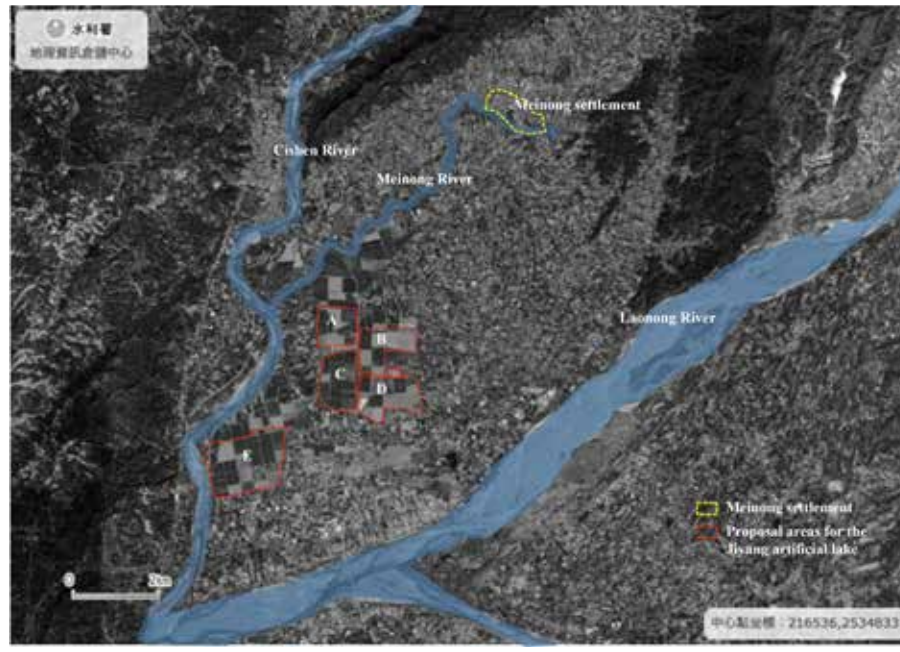
The critical position in water management brings in a more national-led direction in planning. The hydraulic authorities of the national government are often involved or take a leading position in developing policies that have an impact on spatial development. The Southern Regional Water Resource Office (WRASB) is responsible for implementing plans for water resource management. The Water Resource Planning Institute (WRAP) is in charge of developing plans for flood risk management, and the Seventh River Management Office (WRA07) holds the responsibility for implementation. These policies often lead to engineering projects that aim to minimise economic disturbances from flooding and water scarcity. Urban development is rarely taken into consideration.

The local government is seldom involved in framing planning decisions in Meinong due to the lack of institutional capacity in the past. This situation has continued after the administrative reform in 2010 that merged the original Kaohsiung County into the municipality of Kaohsiung. Local NGOs are actively involved in framing strategies for spatial development. The NGOs began to participate decades ago in protesting against the Meinong Reservoir proposal. More recently, they are involved not only in water-related issues but also in the discussions related to agricultural landscape, local regeneration and tourism development.

The following discussion of Meinong is divided into four sections. The first three sections are defined according to the issues being focused on in local planning. They are: artificial lakes (6.1.1), river levee (6.1.2) and integrated planning for water management (6.1.3). The local planning story is summarised in the last section (6.1.4) with a highlight of planning dimensions and the episodes in policy-making. The discussion of planning for resilience is also examined in this section according to the six planning characteristics presented in Chapter 3. The information was gathered by interviewing officials and NGO leaders and by examining plans and policy documents.

§ 6.1.1 artificial lakes

The discussion on artificial lakes began in the early 2000s after the national government officially abandoned the Meinong Reservoir proposal. According to the government report, *Feasibility Study of Chi-Yang Lake*, it was proposed that five artificial lakes be made in the existing farmland (Water Resource Planning Institute, 2000). The proposed development area was located at the downstream area of the Meinong River, on approximately seven hundred hectares (see Figuur 12). In the early 2000s, the WRASB, the responsible sector of the development project, had gained support from the sole proprietor of the farmland, the Taiwan Sugar Corporation, to lease the farmlands for implementation. Private developers were also interested in participating in the project because of the expected profit from tourism and sand mining.



Figuur 12
Locations of artificial lakes

Local protests began after the proposal for the artificial lakes was accepted by the national government. Among many of the discourses arguing the development plan, the protectors (scholars and NGOs) specifically made the three following objections, all of which can be seen in the interview records. First, the development plan did not consider the environmental impact of the lakes. It neglected other valid options that would not cause such massive change in the environment while still remaining functional in dealing with the issues of water supply. For example, instead of constructing five massive lakes, a better strategy might be to expand the existing ponds located in the farmlands which would be a less expensive plan and more efficient in holding water resources.

Second, the intention of the development was unclear. The underlying profit from the development project, such as sand mining, might have been more influential in decision-making than its official purpose of water management. Furthermore, these profits did were not even for the benefit of the public. This is mentioned in the interviewing records:

'You shall know the key issue for development is never water scarcity but the benefits of sand mining. Developers (not even the government) would earn a lot of money from this project, but we as local residents would need to experience the cost of this wrong decision.' (Interview M1, NGO coordinator, 2010)

'Did you know that the government even proposed an express highway especially for sandstone truck in this project? The WRA claimed that the express ramp is proposed to "ensure local safety of Meinong (to avoid traffic accidents)." Should this convince us? No! The economic intention is too clear in this project and the approach to gain profits really foolish the residents here.' (Interview M4, NGO coordinator, 2010)

The third objection of the argument is based on the scientific understanding of underground water in the development area. The proposed location was in a place where the groundwater level was higher than the surrounding area. This means that the artificial lakes would not only fail in being functional for rainwater storage but would even water waste by exposing fresh groundwater to the surface. This is as mentioned in the following.

'Because the groundwater level here is very high (only around five metres below the ground), it is not a proper location digging for artificial lakes. The rainwater retention capacity will be very limited. The WRA proclaimed that these lakes could help to recharge the ground – this argument does not exist from the scientific perspective. The worse situation is, the fresh and clean groundwater flows out to the surface and be evaporated in the air. This plan would not only fail regarding either water retention or water infusion but also destroy the groundwater system of the Kaoping plain.' (Interview M7, Hydraulic academics, 2012)

The tension between the supporters (i.e., the WRASB, the Taiwan Sugar Cooperation and private developers) and the protesters (i.e., scholars and the NGOs) continues. According to the interview records, the tension might be caused by the different attitudes in managing the farmlands. The supporters of the plan often consider farmlands to be a non-specific resource that can be appropriated for any use. For the protesters, however, this land is a unique resource that is important for maintaining the balance of the environment. From the environmental perspective, the development would have a massive impact on the underground water balance of the river basin, and the disturbances caused by the development would be nearly impossible to reverse.

The national study, *Groundwater Hydraulic Observation and Review for Kaoping Lake*, was carried out in the late 2000s (Southern Regional Water Resource Office and Technology, 2009). By evaluating the effect of the environment and the efficiency in water storage, the study concluded that the proposed areas were inappropriate for such an implementation. The WRASB insisted on implementing the plan in spite of having the scientific evidence that showed the shortages of the project. This caused an even stronger backlash from the protesters, who used political tensions to delay the implementation.

§ 6.1.2 river levees

The discussion of river levees arose in the mid 2000s when the village was seriously damaged by flooding. The proposal to heighten the river levees can first be found in the WRAP research document, *Report on the Regulation Planning of Mei-Long Creek* (Water Resource Agency and Water Resource Planning Institute, 2005). This proposal later became a strategy in the *Regulation Project for Flood-prone Area*, a national policy to facilitate defensive infrastructure in vulnerable areas for flood risk management (Water Resource Agency, 2006). The WRA07 was responsible for initiating plans to construct higher levees along the Meinong River. The construction plan was finalised in the late 2000s and implementation began in the downstream area.

The downstream construction did not reduce the occurrence of flooding in the village. In contrast, flooding in Meinong began occurring more frequently and the damage became more severe. In 2007, the village was flooded seven times in the rainy season when the WRA07 had just completed the new river levee. This caused local communities and NGOs began to consider the link between flooding and the new river levees. They argued a possibility that the new river levee changed the original landscape, limited the flow of the river at the downstream area and therefore caused a severe back up to the village. This is shown in the interviewing records.

'Since the beginning of the village established here, agricultural lands at the downstream of the Meinong River always play the role of water retention in flooding seasons. While now river levee is built at the downstream area and limit water from its original floodplain. It is reasonable to doubt that the government plan rather giving us protections but pushing river water into the village.' (Interview M1, NGO coordinator, 2010)

'Rainfall is very generous. It drops in the Meinong River, so does in the Cishan River. In this case, water in the Meinong River is hard to converge into the Cishan River. This is what the natural is. It is not a problem. The problem occurs because the downstream river levee restricts water to flow to the original floodplain (surrounding farmlands) so river water has nowhere to go but push back to the midstream, where the village locates. This situation happens almost every time when rapid rainfalls occur and always causes severe floods in the village.' (Interview M2, NGO leader, 2010)

'Because the elevation from the village to the mouth of the Meinong River is only two metres, water by nature runs very slowly in the village and hard to go out. The problem is not the total amount of river capacity but the capacity to drain water out. Indeed, the WRA07 built the dikes and deepened the river, but what they do is to create the retention capacity and make the river become a stream of retention ponds!'(Interview M1, NGO coordinator, 2010)

The river levee project was continued until construction approached the midstream area, where the village is. Private landowners were unwilling to sell their land for constructing the river dikes due to their consideration of the coincidence between dikes and floods. This delayed the expected progress of the project and caused tension between the WRA07 and the NGOs. The tension became more severe when the national government used this lack of cooperation to explain the continued flooding in the village. Their arguments can be seen in the interviews. From the WRA07's perspective, the flooding caused by the construction was temporary and would be solved after the new river levee was completely established. Local protest was extending the inconvenient period and increasing the potential for flooding. From the perspective of local NGOs and groups, however, the new river levees could not be linked to the prevention of floods because the extreme rainfall levels that had caused flooding in recent years were usually more than the designated capacity of the river levees. The completion of the new river levees would increase the vulnerability of the village since the dike would not able to contain the pressure and would collapse.

'I wouldn't say the government do nothing. We have communicated with the WRA07 for many years, and we know they are government servants who keen to do good to the society. But I would say at least half of the Meinong residents still don't feel the river levee can protect us from river floods.' (Interview M1, NGO coordinator, 2012)

'What if the dike is not able to carry the extreme rainfalls – it will collapse and cause even more severe damages to the village. The government is so naïve to believe there will be no problem after the implementation is accomplished. Who can carry the responsibility if the real situation does not go as they expected? '(Interview M1, NGO coordinator, 2010)

The construction of the river levees along the village was completed in the beginning of the 2010s (see Figuur 13). After that, the WRA07 began to reconsider the effectiveness of the river levee for flood protection. The water-engineering officer pointed out the shortcomings of the project in two aspects. First, only the river floods were considered in the calculation of the construction plan. Other factors, such as the low capacity of the drainage system and the extremeness of rapid rainfalls, were hardly addressed. Second, the river dikes could only protect the village toward a certain risk factor (1-in-50 years standard of extreme rainfalls). The construction could be destroyed if the water pressure exceeded the standard limit which would cause a more severe disaster in the village. Because of these, the WRA07 could only boast of the river dikes as an accomplishment of the implementation rather than the assurance of water safety.

'We celebrated the accomplishment of this plan. This dike ensures the 1-in50 years standard of flooding would not cause damage to the villages. We know it will not be enough to tackle extreme events that brought over-standard rainfall, such as Typhoon Morakot or Fanapi. But we were still happy to see the accomplishment of this plan.' (Interview M3, Water engineering officer, 2012)

Figuur 13
New river levee of the village

'Yes, the dike at the three-stream-entangle spot (the centre of the village) was accomplished, which means half of the village is 'protected' by dikes. Well, I am not sure about this. The village was not flooded in the last two years. This is because the extreme events did not occur, not really because of the dikes.' (Interview M1, NGO coordinator, 2012)

A shift in interest occurred from discussing whether the dike should be built to considering how much more adaptive action is still needed. Both the WRA07 and NGOs accept and recognise that it is not possible to cope with flood risks by the new river levee alone. This is a realisation in relation to the limits of the engineering approach in facing extreme rainfalls. The NGOs have also been active in framing preparation strategies. According to the interview, the NGOs hold a leading role in collaboration with the Fire Bureau Office in Meinong to develop the standard operation procedure for rescue actions (Interview M5, Officer in Fire Bureau, 2012).

§ 6.1.3 integrated planning for water management

The discussion of integrated planning for water management was firstly proposed in a local government research report, *Master Plan of the Culture Town Meinong* (Government and Association, 2005). Led by the local NGOs, this report set up a goal out of developing strategies to reach a balance in policy-making between flood risk management and agricultural development. The idea of an 'underground reservoir' was proposed in this report to achieve the goal. This included strategies at both local and regional levels. At the local level, the proposed planning actions were concentrated on three items: points, lines and plains. The point areas, such as ponds, lakes and wetlands, would be crucial for directing rainwater to underground storage banks. The line areas, such as streams, rivers and ditches, would be important for drainage and tourism development.

The plain areas, such as farmlands, could greatly increase the capacity for water retention. Actions at the regional level are more political. The report recommended establishing a semi-government organisation with a focus on water management, namely, the Kaoping Riverbasin Management Committee. These ideas can be seen in the interview records.

'I believe the idea of the underground reservoir will be more valuable in Meinong than a combination of river levees and artificial lakes. Of course there are so technical issues needed be overcome, but at least this idea recognises water circle and tries to work on its natures. The difficulty to communicate with the (national) government is that they are too directed to the way of problem-solving. Their proposal has very narrow interests and lack of comprehensive thinking.' (Interview M9, NGO leader, 2010)

'We have seen that many problems in this regions regarding water and land use management are resulted from a miscommunication between government authorities at both national and local levels. But in years we can only present our opinions in social movements because of a cross-sectoral platform is inexistence. Today we are pushing to set up the Kaoping Riverbasin Management Committee to be such a platform.' (Interview M12, NGO leader, 2010)

The government did not take the ideas of integrated planning into account until Typhoon Morakot in 2009 brought severe damage in the southern part of Taiwan, especially in the mountainous areas. According to the interview, this catastrophe caused policy-makers to realise the limited nature of engineering strategies and the high cost of repairs when damage occurs (Interview M6, Water engineering officer, 2012). This was also shown in the rethinking of the effectiveness of the river levee and the purpose of water engineering for flood protection.

'For a long time our work focus on defensive facilities. But the atmosphere has been changed so we gradually realise the limits of infrastructures, or maybe I should say, the dangerous to fully depend on defensive facilities. Typhoon Morakot is a big trigger regarding the change of attitude. Our work, as a hydra-engineering sector, is necessary to address not only the defensive but also the retention capacity of the environment.' (Interview M6, Water engineering officer, 2012)

Learning by this extreme event, the WRA07 began to put more emphasis on developing adaptive strategies for flood risk management, such as retention ponds. This was presented in the newly published policy, the *Feasibility Evaluation of Detention Ponds Sites in Mainong Area* (The Seventh River Managment Office and U-An Consultants, 2010). Some of the ideas is this policy were absorbed from the *Master Plan of the Culture Town Meinong*, for example, the initiating of the development plan in referring to the historic map. This is shown in the interviewing record.

'The Japanese old map (Taiwan Baotu, 1904) told us water (flood) management in Meinong was always managed not by dikes but by retention spaces. As you seen in the Taiwan Baotu, farmlands at the downstream areas are remarked as 'flood plain.' This is the way to really keep the village safe from floods! I am glad that the WRA07 can listen to us and consider the concept of water retention.' (Interview M12, NGO leader, 2012)

A collaborative network between the WRA07 and the NGOs was being initiated due to the shared interests in developing local adaptation for flooding. This led to an atmosphere in which local opinions are heard in policy-making. Public involvement was particularly important in proposing innovative strategies for water management. For example, the NGOs were active in finding government support to raise the level of the ridges in the farmlands so that the water retention capacity could be improved.

The flooding of Typhoon Morakot in 2009 was a critical moment that opened a window of opportunity for reforming the coalitions and led to a more collaborative framework in local decision-making. Policy-makers learned to initiate more integrated strategies of planning for water management. This direction opened space for the NGOs and local communities to collaborate. According to the interview records, both the WRA07 and the NGOs considered the collaboration positive.

'A comprehensive strategy between water management and the village's lifestyle is necessary. I would not say the WRA07's plan is really good, but I am happy that finally they offers a cooperation to deal with the uncertainties in a different way, a way they are not used to be. Since you will never know when and where extreme rainfalls would occur, I think the best way to deal with it is by managing the risks in our common life.' (Interview M13, NGO coordinator, 2012)

'We always say the WRA07 and the NGOs here are "lovers." Sometimes they fight, and sometimes they work together. This time the decision-making is really different from the decisions made by only the hydra-engineering perspective. It is addressed from local ideas, and I am looking forward to see its further development.' (Interview M3, Water engineering officer, 2012)

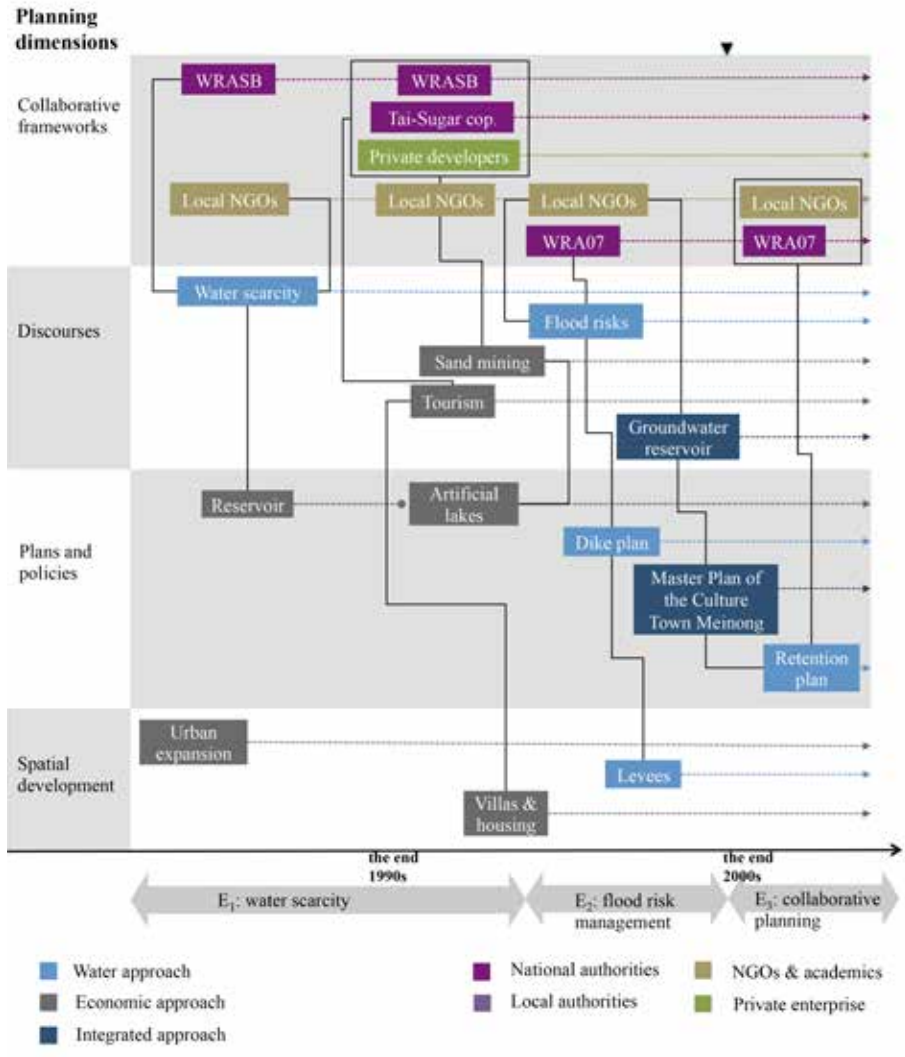
The implementation strategies were mainly concerned with the farmlands surrounding the village. This required a more flexible land use strategy to encourage private landowners to participate, which meant that support from the planning sectors at the local government were necessary. A new challenge arose due to the low involvement of the local government. This has caused difficulties in putting these ideas into practice, because neither the WRA07 nor the NGOs can initiate planning strategies for flexible land use management. As a result, only a few local landowners are willing to cooperate with the integrated strategies. Most of them remain focused on spatial development for private profit and have no interest in supporting adaptive strategies on their property. This is shown in the interviewing record.

'Farmers are not happy if they need to sell their land to the government for resistant facilities (to ensure others' land dry), but they are also afraid to accept the adaptive concepts. In any case, they do not like to 'feel' their lands are flood-vulnerable. The situation becomes more difficult if we address the issue of tourist development. If the landowners expect to develop their land for tourist benefits someday, they will not accept adaptive strategies and claim their lands are safe from floods (to gain good prices in market). The NGOs have worked in negotiating local opinions for many years, but there are still a long way to go.' (Interview M10, NGO coordinator, 2012)

It was also hard for water engineering authorities to manage the implementation. According to the *National Water Law*, all government-funded hydraulic projects must be developed on government-owned land. This would prohibit farmlands from being functional in water retention unless the WRA07 bought the property.

§ 6.1.4 discussions and conclusion

This section summarises the local planning story in Meinong by using the analytical framework which considers the dimensions of spatial planning and the episodes in policy-making. As shown in Figuur 14, there are three episodes addressed in the past two decades: the first is water scarcity, the second is flood risk management, and the third is collaborative planning. This indicates a shift in which a new issue is addressed while the original issues are no longer the primary focus in policy-making. The episode of water scarcity occurred from the early 1990s to around 2005. The discussion remained after the mid 2000s but no longer had a dominant position. The development plan of artificial lakes was the major issue that caused tension between the supporters (i.e., the WRASB, the Taiwan Sugar Cooperation and private developers) and the protesters (i.e., scholars and the NGOs). In this episode the supporters dominated the process of decision-making. The protesters could only delay implementation.



Figuur 14
Local planning story in the case of Meinong.

Several characteristics of planning especially relevant to resilience could be recognised in policy-making during this episode. The characteristic of *examining trends and future trends* was important for framing the strategies for artificial lakes, even though it was recently argued that the expectation of spatial development was overly optimistic in considering the future growth of the metropolitan region (Interviewee M1). *Setting goals* and *initiating actions* were also highlighted in policy-making. Local protests were mainly about the location of implementation and the exclusive nature of policy-making that only included select groups (Interviewee M1, M2, M7).

The episode of flood risk management began around 2005. It gradually moved into the following episode in the late 2000s when the effects of Typhoon Morakot resulted in a greater awareness of the extreme importance of flooding in policy-making. The WRA07 was responsible for implementing new river levees to protect the village from flooding. Local protests delayed the implementation. According to their argument, the designated capacity of the river levees would likely not be able to bear the pressure of the floodwater in the late 2000s. The new river levees might actually increase the vulnerability of the village since the dike would not be able to contain the pressure and would collapse (Interviewee M1). At the end of this episode the levee project represented only the accomplishment of the implementation rather than the assurance of water safety. It became evident that adaptive strategies for flood risk management were necessary (Interviewee M1, M3).

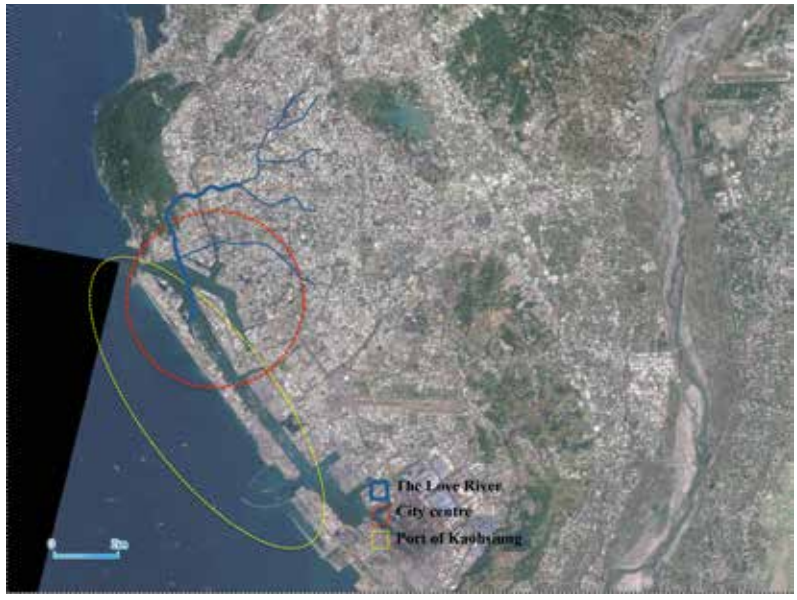
Several characteristics of planning especially relevant to resilience were recorded in policy-making during this episode. The characteristics of *considering the current situation, setting goals* and *initiating actions* were taken into account in planning decision-making for flood risk management. Although the implementation could not completely ensure water safety for the village, the levee project did represent an initiated action to achieve goals. Since that time, adaptive strategies have been considered (Interviewee M5).

The flooding catastrophe of Typhoon Morakot brought local policy-making in Meinong into the third episode, collaborative planning. The new coalition between the WRA07 and NGOs was developed in this episode to initiate integrated strategies that cope with the flooding issues by land use management. However, the integrated strategies were difficult to implement due to the low involvement of local government sectors (Interviewee M1, M2, M3). The implementation was delayed because neither the WRA07 nor the NGOs could initiate planning regulations to promote flexible land use management.

Policy-making during the last episode exhibited several characteristics of planning that can help to promote resilience. The characteristic of *learning from previous experience* was primarily important in this episode. The effects of Typhoon Morakot opened a window of opportunity that led to a shift in decision-making. The new collaborative framework between the WRA07 and the NGOs was established. *Setting goals* and *initiating actions* are evident in spite of a lack of capacity to implement land use regulations. Involving the public was exhibited in this episode. Local opinions were involved and became increasingly important in policy-making for flood risk management.

§ 6.2 Case study 2: Kaohsiung city centre

The case of Kaohsiung city centre (高雄市中心) is the second case in the city of Kaohsiung. As shown in Figuur 15, it has a geographical location between the coast and the Love River. This indicates an important role of water in the development history of the city. The spatial development of the city is influenced by the industrial development of the Port of Kaohsiung. The port drives the economic growth but also has negative effects on the city, such as air pollution and poor quality of the drinking water. Kaohsiung city centre experienced an economic downturn in the 1990s when the harbour industry declined due to the rapid development of other harbours in China. Policy-makers are keen to transform the development of the city from being industrial-oriented to having more focus on trade and services.



Figuur 15
Kaohsiung city centre and the Port of Kaohsiung

The local government of Kaohsiung has played an important role in directing spatial development due to the financial and administrative independence of the city. This has been discussed previously in Chapter 5. The sectors involved in planning can be divided in two streams according to their focus. The Public Work Bureau (PWB) and the Hydraulic Engineering Bureau (EHB, separated from the PWB in 2010) are sectors that mainly focus on engineering construction. They are responsible for initiating projects

of physical implementation. The Urban Development Bureau (UDB) and the Economic Development Bureau (EDB) are sectors that are concentrated on framing development for urban growth. The UDB is more focused on initiating plans and strategies for urban development, and the EDB is more responsible for real estate development.

Academic professionals are involved as consultants in policy-making. Because these professionals often have leading roles in the local NGOs, their role in consulting is important for bringing public opinion into the formal framework of policy-making. Local residents can also be influential in decision-making by making claims for specific issues. The *White Paper of Environmental Strategies of Kaohsiung* is an example of residents making known their general attitudes in relation to urban green, wetlands and waste management (education et al., 2006).

The following discussion of Kaohsiung city centre is structured into four sections. The first three sections are defined according to the issues focused on in local planning. They are: waterfront landscape and living quality (6.2.1), coastal regeneration (6.2.2) and climate adaptation (6.2.3). The local planning story is summarised in the last section (6.1.4) with a highlight on planning dimensions and the episodes in policy-making. The discussion of planning for resilience is also examined in this section according to the six planning characteristics presented in Chapter 3. The information was gathered by interviewing officials, academics and NGO leaders and by examining plans and policy documents.

§ 6.2.1 waterfront landscape and living quality

The discussion of waterfront landscape and living quality was considered important in policy-making in order to redevelop the waterfront areas which were polluted by heavy industry and had lower values for real estate. However, the implementation was hardly addressed in the past until a river flood occurred in the early 2000s that caused the municipality to initiate strategies in the area for flood risk management. This is shown in the published documents, *Planning on the Drainage System Improvement of Love River* and *Assessment report of flood-prevention and sewage system in Kaohsiung*, (Water Resource Planning Institute, 2003, Sewage system office and Disaster Prevention Research Center, 2001). The construction projects aimed to enhance the drainage capacity of the city, and to raise the height of the dikes as well as the bridges (Interview K1, Water engineering officer, 2011). The PWB and the HEB were responsible for implementation.

The projects for implementation did not completely follow the original intention of flood risk management. By considering the prior task of urban development, the

PWB shifted the goals to be more focused on improving waterfront landscape, so that the initiated actions would support urban regeneration along the riverfront. Several hotspots along the Love River were selected for construction (Figuur 16). The construction projects reformed the riverfront environment and created more public spaces for recreation and social activities. According to the interviewing records, these projects caused a massive change in the image of this area and the city.

Figuur 16
Projects of implementation for waterfront landscape

'The transforming story of the Love River is taken as the story of the city of Kaohsiung. The city (the river) used to be smelly and polluted, but today we are clean and attractive. Statistically speaking, the total number of tourists is almost double in the last decade. And this shows our city is becoming attractive.' (Interview K2, Local planner, 2010)

'It might be overemphasised the impacts of the Love River, but I do agree that the changes of the Love River in these years give the citizens a 'hope' of the city's future- we see the city centre is no longer the same as before. The city still needs so many improvements, but we really gain confident after we see the change of our river. (Interview K3, NGO leader, 2011)

The construction projects also had a strong impact on the housing market in real estate. The land price rose up because of the environmental quality. Luxurious housing units were built along the riverfront where small industrial clusters had previously stood. These changes were considered a success and became a great credit to politicians and the administrative party of the municipality.

Local opinions were also involved in shaping decisions for the development of the waterfront landscape. These was mainly related to site selection. In some places, public opinion could be so active that the municipality was persuaded to change the original plan. A government officer used the case of the Jhou-Zai wetland as an example to illustrate how local opinions of environmental protection were considered and eventually changed the development direction. Local communities convinced the municipality to preserve the wetland from a government-led building project. This was a result of local investigations that showed the ecological value of the wetland.

'The Jhou-Zai wetland is an example. This area was originally planned for a cultural centre, but NGOs and communities found out a special kind of bird habituates here. They did a lot of investigation to show how importance to keep it as a wetland. Their argument in ecological perspectives eventually convinced the municipality to cancel the plan of cultural centre. What we get in this example is that there is no longer 'one answer' in planning. Local professions may offer the second, or the third options which may be better than ours.' (Interview K4, Local planner, 2011)

From the perspective of water issues, however, the construction projects were criticised for lacking further considerations for flood risk management. This might result from the fact that Kaohsiung city centre was not considered as an area that was very vulnerable to flooding, according to the interviewing record. Policy-makers often took the flooding experience in the early 2000s as an extreme event that would only occur occasionally.

'The city of Kaohsiung was not really vulnerable by floods. We were not used to prepare for it. Water issues throughout the city's development were always regarded the topic of water quality (regarding our pollution) that turned out to promote the development (restoration) of urban wetlands.' (Interview K4, Local planner, 2011)

Another reason that could explain the lack of preparation for flood risks was related to the development history that caused the city to experience severe problems in air and water pollution. Policy-makers were more concerned with dealing with the issue of water quality than flood risk management. This interpretation was presented by a water-engineering officer during an interview.

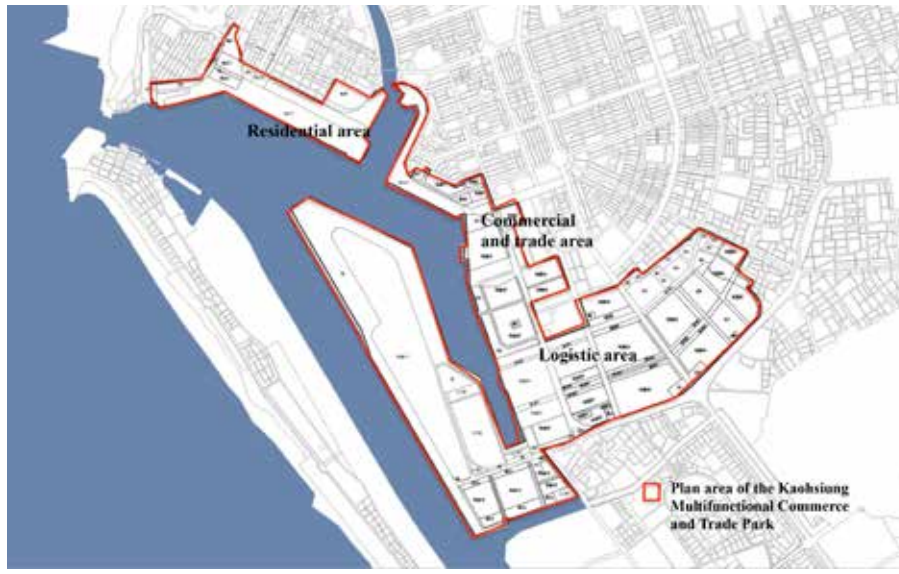
'I personally felt a pity that some of the wetlands were implemented without considering the function of water retention, but I think this interprets the focus of that age. The Jhong-Du wetland would be a perfect retention spot if we installed a water gate at the mouth. But we didn't, so it cannot be useful to tackle extreme rainfalls.' (Interview K5, Water engineering officer, 2012)

The construction projects for waterfront landscape were nearly completed in the early 2010s. Although the projects were shifted from the original direction of flood risk management, they were considered important for their positive impact on urban development.

§ 6.2.2 coastal regeneration

Coastal regeneration was becoming an important issue in policy-making around a decade ago when the city harbour areas were released for urban development. Collaborating with the national authorities, the municipal government proposed the coastal development project, *Kaohsiung Multifunctional Commerce and Trade Park*, in 2006 to transform the development of this area from industrial-oriented to trade and services related (Kaohsiung City Government, 2006, Urban Development Bureau, 2006). According to the development proposal, the UDB and the EDB were two critical players in collaboration with the landowners (i.e., the Port of Kaohsiung and the Export Processing Zone Administration), the semi-government enterprises and private developers.

Policy-makers highlighted the importance of initiating multiple actions for spatial development, including a trade centre, offices, hotels, shopping centres, logistic centres, high-tech science parks and recreational facilities (Urban Development Bureau, 2006). As shown in Figuur 17, the development site was roughly defined in terms of three types of land use: the logistic land use nearby the harbour, the commercial land use in the east bank of the river and the residential land use in the west bank. Each land use zone has particular regulations to define the development.



Figuur 17
Kaohsiung Multifunctional Commerce and Trade Park (Source: based on Urban Development Bureau, 2006)

Although the KWF's master plan was approved and became the government's strategy for development, the implementation did not go smoothly. On the west riverbank, local residents were not willing to cooperate with proposals of a lowered building capacity. According to them, this strategy would harm the development and gradually cause it to lose the commercial-oriented atmosphere of the district.

'We need development. This district by nature is a commercial centre of the city, and this would not be changed simply by reducing the building capacity. This can lead to more troubles for the government to manage this district.' (Interview K3, NGO leader, 2011)

On the east riverbank, the implementation also faced difficulties in gathering private support for the development. At the end of the 2000s, less than half of the development lots had private investments. According to the interview record of a government planner, the shortage of private investors gradually became a financial pressure on the municipality that forced the municipal government to carry a large loan for the development project (Interview K10, Local planner, 2012).

Policy-makers initiated more government-funded construction projects to attract private investors in this area. Four public buildings (i.e., the Kaohsiung Exhibition and Convention Centre, the Maritime Cultural & Popular Music Centre, the Kaohsiung Port Terminal and the Main Kaohsiung Public Library) were concurrently under

construction and were expected to be completed in the mid 2010s. A new tramline was also proposed here, so that the development site could be easily accessed from the city centre. All these projects led to a heavier financial pressure on the municipality. This forced policy-makers to slow down the development process and to reframe the investment plan of public-private collaboration.

'It is very dangerous to keep running this coastal regeneration programme – but we cannot and don't want to stop. It represents a "hope" of the city to be transited with a new living style and cultural taste. We will continue these investments but more conciously' (Interview K10, Local planner, 2012)

'Sometimes I question whether we really need many development of the city. I mean, do we really need to build them at one time? And the answer is always reflected to the political considerations. Politicians need to build something "physically" to convince the citizens to vote them in the next election. The situation will remain unless our citizens do not take only the physical practices as contributions.' (Interview K4, Local planner, 2011)

The regeneration project was also criticised for dismissing consideration of the coastal environment. According to the interview, the issues of potential disturbances, such as flood risks and coastal erosion were hardly considered in the development plan (Interview K9, Local planner, 2010). Planning strategies were focused on economic growth and the potential profits for the development.

§ 6.2.3 climate adaptation

Strategies of climate adaptation for flood risk management were firstly initiated in the early 2000s when the city experienced a severe flooding disaster. According to the government report, *Assessment report of flood-prevention and sewage system in Kaohsiung*, six retention ponds were proposed in and around the city centre (Sewage system office and Disaster Prevention Research Center, 2001). However, only one of them, the Ben-Hi-Le retention pond (Figure 19), was put into implementation. There were three issues which caused this according to the interviewing records: much more focus was given to the waterfront landscape project at this time (see section 6.2.1), public support was lacking, and there was a lack of socioeconomic considerations in the scientific report.

Figuur 18
Ben-He-Le retention pond (Source: Water Resource Bureau, 2014)

A shortage of public support was due to the cultural preferences of applying engineering approaches for flood risk management. According to the interview, both private developers and local communities preferred to have engineering solutions, such as river dikes, rather than adaptive actions, such as water retention ponds. This was related to a general concern that having adaptive strategies in a neighbourhood indicated the area was vulnerable, and this resulted in lower land value.

'Having a water retention pond in your neighbourhood means here is flood vulnerable – and most of people do not like their neighbourhood to have this impression because it indicates low land price and limited potentials of development. If we consider wetlands as an "advantage" of the area (as ecological habitats), then retention ponds is often understood as an "disadvantage"- even they can actually be addressed together.' (Interview K3, NGO leader, 2011)

'We realised that sometimes residents prefer government investment of dikes (or ditches) rather than retention ponds. People like to feel they are "safe" (so the government deserves their supports) even we know water retentions in certain areas are necessary.' (Interview K6, Water engineering officer, 2011)

The lack of socioeconomic considerations in the scientific report was also a key factor that lowered the implementation progress. As shown in the interviewing record, the proposed retention sites were mainly chosen by considering the factors of the physical environment. Social factors, such as land ownership and the implementation costs, were hardly addressed. This caused difficulty in implementing the facilities for water retention.

'The NCKU's proposal is too scientific-oriented. Yes, the calculations are perfect and the proposed sites are correct. But some sites have problem in managing the land property. Because it is too difficult to get the land, the implementation becomes almost not possible. It is really a pity that we make plans in regard to only scientific aspects and neglect the real condition of the city.' (Interview K7, Hydraulic academics/NGO leader/ Local government consulter, 2011)

The atmosphere in decision-making was changed in the late 2000s due to the occurrence of extreme events (Figuur 19[3]). The effects of Typhoon Morakot in 2009 and Typhoon Fanapi in 2010 awoke a greater awareness in policy-making. Learning from these experiences, policy-makers began to realise that the infrastructures of water defence and the urban drainage system would not be adequate. The consideration of having adaptive strategies, such as water retention ponds, became a focus in decision-making. The interview record shows the evidence.

'We make annual budgets for maintaining ditches and increasing the drainage capacity. The facilities are fine, just the rainfall (Typhoon Fanapi) is too intensive. In fact, I believe heavy rainfalls like this would cause floods everywhere in Taiwan, and it just happens here this time (we are not in a good luck!). We need a balance of the city in different aspects. In this regard, I really think our technical facilities are hard to have further improvement to tackle this, and it may not be necessary.' (Interview K1, Water engineering officer, 2011)

'(Although it sounds an excuse), if you ask me what changes after Typhoon Fanapi, I would say we can no longer be so confident of engineer works. Regular facilities are not possible to cope with these kinds of events. Other strategies, such as post-disaster management, are necessary.' (Interview K5, Water engineering officer, 2012)

3 Over 0.6 metres of rapid rainfall occurred within half a day. It caused severe disasters in the city centre of Kaohsiung

Figuur 19
Flooding in Typhoon Fanapi (Source: Water Resource Bureau, 2010)

Strategies of climate adaptation were initiated in various aspects. As illustrated by a water-engineering officer, eight new retention ponds in and around the city centre were proposed by the municipality and became the priority for implementation. Supplementary preparations were also taken into consideration to minimise the potential disturbances of flooding. For example, the municipality was keen to develop rescue plans. Government support for installing household water gates was also taken into consideration.

'Water retention becomes one of 'must-do' tasks after we experienced rapid rainfalls like Typhoon Fanapi and realised our drainage system is really not possible to deal with. We keep our works in drainage, and we add new strategies (after Typhoon Fanapi) focusing on adapting the risks of flood. For instance, we review the NCKU's report (2001) and try to find out a way to implement water retention in the existing context of the city centre. Adaptation strategies are gaining increasingly attentions in policy-making' (Interview K8, Water engineering officer, 2012)

Policy-makers also highlighted the importance of improving monitoring facilities to cope with emerging situations of flooding. According to the government report, *Booklet of Hazard Reaction Strategies*, the monitoring centre was established in 2011. It is directly under the mayor's office to support rescue actions in the case of an emergency (Kaohsiung City Government, 2011).

'We had the monitoring centre in managing flood risks, and it was strengthened after Typhoon Fanapi. Head officers of the municipality are required to stay in the monitoring centre at flooding-risk periods in order to make instant decisions to minimise the impacts of floods.' (Interview K7, Hydraulic academics/NGO leader/Local government consulter, 2011)

Moreover, international networks of collaboration were initiated for knowledge exchange and sharing. The *International Workshop of Water Environment in 2012* formed a collaborative network with the Dutch research team and the municipality in integrating adaptive strategies for urban development along the riverfront (Research

Development and Evaluation Commission and Hydraulic Engineering Bureau, 2012). The *International Conference on Climate Change Adaptation and Sustainable Eco-City Kaohsiung City* highlighted the importance of considering energy efficiency and CO2 emissions in coping with the issue of climate change (Environmental Protection Bureau et al., 2012). Lectures and brainstorming workshops were also sponsored in the municipality. According to the interview with a water-engineering officer, these events formed a more open framework that helped to develop innovative strategies for flood risk management.

'I can tell our (the government's) attitude is changing after the disaster. We have more contacts from other cities abroad where may also face the threats of flood risks. At least in HEB decision-making becomes more open and often "call for ideas (communications)" from our partners abroad.' (Interview K5, Water engineering officer, 2012)

However, the development-focused sectors were hardly integrated in this process. Decision-making for climate adaptation was mainly carried out by sectors that were more concerned with the environment of the city, such as the Hydraulic Engineering Bureau (HEB) and the Environmental Protection Bureau (EPB). The development-focused sectors, such as the UDB and the EDB, hardly took the issue of climate adaptation into consideration. Their passive attitude can be seen in the interviewing records.

'Climate change is too far to impact on the city. We do not know whether the climate is really changing, and how heavy its change will impact. Instead of being afraid of the uncertain impacts of climate change, developing our innovation industries (e.g., culture, music, fashion) and economic growth is things we should work on. It is better to remain focusing on things we want to achieve (economic development) rather than potential threats which may or may not happen.' (Interview K9, Local planner, 2010)

'Yes. We know flood uncertainty. It is important in academics. We also have some research projects in regard to this. But none of our projects are running specifically to develop climate adaptation strategies. And this issue is so far not (yet) introduced in planning practices.' (Interview K10, Local planner, 2012)

The discussion of climate adaptation also lacked public participation. Local NGOs were more active in promoting environmental improvement, such as the waterfront landscape projects, than preparation for future flooding.

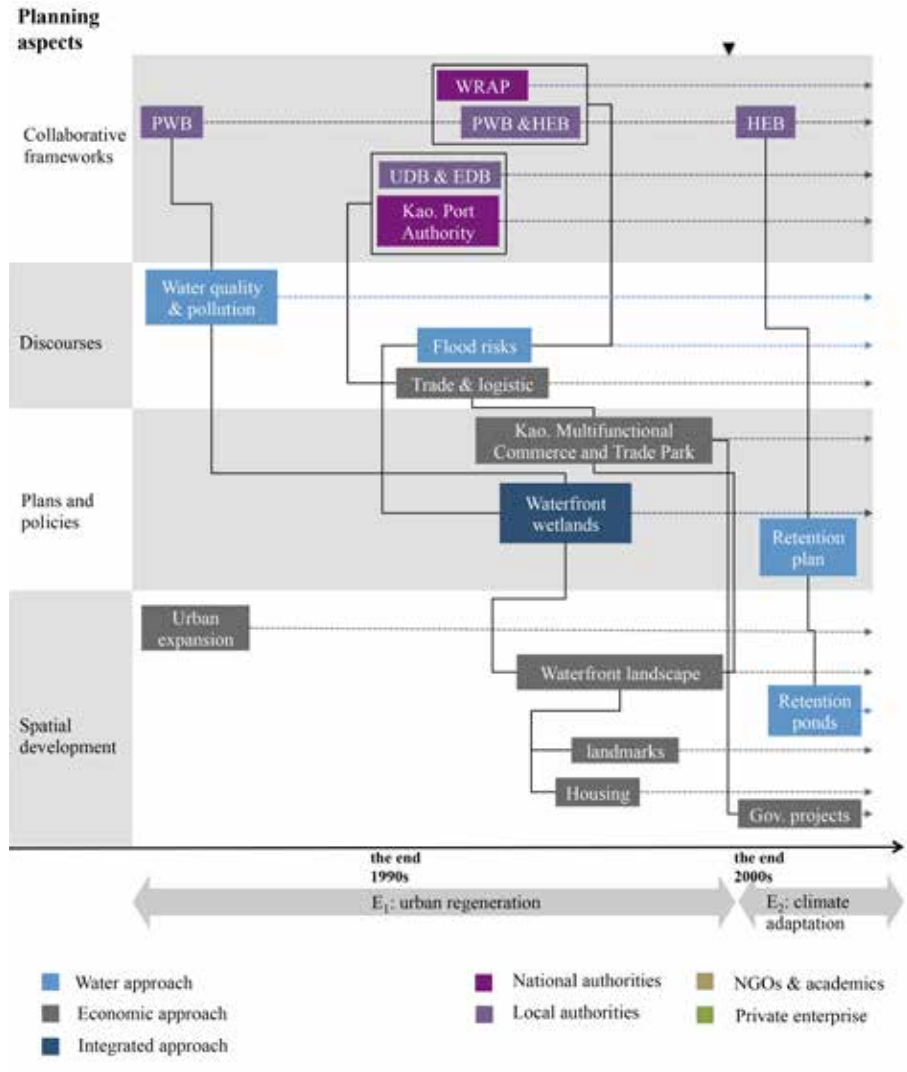
§ 6.2.4 discussions and conclusions

This section summarises the local planning story in Kaohsiung city centre by using the analytical framework considering the dimensions of spatial planning and the episodes in policy-making. As shown in Figure 21, there are two episodes addressed since the 1990s: the first is urban regeneration, and the second is climate adaptation. A shift in episodes indicates that a new issue is addressed and the original issues no longer hold a attention in policy-making that they formerly held. The episode of urban regeneration occurred from the late 1990s. Planning discussion in this episode was focused on two major issues that could help in promoting urban development. The issue of waterfront landscape and living quality aimed to improve the attractiveness of the riverfront, and the issue of coastal regeneration focused on framing new development projects to transform the city from industrial development to trade and services. The waterfront landscape projects were successful in attracting developers to support urban regeneration along the riverfront (Interviewee K2, K3). However, the coastal regeneration project was less successful in gaining private investments and gradually became an obstacle to spatial development (Interviewee K3).

Several characteristics of planning especially relevant to resilience can be recognised in policy-making during this episode. The characteristic of *considering the current situation* was important in policy-making. Government officials in different sectors shared a general understanding of the economic downturn that resulted from the decline of the harbour industry in the 1990s. *Setting goals* and *initiating actions* are also highlighted in policy-making to stimulate spatial development. In this respect, although the UDB and the PWB did not form a formal collaborative network for decision-making, their strategies were complementary for urban development. *Involving the public* was evident in this episode. Policy-making was open to local participation for environmental development, such as the issues of wetlands and waterfront landscape (Interviewee K4).

The flooding catastrophes in 2009 and 2010 brought local policy-making into a new episode. In the episode of climate adaptation, decision-makers were keen to develop strategies that could deal with the disturbances of flooding. The construction projects of water retention ponds were approved by the government and took a priority for implementation. Other strategies, such as rescue plans, monitoring facilities and emergency actions, were also developed. The international collaboration was highlighted to support in developing a more comprehensive framework in decision-making (Interviewee K5, K6). Sectors involved in policy-making were responsible for the environmental quality of the city, such as HEB and EPB. The development sectors, such as the UDB, were seldom involved (Interviewee K9).

Several characteristics of planning especially relevant to resilience were recorded in policy-making during this episode. The characteristic of *considering the current situation* is important. The flood-monitoring centre was established after the flooding in 2010 to support emergency decision-making. Policy-making indicated also ability in *setting goals* and *initiating actions* in this episode. Planning strategies in this episode were no longer limited in physical development. Actions for collaboration and integration were also included.



Figuur 20
Local planning story in the case of Kaohsiung city centre

7 Tainan, Taiwan

This chapter presents the local planning story in Tainan that has been going on since the 1990s and is related to the issues of flood risks and the impact of climate change. The discussion focuses on the planning dimensions of collaborative frameworks, discourses, plans and policies and spatial development (see Chapter 2). The term episode is used to indicate a change in decision-making. Changes in actors and objectives can influence policies and physical development. This helps to facilitate the discussion of how planning can, and does, apply resilience for spatial development.

Two cases in Tainan are presented in this chapter. The first is the case of the Southern Taiwan Science Park (STSP), and the second is the case of Tainan city centre. The STSP is a new development project located in the peripheral area which is vulnerable to flooding. Its geographical condition forces planners to collaborate with water engineers in framing strategies for spatial development. The Tainan city centre is one of the earliest developed areas in Taiwan. It is located at a place which has a relatively high elevation compared to the surrounding areas. The discussion of water issues often is more related to urban landscape and spatial development.

§ 7.1 Case study 3: the Southern Taiwan Science Park (STSP)

The Southern Taiwan Science Park (STSP, 南部科學工業園區) is a nationally-led new development project with the aim of supporting the development of the ICT industry. It is located in the eastern part of the city, around twenty kilometres away from Tainan city centre. Figuur 21 shows the geographical relation between the STSP and the city. The science park development project was proposed in the early 1990s when the first national science park in the north, the Hsinchu Science Park, reached its limitation for further expansion. According to the argument addressed in the *Evaluation Report of Establishing the Second National Science Park*, it was a national political concern to establish the second national science park in the southern part of Taiwan, so that the development of the ICT industry in Taiwan would be more balanced (Graduate Institute of Building and Planning, 1993).

Figuur 21
Location of the STSP and Tainan city centre (Source: adopted by GIS database, Water Resource Agency)

The STSP was designated to be located in the original Tainan County during the early 1990s. The convenient connections of the national highways, the potential for future expansion and the development supports offered by the local government were the main concerns. The national government gained the land property from the sole proprietor, the Taiwan Sugar Corporation, for the STSP development. The development area is approximately four hundred hectares, and the hinterland available for future expansion is approximately two thousand hectares.

The geographical features of the development area have caused the current issue of flooding to become crucial in policy-making for spatial development. As part of the flood plain of both the Zengwen and the Yanshuei River, the development site is very vulnerable to flooding and could only be used for low profit agriculture, such as rice and sugarcane. According to Chen (2010), the Taiwan Sugar Corporation was willing to lease the land for the STSP development because the frequency of flooding often caused economic losses to its business.

The collaborative network of the STSP development includes both the national and local governments. At the national level, the National Science Council (NSC), the authority in managing national science park development, takes a leading role in coordinating the development. Collaborating with the Council for Economic Planning and Development (CEPD, the highest planning authority in Taiwan), the NSC published the planning

strategies in the mid 1990s to guide the STSP development. Different sub-authorities of the Water Resource Agency (WRA) are involved in managing water issues. The Water Resource Planning Institute (WRAP) bears the responsibility to initiate plans for flood risk management. The Sixth River Management Office (WRA06) is responsible for implementing construction projects of water engineering. And the Southern Regional Water Resource Office (WRASB) is in charge of managing the fresh water supply to the development area.

In the scope of the national directive, the local government is responsible for framing practical strategies for implementation. The Water Resource Bureau (WRB) and the Urban Development Bureau (UDB) are two sectors that play important roles in local policy-making. These two sectors often collaborate in framing strategies to promote the STSP development. The collaborative framework between the WRB and the UDB continued after the administrative reform in 2010 that merged the original Tainan County and the municipality of Tainan into one.

The following discussion of the STSP is structured into four sections. The first three sections are defined according to the issues focused on in local planning. These issues are: new town development (7.1.1), flexible zoning (7.1.2) and flood adaptation (7.1.3). The last section (7.1.4) summarises the local planning story in terms of the addressed planning dimensions and the episodes of decision-making. The discussion of planning for resilience is also examined in this section according to the six planning characteristics. Sources of the evidences were gathered by interviewing officials, academics and NGO leaders and by examining plans and policy documents.

§ 7.1.1 new town development

Policy-makers in the local government often considered the STSP project to be an opportunity for new town development. According to the *Tainan County Comprehensive Development Plan*, the STSP area was proposed as a third major city, followed by Tainan and Sinying, to fulfil the polycentric structure of spatial development in the metropolitan region (Graduate Institute of Building and Planning and Government, 1996, Graduate Institute of Building and Planning, 1993). Its strategic location caused the local government, the original Tainan County, to be actively involved in promoting the development project. The interview record supports this argument.

'Different from the Hsinchu Science Park where the local government was passively involved in land use regulation, Tainan County Government was very active in the STSP project. They bided other municipalities in the southern part of Taiwan and won the project. Many supports, such as lower tax policies, were initiated. ' (Interview S5, Planning academics, 2011)

Private investment was also interested in promoting the new town development. According to the interview, many private enterprises from the north were willing to relocate their branches or manufacturing factories to the STSP. This willingness was motivated by both economic and cultural considerations. The economic attraction included lower taxes, an adequate labour force and larger space for development. The personal, cultural links to the south also played an important role in attracting private investments. Owners may have felt a loyalty to this location close to their hometowns.

'Many successful businessmen come from the south. Even though they had been settled in the north for decades, they still want to "go back home". The land connection is very important for people from the south.' (Interview S4, Local planner, 2011)

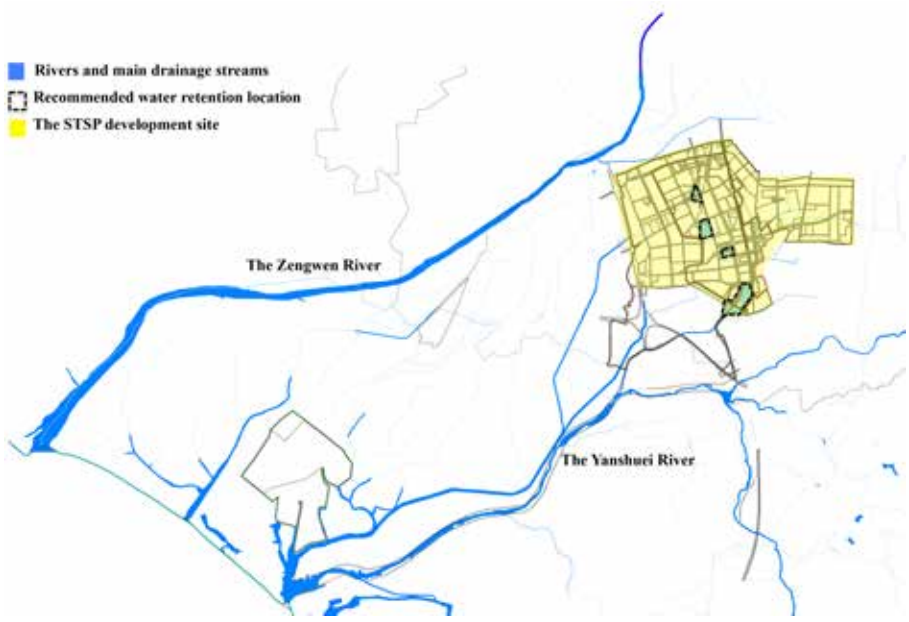
In spite of support from both the government and private enterprises, spatial development in the STSP did not progress smoothly at the beginning due to the concerns with the flood-vulnerability of the area. The geographical features caused collaborative decision-making between planners and water engineers to become necessary (Interview S4, Local planner, 2011). According to the government documents, the initiated actions included engineering projects for ditches, dikes and artificial lakes, as well as land use regulations that required private developers to raise the elevation of the development sites (The Southern Regional Water Resource Office, 1999, NCKU Research and Development Foundation and Water Resource Planning Institute, 2004, Water Resource Planning Institute, 2004). The interview records showed these considerations.

'We cannot change government's decisions, and we also cannot allow any mistakes occur. It is why the double, or triple layers of flooding resistant strategies were proposed in STSP. Strategies of elevation management and drainage capacity are not safe enough. Water retention is our 'backup' strategy for water safety.' (Interview S3, Water engineering officer, 2011)

'A lot of discussions and negotiations were addressed here. We require private developers took responsibilities to uplift their own building site from three to seven metres (although most of them uplift their sites higher than the requirements). And we propose water drainage and retention facilities within the STSP area to contain the extra runoff caused by the new developments. It is important to keep the increasingly runoff 'within' the science park and do not cause problems to the surroundings.' (Interview S2, Water engineering officer, 2011)

The artificial lakes were considered important for adapting to the potential disturbances of flooding. This was firstly proposed in the national report, *Integrated Flood Control Planning of S.T.S.I.P.A. and its Peripheral Drainage*, that identified four important areas for water retention by calculating the capacity of the drainage system (Water Resource Planning Institute, 2004). Figuur 22 shows the location of these

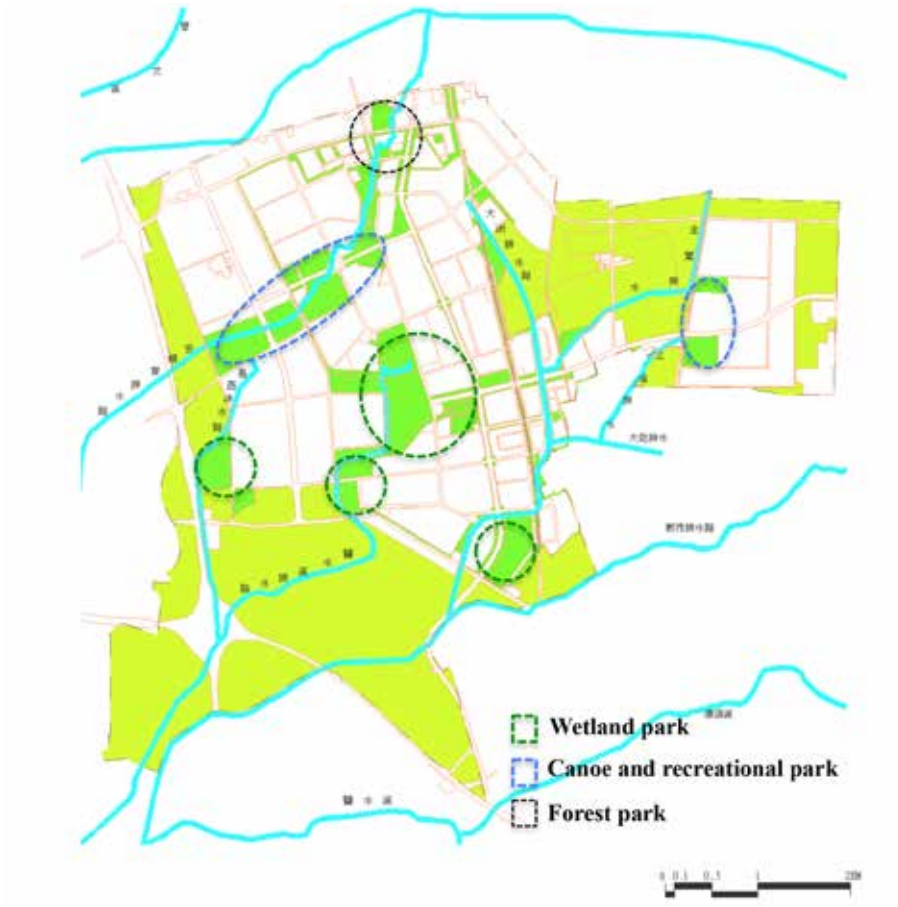
areas. According to the interview record, the consideration of flood adaptation was quite advanced in the early 2000s when strategies of flood risk management were often initiated by following the mitigation approach.



Figuur 22
Proposed locations for water retention (Source: Water Resource Planning Institute, 2004)

'Water retention was important for flood risk management. This was quite advanced at that time (in the early 2000s) when we still try to manage flood risks by constructing dikes and deepening the ditches. I was also happy that the UDB put this proposal into practices.' (Interview S3, Water engineering officer, 2011)

Following the direction of the national report, the UDB proposed eleven artificial lakes in the STSP area. These lakes were designed with various functions to support spatial development. As shown in Figuur 23, the artificial lakes in the middle of the STSP area were defined as wetlands parks. Forest parks and canals were designated at the edge. This proposal was shown in the *Southern Taiwan Science Park Development Plan* (Tainan County Government, 2002). The WRB was the sector responsible for implementation.



Figuur 23
Location of the artificial lakes (Source: Department of Urban and Rural Development, 2003)

In addition to being important for water retention, artificial lakes were also considered to be useful for enhancing the quality of the environment. This offered more attractive opportunities for housing development in this area. More recently, the local government encouraged and supported private developers in building housing units that facilitated new technologies, such as solar panels and other equipment that promote energy sufficiency. By forming a housing development with innovative technologies, the housing projects in the STSP area promoted a new life style that was welcome in the housing market (Interview S4, Local planner, 2011).

§ 7.1.2 flexible zoning

The discussion of flexible zoning was first proposed by the local government in the early 2000s to attract more private investment for the development. According to the local planning policy, *Cambridge Plan in the Southern Taiwan Science Park*, planning actions of flexible zoning were related to the redistribution of the development units and the flexibility of the development progress (Department of Urban and Rural Development, 2003). Strategies of redistributing the development units were initiated in the early 2000s. According to the interview record, the local government convinced the national authorities, the NSC and the CEPD, to subdivide the development lots into smaller units. This allowed the private developers more flexibility in selecting the development sites according to their interests and preferences. The smaller size also reduced the cost of each development lot. This encouraged smaller developers to participate and enhanced the diversity of spatial development.

'It was probably not a new approach today, but a decade ago it was quite unfamiliar with planners and policy-makers at the public sectors. We experienced a lot of problems particularly in convincing the CEPD it was possible! And I was glad that it worked well in the STSP. Our perfect performance in gaining private investments is really resulted from the flexible land use strategy. '(Interview S4, Local planner, 2011)

Chen (2010) summarised policies for flexible zoning by highlighting two purposes – to provide more freedom for private development to initiate physical plans and to decide the procedures of the implementation on their own properties. This increased the willingness of private developers to invest in the STSP. According to the interview record of a water-engineering officer, the flexible zoning strategy also provided a benefit to flood risk management. Private developers were only free to use part of the properties and had to leave the rest of the area for agricultural use until the land value increased. By minimising the impervious pavement in the development area, hydraulic construction, such as canals, would have less pressure in coping with the increasing runoffs caused by the rapid growth of spatial development.

'The floating zoning approach is also good from our hydraulic perspective. Because the impervious pavements increased gradually (instead of paving hard covers all of sudden), runoff does not increase dramatically. The system of flood risk management can therefore facilitate to reach the capacity. And we have some time to think before rushing on the construction works.' (Interview S2, Water engineering officer, 2011)

Both planners and water engineers considered the flexible zoning policies to be successful in supporting their work for the development. In fact, this approach also helped to form a collaboration including the UDB and the WRB, two major sectors for the development. By revising the requirements of the development lots, local planners

and water-engineering officials continued the collaboration after the construction of the artificial lakes was completed in the mid 2000s. Both the UDB and the WRB exhibited a positive feeling toward the collaboration. This is shown in the interview records.

'The STSP case gave us a good experience in collaborative with the Department of Water engineering. It was the first time the UDB and the WRB had a co-working opportunity to really make things go well. We were encouraged by this experience. Since then, the collaboration between the UDB and the WRB could be considered as our "habits." ' (Interview S4, Local planner, 2011)

'The WRB and the UDB often have separated approaches for implementation, and, sometimes, one work contradicts to another. This is not addressed in our experience of the STSP development project. The STSP project is a pleasant experience of the collaboration. I am happy that our implementation project, the artificial lakes, becomes a benefit in promoting spatial development. And I am also glad to see the flooding issues can also be managed by the flexible zoning strategies.' (Interview S3, Water engineering officer, 2011)

In spite of being criticised in academics for neglecting the original context of the agricultural landscape (Interview S5, Planning academics, 2011), the STSP exhibited smooth development progress and a collaborative pattern among the government authorities. Private developers were excluded in initiating strategies but actively involved in implementing projects for spatial development.

§ 7.1.3 flood adaptation

The discussion of flood adaptation began in 2009 when the effects of Typhoon Morakot resulted in a greater awareness in policy-making of the danger of flooding. Although no serious flooding occurred in the development area, its hinterland was seriously flooded when the high water level of the river crushed the Zengwen river levee. Both national and local governments were shocked by this flooding experience. Learning from this extreme event, policy-makers realised the limits of the construction projects when faced with extreme rainfalls and the increased vulnerability of the area when the dike collapsed. Adaptive strategies became necessary. This was specifically highlighted in the government reports, *Review of water governance in the Zengwen River* and *Urgent construction work plan of the Zengwen River* (Water Resource Planning Institute, 2011, The Sixth River Management Office of Water Resource Agency, 2009).

According to the interview, the artificial lakes being able to carry the extreme rainfall was considered to be a main reason that the development area was saved from being flooded . The functionality of the lakes changed the original thinking that mainly focused on mitigation strategies for flood risk management. When considering the critical status of the manufactory in the STSP, policy-makers decided to designate more space for water retention in order to ensure the water safety of the development area.

'I feel grateful to the artificial lakes. I am happy that these lakes are functional during that time. So the private enterprises were not disturbed. The ICT industry is the basis of the national economy. It cannot be collapsed from flooding disturbances' (Interview S2, Water engineering officer, 2011)

'Although the STSP was safe in 2009 because the space for water retention were "big enough" to contain extreme rainfalls this time, we never know whether they will be enough for rainfalls occurred next time. So we need new spatial strategies to deal with the potential risks.' (Interview S3, Water engineering officer, 2011)

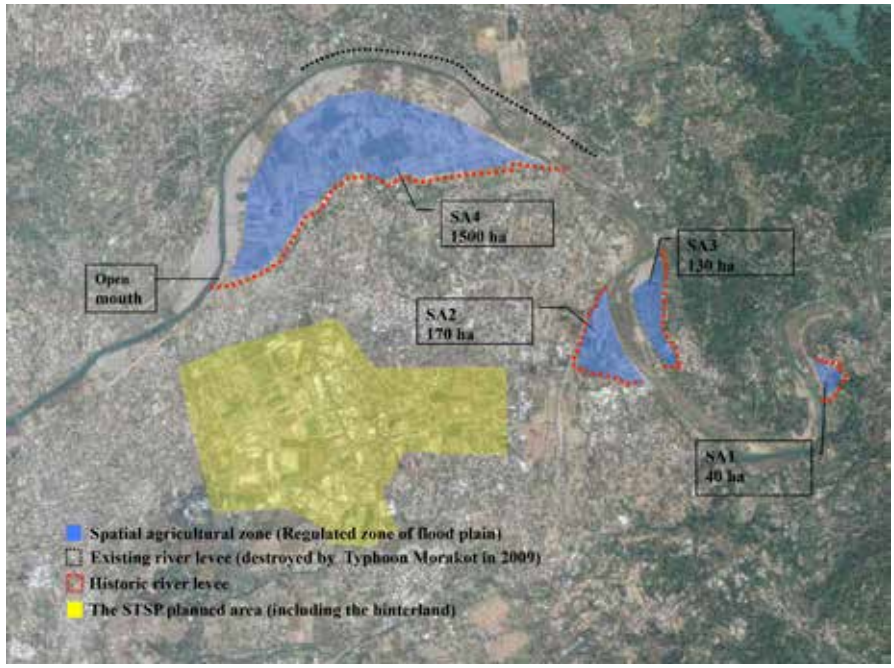
New strategies for flood risk management were proposed after the disaster. In addition to restoring the existing dikes that were destroyed by the disaster, a water resistant buffer was proposed along the south bank of the Zengwen River to contain the potential river floods that could damage the STSP area. This was illustrated in *Review of water governance in the Zengwen River* and confirmed by interviews (Water Resource Planning Institute, 2011).

'Planners at the local level government assign the south bank as a "special agricultural zone" where even temporary buildings are not allowed here - only for sugarcane and rice. In this way we minimise the potential economic loss and protect the residents' safety. Of course, we strengthen the flood protection of the STSP area.' (Interview S6, Local planner, 2011)

'The south bank is the 'bally' of the Zengwen River – the original watercourses. It is good to remain its function as a flood plain of the river. The strategy here is not to create "new" retention space but to restore the original land use here.' (Interview S4, Local planner, 2011)

The implementation of a water resistant buffer had two aspects: to restore the historic dikes, and to designate a planning policy that lowered the capacity of land use in the buffer zone. Figuur 24 presents an illustration. Both the red and black dotted lines show where the river levees are located. On the northern bank, the construction follows the black dotted line that indicates the existing river dikes. On the southern bank, the restoration follows the red dotted line, which marks the location of the historic dikes, in order to provide more space for water retention. The areas between the historic dike and the river (the blue area) are defined to be a Spatial Agricultural Zone where only

low profit agricultural land use was allowed. According to Water Plan Tainan, around two thousand hectares of the farmlands were influenced by this regulation. Private development for housing and industrial facilities was forbidden in order to minimise the potential economic loss by flooding (Water Resource Bureau, 2011).



Figuur 24
Illustrating the strategy of a water resistant buffer

Both planners and water engineers consider the projects of a water-resistant buffer to be a success. Based on the information gained by interviewing a water-engineering officer, the collaboration of planning sectors was a great help in framing regulations for land use management. This dealt with the limitation of the *National Water Law* that forbade the government to use private land for water management.

'This area is just "risky" from floods. It can still be used in most of time. The solution today would be very difficult to achieve if we follow only the hydraulic ways of thinking - we will need to buy the land and do the construction works and each step costs a lot of money. But it becomes so easy in terms of using planning approach. Private landowners (although most of the land here belongs to the Taiwan Sugar Cooperation) are also happy that they do not need to sell out their land and can keep their business here.' (Interview S2, Water engineering officer, 2011)

Having a water resistant buffer also provided a positive impact on spatial development in the STSP area. According to the interview of a local planner, this strategy provided a better standard of flood protection while maintaining the basic land use in the area of the buffer zone. The collaboration between water engineers was considered a success in promoting a better opportunity for spatial development.

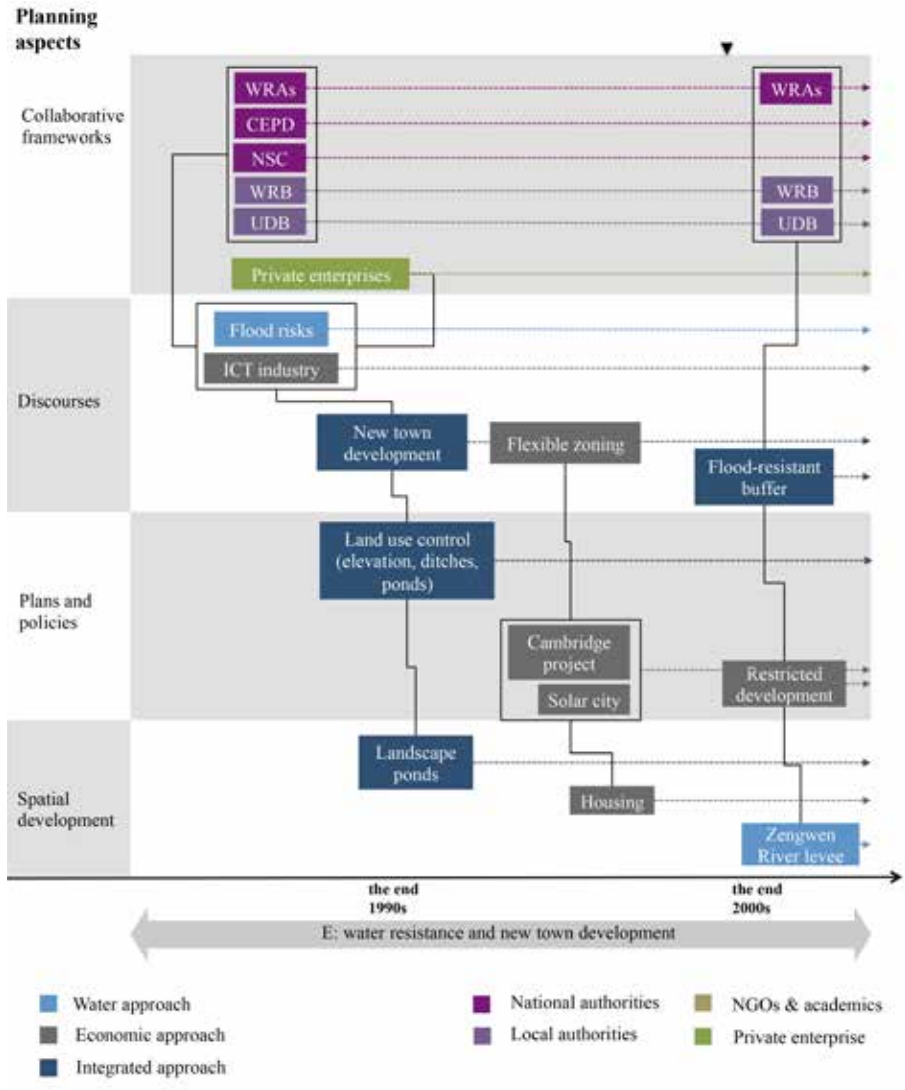
'We work together. It was part of a tradition in the municipality. We learn from each other by cases (projects) and become familiar with what they consider, for instance, hydraulic professions really need a precious calculation regarding populations and covered surface, which would perhaps be just a rough range of number in planning. We learn not to separate in making plans. It is neither "planning-led" nor "hydraulic-led." Just simply a local government strategy.' (Interview S4, Local planner, 2011)

The water resistant buffer project was completed in the early 2010s. The positive experience with this project strengthened the collaborative network among policy-makers. The collaborative atmosphere between governmental sectors also encouraged private enterprises to continue investing in the development area (Interview S6, Local planner, 2011).

§ 7.1.4 discussions and conclusions

This section summarises the local planning story in the STSP by using the analytical framework considering the dimensions of spatial planning and the episodes in policy-making. This forms a more systematic understanding of the local planning story in order for there to be a discussion on how well planning can and does apply for promoting the notion of resilience. As shown in Figuur 25, planning decision-making in STSP has remained in a single episode of water resistance and new town development sine the 1990s. Changes in actors, planning directions and spatial development were less evident. The framework of collaboration was consistent in relation to flood risks and strengthening economic development.

The collaboration in local policy-making shows the capability to integrate the issue of flood risk management into the consideration of spatial development. For example, the implementation of artificial lakes was important not only for water retention but also for spatial development because it increased the quality of the local environment (Interviewee S1, S4). According to the *Cambridge Plan in the Southern Taiwan Science Park*, these lakes had positive impact on spatial development because they promoted housing development and leisure activities (Department of Urban and Rural Development, 2003).



Figuur 25
Local planning story in the STSP case

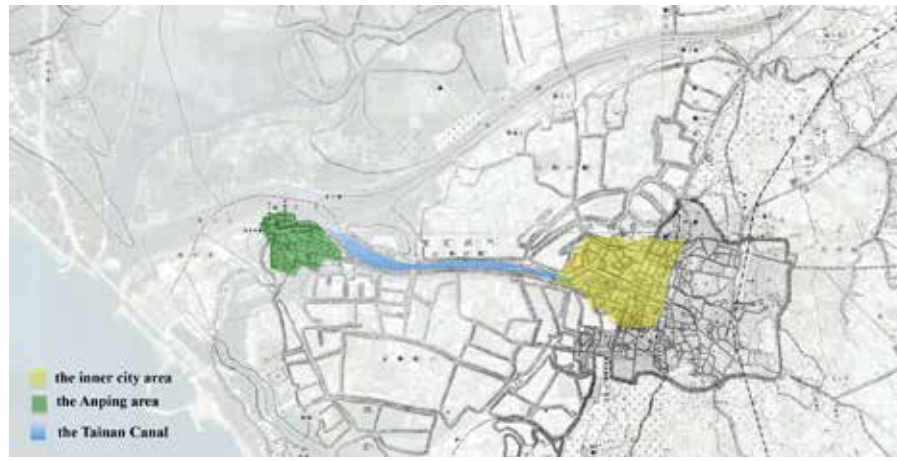
Planning strategies, such as the flexible zoning regulation, were important for providing a flexible scheme that balanced the demands of economic development and the threat of flooding. The benefit of these strategies was not only for the attainment of the economic goals of private developers and enterprises. It was also functional in restraining the rapid increase of impervious pavement which contributes to flood risks. (Interviewee S2, S4). The approach of a water resistant buffer also had a similar result that balanced the two needs (Interviewee S2, S4, S6).

Several characteristics of planning, especially relevant to resilience, could be recognised in policy-making. First, the characteristic of *considering the current situation* was important in this episode. Policy-makers realised the vulnerability of the development site. This initiated integrated strategies of spatial development under the consideration of flood risk management. Second, *learning from previous experience* was highlighted in policy-making. The extreme event of Typhoon Morakot in 2009 is an example of this. Although no serious flooding has occurred in the development site, policy-makers became active in framing strategies to enhance the standard of water safety (Interviewee S2, S3). Finally, *setting goals* and *initiating actions* were clearly addressed in policy-making. The issue of flood risk management was continually highlighted in planning strategies and was successfully addressed by multiple projects.

§ 7.2 Tainan city centre

Tainan city centre (臺南市中心) is known for its cultural value. It was the capital city of Taiwan for centuries until the national administration was moved to Taipei in the early 20th century. Large numbers of historic heritages make the city attractive for tourism industry. Because of this, cultural tourism is a prime focus of urban development. Shown in Figuur 26, the city centre of Tainan is located in two areas: the inner city area (coloured in yellow), and the Anping area (coloured in green). The Tainan Canal (coloured in light blue) is the water road that connects these two parts for transportation. The municipality decided to fill in part of the canal and use this new land for a building project in the 1980s when the canal became shallow due to the build up of deposits and was no longer good for transportation. This change cut off public access to the waterfront and cut off the water road connection between the inner city and the Anping area.

The Tainan city centre is located at a place with relatively high elevation compared to the surrounding areas. From a geographical perspective, the city centre is less vulnerable to flood risks than other places in the Zengwen Delta. The issues of flood risk management are hardly considered as a prime focus in local planning decision-making. Water-related strategies are mainly about environmental beautification. These strategies often have a clear aim to stimulate urban development. In other words, water issues are generally under consideration for urban development. For example, the waterfront development projects often focus on real estate and programmes for economic development. This is discussed in the following sections.



Figuur 26
Location of Tainan city centre (Source: adopted by the Taiwan Bao map, 1904)

The collaborative network for planning in Tainan city centre includes both the national and local governments. At the national level, the Tourism Bureau of the Ministry of Transportation and Communication (TBROC), which is the highest authority for tourism development, and the Council for Economic Planning and Development (CEPD), which is the highest planning authority, are often involved in decision-making to promote tourism development in the city. The TBROC and the CEPD are particularly important for providing financial support for restoring historic buildings and for improving the environmental quality of the surrounding areas. For example, the national framework, Challenge 2008: National development plan 2002-2007 and its sub-document, the Double Tourists Plan, provide guidance and financial support for redeveloping the historic area in Anping for the tourism industry (Council for Economic Planning and Development, 2003, 2005).

At the local level, the Urban Development Bureau (UDB) and the Tourism Bureau (TB) are two major sectors that initiate plans and directions for spatial development in the city centre. The Economic Development Bureau (EDB) and the Cultural Affairs Bureau (CAB) often take secondary roles in decision-making. The Public Work Bureau (PWB) is responsible for implementing projects of practical development.

The following discussion of Tainan city centre is structured into four sections. The first three sections present the issues focused on in local planning. They are: inner city redevelopment (7.2.1), cultural tourism (7.2.2) and waterfront regeneration (7.2.3). The last section (7.2.4) presents the local planning story by considering planning dimensions and the episodes of decision-making. This helps to examine whether and how planning is addressed in promoting the notion of resilience. The information was gathered by interviewing officials at both local and national government levels and by examining plans and policy documents.

§ 7.2.1 inner city redevelopment

The discussion of inner city redevelopment spanned the 1980s and 1990s when the commercial activities of the inner city were declining due to the rapid growth of other parts of the city. Two major projects were implemented: the *China Town Project*, a large building constructed to attract new attention to the area, and the *Haian Road Project*, a widened road that formed a boulevard in the city. The UDB played a critical role in framing strategies for physical development.

The *China Town Project* was initiated in the mid 1980s to redevelop the waterfront area which was abandoned after the Tainan Canal lost its function for water transport. The development plan included three major objectives: to construct the base of the development site by filling in a section of the canal, to construct a massive building (two blocks in size) for housing and commercial use, and to relocate markets and shops in the building.

The implementation of the *China Town Project* was completed in the late 1980s with a form of the traditional Chinese building (see Figuur 27). However, the municipality experienced a difficulty in relocating markets and shops into the building because the indoor environment did not support these activities properly. The housing units also had problems in attracting buyers for similar reasons. The evidence of this can be seen in the interview record. As time went on, crime and poverty marred the area and became an obstacle for urban development of the inner city.

'Yes, in a certain period the China Town was very "fancy" to the city – a very short period of time. The ventilation inside was very poor with many problems such as leaking and darkness. It had a big problem in gathering shops into the building. Very soon the building became problematic site with drugs, crimes and illegal industries. It was still a landmark of Tainan – in a negative perspective.' (Interview T4, Planning consulter/ academics, 2011)

Figuur 27
China Town building

The Haian Road Project was another implementation project proposed by the UDB in the early 1990s to stimulate commercial business in the inner city. Policy-makers decided to widen the Haian Road into a boulevard with an underground commercial sidewalk. The ground level was designated for recreational activities, and the underground level for commercial activities and parking lots. As shown in Figuur 28[4], a great change in the urban landscape was expected to renovate the old districts.

The implementation of this project did not run smoothly, mainly because of engineering difficulties in constructing the underground space and the lack of ground soil to plant trees for ground level activities. According to Lin (2007), the situation was more difficult in the mid 1990s when the municipality was short in financing the project. The delay of the implementation also had a negative impact on nearby districts. The commercial activities of the surrounding neighbourhoods were rapidly declining because of the disturbances from the construction. The interview records also indicate the difficulties of the project.

'The environment was not pleasant at all for shopping: the traffic was complicated, and the shops were always dusty. This area was the busiest area for commercial activities, while it was rapidly declined in the 1990s.' (Interview T5, Planning academics, 2011).

'The Haian Road project was, in fact, crazy. The leaking problems of the underground construction really drove this project down. The reopen of the road was reluctant – it opened because of the public pressure, not because of the completion of the project. (Interview T4, Planning consulter/academics, 2011)

4 The Haian Road Project was implemented in the 1990s. Houses nearby the road were torn down in order to form a city boulevard with an underground shopping street. In a real situation, however, the development was much less successful than expectation and provided only parking space.

Figuur 28
Haian Road project (Source: the municipality of Tainan)

Instead of stimulating commercial activities, the projects accelerated the economic decline. Only around one-tenth of the original shops remained in business when the municipality finally completed the underground construction and reopened the Haian Road to traffic in the early 2000s. The accomplishment of the project was heavily criticised by both academics and the public. The interview record of a scholar shows the critiques.

'Where is the boulevard? There is not possible to become a boulevard, because the sand cover was too little to put any plants on it. The boulevard turned out becoming a huge area that was lost of the urban context and could be only used for parking' (Interview T4, Planning consulter/academics, 2011).

Once the municipality recognised the failure of these projects, they began framing new strategies. They concentrated on beautifying the area with painting and public art. However, this surface strategy was ineffective in an area that needed spatial reform, according to the interview records (Interview T4, Planning consulter/academics, 2011).

After being abandoned around a decade later, the Haian Road and the surrounding neighbourhoods gradually became more vital in the late 2000s. By using the scars that were left from the building project, private owners created a unique and attractive atmosphere in this area. Stylish shops, bars, hotels and restaurants were opened and

became popular for local residents and tourists. Figuur 29[5] showed an example of a stylish bar located in the Haian Road. The building was renovated to reflect the original street house before it was demolished. This kind of renovation can be seen in many places along the Haian Road and the area has gradually been formed into a new tourist attraction.

Figuur 29
Blue Print bar – an example of the new texture in Haian Road

§ 7.2.2 cultural tourism

Strategies for cultural tourism are often considered to be important for urban development in the Tainan city centre. Policy-makers include both national and local level governments. The national authorities, such as the TBROC and the CEPD, are often involved in policy-making by providing guidance and financial support. Local government sectors, such as the UDB and TB, are more responsible for putting planning actions into practices.

The national policy, *Challenge 2008: National development plan 2002-2007*, provided an important framework to support tourism development. Within this framework, the *Anping Special Scenic Area* was established by the TBROC during the mid 2000.

5 The old house of the Blue Print bar is going to be torn down in 2014 by private developers for new housing development.

Both the old districts and the Anping Port were included in the scenic area for tourism development (Ministry of Transpiration and Communication, 2008, Council for Economic Planning and Development, 2003, 2005). Following the national direction, the UDB presented the development plan for the scenic area, which is presented in Figuur 30. The proposed planning actions included three objectives: to promote the harbour as a recreation area, to improve the environmental quality of the area, and to recover the scenic landscape around the main historic building, the King's Palace (Fort Zeelandia), that was built in the 17th century by the Dutch East India Company. The interview record supports the evidence collected from the government documents.

Figuur 30
Development plan of Anping Special Scenic Area (Source: Urban Development Bureau, 2005)

'"To recover the original water scenery," sounds very crazy at the beginning, but gradually we recognised it would be a good idea to make Anping impressive for tourists. And we can offer national supports to put the relevant projects into practice.' (Interview T1, National planner, 2010)

'Anping is an important spot throughout the historical development in Taiwan. But today, its cultural value is hidden by small business in its surrounding neighbourhoods. Our proposal (the King's Palace) is to clean this area to recover the atmosphere in the ancient time. We believe to recover the Anping's 'previous' glory is definitely valuable for tourism development.' (Interview T2, Architect, 2011)

Physical development of the first two objectives was completed at the end of the 2000s. A new waterway was established in the harbour to separate the recreational area from the commercial fishing area. Cruises and short trips to small dunes became popular. Projects of environmental beautification were implemented in the old districts and the waterfront area. This included the renovation of historic buildings. Based on the evidence collected by interviewing a key local planner, these projects supported the development of the tourist activities and made Anping one of the most popular tourist hotspots in Taiwan (Interview T3, Local planner, 2011).

The success of tourism development led policy-makers to rethink the necessity of implementing the King's Palace. According to the evidences collected from the interview, policy-makers seemed satisfied with the existing development progress. This led to a more conservative perspective in promoting such a project which would create a massive disturbance in the environment.

'The current situation has already been an improvement. We have reached (or ready to approach) our goal to double the amount of the tourists. Instead of having a big construction project, many small improvements may be more useful to continue stimulating the tourism development.' (Interview T3, Local planner, 2011)

'I still think a massive change in Anping is necessary. The government should not be satisfied by the current economic growth. It is important for seeing a long-term development. Tourists will eventually get tired of these small changes. We need something very unique and impressive to identify this area.'(Interview T4, Planning consulter/academics)

The practical implementation of the King's Palace was eventually suspended due to the difficulties in gaining private land property to dig and recover the scenic landscape around the historic building (Fort Zeelandia). Although the discussion of this project continued, the physical development did not progress.

Local decision-makers also initiated a strategy in which three rings of attractions would be developed. According to the *White Paper of Tainan Urban Landscape*, these three coloured rings would each have a particular type of sightseeing spots (Urban Planning Bureau, 2005). As shown in Figuur 31, the blue ring signifies urban waterfront, the green ring indicates urban parks and boulevards, and the orange ring represents cultural heritage sites. According to the interview, the purpose of this strategy was to develop the area along the rings to create a continual path of sightseeing hotspots.

Figuur 31
Triple-ring system in Tainan city centre (Source: Urban Planning Bureau, 2005)

'People like to visit Tainan. We are different, unique and boutique. The triple-ring framework is important to link tourism activities for individual spots to a path, a line pattern, where the visitors can explore the city deeper. And we can ensure that every time they will find some "new" things happening in the city.' (Interview T7, Officer of the Tourism Bureau, 2011)

However, the municipality did not develop practical strategies to fully connect the sights along the rings. In spite of this lack of development, this concept of three rings was often used to provide guidance to tourists.

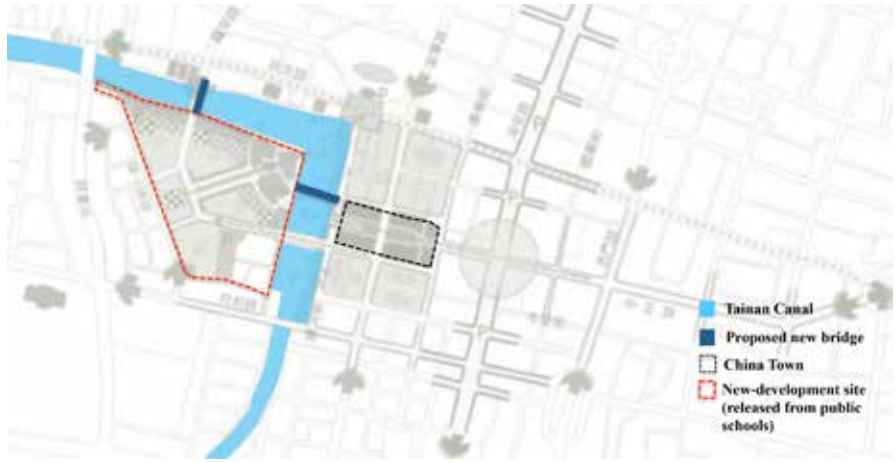
§ 7.2.3 waterfront regeneration

The discussion of a waterfront regeneration project was brought into planning in the late 2000s after the municipality implemented the *China Town Project* that cut off the connection between the waterfront and the inner city. It was considered as a rethinking of the previous development strategies. The regeneration project, *Sparkling Tainan Canal*, was presented in the late 2000s by the UDB. Three objectives were expressed: first, to promote commercial development on the west bank of the Tainan Canal, second, to strengthen the mobile connection between the new development site and the inner city, and third, to recover the waterfront landscape of the inner city by

demolishing the China Town building (Urban Development Bureau, 2009). According to the interview record of a local planner, the third objective was greatly emphasised by policy-makers as a means of recovering the inner city from its economic decline.

'The China Town today has become a problematic spot of the city. Small business can no longer exist inside, even the movie theatre was closed. It is probably a good time to do a big thing here – to tear down the China Town. We have confident of the regeneration project called the Sparkling Tainan Canal not only because of its perfect location (facing the city on the one site and the canal on the other) but also because of the possible connection of tourism development in the future. This regeneration site would be the 'heart' of the city in terms of commercial business, waterfront living and urban tourism.' (Interview T3, Local planner, 2010)

The implementation contained two parts (see Figuur 32). In the west bank area, planning actions were initiated to develop this new area as an extension of the city centre. Approximately eleven hectares of municipal-owned land was prepared for luxurious hotels, office buildings, shopping malls and housing units (Urban Development Bureau, 2009). The UDB has finalised the development plan and has begun searching for private investors. According to the government report, the implementation has continued and is expected to be completed in the mid 2010s.



Figuur 32
Sparkling Tainan Canal development sites (Source: Urban Development Bureau, 2009)

In the east bank area, policy-makers sought a strategy to deal with the negative effect caused by the China Town building. According to the interview record, the original plan was to demolish the China Town building and open the waterfront area for urban activities. This would be advantageous for long-term development in the inner city. The implementation was delayed, officially, because of the complicated ownership in the building. A more real concern, however, was that policy-makers were hesitated to make another massive physical change to the area.

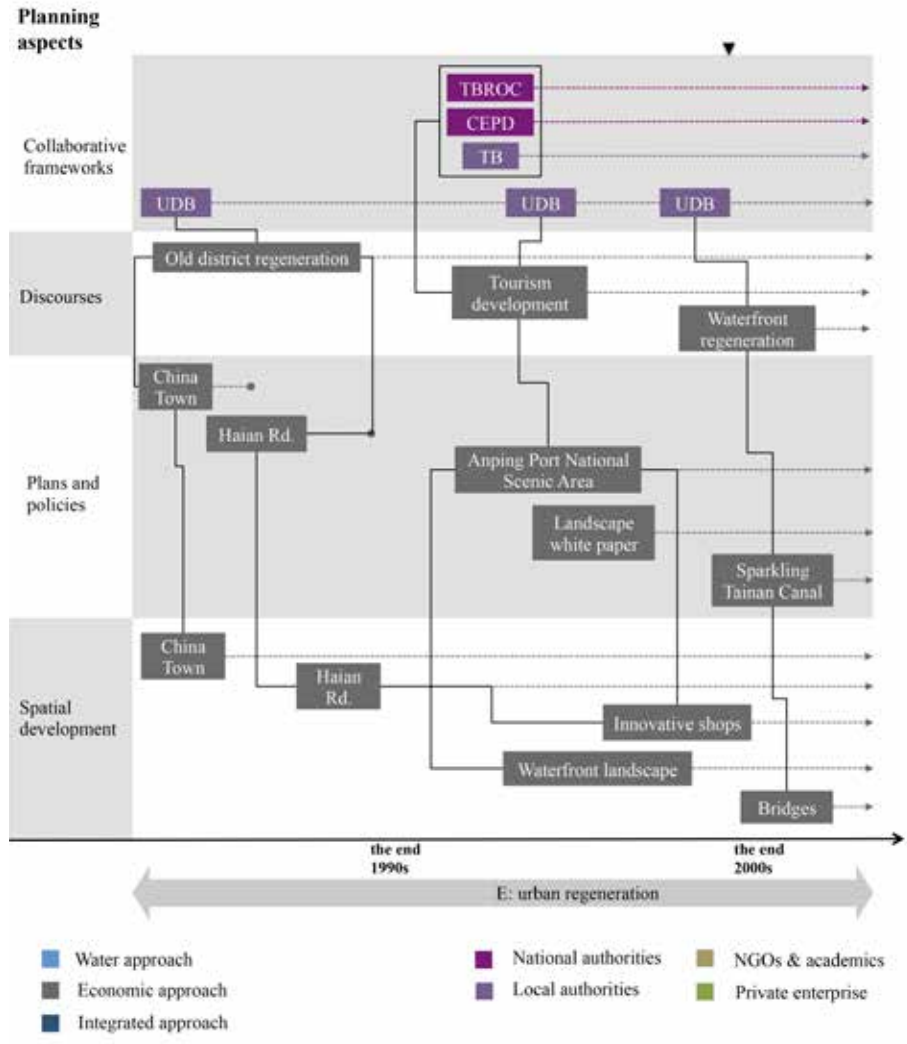
'The property of the China Town building is very complicated. Some of the property owners are missing and hard to find them. I can imagine it will take years to finish all the property things and then we can start our construction work to tear it down. It is a really challenge for government to do this.' (Interview T3, Local planner, 2010)

'The regeneration project is very ambitious at the beginning, but now it looks like a half way project that can contribute nothing more to the city. Land property is always a difficult issue, I agree, especially to city like Tainan where is old and full of history. But it shouldn't be taken as an "impossible" task in urban planning. The city cannot grow if we keep stuck in this issue.' (Interview T5, Planning academics, 2011)

Again, because of past negative experiences, policy-makers were conservative and wanted to avoid a massive change of the environment. The regeneration project was therefore more concentrated on the west bank area and left the consideration of a new urban waterfront in the stage of discussion.

§ 7.2.4 discussions and conclusions

This section summarises the local planning story of Tainan city centre by using the analytical framework considering the dimensions of spatial planning and the episodes in policy-making. As shown in Figuur 33, the local planning story remains in the episode of urban regeneration. This means that changes in local policy-making in the past two decades are less evident. The collaborative network between national and local level governments is based on the intention to encourage the development of tourism which is a core driver for urban development in this area (Interviewee T1, T7). According to the interview record, policy-makers at the national level put more emphasis on restoring historic buildings, and local government actors are more focused on creating cultural districts and an ideal environment for tourism (Interviewee T4, T6, T7).



Figuur 33
Local planning story in the case of Tainan city centre

Urban regeneration is another important issue in this case. Actors involved in the collaborative network are mainly sectors within the local government. For example, the UDB was in collaboration with the PWB in implementing the *China Town* and the *Haian Road Project* (Interviewee T4, T5). A decade later, the UDB collaborated with the EDB in framing the *Sparkling Tainan Canal Project* for waterfront regeneration. The new development site, the west bank area of Tainan Canal, is in the process of attracting private investment and expected to begin construction in the mid 2010s.

The discussion also reveals hesitancy among policy-makers to massively change the physical environment. Two examples, the discussion surrounding the King's Palace and the reluctance to demolish the China Town building, illustrate this point (Interview T3, T5). This may be related to the negative experiences of the *China Town* and *Haian Road projects* (Interviewee T4).

Tainan city centre is also a case where the issue of flood risk management is hardly addressed in planning considerations. This can be explained in two ways: first, the city centre is not frequently flooded and when it is, the damages are minor. Second, policy-makers only calculate the economic loss of flooding and dismiss other social factors, such as damage done to historic buildings. However, a recent study, *Pilot Case Study on Urban Flood Control – Using Tainan as Example*, pointed out the vulnerability of flooding in the city if the population structure is taken into account (GT International and Water Resource Planning Institute, 2012). This result may be due to a more elderly population that has a lower capacity to cope with the extreme events. The collected evidence did not show a clear consideration related to this issue.

Several characteristics of planning especially relevant to resilience were recognised in this discussion. The characteristic of *considering the current situation* was important in policy-making. This is mainly related to the cultural values of the city. Policy-makers also showed their capability in *setting goals* and *initiating actions* to stimulate the development of the city. The initiated strategies are not necessarily link to the issues of flood risk management. In fact, the link is weak.

8 Rotterdam, The Netherlands

This chapter presents the local planning story of Rotterdam during the past two decades. The discussion focuses on planning in coping with flood risks and the impact of climate change, which is presented in terms of the dimensions of collaborative frameworks, discourses, plans and policies and spatial development (see Chapter 2). The study uses the term episode to exhibit changes in local policy-making. A change in actors or objectives may have an impact on policies and physical development. A study of the episodes can help to form the discussions of resilience being applied in planning for spatial development.

Two cases are presented in this chapter. The first is the case of Nesselande, and the second is the case of Rotterdam city centre. These two cases present different patterns of local planning governance especially in coping with the issues of flood risks. The first case, Nesselande, is a development project led by the national government to provide sufficient housing units. Two national policies, the *Fourth Report on Physical Planning (de Vierde Nota, VINO)* and the *Fourth Report on Physical Planning Extra (de Vierde Nota Extra, VINEX)*, are important for the development (Needham and Dekker, 1988, Priemus and Spaans, 1992). Nesselande is located in the region where is probably the lowest area of the county, around five to six metres below the average sea level. The water boards used to play an important role to create polders for cultivation. Their involvement remains critical in this area to ensure water safety for spatial development. National policies, such as the dike ring[6] and strategies of multi-level safety, are implemented and generally considered sufficient for flood protection. Planning authorities of the municipal government often focus on housing development and have less emphasis on the issues of flood risk management. This is also represented by a shorter discussion of the case. The debate of whether this lowland area is suitable for urban development has been arisen recently due to the consideration of a city's climate adaptability. This debate shows the growing doubt about the long-term sustainability of the Dutch water defence system (Zonneveld, 2010).

The second case, Rotterdam city centre, presents a case where the local government is active in framing strategies to stimulate urban development. The southern part of the city centre experienced social problems such as high rates of unemployment,

6 Dike ring is one of the national strategies of flood protection. As the Netherlands is considered to be specifically vulnerable from flooding, the entire nation was divided into several dike ring areas. Individual dikes are constructed for water defence.

urban poverty and social segregation after the port industries left the riverbanks. Policy-makers have been worked on regenerating this area in decades to promote Rotterdam-south becoming an extension of the city centre. For example, the *Kop van Zuid Regeneration Project* was proposed in the 1990s to transform 200 acres of former harbour into a distinctive urban area. This project played an important role in promoting the river as the core of urban landscape across the metropolitan region (Meyer, 2010). More recently, the issue of flood risk and climate change is also considered important for urban development. Policy-makers are active in framing collaboration to cope with climate uncertainty at the meanwhile to promote economic competitiveness of the city. This is discussed later in section 8.2.

§ 8.1 Case study 5: Nesselande

Nesselande is a new development area located in the north-eastern part of the metropolitan region, about twenty kilometres from the city centre (see Figuur 34). Nesselande is one of the VINEX projects initiated in the 1990s to promote housing development in and around the major cities for urban extension (Needham and Dekker, 1988, Priemus and Spaans, 1992). Car mobility and public transportation were highlighted in the VINEX project to provide sufficient connections to the city centre. The development plan was made with clear physical tasks and timetables to achieve. It began in the 1990s and was recently finished. Physical development in Nesselande is considered to be successful because the practical outcomes generally match the plans (Interview N1, Local planner, 2012).

Although Nesselande is very low in elevation (around five to six metres below the average sea level), the development plan is not focused so much on managing the flooding issues. This can be interpreted as a consequence of the traditional approach of water management in polder landscape and the implementation of the national dike ring protection. The polder landscape in this area has been made and properly maintained in centuries for spatial development. The water boards were experienced to create polders by building dikes and drainage systems (Bobbink and Nijhuis, 2010). Water management policies, such as the dike ring and the strategies for multi-level safety, were also implemented to provide sufficient water safety for spatial development (Province of Zuid-Holland, 2009, Province of Zuid-Holland and Gemeente Rotterdam, 2005, Commissie, 2012, Delta Commissie, 2008).

Figuur 34
Location of Rotterdam city centre and Nesselande

The collaborative network of Nesselande included both national and local governments. The Ministry of Housing, Spatial Planning and Environment (VROM) is important in allocating the land for development, which shows a more top-down approach for spatial development. The municipal sectors are mainly responsible for implementation according to the decisions made by the national government. The Department for Urban Planning and Housing (dS+V), the Economic Development Board Rotterdam (EDBR) and the Development Corporation Rotterdam (OBR) were responsible for initiating plans for physical development and framing public-private collaboration with private stakeholders for implementation. The Rotterdam Public Works Department (GW) held the responsibility for public infrastructure. Water boards were responsible for water drainage and fresh water supply.

The following discussion of Nesselande is structured in three sections. The first two sections present the issues focused on in local planning. They are: quality of living (8.1.1) and recreational development (8.1.2). The last section (8.1.3) presents the local planning story by considering planning dimensions and the episodes of decision-making. This helps to examine whether and how planning is addressed in promoting the notion of resilience. The information was gathered by interviewing officials in municipal sectors and by examining plans and policy documents.

§ 8.1.1 quality of living

The issue of quality of living has been emphasised since the beginning of the development plan. It is often used to increase the competitiveness of Nesselande in the housing market. Located at the edge of the Rotterdam metropolitan region, Nesselande is very close to the *Green Heart (Groen Hart)*[7] , an area where development is restricted in order to preserve a green area. The municipality promoted this development area as a place with close access to nature and convenient transportation to the city.

In addition to the attractiveness of the natural landscape, the quality of living environment is also considered in terms of urban mobility, waterfront landscape and suburban housing. Kruythoff and Teule (1997) and Boeijenga and Mensink (2008) both highlighted the importance of urban mobility in Nesselande as well as in almost all the VINEX development projects. In Nesselande, this issue was resolved by creating a direct connection to the national highways, A16 and A20, and a new metro line that provides public transportation directly linked to the city centre. Physical development in Nesselande is clear influenced by the transportation facilities. According to Alpkokin (2012), policy-makers designed the centre of the development area around the metro station. Social housing for elderly people was also constructed in these neighbourhoods, and the industrial area was located near the highway to draw the development of the logistics industry.

Car mobility is one of the issues that the VINEX development areas are often criticised. In spite of having a metro station and bus stops in this area, private car use has remained high. According to the interview record, this is partly due to the long commuting distance and partly caused by the preference of the local residents (Interview N1, Local planner, 2012). The interview also showed that, from the local perspective, the high private car use did not cause much of a disturbance to the neighbourhoods. It was felt that the problem could be better solved by the national government enlarging the capacity of the highway system.

'As you may know the VINEX projects are often criticised for the increasing car traffic at the regional scale. But it is not really a problem from the local perspective because cars are excluded from the neighbourhoods and playgrounds.' (Interview N1, Local planner, 2012)

7 The concept of the Green Heart (Groen Hart) was presented in the 1990s in the Fourth Report on Physical Planning (de Vierde Nota, VINO) to limit spatial development in the centre of the country. This protects natural landscape from the rapid growth of development pressure in the country.

Water is an important element for enhancing the quality of living. As shown in Figuur 35, the waterfront landscape is formed by two major water bodies – the Rietveldpark in the middle, and the Zevenhuizerplas on the west side of the development area. Illustrated by the municipal-published report, *Nestling in Nesselande: Portrait of a Rotterdam VINEX district*, the Rietveldpark is the main canal from the original polder landscape. This canal was transformed into a linear waterpark running along the main road in Nesselande. The Zevenhuzerplas is the lake located in the west side of the development area (Rotterdam, 2007a). This lake was doubled in size to support the development in three aspects: increasing the capacity of water retention, providing sand for development construction, and forming a beach for recreational activities (Alpkokin, 2012, Boeijenga and Mensink, 2008). In addition to the intended use of waterfront landscape, the water bodies also contributed to satisfying the national regulation of surface water retention in all the VINEX development projects. This is shown in the interview records.

Figuur 35
Master plan of Nesselande (Source: Rotterdam, 2007a)

'Of course the Zevenhuizerplas has its function in retaining extra (extreme) rainfalls, but it is not the focus of the decisions. It addresses as a spatial element of waterfront landscape to increase the attractiveness of the districts.' (Interview N3, urban planner and architect, 2012)

'Regarding the national regulation of 10% surface water in all VINEX districts, I believe in Nesselande we have already done more than they required. Water landscape here is really the highlight of this project in shaping a pleasant living quality for the district.' (Interview N1, Local planner, 2012)

Housing development is essential for Nesselande. It was defined in terms of three districts: Tuinstad in the south, Badplaats in the west and Waterwijk in the north (see Figuur 35). Lux (2007) and Hooimeijer (2011) presented the specific characteristics for development in each district. The Tuinstad district is located in the south, near the industrial area and the highway entrance. This district was designed to have super-size blocks, so that the buildings could have large courtyards where cars were forbidden to go. The Badplaats district, located in the middle part of this area, was designated for recreational houses along the beach and apartments with commercial use at the ground floor level (see Figuur 36). This area is also popular for tourist activities because of easy access to the metro station and the attractive scenery of the beach.

Figuur 36
Centrumgebied: high-density housing project in the centre (Source: Rotterdam, Gemeente, 2007a)

The Waterwijk district, located in the north of the development area, was designed for small villas and houseboats (see Figuur 37). This area is popular because of the water living environment. The municipality leased the land directly to private buyers and allowed them to build their own houses with minimal regulations. Each lot had direct access to the Zevenhuizerplas and the Rotte Rive in the north. The physical development projects were near completion in the early 2010s. The housing units were considered attractive in the housing market due to the suburban lifestyle (close to nature). This matched the original expectations of the development plan.

Figuur 37
Periscoopwoningen: housing development in the Waterwijk district (Source: Rotterdam, Gemeente, 2007a)

In spite of having generally positive impression, policy-makers are increasingly aware of the negative impact caused by the development. This is considered in terms of the environmental protection and the sensitivity of flood risks. First, the development of Nesselande accelerated the spread of urban extension which transformed natural and agricultural land to be urbanised. This contradicted the idea of Green Heart that aimed to preserve the environment. However, the issue of environmental protection was seldom considered at the time when the development plan was made. This is shown in the interview records.

'In the 1990s we did not really think about this. National government assigned the directions, so we followed to put the direction into practices. It would be different if the project was requested to implement today because now we know it is important to not "eat" the farmlands for many considerations – preparing for climate uncertainty is one of them. Nesselande is quite successful as a development project, while perhaps it would be not the best solutions when we evaluate ourselves today.' (Interview N2, Local planner, 2012)

The debate of whether the lowland area is suitable for urban development was also arisen due to the awareness of climate uncertainty and the consideration of adaptability (Zonneveld, 2010). The effects of climate change, such as rapid rainfall, rising sea levels and the increased occurrence of storms, cause policy-makers to realise the difficulty (or impossibility) to provide completely water safety by mitigation strategies alone. This rises up the necessity to reconsider future flood-safety standards and to prepare adaptive measures (Stive and Vrijling, 2010). Although this debate shows the increasing doubt about the Dutch water defence system, it remains in the processes of discussion. Practical strategies in Nesselande have not yet been addressed.

§ 8.1.2 recreational development

Policy-makers began to consider the approach of recreational development during the late 2000s when physical development projects in Nesselande were nearing completion (Alpkokin, 2012, Boeijenga and Mensink, 2008). This was considered as a strategy in competing with other VINEX development areas in the housing market (Rotterdam, 2007a). For example, the beach and sand dunes along the Zevenhuizerplas provide a seaside atmosphere. According to the interview, this was particularly attractive to people who lived in cities that did not have direct access to the coastline, such as Gouda and Zoetermeer.

'After Nesselande was decided to be the VINEX district of Rotterdam, we started to struggle to in which way Nesselande can be different from (and competed with) other VINEX districts located also in the Randstad region? Or, which kinds of housing buyers we want to have here? The solution was to make it unique by highlighting water elements within the original context of polder landscape, and that is how we started.' (Interview N1, Local planner, 2012)

Recreational activities have blossomed in recent years. For example, the Nieuwjaarsduik (New Year dip) is a popular activity hosted in the winter to celebrate the coming of a new year (see Figuur 38[8]). Many festivals are also hosted along the beach in the summer and linked with water activities.

Figuur 38
Nieuwjaarsduik in Nesselande

8 *Source: http://www.rotterdam.info/bezoekers/agenda/11877/unox-nieuwjaarsduik-rotterdam/*

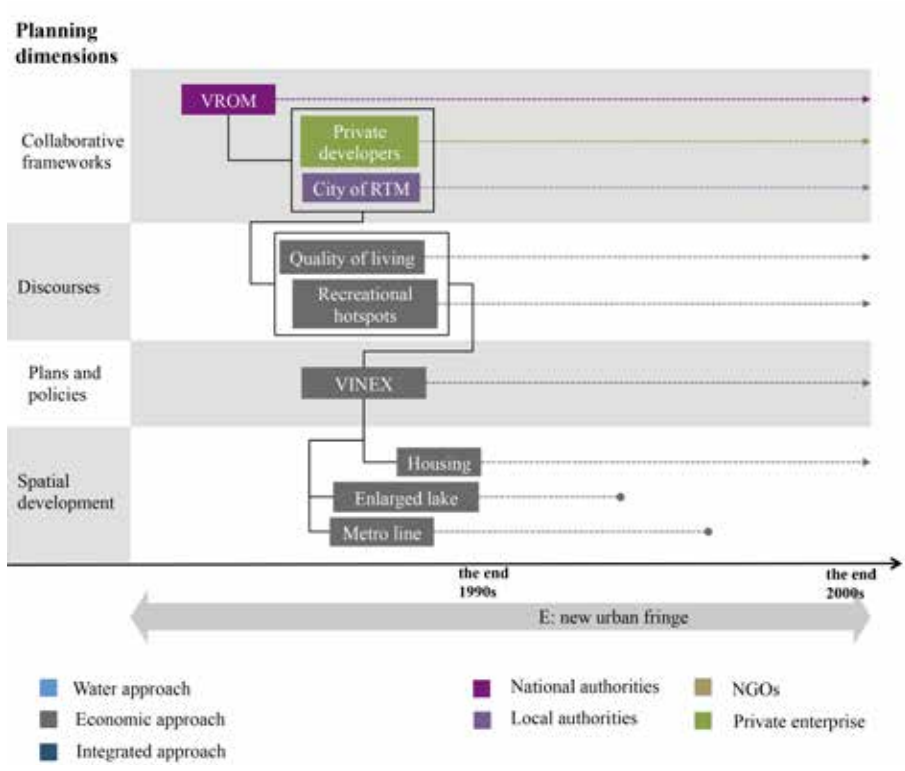
In spite of the benefit gained from recreational development, the increasing number of tourists has caused disturbances to the residents. This became an issue directly affecting to the quality of the living environment. Local residents began to set up signs requesting visitors not disturb the peace. However, their concerns were not yet addressed in planning policy-making. According to the interview results, the municipality considered the disturbances to be merely a seasonal problem (Interview N1, Local planner, 2012)

§ 8.1.3 discussions and conclusions

This section summarises the local planning story in the case of Nesselande by using the analytical framework considering the dimensions of spatial planning and the episodes in policy-making. As shown in Figuur 39, the local planning story during the past two decades remained in the episode of new urban fringe. This means changes in local policy-making in the past two decades are less evidence. Planning policy-making was mainly dominated by a small number of government sectors that joined together to make decisions for spatial development. The national government played a critical role in setting goals for spatial development. The local government focused on initiating actions to achieve the goals. And private investors followed the guidance of the government for the housing development.

Nesselande also presents a case where planning was mainly considered to be the management of the physical development by land use regulations. Integrating and coordinating activities for spatial development were seldom taken into account. Spatial development is approaching completion. Planning policy-making might be suspended if there are no further demands requiring the initiation of projects for physical development.

In addition, planning decision-making in Nesselande often focused on issues that would make the project more competitive in the housing market, such as the recreational development along the Zevenhuizerplas. The negative impact caused by this new development area, such as the increase of traffic pressure, was seldom considered. The shortage of consideration for the negative impact might be explained by the fact that it was mainly a regional issue and could not be managed at the local level (Interviewee N1). However, it might also indicate that the multi-level collaboration was too narrow and only considered physical development.



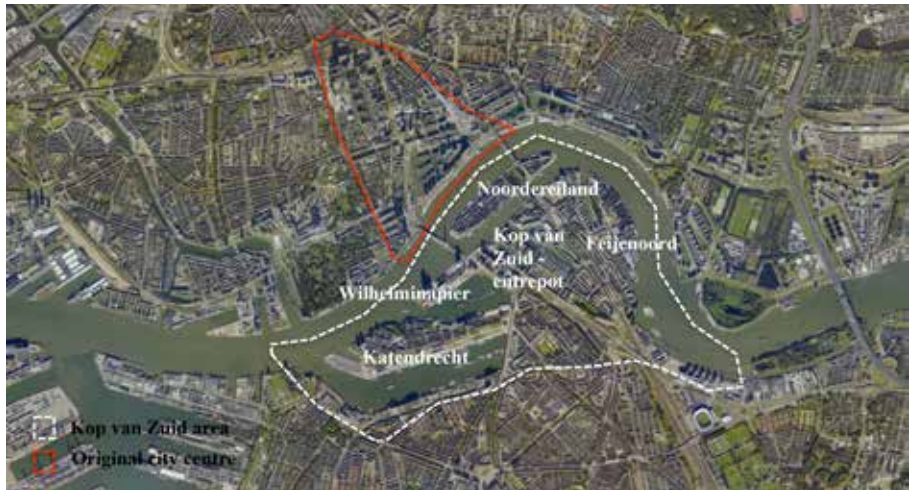
Figuur 39
Local planning story in the case of Nesselande

Nesselande was also a case where planning consideration of flood risks was less evident. The issues of flood risks were managed by the water boards and the upper level government (Province of Zuid-Holland, 2009, Province of Zuid-Holland and Gemeente Rotterdam, 2005, Commissie, 2012, Delta Commissie, 2008). Water safety is considered sufficient for urban development. From the local perspective, the development area was protected by the dike ring and had no direct threats from flooding (Interviewee N1). Although water elements were often used in the development area for parks, canals and lakes, these were for the enhancement of the living environment rather than the consideration of water retention.

Several characteristics of planning can be recognised in this discussion. The characteristic of *considering the current situation* was important in policy-making. The original polder landscape was integrated to become an open space for the development site. Policy-makers also showed their capability in *setting goals* and *initiating actions* to stimulate housing development. By providing a better quality of living environment and a recreational atmosphere, policy-makers enhanced the competitiveness of Nesselande in the housing market.

§ 8.2 Case study 6: Rotterdam city centre

The last case of the empirical study, Rotterdam city centre, presents a planning story that has a more local-based, area-specific framework of collaboration. This is more close to the description of the Dutch planning in Chapter 5. Urban development of Rotterdam city centre is highly related to the harbour industries. The waterfront area was used for logistics and heavy industry. Urban living activities were seldom addressed along the riverside before the harbour industries left during the 1980s and 1990s. The city centre of Rotterdam is often considered in two parts: the original city centre on the north bank of the Maas River, and the newer development area in the south. Figuur 40 shows the geographical locations of these two areas. The area circled by the red dotted line is the original city centre. The area circled by the white dotted line is the new development area that was made available to the city after the harbour industries moved along the coast and left the city harbour areas (Stadshaven) for urban development. The new development area includes five districts: Noordereiland, Kop van Zuid entreport, Feijenoord, Wilhelminaplein and Katendrecht.



Figuur 40
Rotterdam city centre

The study is primarily focused on spatial development in the southern part of the city centre, the original harbour area, where is outside of the national dike ring protection. This means the development area is more vulnerable to flooding and its relevant impact than other parts of the city centre. Rotterdam-south also experienced serious problems after the harbour industries left the riverbanks (Meyer, 2010). Issues like high rate of employment, urban poverty, social segregation and racial problems caused the municipality keen to find a way for urban regeneration. The municipality has also been concentrated on applying strategies in this area to integrate the issues of water management and urban development. The *Rotterdam water city 2035 - International Architectuur Biennale Rotterdam 2005 (Rotterdam waterstad 2035 - Internationale Architectuur Biënnale Rotterdam 2005)* was the first policy document that highlight the importance of developing innovative strategies of water management for urban development (Greef, 2005). This approach continues in the policy of *Rotterdam City Vision 2030 (Stadsvisie Rotterdam 2030)* and *Water Plan 2 Rotterdam* (Rotterdam, 2007b, Rotterdam et al., 2007).

Issues of climate change raised new challenges to cope with flood risks. Since the impact of climate change are deeply uncertain, scientific studies became more and more important to support planning decision-making. The concept of multi-layer safety was introduced in this context to integrate different types of measures in Dutch flood risk management and to minimise the probability and the consequences of floods. The concept consists three layers: the prevention layer, the layer of spatial solutions and the layer of crisis management (Ministry of Transport Public Works and Water Management et al., 2009, Hoss et al., 2011). The prevention layer indicates strategies to prevent floods caused by river and sea. This is mainly done by building flood defence infrastructures and by preventing high river discharges. The layer of spatial solution focuses on spatial planning strategies that minimise the loss when flooding occurs, and the layer of crisis management is mainly about the organisational preparation for floods, including disaster plans, risk maps, early-warning systems, evacuation, rescue actions and medical helps. An advance of the multi-layer safety approach is to increase safety by anticipating the consequences of floods. For example, stronger flood defence facilities will be needed less frequently if urban development can be more adaptive to floods and does not increase the consequences of floods. This offers an opportunity to be more cost-efficient in smaller scale.

The multi-layer safety approach is addressed at both national and local levels. At the national level, the approach is emphasised on the *National Water Plan 2009-2015*, the new national policy of flood risk management, although actual guidance of implementation does not always follow this approach (Ministry of Transport Public Works and Water Management et al., 2009, Hoss et al., 2011). Local strategies to achieve multi-layer safety are more emphasised on adapting uncertain disturbances. The city of Rotterdam began to demonstrate an awareness of the impacts of climate-related floods in the mid 2000s, including the national, regional and local levels (Delta

Commissie, 2008, Commissie, 2012, Rotterdam et al., 2007, Ministry of Transport Public Works and Water Management et al., 2009). Practical implementation in Rotterdam-south is considered to be showcases or experimental models to market the city's expertise in adapting climate uncertainty and flood risks (Rotterdam Climate Initiative, 2009, 2010). Climate uncertainties in this respect are treated not only as a threat to the city but also as an opportunity to develop and market its knowledge-based economy of climate-proof decision-making.

Actors involved in policy-making include national and regional governments, semi-government organisations (such as water boards), business communities and private enterprises. The municipality is important in framing the collaboration. Within the municipal government, the Department for Urban Planning and Housing (dS+V), the Development Corporation Rotterdam (OBR) and the Economic Development Board Rotterdam (EDBR) are key actors in proposing planning strategies for urban development. The Rotterdam Public Work Department (GW) is responsible for initiating projects of public infrastructure. Water boards are involved particularly in managing water issues. The planning document, *Water Plan 2 Rotterdam*, was initiated by the municipality and three water boards to direct spatial development becoming more adaptive to flood risks (Rotterdam et al., 2007).

The Port of Rotterdam also plays an important role in shaping development strategies, especially in the original city harbour area. Although the Port of Rotterdam is a corporation partly owned by the local government, conflicts can occur in policy-making due to their different considerations for spatial development. For example, the harbour authority may hesitate to support the development of waterfront activities because of the concerns for shipping safety. The issue of high water level may in fact provide a positive impact for the harbour industry by providing more capacity for shipping. Actions of communication and negotiation between the municipality and the harbour authority are therefore crucial in directing spatial development.

The following discussion of Rotterdam city centre is structured in five sections. The first four sections present the issues that were emphasised in local planning policy-making. These are: urban regeneration (8.2.1), living with water (8.2.2), climate adaptation (8.2.3) and climate knowledge economy (8.2.4). The last section (8.2.5) summarises the local planning story by using the analytical framework of planning dimensions and the episodes of local decision-making. This helps to examine if and how well planning has sought to apply resilience. Sources of evidence were gathered by interviewing planners and officials at both local and national government levels and by examining plans and policy documents.

§ 8.2.1 urban regeneration

The discussion of urban regeneration started in the early 1990s when the city harbour area was gradually released from the harbour industry and prepared for urban development. In the Kop van Zuid area, 200 acres of former harbour was proposed for urban regeneration in the 1990s. According to the interview, the discussion of urban regeneration was triggered by a development project that was important for the city but challenged the existing land use regulation. The Kop van Zuid Regeneration Project was initiated by considering the situation of the south bank area and the demands for urban development. The development plan was located at the peak of the city harbor area to promote housing and commercial activities. As shown in Figuur 41, physical development was primarily proposed on the Kop van Zuid, the Wilhelminapier and the Katendrecht (see also Figuur 40). According to Ostoja and van der Laan (1999), the regeneration project included three objectives: to redevelop the Wilhelminapier for high rises and commercial buildings, to regenerate the Katendrecht for housing, and to build a bridge that provided a direct connection from the old city centre to the Kop van Zuid area.

Figuur 41
Master plan of the Kop van Zuid project (Source: the Department for Urban Planning and Housing, Rotterdam)

'The Kop van Zuid project was initiated in the late 1980s when two private companies wanted to build their new headquarters in the area where were designated in the master plan for open space of the city centre. The municipality could not permit for these but also did not want to push them away – so they decided to 'make' a new city centre of Rotterdam to satisfy the requirements of private developers at the meanwhile to create more possibilities for urban development that was not related to the port business.' (Interview R1, Academics, 2012)

'The development of the city was struggling in the mid 1980s to the early 1990s when the harbour business in the city centre was declined and also moved toward to the coast, which forced us to initiate urban development projects to create further business activities. So the city can be less dependent on the harbour industry.' (Interview R8, urban planner and architect, 2012)

The regeneration project had a clear intention to enhance the attractiveness of the city by physical development, such as new buildings and constructions. Based on the information gained by the interviews, policy-makers were keen to change the area's reputation of urban poverty into an image of a new part of the city centre. This helped to promote the economic development of the city. Strategies for urban regeneration were mainly focused on improving the quality of the living environment to attract private investors and tourists in the south bank area. For example, plans were initiated to develop a luxurious hotel, the Hotel New York, in this area to attract visitors to the new development area. The implementation of the Erasmus Bridge in the mid 1990s was important for the regeneration Project (see Figuur 42[9]). In spite of having a huge debate in policy-making concerning the purposes and the investment required for construction, the completion of the bridge was considered to be a milestone of the regeneration project. According to the interviewing record, the bridge represented more than a pathway for transportation. It had become a landmark of the development area.

Figuur 42
Erasmus Bridge and the Kop van Zuid area

9 *Source: http://janeduttonutrecht.wordpress.com/2011/page/6/*

'The Hotel New York was one of the early projects for urban regeneration in the Kop van Zuid area. It was difficult at the beginning to attract visitors – the hotel was good, but the surrounding area was poor and dangerous. We put a lot of effort to support the redevelopment.' (Interview R1, Academics, 2012)

'The "attractiveness" of the city was another reason that initiated the project. The government built up amount of social housing in the south bank area in the 1960s to offer enough housing for the larbour of the harbour, and those districts always referred with an image of crime and poverty. In the late 1980s the municipality held a different approach: Instead of only serving the port business, the government aimed to increase the diversity of business in the city. The regeneration project in this sense was important to enhance the "attractiveness" of the city for further economic growth.' (Interview R2, Local planner and academics, 2012)

'There was a very big confliction between having a bridge and having a "fancy" bridge. Are we crazy to spend so much money on a bridge? Even though the bridge was eventually paid by the national government, it cost a lot of money in the age with financial difficulties of the country. And the actual expenses were far more than the expectation because engineers needed to do some adjustments after it was accomplished. At that time the DS+V rejected the GW's bridge proposal (which was nice already) and insisted to build a really stylish one. If I look back, I would say this was the right decision because it really became a highlight, a landmark of the regeneration project.' (Interview R2, Local planner, 2012)

'The Erasmus Bridge was really a milestone of the Kop van Zuid project. There was a very big debate about the bridge especially regarding the financial difficulties in the late 1980s and the early 1990s. Yet, eventually the head of the DS+V convinced everyone that this new bridge should address not only a transportation function but also indicate "something" that showed the government's ambissions of this project.' (Interview R1, Academics, 2012)

The completion of the Erasmus Bridge encouraged private developers to invest by offering reassurance to the investors that the government was willing to support the development of this area. According to Ostoja and van der Laan (1999), private enterprises, such as banks and telecommunication companies, began to invest in the new development area in the late 1990s. Private investments for housing and commercial buildings were also increased after the implementation of a new metro line. The *Kop van Zuid Regeneration Project* was officially ended in the early 2000s after the government projects for physical development were completed. Policy-makers generally considered this project as a successful redevelopment experience for the city because physical development reached the goal of urban regeneration.

§ 8.2.2 living with water

The discussion of living with water became increasing important in the 2000s after experiencing flood events that took place in 1993 and 1995 when extremely high river discharges in the Meuse and Rhine rivers tested the durability of the dikes. While no serious floods occurred in the end, the shock of the events prompted heated debates about the Dutch tradition of fighting with water. Decision-makers proposed new planning strategies to 'live with water'. Related planning strategies, like the *Room for the River (Ruimte voor de Rivier)* planning document, were established in the 2000s to offer more space for water by changing current river conditions, engineering infrastructure and land-use strategies (Ruimte voor de Rivier afdeling Communicatie, 2007, Zevenbergen et al., 2013b, Rijke et al., 2012).

Regional and local governments also developed adaptive water strategies. This was particularly important in places that were outside of the dike ring protection, such as the Kop van Zuid districts and the original city harbour area. According to the interview record, the Architecture Biennale Exhibition in 2005 was the first event that raised the awareness of living with water in planning decision-making. Two government-published reports, *International Architecture Biennale Rotterdam* and *Rotterdam water city 2035 - International Architectuur Biennale Rotterdam 2005 (Rotterdam waterstad 2035 - Internationale Architectuur Biënnale Rotterdam 2005)* both support this argument (International Architecture Biennale Rotterdam, 2005, Greef, 2005).

'The focus of water-living issues started on the Architectural Biennale in 2005. This Biennale was the water Biennale with its theme – the floods. It rose up the discussions of policy-makers in the municipality to face the city's close relations with the water. For instance, policy-makers in the city of Rotterdam usually separate the water body (river) from daily life of our citizens because firstly the river was for logistic usage and secondly it was dangerous regarding the potentials of flooding. The Biennale helped us to see another direction for the city's development from its water environments.' (Interview R3, Local planner, 2010)

The municipality initiated two important planning policies after the exhibition. Both of them reflected the issue of living with water. The *Rotterdam city vision 2030* officially took living with water into planning considerations as a way to promote the attractiveness of the city (Rotterdam, 2007b). The *Water Plan 2 Rotterdam* formed a legal framework to implement adaptive strategies for flood risk management in zoning plans at the district level (Rotterdam et al., 2007). The interview records also show the evidence.

'After the exhibition, the municipality re-designated the local water plan – and named it Water Plan 2 Rotterdam (Waterplan2 Rotterdam) to differentiate it from the first one which was nothing related to water living approach. From the government point of view, the Water Plan 2 Rotterdam gave a legal position (and funding) for many following strategies. It is on behalf of this policy we conducted further research and experimental studies to make living with water possible in the city. So the term "living with water" would be no longer abstract but applicable. This is very important.' (Interview R8, Urban planner and architect, 2012)

A shift in local policy-making was made in the mid 2000s for flood risk management – from considering water as a threat to seeing it as an opportunity for spatial development. This also changed the original pattern of spatial development that tended to keep urban living activities away from the waterfront area in order to ensure the safety of the local residents. Surely, the moving of the harbour industry and the urban regeneration project also provided an atmosphere that formed this change in policy-making. According to the interview of a local official in public work, policy-makers were keen to increase waterfront activities and to present the waterfront as the attractiveness of the city. This was exhibited in both policy documents and interviews.

'Yes, water as the threats but also as the challenges for more attractive city. We want the city became more attractive, and water would be an approach to achieve the target.' (Interview R4, Local officer for public work, 2010)

'The external committee recommended us to strengthen the city's connection to the water. The city centre of Rotterdam seldom had waterfront activities. It was not easy especially at the beginning to negotiate with the Port authority. They did not like to have too many water activities because that would cause problems for the shipping delivery. So we needed to try hard to convince them – on the one hand, the shipping business was moving to the coast area and the demands in the Stadshaven were decreasing. On the other hand, urban water activities needed to be intervened only at certain well-regulated areas to ensure the safety for two sides.' (Interview R3, Local planner, 2010

More recently, the discussion of living with water has been integrated into a broader framework of spatial development to tackle climate-related disturbances such as flooding and the green house effect. By taking potential disturbances as opportunities for urban development, policy-makers hope to promote the city's profile in managing potential disturbances. A further discussion is presented in the next section.

§ 8.2.3 climate adaptation

The discussion of climate adaptation has been highlighted in policy-making since the late 2000s due to the awareness of climate uncertainty. Since the impacts of climate change are deeply uncertain, projections and scientific and scenarios became more and more important as a reference for planning decision-making. In 2006, a report by the Royal Netherlands Meteorological Institute indicated that the sea level may rise between 0.35 and 0.85 m in Dutch coastal areas by 2100, and if subsidence is included the increase in water level would be between 2.50 and 5.00 m (Royal Netherlands Meteorological Institute, 2006). This scenario estimation increases the chance of flooding in Rotterdam in 2100 at least tenfold compared with the current situation, and the existing storm surge barriers would no longer meet the requirements of protecting the city of Rotterdam or the greater Randstad region. These potential climate-related floods would be the result of two trends: rising sea levels and more extreme water discharge in rivers draining into the sea. The situation would be aggravated even more if sea and river water levels increase at the same time.

The potential disturbances highlight the importance of developing adaptive strategies for the city, especially in places where outside of the dike ring protection. The consideration of flood risk management is one of the primary focuses in decision-making. New terminologies, such as resilience, have been introduced in the context of this new concern. As shown in the information gained by interview, formerly this term indicated mitigation strategies, but now it is generally understood as a synonym for adaptation.

'And the topic of living with water was correlated to the awareness of climate uncertainty in the late 2000s. The issue of climate change strengthened the directions of planning decision-making toward the adaptability of the flooding. It became the prior topic of the city.' (Interview R3, Local planner, 2010)

'A shift in attitude from "resistant" to "resilience" was happening. The term resilience indicated the focus to be adaptive of the environment – the uncertainty that would address in our living environment. Now we know water in the future would be much more – and harder to deal with than what we face today. This might (and would expect to) change the way of our living. And we should start our preparations.' (Interview R4, Local officer for public work, 2010)

The goal of becoming more adaptive to climate change led to the creation of a new organisation. The Rotterdam Climate Initiative (RCI) was established in the late 2000s as an association responsible for making climate adaptive strategies. Actors in the RCI include both government sectors, such as the national government and municipal sectors, semi-government organisations, such as Port of Rotterdam and water

boards, and private stakeholders, such as the DCMR Environmental Protection Agency Rijnmond. The RCI also collaborates with business communities and scientific research institutes for planning decision-making. This is shown in the interview record.

'You may take the RCI as a collaborative platform initiated for making climate strategies. At this moment we have six or seven projects running over the city, most of them addressed in combining with energy and water issues. We keep (and be) the close linkage between research, government and private sectors in framing adaptive strategies on a knowledge base of climate uncertainty. And we believe that to develop climate strategies (and make the city safe from climate disturbances) is essential for the attractiveness of the city for the further development of its economy.' (Interview R6, Local officer, 2012)

The RCI also held the responsibility for framing the issue of climate adaptation into planning practice. Two planning documents, *Rotterdam Climate Proof 2009* and *2010*, were published to associate planning actions for climate proofing, such as green roofs, multifunctional parks and parking areas under the dikes (Rotterdam Climate Initiative, 2010, 2009). These strategies were proposed not only to manage the potential flood risks, but also to strengthen the capacity of urban development and economic growth. In other word, the disturbances were considered as opportunities for urban development. The interview record shows an example of this in relation to the development of the harbour industry. By being more aware of the impact of climate change, the Port of Rotterdam can be more secure against the threats of climate disturbances than other harbours and thus become more attractive to potential investors.

'The harbour authority embraced this idea and was keen to be not only a sustainable harbour but also a climate-proof harbour that indicated the image to be safe (regarding flood risks) and clean (regarding energy efficiency) – two characteristics address like two shortcomings of the Rotterdam Port among many of its advantages. It would be a massive potential for long-term development if the harbour made the improvements in these two aspects.' (Interview R1, Academics, 2012)

Physical implementation for promoting climate adaptation is mainly located in places that are outside the dike ring protection and therefore especially vulnerable to the potential disturbances of flooding. The new development area of the *Kop van Zuid Regeneration Project* is one of them. Both interviews and the planning documents indicate that the implementation projects are mainly considered as individual showcases or experimental models that represent innovative ideas for climate adaptation. This is different from the *Kop van Zuid Regeneration Project* that focused on practical development for urban regeneration. The floating pavilion in Katendrecht and the water square in the city centre are two examples that are used to market the city as a centre of expertise in coping with the issues of climate change at the international level (Interview R8, Urban planner and architect, 2012). According

to the interview, the new physical developments have become tourist hotspots that attract people from all over the world, including both private travellers and groups of government officials.

'"To build something" is one of our targets written in the Climate proof policies (2009). The project needed some practical implementations to convince policy-makers and our network members that we were really able to deal with the risks of climate change (in terms of flood risks), and the significance of the floating pavilion addressed in this perspectives.' (Interview R3, Local planner, 2010)

'In past years we were busy in selling the ideas of Rotterdam as a climate proof city. We had many visitors from other countries. Some were private visitors who interested in the adaptive projects of the city (which stimulated the tourism business), and some were government officers who tend to build up the collaboration with us for the development of climate proof strategies for their cities. I would said the approach of climate adaptive strategy have become a economic track that supports the development of the city.' (Interview R3, Local planner, 2010)

The development of climate adaptation has resulted in an economic profit for the city. This is also related to the development of scientific studies that support decision-making for climate adaptation. The discussion is addressed in the next section.

§ 8.2.4 climate knowledge economy

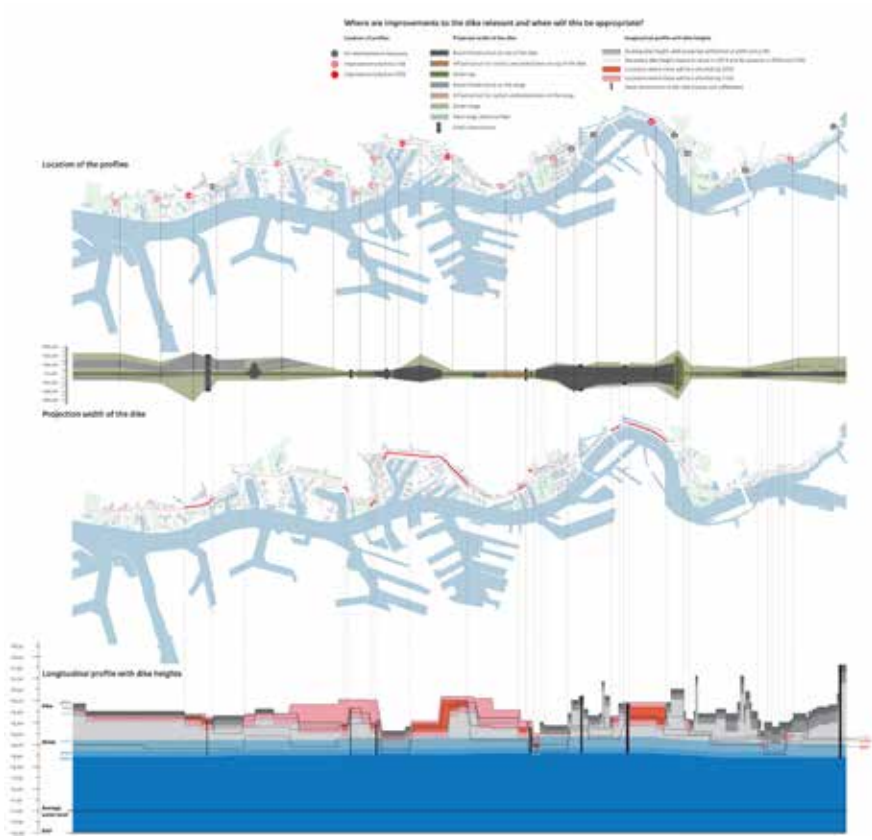
The discussion of a climate knowledge economy in local policy-making focused on promoting the city's expertise in dealing with the uncertainty of climate change and flooding. The national programme, *Knowledge for Climate (Kennis voor Klimaat)*, was initiated in 2007 to develop applied knowledge of climate impact and to ensure that climate adaptability will be taken into account in governance decision-making. According to the interview, this programme is important in forming a collaborative platform between the national government, local municipalities, business communities and scientific research institutes.

'We realised the "results" of natural science are hard to use unless the outcomes were "translated" and became applicable to policy-making. So at the first phase we focused the interests on the selected "hotspots" to produce fit-able knowledge for them. Rotterdam city is one of them. At the second phase we started the focus of specific "theme" on the behalf of the existing knowledge of practices. In this way we ensure the produced knowledge can be useful to the practices.' (Interview R7, Officer of the Knowledge for Climate project, 2012)

'The Knowledge for climate is a national research programme of climate change for local practices. The national government firstly asked us – what do you want to know about climate change for the decision-making of the city? For instance, the precisely study of sea level rising in Rotterdam region was the information we need. Then the government helped in building up the collaborations with research institute for the study with a particularity of the city. In this way the Knowledge for climate initiate the cooperation between scientific study and decision-making.' (Interview R3, Local planner, 2010)

Different research projects have been initiated under this national programme. The *Safe and well built water barrier in Rotterdam (Veilige en goed ingepaste waterkeringen in Rotterdam)* is one of the projects with a specific location in Rotterdam. The goal of this project is to examine the robustness of the dike ring in facing the possible situation of higher water levels, so that more strategic policies can be developed (De Urbanisten et al., 2010). The finding of the research is shown in Figuur 43. The dark red colour shows the places where urgent actions are required. Light red indicates places where planning actions are needed to ensure water safety. The grey colour means the current protection is sufficient and can be trusted to be well functioning for flood risk management.

The influence of these scientific studies led to a more comprehensive framework in coping with climate change and flooding. According to the interview, this can be illustrated in two ways. First, scientific projections of future trends and potential threats encourage a broad set of actors to be involved in policy-making. By sharing the responsibilities in decision-making, disturbances due to the lack of capacity in the government sectors can be minimised. For example, partnerships of private corporations might play an important role in investing in the development of climate adaptive strategies, so that spatial development could continue even if the government was experiencing financial difficulties. Second, different scenarios of future situations help policy-makers to have a clear focus while remaining flexible in their practice. Strategies for climate adaptation might need to be revised over time according to changes in government direction, involved stakeholders and public expectations. The guidance of being adaptive, however, would remain important in directing the spatial development of the city.



Figuur 43
Study of the current conditions of the dike rings (Source: De Urbanisten et al., 2010)

'At the beginning we were very nervous about the new conditions. But after years of working we gradually understand perhaps there is no need to always use the worst scenario for planning, which made a huge difference in decision-making.' (Interview R5, Local planner, 2012)

'We are facing the financial difficulties at this moment. So it might mean that we need to adjust our strategies (or even the institutional system) to remain balance financially. Scenarios are important for us to ensure the institutional adjustments would not cause a collapse of water safety – so we can know where we shall spend money on, and where we the improvements would be possible to postpone but the city can still be robust and run properly. ' (Interview R5, Local planner, 2012)

These discussions result in a more scenario-based approach in policy-making. According to the interview, this approach is not just beneficial to cope with flood risk. It also becomes an advantage in promoting the economic growth of the city. Policy-makers are actively marketing the city's climate adaptive strategies all over the world. This has raised the profile of the city as a centre of expertise in dealing with flood risks and the potential disturbances of climate change, thereby stimulating international exchange of experience and economic development.

'Policy-makers in the municipality take this chance for the growth of the city. It is about economy. On the one hand the development of climate adaptive strategies helps us to ensure the city is safe from potential flooding (even though we are graphically lower than the sea-level), which is good to attract external investments (because we are safe). On the other hand the climate adaptive strategies offer an opportunity to exchange our experiences to other cities where also struggle or intend to be climate proof. And it provides a new direction to develop our economy.' (Interview R3, Local planner, 2010)

Rotterdam's climate preparation was initiated with a strong marketing component. This is shown clearly in the planning documents, *Rotterdam Climate Proof 2009* and *2010* (Rotterdam Climate Initiative, 2010, 2009). The exhibition of Rotterdam's floating pavilion at the 2010 Shanghai World Expo is one example that showcased Rotterdam's capacity to manage climate-related floods through engineering as well as spatial development and other adaptive strategies. The development of a climate knowledge economy also benefits the city by allowing it to become less dependent on the harbour industry. This is one of the core intentions for urban development that has been addressed since the early 1990s. The interview records present this underlying expectation in promoting the development of a knowledge economy.

'Rotterdam is always addressed the images we have for a harbour city – labours, low incomes (comparing with commercial cities like Amsterdam) with heavy industries. The development of knowledge economy is nothing more than a continuing approach for attractiveness and competitiveness of the city.' (Interview R2, Local planner and academics, 2012)

'Why the city are so keen in developing its climate adaptability? It is important to look this topic from the perspective of the city's development history. Environmental qualities (e.g., pollutions) are always the "weak points" - and also the "short cuts" for city competitiveness if we can conduct our weakness into attractiveness. ' (Interview R1, Academics, 2012)

Policy-makers have put much effort in collaborating with other cities where the issues of climate adaptation are also emphasised in planning decision-making for spatial development. The collaborative networks are established at national and international levels. For example, the municipality has a close partnership with the city of Dordrecht

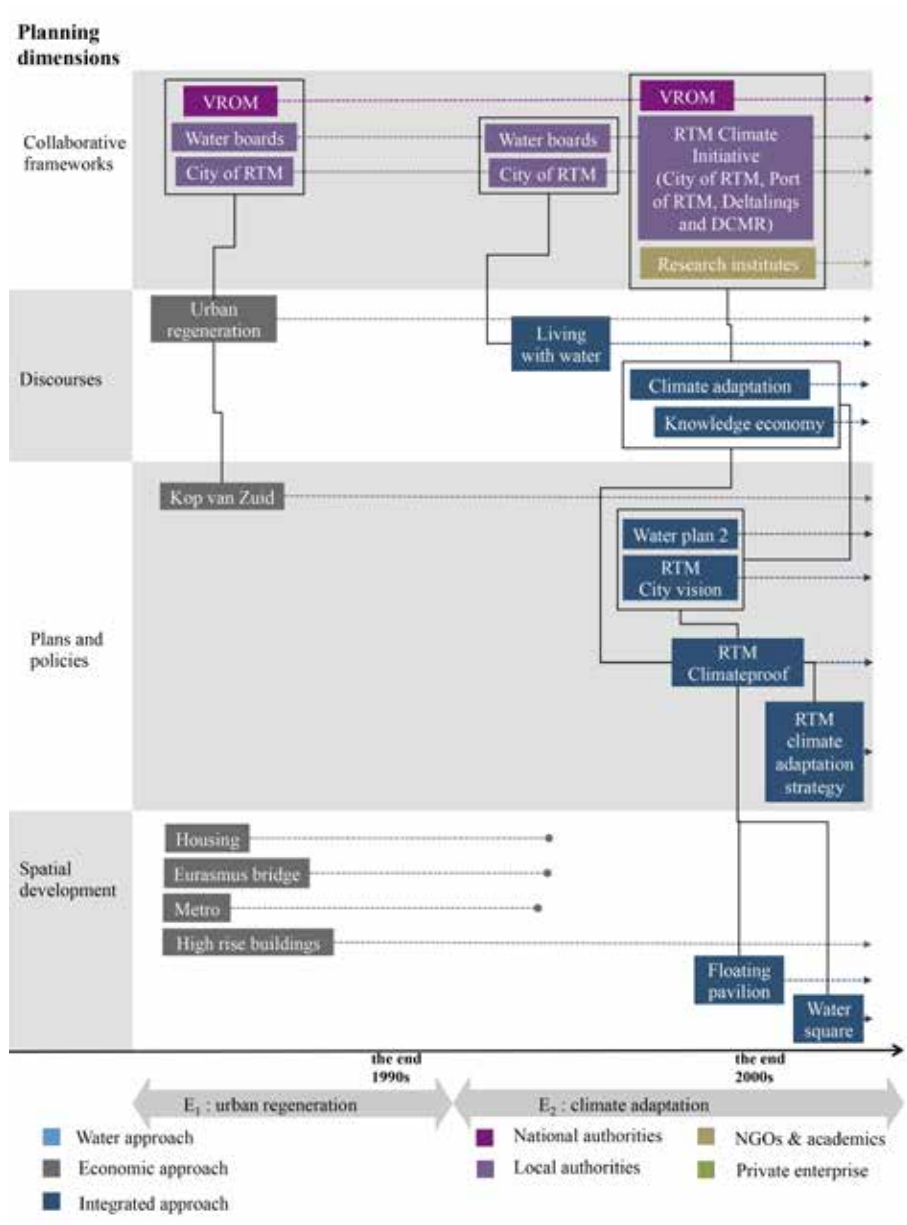
in developing adaptive strategies on a regional scale. Policy-makers in the city of Rotterdam are also active in framing collaboration with other harbour cities in Europe, such as Hamburg in Germany, to exchange their experiences in managing the potential impact of rising sea levels. Policy-makers are also active in sharing expertise with cities where future flooding is a threat such as New Orleans in the United State, Ho-Chi-Minh city in Vietnam and Kaohsiung in Taiwan. The importance of framing international networks is shown in the interview.

'It is very important from the city's perspective to share and exchange knowledge and experiences in managing the uncertainty of floods. For example, policy-making in New York has a very strong framework of legitimacy in coping with flooding issues, which is not addressed here in Rotterdam. Through the learning experiences we can share with our "friends" our knowledge especially in framing strategies for practical experiences.' (Interview R6, Local officer, 2012)

A criticism has been made in relation to the active attitude in promoting a climate knowledge economy. Some scholars warn that focusing on a climate knowledge economy may lead to climate adaptive strategies that are too closely integrated to the market and gradually dismiss scientific considerations. For example, policy-makers may only be interested in issues that could provide economic profits and ignore others that require more long-term studies. Another warning is related to the knowledge exchange with other cities where the environmental situations, institutional frameworks and public expectations are different from the city of Rotterdam. This dubious exchange can cause even more vulnerability in these cities.

§ 8.2.5 discussions and conclusions

This section summarises the local planning study in Rotterdam city centre by using the analytical framework considering the dimensions of spatial planning and the episodes in policy-making. This helps to form a more systematic understanding of the local planning story in order to discuss how well planning can and does apply the promotion of the notion of resilience. As shown in Figuur 44, there are two episodes addressed in the past two decades: the first is urban regeneration, and the second is climate adaptation. This indicates a shift in which a new issue is addressed, causing the original issues to receive less attention in policy-making.



Figuur 44
Local planning story in the case of Rotterdam city centre

The episode of urban regeneration occurred from the 1990s. The discussion has remained in the 2000s but no longer has a dominant position. Policy-making in this episode focused on the Kop van Zuid area becoming an extension of the city centre (Interviewee R1, R3). The implementation was mainly addressed in three aspects: to redevelop the Wilhelminapier for high-rises and commercial buildings, to regenerate the Katendrecht for housing, and to build the Erasmus Bridge that provides a direct connection from the old city centre to the Kop van Zuid area (Ostoja and van der Laan, 1999). The *Kop van Zuid Regeneration Project* has reached an end state of implementation. This project was generally considered as a success for the city because the implementation matched the intention of planning strategies.

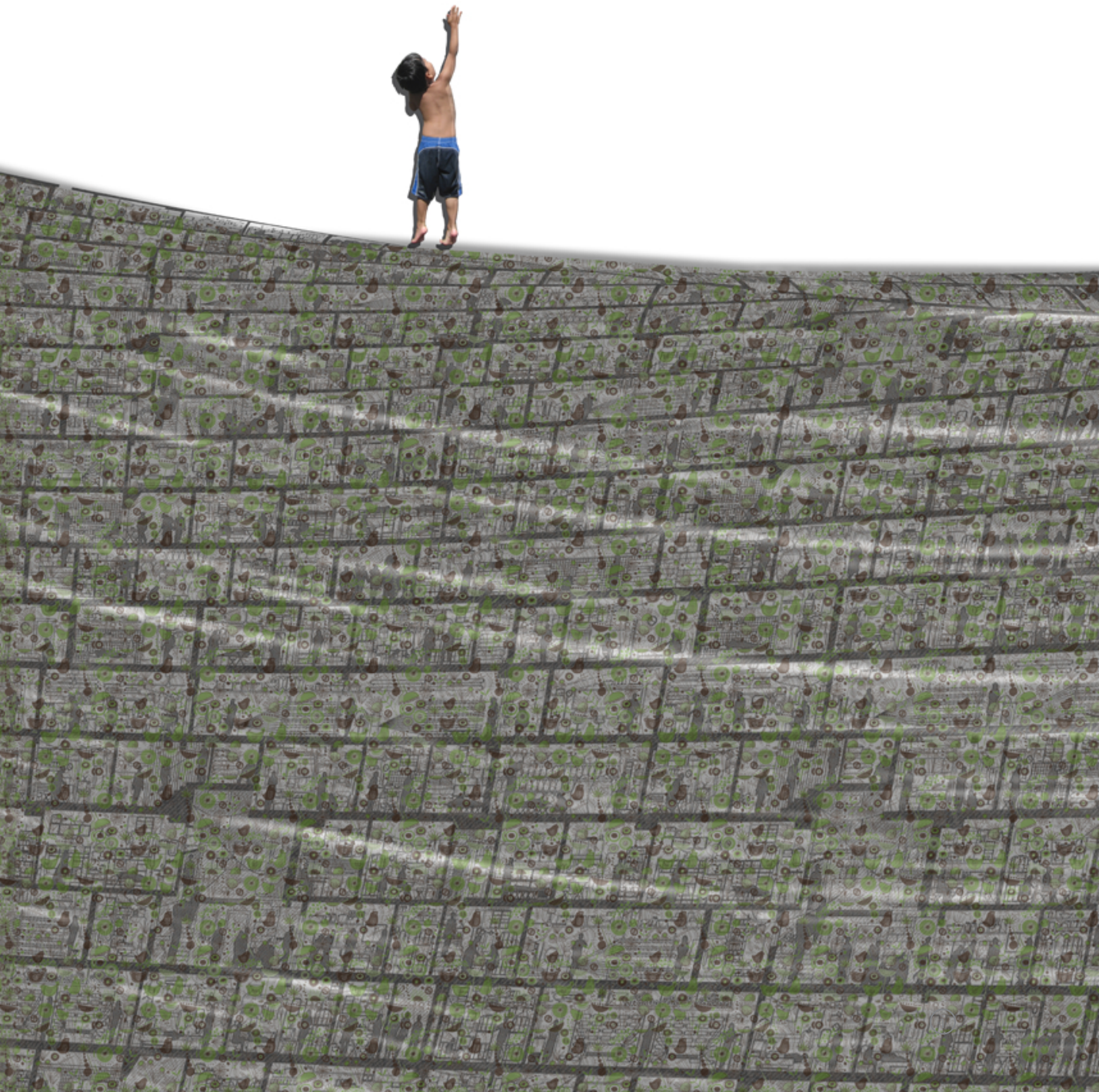
The local government sectors, the municipal sectors and the Port of Rotterdam, were the key actors involved in the process of planning policy-making in this episode. They also collaborated with upper level governments for financial support for implementation of projects, such as the Erasmus Bridge and the metro line (Interviewee R1, R8). Private stakeholders were only included in the construction of housing and commercial buildings. Policy-makers highlighted the importance of opening the waterfront areas for urban activities, but not paid too much attention on the issue of flood risk management.

Several characteristics of planning especially relevant to resilience could be recognised in policy-making during this episode. The characteristics of *considering the current situation* and of *learning from previous experience* were important in policy-making. These were mainly related to the situation of the high unemployment rate, poor environment quality and the problems of social segregation. Policy-makers also exhibited capacity in *setting goals* and *initiating actions* in the redevelopment of the Kop van Zuid area. Policy-makers had a clear focus on urban regeneration and showed the ability to initiate strategies that direct physical development to reach a goal.

The episode of climate adaptation occurred in the mid 2000s. The original focus of this episode was limited to the consideration of a more adaptive approach to flood risk management. During the late 2000s, this focus was broadened to include the impact of climate change. The RCI was established in the late 2000s to promote applicable strategies of climate change in collaboration with the national government, the municipal sectors, business communities and scientific research institutes (Interviewee R6). This association was important for framing the awareness of climate adaptation into planning policies. For example, the *Rotterdam Climate Proof 2009* and *2010* focused on possible strategies for climate proofing, such as proposals for green roofs, multifunctional parks and parking areas under the dikes (Rotterdam Climate Initiative, 2010, 2009).

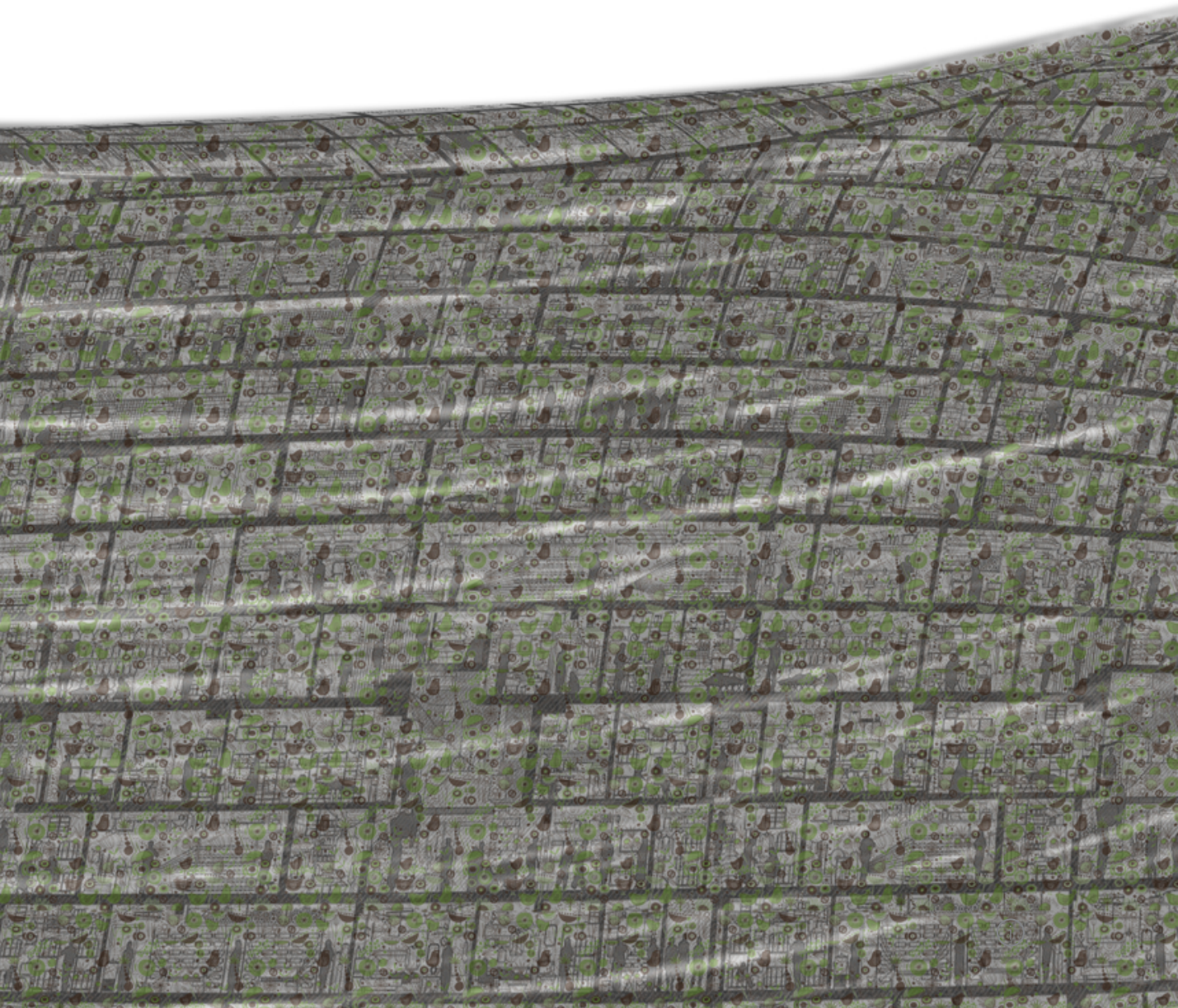
The focus of climate adaptation also led to the necessity of integrating the outcomes of scientific projections into planning considerations. The national research programme, *Knowledge for Climate (Kennis voor Klimaat)*, is an example that provides knowledge related to the impact of climate change. Under this research programme, the scientific scenarios were developed to support policy-makers in framing more strategic policies according to different environmental conditions, local contexts and the urgency of the current situation (Interviewee R2, R3, R7). In recent years, the approach of scenario-based policy-making has become advantageous in promoting the economic growth of the city. Policy-makers are active in promoting the profile of the city as a centre of expertise in dealing with flood risks and potential disturbances of climate change. However, the potential overemphasis of developing a climate knowledge economy might have a negative outcome. For example, policy-makers might concentrate on issues that would provide economic profits within a short period and neglect issues requiring a longer time for study.

Several characteristics of planning especially relevant to resilience were considered in policy-making during this episode. The characteristic of *considering the current situation* and *examining trends and future threats* were both related to the focus of scientific studies and research projects. This provided policy-makers with a firm platform to initiate more comprehensive strategies. *Learning from previous experience* was mainly related to the near-flooding experiences in 1993 and 1995 that necessitated action related to the issue of climate adaptation. *Setting goals* and *initiating actions* in this episode were also highlighted. The strategies were not just considered in relation to physical development. They were initiated under a broader framework that also took international networks into consideration. These networks became advantageous for the economic growth of the city. Finally, *involving the public* was considered in terms of the collaboration among a wide set of actors with various interests for spatial development.



PART 4

Assessing resilience in local collaborative networks



9 National comparison of two cities in Taiwan

The discussion in Part IV focuses on the way in which the collaborative framework of local planning governance is formulated to promote resilience in facing climate change and flood risks. It is based on the local planning stories of the case studies presented according to the dimensions of spatial planning and the episodes in policy-making (see Chapter 2). The discussion puts particular attention on the relations between actors and coalitions, which sometimes cause policy-making to transform into a newer episode. The assessment is structured by the six characteristics of planning that are especially relevant to promote resilience (see Chapter 3). These comprise: considering the current situations, examining trends and future threats, learning from previous experience, setting goals, initiating actions and involving the public.

The assessment includes both a national and international perspective comparing cases within Taiwan and between Taiwan and the Netherlands. This is presented separately in Chapter 9 and 10. The national comparison examines the way in which local planning governance is addressed in shaping decisions to deal with flood risks, which may vary among cases where share similar interests of spatial development the same national institutional framework. The international comparison between Taiwan and the Netherlands discovers the critical roles of planning to promote a resilient city in facing flood risks and climate change. This can reflect to the tradition of planning indicating the way in which decisions are made.

This chapter presents the assessment of local collaborative frameworks and the national comparative analysis in the four Taiwanese cases. The interpretation of the evidence is based on the interview records and the policy documents. Some interpretations are less certain but seem to be an answer given by the evidence. The discussion is structured in three sections. The first two sections present the assessment of local collaboration in Kaohsiung (9.1) and Tainan (9.2). The last section (9.3) compares the framework of local policy-making in the two cities and the relationship between national and local strategies. This can lead to the discussion of the role of local planning governance in facing flood risks as the conclusion.

§ 9.1 Kaohsiung, Taiwan

This section examines the local collaborative pattern of policy-making according to the characteristics of planning presented in Chapter 3. Two cases in Kaohsiung are presented: Meinong (9.1.1) and Kaohsiung city centre (9.1.2). These cases illustrate a great difference in actors involved in policy-making. Local collaboration in the case of Meinong mainly includes national authorities and local NGOs. In the case of Kaohsiung city centre, the municipal sectors are the major actors in policy-making. A comparative study of these two cases is addressed in section 9.1.3.

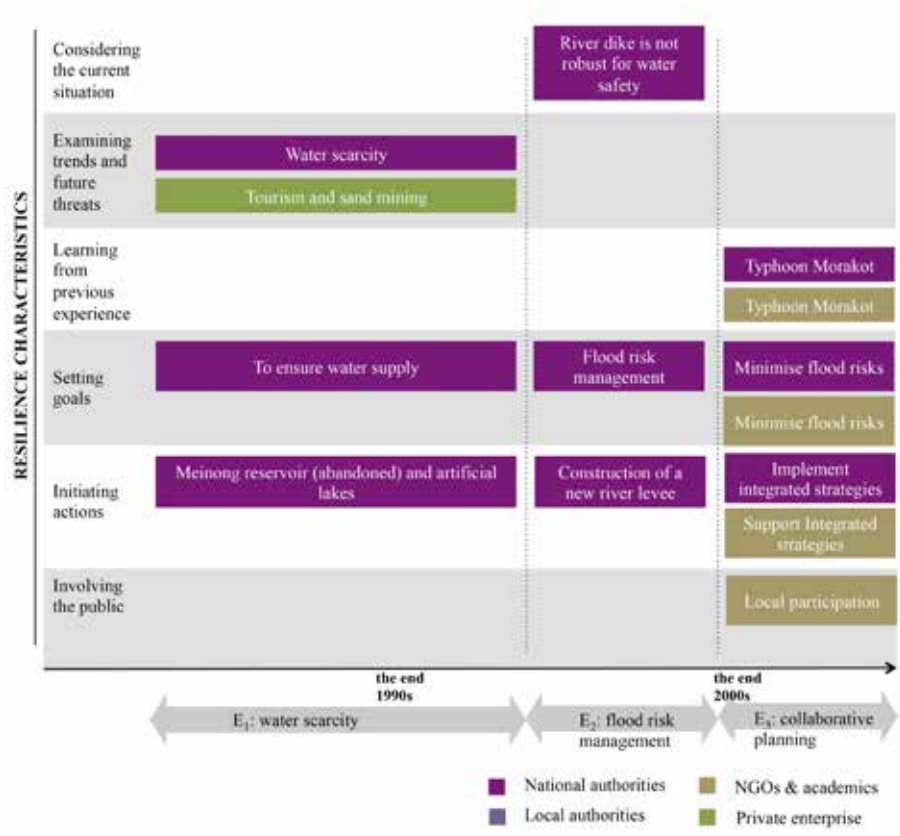
§ 9.1.1 Meinong

The assessment of the local collaborative pattern of policy-making in the case of Meinong is presented in this section. As shown in Figuur 45, policy-making in the past two decades can be divided into three episodes: water scarcity, flood risk management and collaborative planning. This indicates a shift in policy-making that brings a new issue into the discussion and causes the original issues to be less relevant in policy-making. The involved actors are mainly the national government sectors and the NGOs. The local government is not involved in these three episodes due to the lack of institutional capacity in the past. The national government sectors dominate planning decision-making in the first two episodes. The NGOs were involved in decision-making in the last episode. The experience of flood disasters in the late 2000s causes the process of policy-making to become more open for collaboration and negotiation.

The importance of *considering the current situation* was particularly strong in the second episode. This was linked directly to the construction of a new river levee. A risk factor (1-in-50 years standard of extreme rainfall) was used to specify the construction standard. However, this standard was neither based on expected threats nor on previous experience: the standard was based on existing regulation for urbanised areas. At the end of the episode policy-makers realised that water safety could not be ensured by the new river levee alone. Adaptive strategies were necessary.

The characteristic of *examining trends and future threats* was mainly evident in the first episode. Policy-makers were concerned with the expected situation of water shortage in the metropolitan area. This directed to the national strategies of the Meinong Reservoir and artificial lakes in this area. Both strategies were criticised by local communities and NGOs who challenged the expected water scarcity and argued that the construction projects were unnecessary. The protests caused delay to implementation and in some cases resulted in the abandonment of the plans. More

recently, the municipal government has addressed the issue of water scarcity by buying fresh water from the municipality of Tainan in drought periods for industrial and domestic use.



Figuur 45
Pattern of collaboration in Meinong

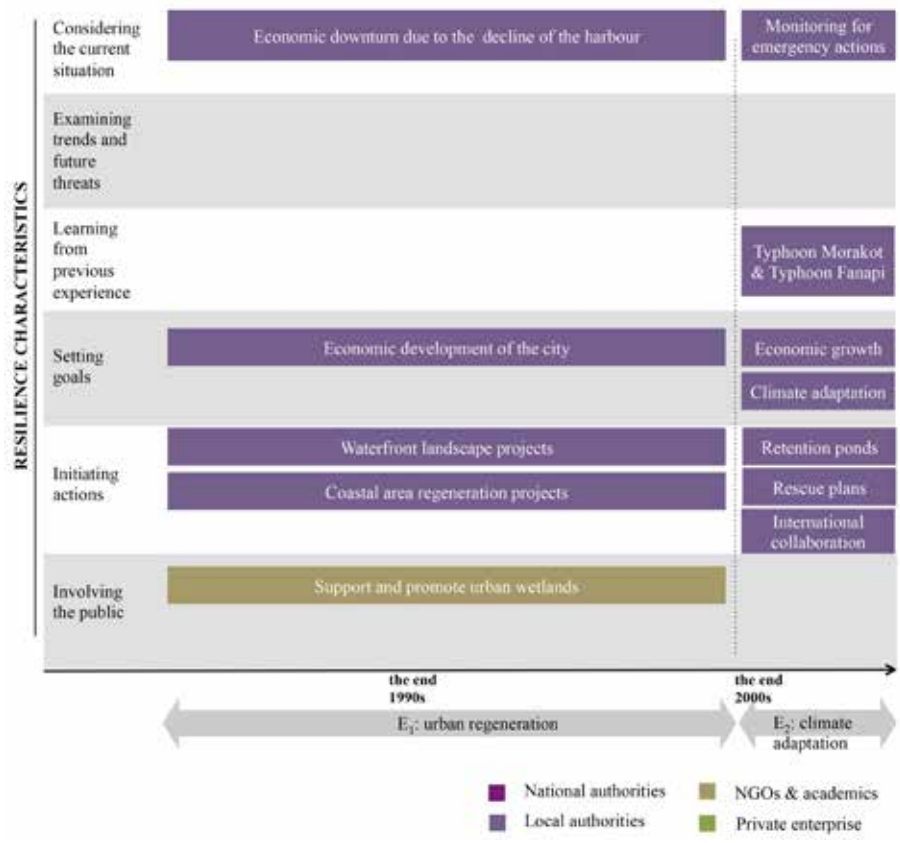
Learning from previous experience is important in the third episode. Increased flooding events since around 2005 and the effects of Typhoon Morakot resulted in policy-makers no longer considering engineering strategies as the only option. They realised that construction projects cannot completely ensure water safety and can lead to more severe disasters if the construction is destroyed (Interviewee M6, M11). Adaptive strategies were important for the episode of flood risk management.

Setting goals and *initiating actions* were important in each episode. The objectives of planning decision-making shifted from the issue of water shortage (E_1) to flood risk management (E_2) which has recently moved towards the consideration of integrated strategies for water management (E_3). The national government sectors dominated policy-making during the first two episodes. The process of decision-making became more open and local opinions were given more importance during the third episode. Local participation was also part of the decision-making at the regional scale. NGOs were active in initiating the Kaoping Riverbasin Management Committee and promoting the committee as a semi-government organisation. As a result, local coalitions were formally allowed to take part in decision-making for regional water management (Interviewee M9, M12).

Involving the public was mainly important in the third episode. During this third episode, policy-makers collaborated with local NGOs in framing integrated strategies to manage water issues through land use management (Interviewee M3, M9, M10). The NGO-led proposal, the *Master Plan of the Culture Town Meinong*, became increasingly important for initiating strategies for flood risk management (The Seventh River Managment Office and U-An Consultants, 2010, Government and Association, 2005). For example, proposals for water retention were based on this document. However, the collaborative pattern of policy-making only occurred between the Seventh River Management Office (WRA07) and the local NGOs related to coping with flood risk management. The national authorities remained in control of the strategies to tackle the issue of water shortage, so local protests on this issue continued. The involvement of local government sectors remained low (or absent) which created difficulties for the implementation of integrated water management strategies (Interviewee M1, M2, M3). These difficulties were due to the fact that neither the WRA07 nor the local NGOs can initiate planning strategies for flexible land use management themselves (Interviewee M13).

§ 9.1.2 Kaohsiung city centre

This section presents the assessment of the local collaborative pattern of policy-making in the case of Kaohsiung city centre. As shown in Figuur 46, policy-making in the past two decades can be divided into two episodes: urban regeneration and climate adaptation. This indicates a shift in policy-making that brings a new issue into discussions and causes the original issues to become less relevant in policy-making. Sectors from the local government are the major actors in these two episodes. The national government often had a supplementary position in providing financial and technical supports.



Figuur 46
Pattern of collaboration in Kaohsiung city centre

The characteristic of *considering the current situation* was important in policy-making in both episodes. Policy-makers in the first episode (the episode of urban development) were influenced by the economic downturn of the harbour. Decision-makers had two major approaches to address the situation. First, the approach of waterfront regeneration aimed to enhance the liveability of the city by improving the quality of the environment. Second, the approach of coastal regeneration focused on new development to transition the city from industrial development to trade and services. The waterfront landscape projects successfully promoted housing development along the riverfront. However, the coastal regeneration projects were less successful and became mere development bubbles (Interviewee K3). During the second episode, the flooding situation was monitored to support flood risk management. Government officers were required to plan emergency actions in order to minimise flood disturbances, for example, by closing the water gates or delivering resources to areas which were vulnerable to flooding (Kaohsiung City Government, 2011, Hydraulic Engineering Bureau and Foundation, 2011).

Learning from previous experience was important in the second episode. Policy-makers used to take little account of flooding until it became more frequent and extreme in the late 2000s. The flooding events also caused decision-makers to consider the necessity of initiating adaptive strategies. The municipality proposed eight new retention ponds in and around the city centre. Other adaptive strategies, such as household water gates, were also included.

Setting goals and *initiating actions* were important in both episodes. The objective of the first episode was primarily to promote economic development in the city. The municipality implemented strategies of flood risk management with a focus on improving water quality and the waterfront landscape. These strategies provided an advantage to the regeneration projects along the riverfront (Interviewee K2, K3). In this respect, although the Urban Development Bureau (UDB) and the Public Work Bureau (PWB) did not form a formal collaborative network for decision-making, their strategies were complementary for urban development. However, the heavy focus on waterfront landscape reduced attention to other issues of water management, such as the discussion of water retention ponds (Interviewee K5). Another approach to transitioning the city from industrial development to trade and services was coastal area regeneration. Planning actions in the coastal area were mainly concerned with physical development, especially government-funded projects. These were less successful due to the lack of careful consideration in investment and, more recently, the financial pressures facing the local government.

The issue of climate adaptation began to be highlighted during the second episode. Planning actions included more proposals for water retention facilities, rescue plans, emergency actions, and more international collaboration. The purpose of international collaboration is not just physical development. Knowledge exchange and sharing were also important for developing a more comprehensive framework in decision-making (Interviewee K5, K6). However, decision-making for climate change mainly affected sectors that were more concerned with the environment of the city, such as the Hydraulic Engineering Bureau (HEB) and the Environmental Protection Bureau (EPB). The development-focused sectors, such as the UDB, hardly took the issue of climate change into consideration (Interviewee K9). This was because policy-makers mainly focused on economic growth and dismissed climate change and its impact on urban development (Interviewee K9, K10).

Involving the public was more evident during the first episode. This was because policy-making was more open to local participation for environmental development, such as wetlands and waterfront landscape. Issues like flood risk management and climate adaptation were considered as professional matters that remained technocratic in decision-making processes. Nevertheless, local communities preferred to have engineering solutions, such as river dikes, rather than adaptive actions, such as water retention ponds for flood risk management (Interviewee K6). This was related to a

general concern that having adaptive strategies in neighbourhoods indicated that the area was vulnerable, and this reputation resulted in lower land values (Interviewee K3).

Policy-making during both episodes illustrated a lack of consideration in *examining trends and future threats*. The first episode suggests that policy-making for spatial development seemed too optimistic in making plans before carefully considering investment options (Interviewee K3). More recently, these development projects have had financial difficulties. In the second episode, strategies for flood risk management were made mainly by considering the flooding experiences in the late 2000s and were less related to scientific studies (Interviewee K5, K6).

§ 9.1.3 assessment of planning in Kaohsiung

The assessment of planning in the two cases of Kaohsiung shows a consequence that flooding events, such as the disasters in 2009 and 2010, can lead to a shift in local decision-making. Policy-making in the new episode can become more open to public participation. In the case of Meinong, collaborative planning was important in the third episode for promoting adaptive strategies. Policy-makers realised that water safety could not be ensured by the new river levee alone and that adaptive strategies required local participation (Interviewee M3, M6, M12, M13). However, a new episode can also lead to a more technocratic approach. In the case of Kaohsiung city centre, spatial development in the second episode followed the parallel approach. The economic development approach retained the element of public participation, but the flood risk management approach was limited to select groups, mainly professionals (Interviewee K8, K9, K10).

The continuing discussions about flood risk management during the previous episode were important for opening a window of opportunity that could bring policy-making into a new episode. For example, in the case of Meinong, the discussions of the new river levee in the second episode increased the awareness of flooding. This promoted a shift to a new episode when more extreme events occurred (Interviewee M1, M3). In the case of Kaohsiung city centre, the focus of economic development remained important in the first episode after the experience of the extreme event of Typhoon Trami in the early 2000s. Planning decision-making did not take flooding issues into consideration until around 2009 when extreme events began to occur more frequently and the disturbances to the city became more severe.

Another important finding is related to the fact that planning policy-making in the same city may have different forms of collaboration. These different patterns of collaboration can change the focus of spatial development. In the case of Meinong,

the involvement of local government sectors was low (or absent) due to the lack of institutional capacity in the past. The national authorities used to dominate the process of decision-making. Local opinions were seldom addressed in policy-making or could only delay implementation by local protests. More recently, the low participation of local government has created difficulties for the implementation of integrated water management strategies (Interviewee M1, M2, M3). This is because neither the WRA07 nor the local NGOs can initiate planning strategies for flexible land use management by themselves (Interviewee M13). The case of Kaohsiung city centre represents a different example in which local government is actively involved in policy-making. The city has financial and administrative independence in initiating plans and strategies for urban development. National authorities have little impact on policy-making here and are often involved in implementing construction projects.

The issue of flood risk is seldom addressed in local decision-making unless it is urgent. Flood risk management is normally considered as the responsibility of engineering sectors within the government. Planning authorities are hardly involved. In the case of Meinong, increased flooding events since 2005 and the effects of Typhoon Morakot resulted in a greater awareness of flooding in decision-making. Strategies of flood risk management were initiated in collaboration with hydraulic authorities at the national government and local NGOs (Interviewee M6, M12, M13). The participation of government planners was low (or absent). In the case of Kaohsiung, the issue of flood risk was only considered after 2009. Strategies of flood risk management were initiated under the framework of climate adaptation. Sectors involved in policy-making were responsible for environmental quality of the city, such as HEB and EPB. The development sectors, such as the UDB, were hardly involved (Interviewee K9).

Finally, the discourses of spatial development were important for framing coalitions in decision-making. The coalition can be considered as a collaborative network. For example, in the last episode of the Meinong case, the WRA07 and the local NGOs formulated a coalition to initiate integrated strategies collaboratively (Interviewee M3, M13). Local opinions were also important in initiating the Kaoping Riverbasin Management Committee and promoting it as a semi-governmental organisation. Local opinions are therefore formally allowed to take part in decision-making for regional water management (Interviewee M9). The coalition can also be initiated by a shared direction for spatial development, as illustrated in the first episode of the case of Kaohsiung city centre. In this episode, although the UDB and the PWB did not form a formal collaborative network for decision-making, their strategies were complementary for urban development (Interviewee K2, K3). This collaboration became less important more recently when the discourse of economic development was no longer the only issue that policy-makers were concerned with. As a result, although decision-makers were active in promoting international collaboration, policy-making in this episode had a narrower focus and excluded some schemes for local collaboration (Interviewee K5, K7, K8).

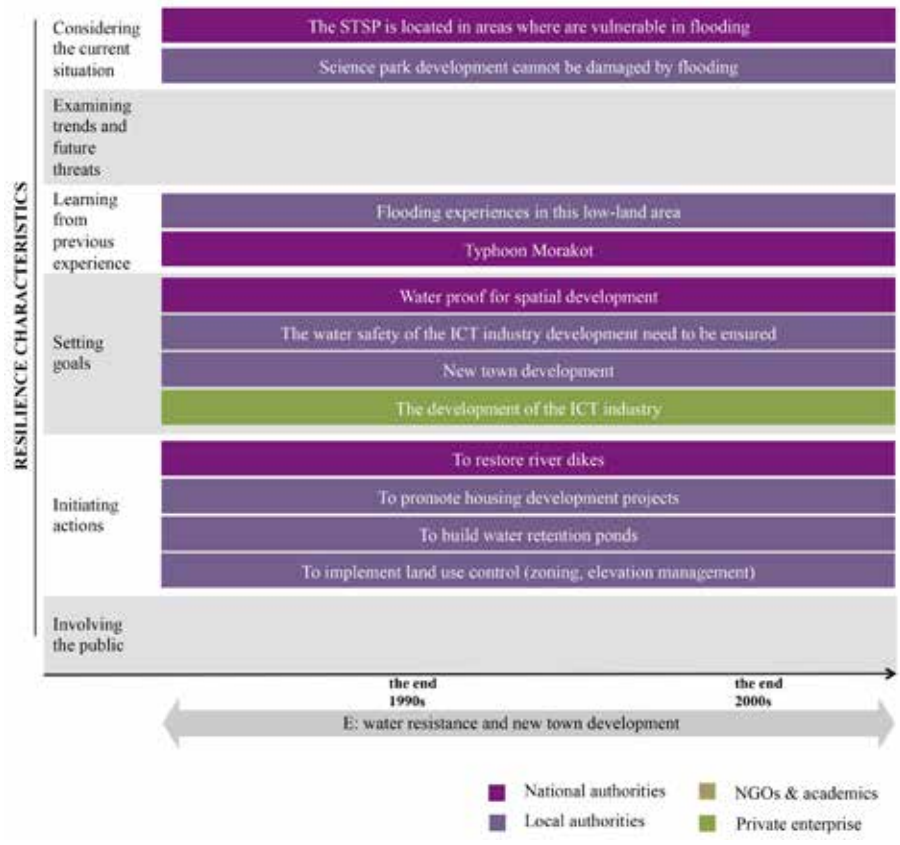
§ 9.2 Tainan, Taiwan

This section continues to examine local collaborative patterns of policy-making according to the characteristics of planning presented in Chapter 3. Two cases in Tainan are presented: the Southern Taiwan Science Park (9.2.1) and Tainan city centre (9.2.2). The collaborative patterns in both cases share the similarity that the municipality of Tainan plays a leading role for spatial development in collaboration with national authorities. A comparative study of these two cases in addressed in 9.2.3.

§ 9.2.1 the Southern Taiwan Science Park (STSP)

The assessment of local collaborative patterns in policy-making is presented in this section. As shown in Figuur 47, there is only one episode of policy-making addressed in the past two decades which is concerned with water resistance and new town development. This means changes in actors, planning directions and spatial development were less evident. The local government collaborated with the national government in coping with the flood issues so that spatial development in this area could be ensured.

The characteristic of *considering the current situation* is important in this episode. The geographical features of the development area caused the issue of flood risk management to become crucial in policy-making for spatial development. As part of the flood plain of both the Zengwen and the Yanshuei River, the development area is vulnerable to flooding and therefore was used only for low profit agriculture before being designated as the location for a national science park. The development plan was based on the consideration of the poor condition related to potential disturbances of flooding and the importance of promoting the development of the ICT industry (Interviewee S2, S3). The collaborative network among government authorities was also formed under these considerations.



Figuur 47
Pattern of collaboration in the STSP

Learning from previous experience is evident in this episode. This is particularly clear in relation to flood risk management strategies (Interviewee S5). For example, the project to develop a water-resistant buffer was initiated after the near-flooding experience of Typhoon Morakot in 2009. Although no serious flooding occurred in the development area, its hinterland was seriously flooded because the high water level of the river crushed the levee of Zengwen River. This flooding event strengthened the arguments to manage flood risks by preparing more space for water retention (Water Resource Planning Institute, 2011, The Sixth River Management Office of Water Resource Agency, 2009).

Setting goals and *initiating actions* are important in this episode. The goal of being water resistant was highlighted in policy-making as a primary concern for development in the science park. Strategies for implementation included construction projects, such as ditches and artificial lakes, as well as land use regulations. For example, an elevation

control regulation requires private enterprises to raise the height of development sites before construction (Interviewee S2). The project to develop a water-resistant buffer was initiated due to similar considerations of minimising potential disturbance of flooding for economic development (Interviewee S2, S4).

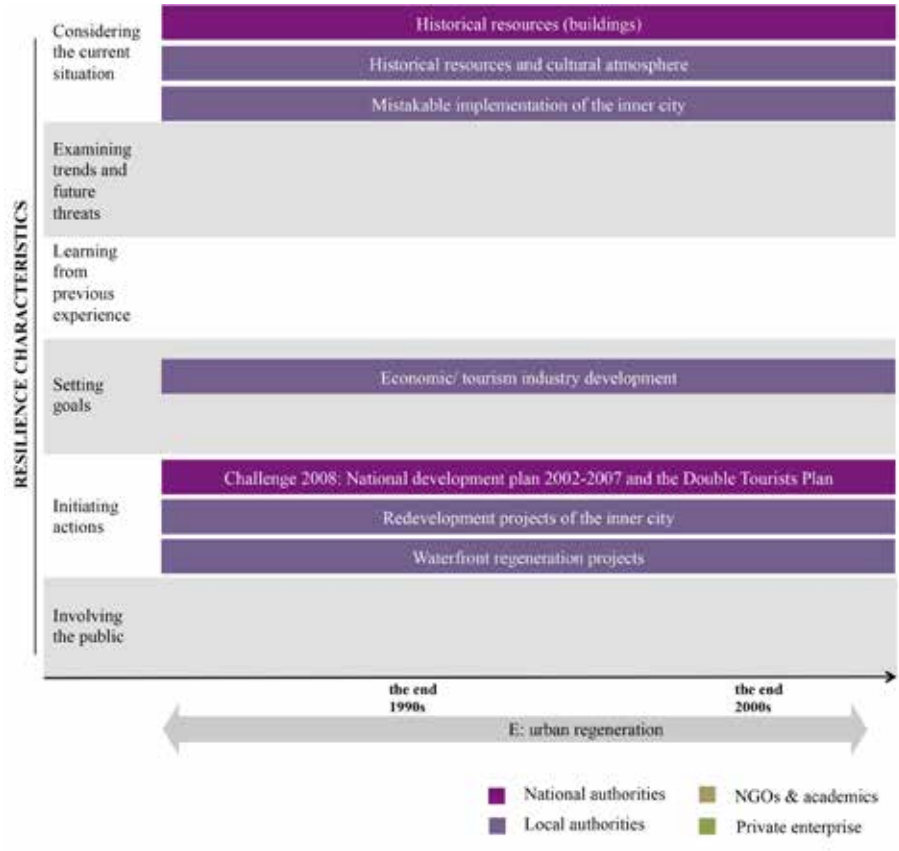
The strategy of flexible zoning is important in managing physical development in the STSP area. It provides more freedom for private developers to initiate physical plans and to decide the procedures of the implementation on their own properties (Interviewee S4). This raised the willingness of private developers to invest in the STSP (Chen, 2010). The flexible zoning regulation was also functional in encouraging developers to slow the development process. By minimising the impervious pavement in the development area, hydraulic construction, such as canals, may have less pressure in managing the increasing runoffs caused by the rapid growth of spatial development (Interviewee S2, S3, S4).

The issue of new town development has been discussed more recently. Some construction projects, such as artificial lakes, have become important for development in order to increase the quality of the local environment (Interviewee S1, S4). The *Cambridge Plan in the Southern Taiwan Science Park* is an example in which housing development projects were proposed along the artificial lakes mainly for leisure activities (Department of Urban and Rural Development, 2003).

Examining trends and future threats and *involving the public* are less evident in this episode. Scientific projections at the local level might be part of the reason that policy-makers are more willing to initiate future development strategies according to the previous experiences. The lack of local participation is because planning policy-making mainly involves government authorities. The collaborative network is both vertical (between the national and the local level) and horizontal (within the municipal government). For example, the Urban Development Bureau is collaborating with the national hydraulic authorities to promote the project to develop a water-resistant buffer along the Zengwen River. Decision-makers initiated the special agricultural zone where only low profit agricultural land use is allowed (Interviewee S2, S4). Regulations of the new town development projects have been initiated by several sectors in the municipality to ensure a balance between spatial development and water management (Interviewee S4).

§ 9.2.2 Tainan city centre

This section evaluates local planning collaboration in the case of Tainan city centre. As shown in Figuur 48, there has only been one episode of policy-making addressed since the 1990s, which is concerned with urban regeneration. Changes in actors, planning directions and spatial development were less evident. Both national and local governments highlight the importance of tourism development for the economic growth of the city.



Figuur 48
Pattern of collaboration in Tainan city centre

The characteristic of *considering current situation* is important in this episode. Policy-makers recognised and highlight the importance of cultural values for urban development. Generally speaking, policy-makers at the national level put more emphasis on restoring historic buildings. Local government actors were more focused on creating cultural districts for tourism development.

Setting goals and *initiating actions* are both important in this episode. The objectives of planning decision-making often related to tourism (Interviewee T2, T7). For example, the *Anping Special Scenic Area* was initiated in the mid 2000s. Policy-makers involved in this tourism development project included national authorities, such as the Council of Economic Planning and Development (CEPD) and the Tourism Bureau of the Ministry of Transportation and Communication (TBROC), as well as local authorities, such as Urban Development Bureau (UDB), Tourism Bureau (TB) and Cultural Affairs Bureau (CAB).

The *White Paper of Tainan Urban Landscape* is another example of local sectors collaborating, this time for the promotion of three rings with particular types of sightseeing spots (Urban Planning Bureau, 2005). This concept of three rings is often used to provide guidance to tourists, yet it has been little addressed in framing practical strategies to connect the sights along the rings (Interviewee T7). Planning decision-makers seem becoming hesitated to develop large-scale projects after realising a fact that the two regeneration projects, the *China Town* and the *Hainan Road Projects*, was less successful and became an obstacle for urban development (Interviewee T4). New physical development projects, such as the King's Palace project, have been delayed and in some cases abandoned (Interviewee T3).

Examining trends and future threats, *learning from previous experience* and *involving the public* are hardly considered in the episode. Policy-makers do not give the outcomes of scientific projections much importance, such as *A Pilot Case Study on Urban Flood Control - Using Tainan as Example* (GT International and Water Resource Planning Institute, 2012). The impact of flooding on policy-making in recent years is low. Public participation is not very important in policy-making but the public does have an important impact on physical development. For example, local landowners redeveloped the Haian Road collaboratively (Interviewee T4). More recently, the redevelopment of the Haian Road became an important area for tourism (Interviewee T4).

§ 9.2.3 assessment of planning in Tainan

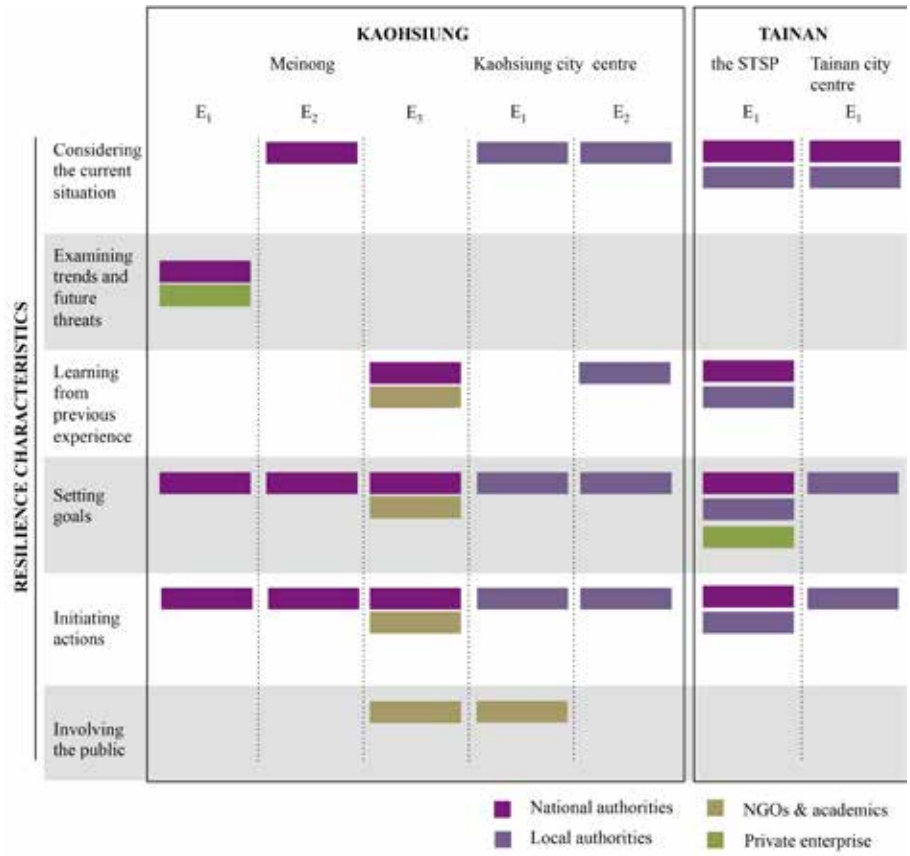
The assessment of planning collaboration in Tainan concludes that, first, both vertical and horizontal collaboration is shown in planning decision-making in these two cases. Issues that initiate government coalitions are varied and affected the actors who participate. The national hydraulic sectors are heavily involved in policy-making in the STSP case because being water resistant is crucial in the science park development project. Collaboration between government planners and water engineering officials is smooth and has advantages for spatial development (Interviewee S2, S3). For example, government planners were involved in framing the water-resistant buffer along the Zengwen River by regulating land use (Interviewee S2, S4). Some hydraulic infrastructures, such as the artificial lakes, were beneficial for housing development by improving the quality of the living environment (Interviewee S1, S4). In the case of Tainan city centre, government coalition is mainly based on the intention of tourism development. Actors involved in policy-making include planners at the national and local level, the TBROC officials and the TB responsible members (Interviewee T7). The coalition focuses more on developing tourism programmes, such as tourism packages and guidance. Physical projects are mainly about restoring historic buildings or providing improving the quality of the environment (Interviewee T3).

Second, the issue of flood risk management has different levels of importance in the two cases depending on the perceived impact on economic development. In the STSP case, policy-makers highlight flood risk management throughout the development process (Interviewee S2). The case of Tainan city centre is probably an opposite example that flooding issues are seldom addressed in planning decision-making for spatial development. This can be interpreted as a consequence of the geographic location of the city centre that is safer from flooding than the newer development areas. Another explanation is related to a fact that construction projects for flood defence have been implemented in the city centre area throughout the history. Water issues in the city centre are mainly about urban landscape that can promote spatial development.

Finally, public participation in coping with flooding issues is addressed neither in the STSP case nor in the case of Tainan city centre. According to the interview, local groups are more interested in other issues such as habitat protection or ecological conservation. Collaboration is mainly addressed among the government sectors (Interviewee T4).

§ 9.3 National comparison: Kaohsiung and Tainan

This chapter examines local collaboration in Kaohsiung and Tainan according to the six characteristics of planning that help to promote resilience. As shown in Figuur 49, the cases in Kaohsiung present a diversity of collaboration in planning, while the cases in Tainan have a more uniform style of decision-making. According to the collected evidence, this could be interpreted as a consequence of the different sectors of local government involved in decision-making and their relationship with the national government.



Figuur 49
Comparative analysis of case studies in Kaohsiung and Tainan

The discussion in this section begins by reflecting local policy-making in Kaohsiung and Tainan to the general focus of planning for urban development. As shown in Chapter 5, these focus are (i) economic development, (ii) political influences and (iii) administrative reform. Based on this, the discussion can then emphasises on the role of local planning governance in facing flood risks as the conclusion.

- economic development

The issue of economic development is important for local decision-making. This issue can lead to coalitions and networks that help to initiate strategies for spatial development. In the case of Kaohsiung city centre, for example, planning decision-making in the first episode was based on a shared objective of urban development, even though policy-makers did not form a formal collaborative network (Interviewee K2, K3). The coalitions became less evident in the second episode when some policy-makers considered primarily the issue of flood risk management and became little concerned with the issue of economic development (Interviewee K5, K7, K8). The importance of economic development is also highlighted in the two cases in Tainan. In the STSP case, the intention of becoming more water resistant was the result of considering potential disturbances of economic growth from flooding (Interviewee S2). The collaboration between planners and water engineers was formed in this context. Some projects, such as the artificial lakes, became advantageous for housing development (Interviewee S1, S4). The focus of tourism development in the case of Tainan city centre can also be considered as a part of strategies in promoting economic development. The coalitions between the national and local government sectors are formed by a shared interest for economic growth of the city. The occurrence of the privately-run business also gives positive impact on economic development (Interviewee T4).

The case of Meinong is probably the only case in Taiwan that the intention of economic development is less evident or even hidden by the urgent situations of flooding and the lack of institutional capacity for urban development. The objective of economic development was mainly addressed in the proposal of the Meinong Reservoir that aimed to provide sufficient water resource for industrial development of Kaohsiung metropolitan region. However, this proposal was criticised and abandoned in 2000. The subsidised strategy, the artificial lakes, was considered less sufficient and was criticised by lacking of environmental considerations and the technocratic perspective of the responsible authority, the Southern Regional Water Resource Office, WRASB (Interviewee M1, M4, M7). During the second and the third episodes, the issue of flood risks was considered to be more urgent and required priorities to cope with. The implementation of flood risk management was mainly focused on the engineering approach to ensure water safety of the metropolitan area. Economic development of the village was mainly considered by private landowners to develop their own properties (Interviewee M1, M2, M3). Local coalition formed a powerful network of local protests in the second episode to fight against the government strategies of the river levee project. In the third episode, however, the coalition seemed becoming an

obstacle of local collaboration (between the WRA07 and the local communities) due to the overemphasised intention of economic development (Interviewee M1, M2, M3).

- political influences

The impact of politics is different among the cases depending on the collaborative framework and the focus of spatial development. In the case of Kaohsiung city centre, the administrative party gained more public support by implementing waterfront landscape projects in the early 2000s that enhanced the liveability and the environmental quality of the city (Interviewee K2, K3). This was advantageous for the administrative party during the elections. The success of these strategies caused policy-makers to propose more construction projects to consolidate public support. However, the municipality has had financial difficulty in implementing these development projects that were mainly political showcases and had few direct links to society (Interviewee K3).

Political influences in the case of Meinong are more about political tensions between the two parties of the government. The NGOs and local communities often use political tension to delay or redirect unwelcomed government strategies. For example, the implementation of the Meinong Reservoir was delayed and eventually abandoned in 2000 during the president election period. Its subsidised strategy was also delayed to implement and remain in the processes of discussion (Interviewee M1, M2, M4, M7). Political tension can be also used to promote strategies that are considered to provide positive impact on long-term development of the region. For example, the NGOs were active in initiating the Kaoping Riverbasin Management Committee and promoting the committee as a semi-government organisation, so that local coalitions can formally be allowed to take part in decision-making for spatial development.

Political influences in the Tainan cases are less evident due to a more coherent framework of collaboration between the national and local government authorities. In the STSP case, spatial development is initiated by collaboration between government planners and water engineers at both the national and local levels. This makes industrial development become possible in such a place where is very vulnerable to flooding. In the case of Tainan city centre, both the national and local government sectors share a general agreement of tourism development, so government resource can be directly addressed to reach the intention of spatial development.

- administrative reform

The impact of administrative reform is addressed differently in Kaohsiung and Tainan. In the city of Kaohsiung, the impact of the reform has not yet become clear. In the case of Meinong, the original local government, Kaohsiung County Government, used to be more conservative in shaping development policies due to the lack of institutional capacity in the past. This caused the national authorities to be involved or even took leading positions in policy-making. The new local government, Kaohsiung

City Government, is so far hardly involved and pays attention to initiate strategies in this area. The lower involvement of the local government can create difficulties to implement integrated water management strategies (Interviewee M1, M2, M3). As shown in the third episode, the lack of local government participation caused difficulties to implement integrated strategies, because neither the WRA07 nor the local NGOs has authority to initiate planning strategies for flexible land use management (Interviewee M13). Changes caused by the administrative reform are also limited in the case of Kaohsiung city centre. Sectors of the local government remain important in policy-making. Policy-makers often initiate planning strategies separately according to interests of different government sectors (Interviewee K5, K9). The implementation can be unrelated to each other and does not always follow the direction of national government.

The situation is less exceeding in the city of Tainan. This may cause by a fact that both the original County and the City Government were under the same authority of the Taiwan Province and had more collaboration with each other before. In this aspect, the administrative reform may provide positive impact on promoting spatial development of the metropolitan region. Collaboration between local and national authorities is also evident in the Tainan cases. In the STSP case, spatial development was promoted by collaboration to minimise the potential disturbances from flooding. In the case of Tainan city centre, policy-makers consider tourism as a key factor for urban development (Interviewee T7). This mainly favours soft strategies, such as tour guidance and new routes. Projects that can improve the quality of the environment, such as the King's Palace proposal, have not yet been implemented (Interviewee T3).

Three important lessons are presented at the end to conclude this chapter. First, the two cities present different patterns of local planning governance. Planning decision-making in Kaohsiung is more open to public participation, while is also more sensitive to external factors, such as the extreme events or political influences. This is shown by being more likelihood of a shift to a new episode in both cases. Policy-making in Tainan is more restricted to sectors in the national and local government. Public participation is less evident or only occurs when having a clear intention of economic development, as shown in the STSP case. By having a more stable framework of collaboration, the episodes of local governance often last longer and are less likely to change. Public opinions often focus on environmental issues.

Second, the discussion indicates a lack of scientific considerations in local planning policy-making to cope with flood risks and climate change. This is shown both in the city of Kaohsiung and Tainan. An interpretation is related to a fact that the existing scientific studies often focus on monitoring changes on a large scale. From the local perspective, the information is too broad to promote specific strategies for spatial development. Another explanation is about the recommendations of the existing studies, which are often concentrated on physical environment and have

less considerations of the socioeconomic impact such as land prices. The proposed strategies can therefore become too abstract to implement in local practices. For example, the two scientific reports, the *Scientific Report of Climate Change in Taiwan 2011* and the *White Book on Water Infrastructure Strategies to Climate Change*, draw attention to places that are particularly vulnerable to climate-related disturbances but do not contain clear advice for local actions (Taiwan Climate Change Projection and Information Platform Project, 2011, Water Resource Agency and Sinotech Engineering Consultants, 2010).

Finally, the role of planning in coping with flood risks is different in each case depending on the institutional capacity and the tradition of planning collaboration. This is shown in actors who are involved in managing flood risks and spatial development. The national authorities of water engineering are critical in the case of Meinong to initiate decisions that would give influence on spatial development. Other actors are hard or lack of interests to participate in policy-making. The case of Kaohsiung city centre shows a pattern that the local government sectors are active in framing decisions for spatial development. However, the collaboration may not be formulated unless a general agreement is presented and considered as a shared direction in policy-making (see section 9.1.2). A more collaborative framework is seen in the STSP case where both the national and the local government sectors are considered the development important and willing to participate in decision-making. The role of planning is more clear in this case to support collaborating and negotiating activities in coping with the issues of flood risks and climate change. The case of Tainan city centre is an example where flooding issues are seldom paid attention in local policy-making due to the geographic and historic reasons. Planning in this case has a clearer goal of tourism development. Integrated strategies between urban development and water management are mainly located in places where are outside of the city centre (Interviewee T3).

10 International comparison between Kaohsiung, Tainan and Rotterdam

This chapter presents the assessment of local collaborative frameworks in the Rotterdam cases and the international comparison between Taiwan and the Netherlands. Just as in Chapter 9, the discussion is based on the local planning stories presented in Part III according to the dimensions of spatial planning (see Chapter 2). A specific focus is put on the relations between actors and coalitions, which may cause a transition in policy-making and lead local collaboration to a newer episode. The assessment is structured by the six characteristics of planning that can promote resilience (see Chapter 3). The interpretation of the evidence is based on the interview records and the policy documents. Some interpretations may be less certain but still seem to be an answer given by the evidence.

The chapter has two sections. The first section presents the assessment of local collaboration in Rotterdam (10.1). These findings are used together with the finding in the Taiwanese cases to form the discussion of international comparison in the second section (10.2). The intention of international comparison is to discover the critical roles of planning in promoting a resilient city under the considerations of flood risks and climate change. Both the current pattern and the transitional pattern of local policy-making are considered important.

§ 10.1 Rotterdam, the Netherlands

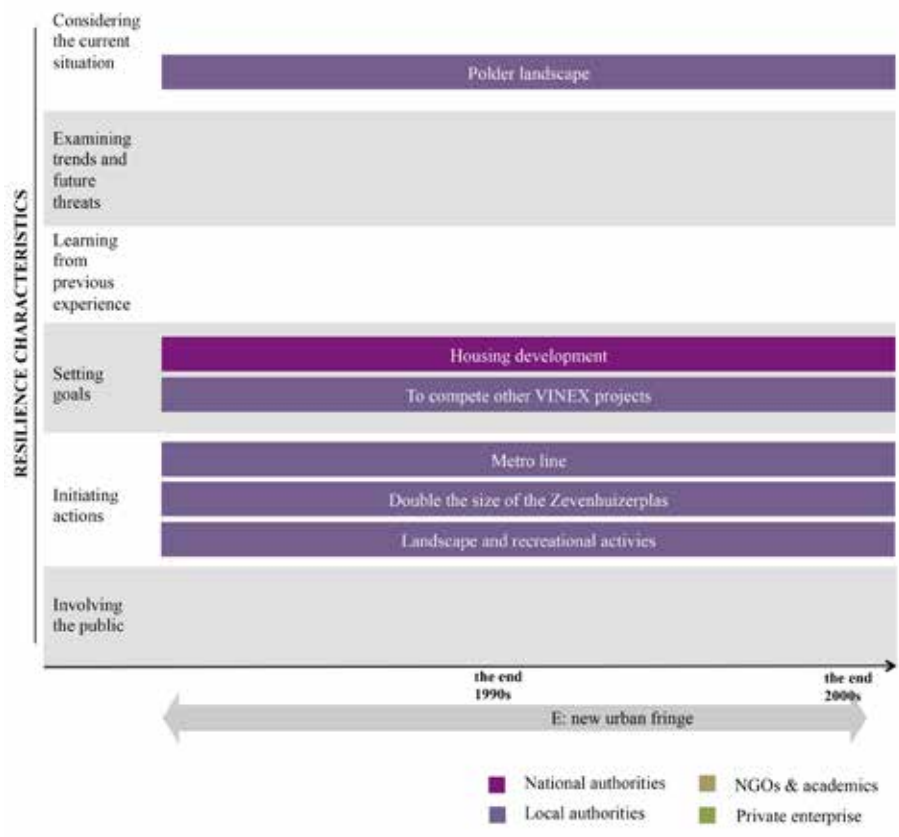
This section examines the local collaborative pattern of policy-making according to the characteristics of planning presented in Chapter 3. Two cases in Rotterdam are presented: Nesselande (10.1.1) and Rotterdam city centre (10.1.2). A comparative study of these two cases is presented in section 10.1.3. The two cases reflect a great difference in local decision-making. Policy-making in the case of Nesselande follows a more top-down approach for housing development. The development is led by the national government strategies to provide sufficient housing units for urban extension. This is presented by having a more simple and task-directed framework in local policy-making. The development is located in a region where is very low in elevation. However, planning authorities seem mainly concentrating on housing development and have fewer discussions in relation to the issues of flood risk management. This may be interpreted as a consequence of two reasons. First, the water boards have initiated

strategies to manage water issues properly. Second, national policies, such as the dike ring and multi-level safety strategies, are implemented and generally considered sufficient in providing flood protection for spatial development. The debate of whether this lowland area is suitable for urban development has been arisen recently due to the realisation of the difficulty to provide completely safety by water defence strategies and the awareness of climate uncertainty. However, it remains in the processes of discussion and has not yet been addressed in practical implementation.

The case of Rotterdam city centre presents a more local-based, area-specific framework of collaboration for urban development. The municipal government plays an important role to form collaboration between national and regional governments, semi-government organisations (such as water boards), business communities and private enterprises. This is more close to the discussion of the Dutch planning transition addressed in Chapter 5, which encourages the national government to focus on a vision for spatial development and offers more room for collaborative policy-making to the lower-level government (Gerrits et al., 2012). The municipality is also active in framing integrated strategies to cope with the complexity between urban development and the potential disturbances of flood risks and climate change. This is specifically critical to places where are outside of the national dike ring protection, such as the Kop van Zuid districts and the city harbour areas. The issues of flood risks and climate change, in this respect, are considered not only a threat that needs to be minimised but also an opportunity that can promote economic competitiveness of the city in global market.

§ 10.1.1 Nesselande

This section examines the local collaborative pattern of policy-making in the case of Nesselande. As shown in Figuur 50, there is only one episode of policy-making, and it is concerned with new urban fringe. Changes in actors, policies and spatial development are less evident. The case of Nesselande is a housing development project allocated according to the national planning policies, the *Fourth Report on Spatial Planning (de Vierde Nota)* and *its extra document (de Vierde Nota Extra, VINEX)*, to provide housing for the Rotterdam metropolitan region (Needham and Dekker, 1988, Priemus and Spaans, 1992). The local government is more responsible for implementing the national decision.



Figuur 50
Pattern of collaboration in Nesselande

The characteristic of *considering the current situation* is important in this episode. The polder landscape is integrated to provide important elements for spatial development. For example, the Rietveldpark was reformed into the major polder and became the open space of the development site. The Zevenhuizerplas (lake) was preserved and expanded to enhance the living quality of the environment (Interviewee N1, N3).

Setting goals and *initiating actions* are also important during the episode. The goal of providing a housing development was highlighted in policy-making to support urban development in the Rotterdam metropolitan region (Interviewee N1). Planning actions, such as the metro line C, were initiated to support the housing development. The Zevenhuizerplas was important for spatial development. Policy-makers doubled the size of the lake for three purposes: to enhance the capacity of water retention, to provide sand for development construction, and to form a beach for recreational activities (Alpkokin, 2012, Boeijenga and Mensink, 2008). Tourism activities along

the beach attracted visitors from the surrounding cities, such as Rotterdam, Gouda or Zoetermeer. The beach activities also formed the leisurely characteristics of Nesselande that encourage the development of the housing markets.

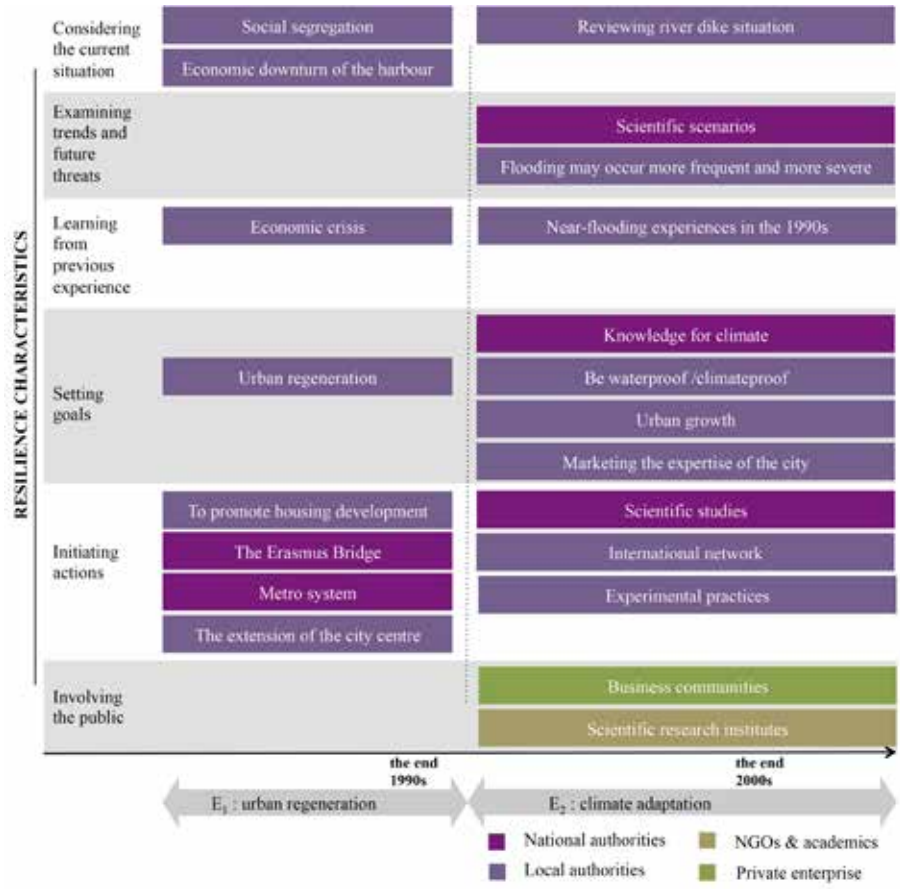
Examining trends and future threats, learning from previous experience and *involving the public* are less evident in policy-making during this episode. Local decision-making is mainly about implementation for physical development. Local opinions are hardly addressed or only relate to the bothersome noise from the tourist activities (Interviewee N1, N2).

§ 10.1.2 Rotterdam city centre

The assessment of local collaboration in Rotterdam city centre is presented in this section. As shown in Figuur 51, policy-making in the past two decades can be divided into two episodes: urban regeneration and climate adaptation. This indicates a shift in policy-making that brings new issues into discussion and causes the original issues becoming less dominated in planning decision-making. A framework of multi-level collaboration in coping with issues of urban complexity is shown in both episodes. The municipal government is important for framing planning collaboration with the national and regional governments, semi-government organisations, business communities and scientific research institutes.

The issue of urban regeneration was highlighted in the first episode when the city experienced an economic downturn in the 1990s due to the decline of the harbour industry. This focus remained until the mid 2000s when the issue of climate adaptation was increasingly important and became a primary focus in planning decision-making for spatial development. The discussion of urban regeneration, however, does not disappear. Rather, it is mainly addressed within the consideration of climate adaptation to promote the sustainability of the city.

The characteristic of *considering the current situation* is important in policy-making in both episodes. Policy-making in the first episode was based on the situations addressed in the early 1990s when the city experienced difficulty in coping with the issue of social segregation and the economic downturn of the harbour. The situation was worse in Rotterdam-south, the city harbour area, where was marred by crime and poverty. The *Kop van Zuid Regeneration Project* was initiated in this context to promote commercial and housing development at the peak of the city harbour area. Policy-makers aimed to regenerate this area to be an extension of the original city centre, so that the environmental quality on the south bank could be improved (Interviewee R1, R2).



Figuur 51
Pattern of collaboration in Rotterdam city centre

The current situation during the second episode is mainly about the consideration of flood risks and the increasing awareness in promoting climate adaptability of the city. Policy-makers in this episode highlight the importance of developing the city in referring to the impact of climate change, such as rising sea levels and green house effects resulting from the increasing amount of CO_2 emissions (Interviewee R6). The focus on developing climate adaptive strategies has not only the passive objective to minimise the potential disturbances but also the active intention to stimulate urban development by presenting the city's expertise in coping with the issues of climate change (Interviewee R2, R3, R6).

Examining trends and future threats is mainly evident in the second episode. Studies of scientific scenarios, such as *Knowledge for Climate (Kennis voor Klimaat)*, were initiated by the national government to present applied knowledge of future circumstances in

relation to the impact of climate change (Royal Netherlands Meteorological Institute and Ministry of Transport, 2009). Based on the scientific studies, policy-makers are driven to initiate planning strategies to tackle the uncertain disturbances of flooding and climate change (Interviewee R3, R4). For example, the *Safe and well built water barrier in Rotterdam (Veilige en goed ingepaste waterkeringen in Rotterdam)* examines the robustness of the dike ring in facing the potential situations of higher water levels (De Urbanisten et al., 2010). This report has provided specific guidance for policy-makers to initiate strategies of water safety according to the environmental conditions and local context.

Learning from previous experience can be found in both episodes. In the first episode, the previous experience of economic downturn caused policy-makers to realise the necessity of increasing the attractiveness of the city, so that urban development could be less dependent on the harbour industry (Interviewee R1, R2, R8). The near-flooding experience in the 1990s was also important in framing new awareness in policy-making. Although no serious floods occurred in the city, the shock of the events raised the awareness of the urgency of managing flood risks. For example, policy-makers began to highlight the importance of giving more space for water after the near-flooding experience (Interviewee R3, R4, R8). This consideration was integrated into the discussion of climate adaptation during the second episode in developing a climate knowledge economy of the city (Interviewee R6, R7).

Setting goals and *initiating actions* are found in both episodes. The issue of urban regeneration was highlighted in the first episode. The *Kop van Zuid Regeneration Project* exhibited the way in which policy-makers could promote housing and commercial development and thereby resulted in a success in urban transformation (Interviewee R1, R8). Local policy-makers also showed the ability to collaborate with the national and regional government for projects of practical implementations, such as the Erasmus Bridge and the metro line D and E (Interviewee R2).

Strategies of climate adaptation were highlighted in the second episode for spatial development due to the vulnerable conditions of the city in facing the potential disturbances of climate change. More recently, these conditions were transformed to become opportunities to develop the city's expertise in coping with uncertain disturbances and maintaining the quality of living (Interviewee R2, R3, R6). The Rotterdam Climate Initiative (RCI) was established in the late 2000s to promote applicable strategies in collaboration with the national government, the municipal sectors, business communities and scientific research institutes (Interviewee R6). The RCI was important for framing the awareness of climate adaptation into planning policies. For example, the *Rotterdam Climate Proof 2009* and *2010* focused on possible strategies for climate proofing, such as proposals for green roofs, multifunctional parks and parking areas under the dikes (Rotterdam Climate Initiative, 2009, 2010).

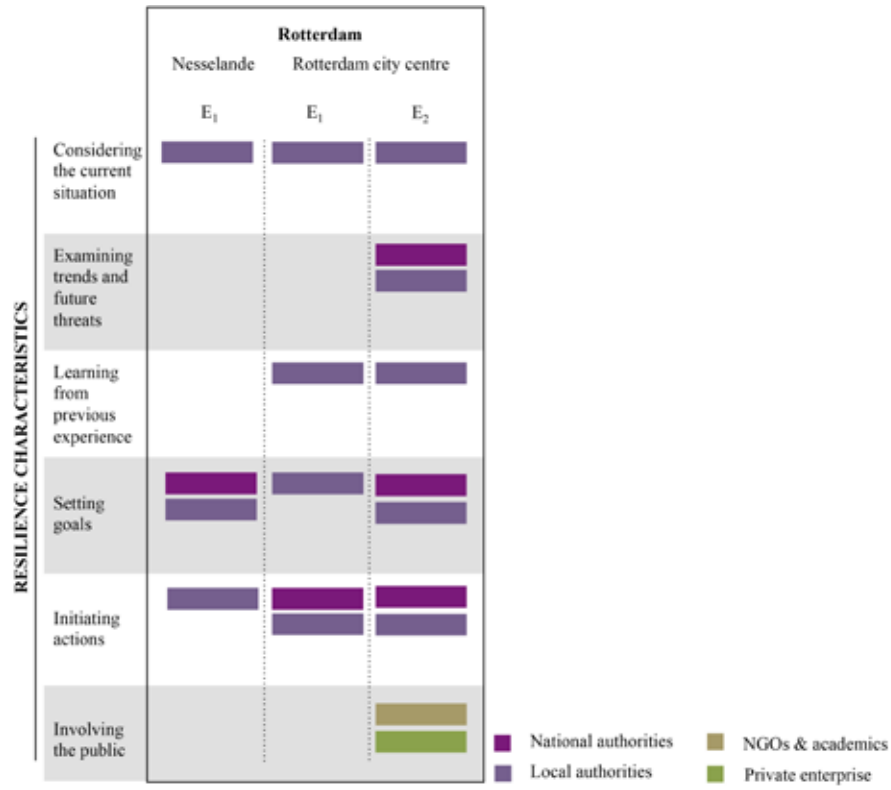
The focus of climate knowledge economy is highlighted in the second episode to promote the economic development of the city (Interviewee R2, R6). As one of the hotspots of the national programme, *Knowledge for Climate (Kennis voor Klimaat)*, policy-makers were encouraged to develop applied knowledge of climate impact and to ensure that climate adaptability will be taken into consideration in planning strategies (Interviewee R6, R7). Influenced by this programme, planning policy-making can focus on raising the profile of the city as a centre of expertise in dealing with flood risks and potential disturbances of climate change, thereby stimulating international collaboration exchange of experience and economic development (Interviewee R2, R6).

Physical implementation in the second episode is often considered as showcases or experimental models to market the city's expertise at the international level (Rotterdam Climate Initiative, 2009, 2010). This approach is different from the first episode in which policy-makers took projects of physical implementation as major tools for urban development (Interviewee R1). The exhibition of Rotterdam's floating pavilion at the 2010 Shanghai World Expo was one example. Policy-makers used the exhibition to promote Rotterdam's expertise and capability to manage climate-related floods through engineering as well as spatial development and other adaptive strategies (Interviewee R3, R6, R8).

Involving the public was more important in the second episode. The RCI represents a new public-private coalition for promoting climate adaptive spatial development. This coalition has initiated various activities to highlight the importance of considering climate impact on future spatial plans, implementation projects and management activities (Interviewee R6, R7).

§ 10.1.3 assessment of planning in Rotterdam

The assessment of local collaborative pattern in the two cases of Rotterdam is summarised in Figuur 52. The figure shows a similar pattern of collaboration between the two cases in relation to the local and the upper level government. However, the approaches of local policy-making differ greatly in terms of the content and the leadership of local governance. Generally speaking, policy-making in the case of Nesselande mainly follows a linear approach for spatial development. As one of the VINEX projects, the national government was the main actor that decided to allocate resources under the concerns of the national development plan. The local government in this case mainly concentrates on implementing projects of physical development that make Nesselande competitive with other VINEX projects in the housing market (Interviewee N1, N2). Policy-makers often assess this development project in terms of the complementarity between plans and practical outcomes (physical achievements). The discussion concerning the process of policy-making is hardly addressed at the local level (Interviewee N2).



Figuur 52
Comparative analysis of two cases in Rotterdam

The case of Rotterdam city centre is different. Policy-making in this case exhibits a more locally-oriented framework for spatial development. The municipal government is important for policy-making in both episodes, especially in framing collaboration with a wide range of actors, such as the national and regional governments, semi-government organisations, business communities and scientific research institutes (Interviewee R2, R3). The intention of local collaboration has always had a strong link to urban development. This shows clearly in the *Kop van Zuid Regeneration Project* during the first episode. In the second episode, the highlight of climate adaptive strategies is not just to minimise potential disturbances of climate change. It is also important to promote the profile of the city as a centre of expertise in dealing with potential disturbances of climate change. Projects of physical development are implemented to be showcases or experimental models that exhibit the city's capability in promoting the climate knowledge economy (Interviewee R2, R6).

The two cases in Rotterdam exhibit a great difference in relation to the characteristics of planning used to promote resilience. Only three of the six characteristics are considered in planning policy-making in the case of Nesselande. This may be interpreted as a consequence of the overall focus on housing that has a simpler intention of spatial development. There was little debate about a wider environmental context when the development plan was initiated (Interviewee N1). Although the debate of whether this area is suitable for urban development has been arisen recently due to a consideration of climate change, it is remaining in the processes of discussion and has not yet been implemented. The case of Rotterdam city centre presents a more comprehensive pattern in considering these characteristics. In the episode of climate adaptation, six of the characteristics are all addressed and considered important in policy-making. Policies for resilience are often embedded in and mixed with other approaches, such as adaptation, mitigation or sustainability. This indicates a fact that the notion of resilience is used implicitly in local planning decision-making. Policy-makers may use the underlying ideas of the notion in shaping decisions without using the terminology directly.

The assessment also shows a greater difference between two Rotterdam cases in coping with flood risks and climate change. In the case of Nesselande, local planning authorities mainly focus on housing development to achieve the goal initiated by the national government. The discussion of flood risks is hardly addressed. The water boards are the responsible actor in managing water issues at the local and regional levels, and the national dike ring is considered to provide sufficient water safety for spatial development (Interviewee N1). In contrast, policy-makers in the case of Rotterdam city centre give more attention to cope with flood risks. The issues of flood risks and climate change are particularly emphasised in the second episode. Policy-makers are more willing to initiate development strategies under the consideration of the flooding issues that can occur more frequent and more severe in the future. This is particularly important in places outside of the dike ring protection, such as the Kop van Zuid area and the city harbour area (Interviewee R1, R2, R4).

Finally, policy-making in the city of Rotterdam reflects to the Dutch tradition of negotiation and collaboration discussed in Chapter 5 (Gerrits et al., 2012, Zonneveld, 2010). Collaboration in the case of Nesselande is mainly vertical, between national, regional and local government sectors. For example, the water boards are important for providing sufficient water safety for local housing development. The national government also plays a critical role, not only in housing development but also in coping with the issues of flood risks (e.g., the national dike ring protection). In the case of Rotterdam city centre, both vertical collaboration among different levels of government and horizontal collaboration between the government and private stakeholders are important. In the episode of urban regeneration, the national government played an important role for implementing larger infrastructure, such as the Erasmus Bridge and the metro system. Collaboration in the episode of climate

adaptation is more emphasised on scientific studies and knowledge economy. The collaboration of climate studies and related knowledge has a stronger intention to promote the city's international competitiveness in facing climate change and flood risks (Interviewee R2, R3, R6, R7). Rotterdam's climate preparations also have a strong marketing component. The exhibition of Rotterdam's floating pavilion at the 2010 Shanghai World Expo is one example where the city used the exhibition to showcase Rotterdam's expertise and capability to manage climate-related floods through engineering as well as spatial development and other adaptive strategies.

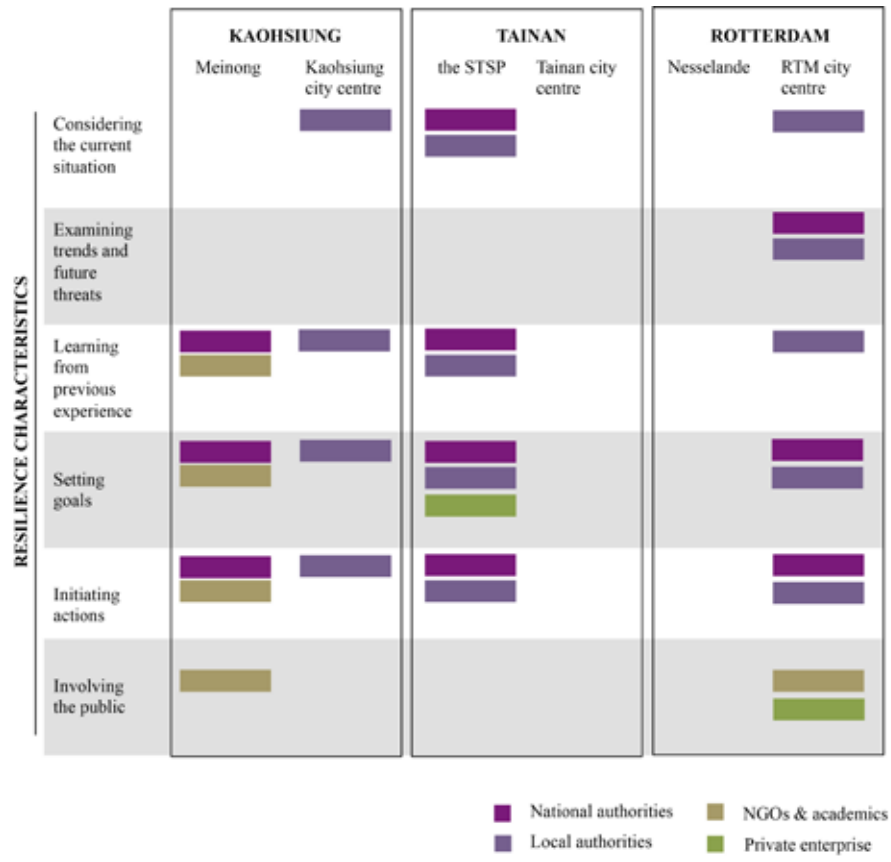
§ 10.2 International comparison: Taiwan and the Netherlands

The international comparison between Taiwan and the Netherlands aims to discover the critical roles of planning in promoting a city to become more resilient when facing flood risks and climate change. This is evaluated according to the findings of the assessment in each case of the three cities (see section 9.1, 9.2, 10.1). The comparison considers both the current and the transitional patterns of local collaboration. The discussion of the current pattern examines the way in which local collaboration in the latest episode is formed to face the flooding issues. The discussion of the transitional pattern exhibits the changes in local policy-making to cope with flood risks since the 1990s. These discussions help to form a more comprehensive understanding of the role of planning in Taiwan and the Netherlands in the context of flood risks and climate change.

- the current pattern

The assessment of the current pattern compares local policy-making in coping with flood risk during the latest episode. Two cases, Tainan city centre and Nesselande, are excluded from the discussion due to the lower interest in taking the flooding issues into planning considerations. The existing strategies of flood protection in both cases are mainly considered to provide sufficient water safety for spatial development. The current pattern in other four cases indicates greater differences between cases in the same city, whereas there are fewer differences between Taiwan and the Netherlands (see Figuur 53). This may result from the variety of actors involved in policy-making and their specific interests in planning and environmental management. In the city of Kaohsiung, the two cases differ greatly in relation to actors who are involved and take a lead in framing strategies to cope with flood risks. The case of Meinong is dominated by the water engineering sectors of the national government, and the case of Kaohsiung city centre is dominated by sectors of the local government. In both Tainan and Rotterdam, planning policy-makers show the interests in managing flood risks in only one case in each city, the STSP and Rotterdam city centre. Collaboration is important in

both cases, including vertical collaboration between different levels of government and horizontal collaboration between local government sectors, business communities and private enterprises.



Figuur 53
Comparison of the current pattern in case studies

The characteristics of planning help to exhibit the focus of local collaboration in promoting a city to become more resilience. According to the previous discussion (see section 9.1, 9.2, 10.1), four of the characteristics are often highlighted in policy-making. These comprise: *considering current situations, learning from previous experiences, setting goals* and *initiating actions*. The focus of these characteristics matches the general understanding of planning that formulates guidance and policies for land use management according to the existing situations and the failures experienced in the past (UNECE, 2008, Mastop and Faludi, 1997).

Rotterdam city centre is the only case where the characteristic of *examining trends and future threats* is considered important in local decision-making to cope with flood risks. This is one of the urban development strategies to raise the profile of the city as a centre of expertise in dealing with flood risks and potential disturbances from climate change, and thereby stimulates international collaboration exchange of experience and economic development. The highlight of scientific studies in this episode also indicates that scientific projections may become more influential in planning policy-making to manage the potential impact of climate change. Actors who represent the scientific professions may therefore become more important in policy-making for the directing of strategies for spatial development.

The characteristic of *involving the public* is a very important consideration in planning policy-making. The lower consideration of this characteristic indicates that local policy-making is more technocratic and often dominated by certain expert groups, mainly government authorities, which join together and make decisions for spatial development. The case of Kaohsiung city centre and the STSP case are two examples in which current planning strategies are mainly initiated by collaboration between government officials and experts who represent technical professions in their fields. Non-government groups, such as NGOs, are seldom included in decision-making or appear only after a plan is practically adopted. Meinong and Rotterdam city centre are two cases where local policy-making are or have become more open to a wider range of actors, including officers who represent the power of the government authorities, leaders of NGOs or stakeholders who are interested in shaping spatial development. Their local collaborative frameworks are more close to the discussion of spatial planning that highlights the importance of coordination and integration in policy-making (Nadin, 2007). The issues of flood risks in these two cases are considered more significant and cannot be managed by water engineering infrastructure of water defence alone. This consideration is based on the previous experiences of flooding and on the awareness of the great scope of climate change. The process of policy-making is therefore more political. The initiated strategies do not always lead to physical development. They may lead instead to a specific understanding of a particular issue, a possible solution or a conceptual vision for urban development.

The mix of actors is critical. Actors involved in local governance are different in each case. Mostly, the municipal government takes a leading role in collaboration with national authorities to initiate planning strategies for spatial development. This is shown in three of the four cases (except the case of Meinong). The two cases in Kaohsiung shows an opposite pattern of local collaboration in coping with flood risks. In the case of Kaohsiung city centre, the municipal government often dominates the process of policy-making due to the financial and administrative independence given by the constitution of the nation. National authorities are hardly involved or only participate in implementing construction projects. The case of Meinong, however, local government is hardly involved in policy-making due to the lack of capacity in terms

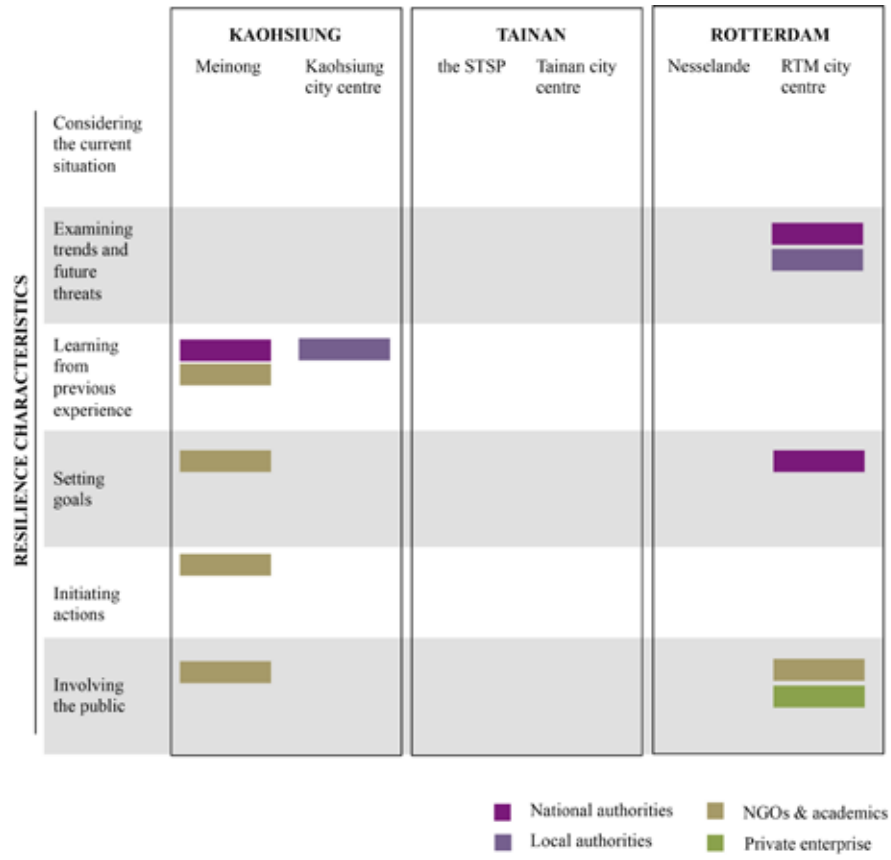
of professional expertise and governance resources in the original Kaohsiung County Government. This situation has continued after the administrative reform in 2010 that merged the original Kaohsiung County into the municipality of Kaohsiung.

The STSP case indicates an example where actors involved in policy-making are mainly government authorities. Collaboration here is addressed between the national and local government and between sectors of the local government. In the case of Rotterdam city centre, the municipality coordinates with a wider range of actors in policy-making, including the national and regional governments, semi-government organisations, business communities, private enterprises and scientific research institutes. The framework of collaboration causes policy-making to become more comprehensive and can sustain for a longer term. This is more close to studies that understand planning as a self-reinforcing process that continually negotiates the varied interests to reach agreements. In this context, the visions, actions and means for implementation can be produced and more fit the needs of spatial development (Healey, 1997, Albrechts et al., 2003, Albrechts, 2004).

The comparison also indicates that whether the case is in urban or rural areas has little impact on framing the network of local collaboration in policy-making. Local collaboration does not form significant differences according to the locations of whether the cases are in the city centre or on the edge of the metropolitan regions. In fact, having a shared agreement is more critical in framing collaboration to cope with the flooding issues. The STSP case and the case of Rotterdam city centre exhibit more similarities of local collaboration. This is because policy-makers in both cases share a general understanding that strategies for flood risk management are important for promoting spatial development in these areas.

- the transitional pattern

The assessment of the transitional pattern compares the shift in policy-making to deal with flood risks and climate change. The extent to which there is a shift in thinking or paradigm in policy-making is measured by examining the changes of planning characteristics between the different episodes in the case studies. Figuur 54 highlights the changes by considering the actors who cause or promote the changes. Three cases, the STSP, Tainan city centre and Nesselande, are excluded from the discussion because there was no change in episodes since the 1990s. This can refer to a more stable framework of local policy-making, as shown in the STSP case, as well as a lower interest in planning considerations for flood risks, as shown in the case of Tainan city centre and Nesselande. Another interpretation of their absence is related to a fact that these three cases have neither influenced by severe flooding disasters nor experience a greater change of the involved actors, an adjustment of development direction. Local policy-making is more stable and less likely to change, because a strong coalition of local and national sectors has been continually maintained and succeeds in implementing strategies for spatial development.



Figuur 54
Comparison of the transitional pattern in case studies

The transitional pattern is addressed clearly in the case of Meinong. The flooding catastrophe of the late 2000s was a threshold that caused this change. The characteristic of *learning from previous experience* was highlighted after the disaster. By realising the limits of water engineering infrastructure for water defence and the greater damage if the infrastructure collapsed, policy-makers became more willing to give room for local collaboration. This is shown in the change in the characteristics of *setting goals, initiating actions* and *involving the public*. However, local collaboration seems only occurred between the Seventh River Management Office (WRA07) and the local NGOs. Other issues, such as water scarcity and artificial lakes for freshwater storage, remain dominated by the national authorities. NGOs and local communities continued their protests on these issues by using political tension to delay or redirect government directions. The involvement of local planning government sectors remained low (or absent) which created difficulties for the implementation of integrated water management strategies. In spite of having a shared awareness of

the necessity to consider flood risk management as a part of spatial development, neither the WRA07 nor the NGOs can initiate land use policies that can support urban development in the context of flood risk management coherently.

In the case of Kaohsiung city centre, a major change in policy-making is about the increasing awareness of climate change and uncertain disturbances of flooding. This awareness can be considered as a consequence of the extreme events occurred in 2009 and 2010, showing mainly in the characteristic of *learning from previous experience*. However, the highlight of this characteristic does not form a more collaborative framework in local planning decision-making. Local collaboration is rather separated depending on the interests of the government sectors. Some municipal sectors, such as the Hydraulic Engineering Bureau (HEB) and the Environmental Protection Bureau (EPB), are becoming more active in framing climate adaptive strategies, so that urban development may be less disturbed by the occurrence of extreme events in the future. Others, such as the Urban Development Bureau (UDB) and the Economic Development Bureau (EDB), remain focusing on promoting the economic growth of the city and hardly pay attention on the issues of flood risks. This reflects to the underlying principle of economic development in planning in Taiwan and the divided responsibilities between the government sectors (see discussion in Chapter 5).

Transitions of local policy-making in the case of Rotterdam city centre are mainly caused by the highlight of working with nature and the preparation of climate uncertainty. These changes are clearly addressed in the characteristics of *examining trends and future threats, setting goals* and *involving the public*. Scientific studies in this case are used to form an arena that allows multiple actors to communicate and negotiate their interests of spatial development, which is hardly seen in the Taiwanese cases. An interpretation of this situation is related to a fact that scientific projections in Taiwan are often too broad to conclude in solutions for practical implementation. As a result, policy-makers in Taiwan are more used to take considerations of the previous experiences of disasters than the existing studies of scientific scenarios.

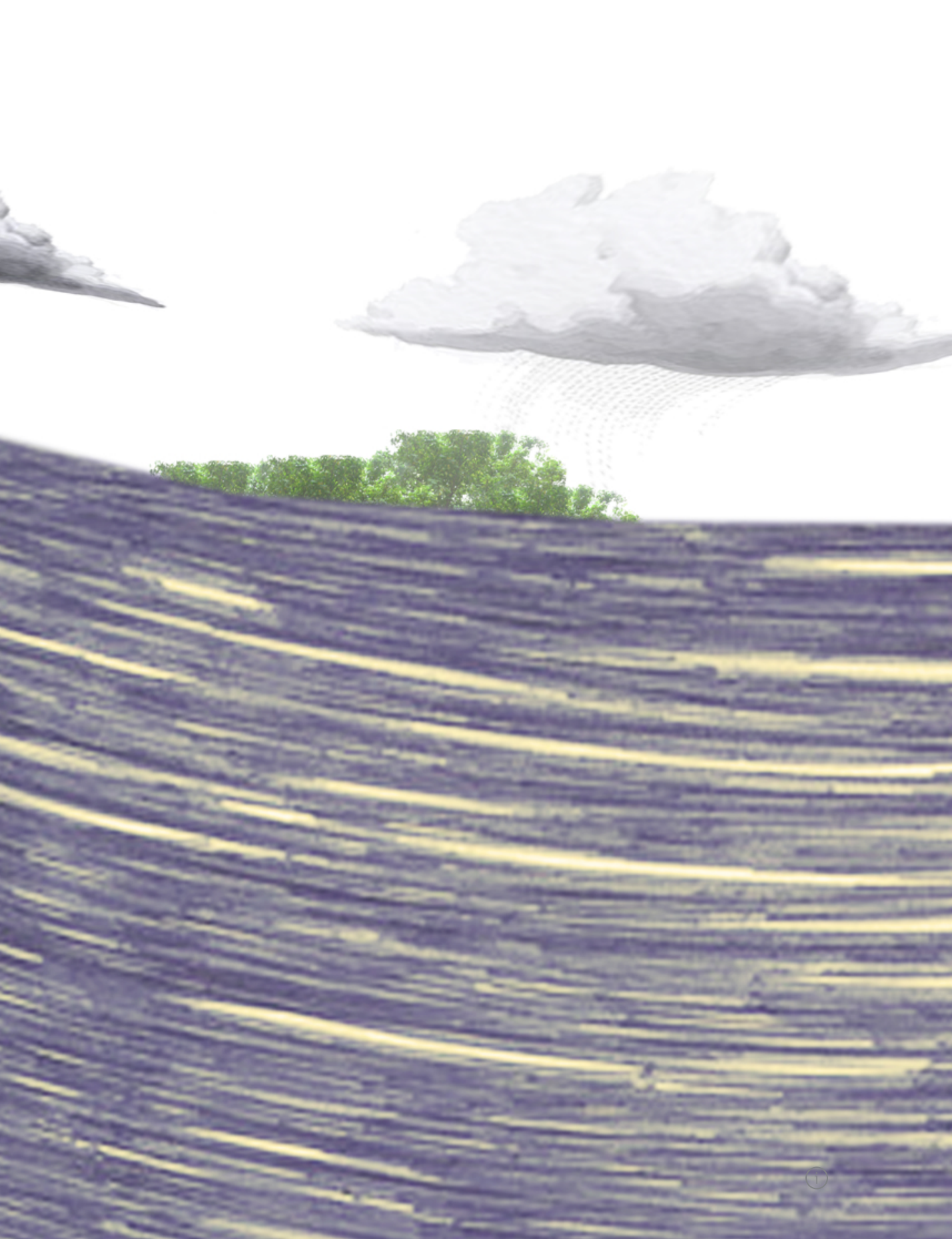
Local collaboration in the Netherlands is not only a part of the planning tradition. It is also considered as a way to join up the environmental agenda with the economic competitiveness objective of the city. For example, the national programme, *Knowledge for Climate (Kennis voor Klimaat)*, forms a network of collaboration that includes the national government, the municipal sectors, business communities and scientific research institutes. Under this umbrella programme, applied knowledge of climate impact can be developed and may contribute to shaping strategies for spatial development. This helps to promote Rotterdam's expertise and capability to manage climate-related floods through engineering as well as spatial development and other adaptive strategies.

Two important lessons related to planning and flood risk management are gained according to the international comparison between Taiwan and the Netherlands. First, the traditional role of planning is critical in framing collaboration to cope with flood risks and climate change. In Taiwan, planning has an underlying principle of economic development. Collaboration is mainly formed with a specific intention to promote urban development. Other issues, such as flood risks, are seldom addressed in planning decision-making unless they may damage the interests of economic development. The case of Tainan city centre shows an example where local collaboration is focused on promoting economic development alone. The STSP case is another example where the benefits of industrial development are considered so important that cause policy-makers to form collaboration in order to minimise the potential disturbances of flooding. The focus of economic development also separates the responsibilities of government sectors. Generally speaking, sectors of water engineering are responsible for coping with flooding issues. Planning sectors are hardly involved in framing decisions or take supplementary positions only. Integrated strategies of flood risk management can be difficult to implement because the participation of planning sectors are low (or absent), as shown in the case of Meinong. In the case of Kaohsiung city centre, local decision-making has two separated tracks. The track of economic development is led by the planning sector to continue the growth of the city. The track of climate adaptation is led by the engineering sectors to minimise the disturbances of extreme events of flooding in the future.

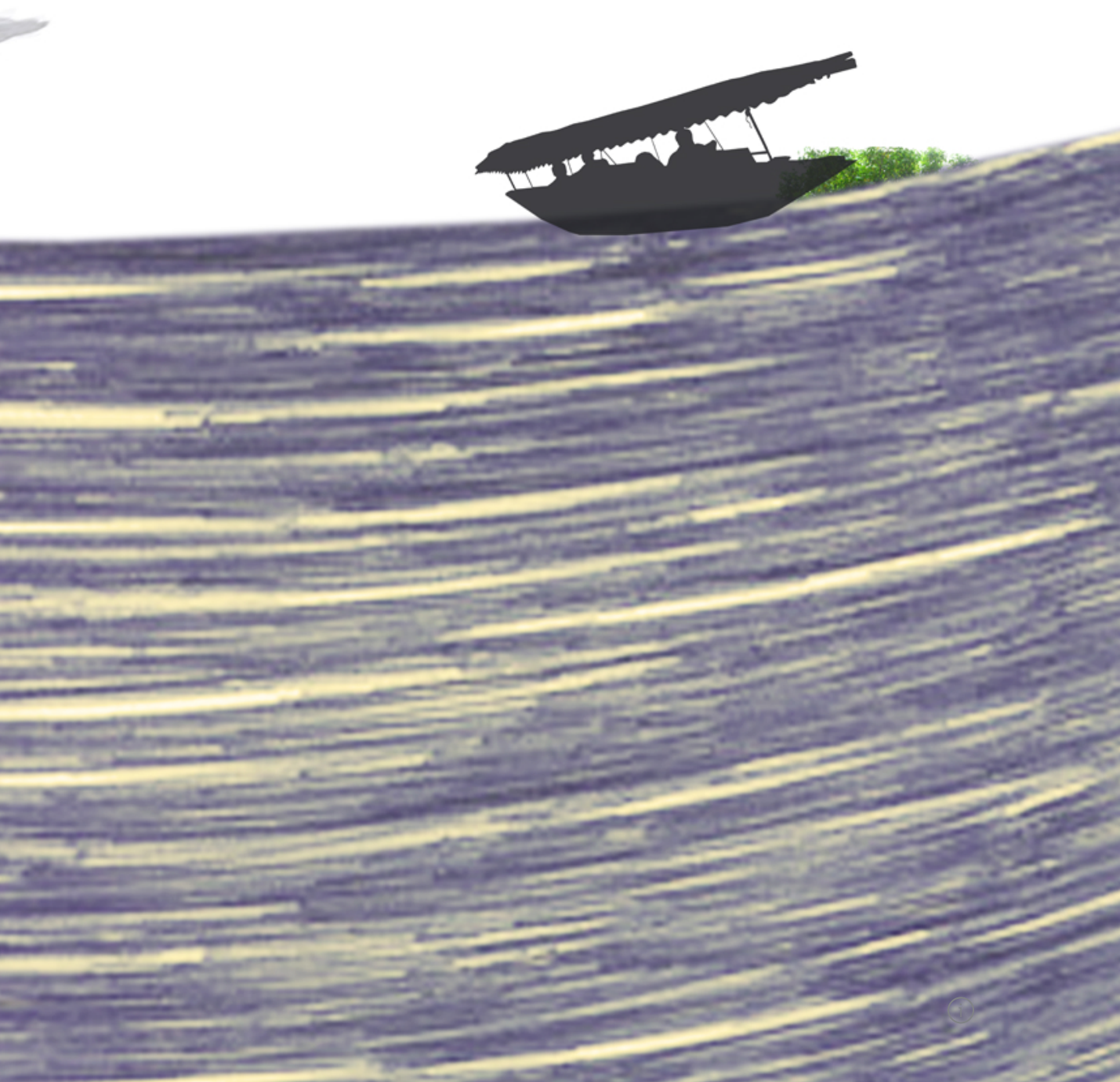
Planning in the Netherlands has a stronger tradition of negotiation and communication, including vertical collaboration among different levels of government and horizontal collaboration between the government and the private stakeholders (Gerrits et al., 2012, Zonneveld, 2010). The intention of economic development is often integrated with other environmental issues, such as the issues of water management. In the case of Nesselande, collaboration is more hierarchical. The national government is responsible for initiating directions of spatial development. The local government is in charge to develop strategies for implementation, so what physically addressed can match the intention of the development plan. Water issues in this case are managed by the national dike ring protection and by the local drainage system of the water boards. This is considered to offer sufficient water safety for spatial development. Local collaboration in the case of Rotterdam is more influenced by the decentralised approach, which has been emphasised since the early 2000s to form a more open framework of collaboration. By providing limited strategies of practical development at the upper levels and offering, the local government has more opportunities to initiate development plans in collaboration with private enterprises, local associations and stakeholders (Hajer and Zonneveld, 2000, Priemus, 2007). The municipality plays an important role in framing collaboration for spatial development. The issue of flood risks and climate change are critical for urban development. Policy-makers are active in framing collaboration to cope with climate uncertainty at the meanwhile to promote economic competitiveness of the city.

Another lesson gained from the international comparison is about the way to support policy-making in coping with flood risks. In Taiwan, strategies of flood risk management are mainly initiated according to the previous experiences of disasters. In the Netherlands, strategies are initiated by considering both the previous flooding experiences as well as the possible floods in the future. This difference may be interpreted as a consequence of the various types of flooding occurred in the two nations. In Taiwan, although flooding has higher probability to occur, it has more moderate impact on shaping spatial development because flooding generally lasts for a short period. Policy-making in this context is more focused on strategies that can lead to a faster recovery after experiencing the disasters, such as household water gates, rescue plans and actions for resource distributions. The Netherlands has a lower probability of flooding. However, the impact on urban development is often significant and requires a longer duration to recover. This causes policy-makers to concentrate on preparation strategies that enhance a city's ability to assess and be prepared for uncertain disturbances of flooding. For example, the multi-layer approach is used to develop strategies that can support spatial development in facing the complexity of flood risks.

According to Foster (2006), the different focus of flood risk management in Taiwan and the Netherlands represents a various focus of the two aspects of resilience in planning: preparation and performance. Preparation actions are more addressed in the Dutch context that focuses on assessment, such as monitoring current conditions, producing future simulations and investigating possible solutions for future risks. Actions for performance are the primarily focus of policy-making in Taiwan for flood risk management. These actions are more related to develop the capacities of response and recovery, so a city may react and retain basic functions, rearrange key resources, and propose redevelopment strategies for recovery.



PART 5 Synthesis and conclusions



11 Summary and conclusion

The last part of this thesis presents the conclusions and an evaluation of the outcomes of the study according to the empirical study addressed in Park III and the analysis addressed in Part IV. As discussed before, Taiwan and the Netherlands share a general necessity to cope with flood risks and climate change. However, the role of planning and the consequence of flood risks are very different. In Taiwan, planning has a strong focus on economic development. Collaboration is mainly formed with a specific intention to promote economic growth. Although flooding has higher probability to occur, the impact on urban development is less significant because flooding often lasts for a shorter period. Planning in the Netherlands has a longer tradition of collaboration and negotiation. Flooding in the Netherlands may occur less often than in Taiwan. However, the damage on urban development is often significant and needs a longer duration to recover. This can be interpreted as a result of having a stronger framework of collaboration between spatial development and water management.

The study includes six cases in the three cities – Kaohsiung and Tainan in Taiwan and Rotterdam in the Netherlands. Each city has one case located in the city centre and another on the edge of the metropolitan region, so the different types of spatial development can be considered. Sources of evidence have been gathered by interviewing officials and local specialists and by examining plans and policy documents that provide critical strategies in coping with flood risks. Local planning stories are presented according to the dimensions of spatial planning (see Chapter 2). The assessment of national and international comparison is illustrated in terms of the characteristics of planning that are particularly relevant to promote resilience (see Chapter 3). The discussion in this chapter begins by presenting the conclusion of the study. This includes a reflection on theoretical discussion of planning conformance and performance, a brief review of the findings of the case studies and an exploration to answer the research questions of the study. Next, the discussion presents the reflections on the analytical framework and a critical reflection of the study with an outline of possible future research topics.

§ 11.1 Conclusions of the study

The thesis aims to understand the way in which spatial planning can be addressed in promoting resilience to cities in the context of flood risks and climate change. This is based on a realisation that the concept of resilience has been absorbed and is becoming increasingly prevalent in planning to cope with the issues of climate

change and the uncertainty of flooding (Jabareen, 2013, Wardekker et al., 2010). The notion of resilience in planning often refers to the capacity of a place in coping with outward disturbances while maintaining basic functions. It is often implicit in planning decision-making. Policy-makers may use the underlying ideas of resilience in shaping decisions for urban development without directly using the terminology. For example, policy-makers may develop strategies to tackle flood risks in terms of previous experiences of flooding. These strategies contain some underlying ideas of resilience without directly using the term resilience.

The conclusion first reflects on the theoretical discussion of conformance and performance that is applied in the study to examine the relationships among the notion of resilience, planning decision-making and physical development (see section 4.1). According to the case studies, planning conformance and performance is highly dependent on the context of the individual cases. This may result from the fact that the involved actors, the interpretation of the notion, the focuses of spatial development and the governance power are often different. Planning conformance is about the relation between policy-making and physical development. Generally speaking, it is more assessable by the collected information of local planning practices. The performance of planning, however, is more abstract and difficult to measure. This is because policy-makers may interpret the notion differently according to their training background and their interests for spatial development. For example, planners may be more likely to initiate adaptive strategies to promote resilience. For water engineers, mitigation strategies can be the major concerns in promoting resilience. Different focus may lead policy-making to become more comprehensive. However, it may also cause a tension or even conflict in decision-making. Another interpretation concerning the complexity of assessing planning performance is related to a fact that the pattern of local collaboration may change over time depending on the interests, resource and power of governance. The transition of planning coalitions may cause a group of actors to become more influential in decision-making or marginalise others who have been involved previously. The case of Meinong can present an example. The conflict between national water engineering authorities and the local NGOs was gradually changed in the early 2010s when both of them realise the limits of water defence in coping with extreme flooding events. This forms a more collaborative framework in local policy-making to cope with flood risks.

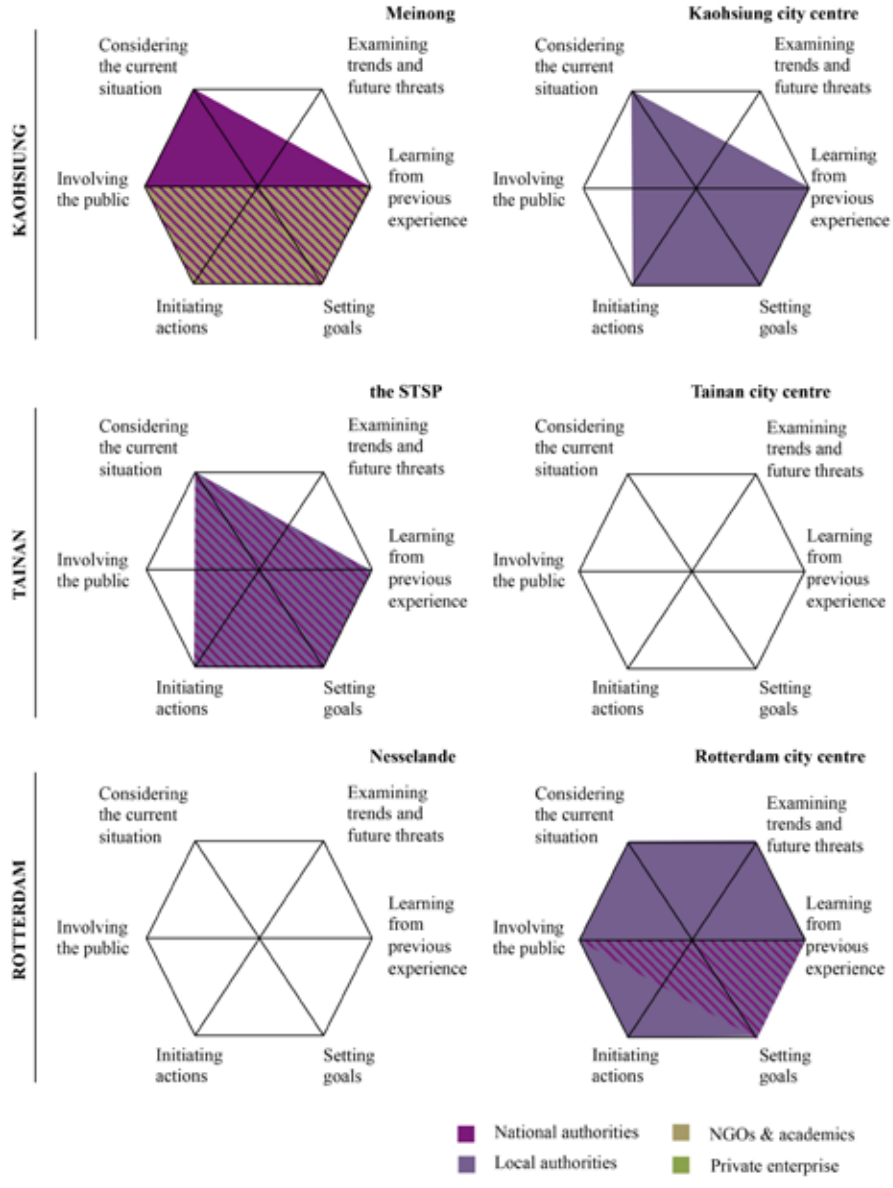
Assessing planning conformance and performance also helps to understand the different framework of local collaboration in the three cities. According to the case studies, there are no clear similarities of local collaborative framework addressed in the two cases of each city. The focus of spatial development, the experiences of flooding, the involved actors and the existing ways of local planning governance can be different among the cases. As a result, local policy-making in one case may share similarities with another even though they are geographically far from each other. For example, both the case of Tainan city centre and Nesselande show a lower consideration of flood

risks in local planning decision-making because the existing systems of water defence are considered sufficient to provide water safety for spatial development. Kaohsiung and Rotterdam city centre have a shared focus of urban regeneration in their earlier episodes. Regeneration projects in both cases aimed to improve the local environment but not focused on flooding or climate change.

The brief review of local collaboration in each case is presented in Figuur 55[10]. The hexagon in the future indicates the six planning characteristics especially relevant to resilience. The different colour of the shadow presents the various categories of actors and their focuses in promoting resilience. The blank in the figure indicates the lower consideration of certain characteristics. In two cases, Tainan city centre and Nesselande, the hexagons are empty because local planning collaboration does not have a clear focus on coping with flood risks and climate change. In the other four cases, local collaboration to cope with flood risks is generally shown in terms of four planning characteristics: *considering the current situation, learning from previous experience, setting goals* and *initiating actions*. These four characteristics represent the general focuses of planning as a profession to formulate strategies of land use management for long-term development. The focus of local policy-making is often related to the tasks set by the government. These tasks are sometimes initiated by a local government, as in the case of Kaohsiung city centre, or sometimes shaped by the collaboration between national and local governments, as in the STSP case. In both cases, the actors involved are mainly technocratic professionals.

The characteristic of *involving the public* indicates the collaboration between the government sectors and local specialists (e.g., NGOs and private enterprises). This forms a framework of local collaboration that can initiate strategies to cope with flood risks more comprehensively. Collaboration in the case of Meinong is more informal. In the case of Rotterdam city centre, local collaboration is formally addressed in the existing framework of policy-making as part of the tradition for local governance. The case of Rotterdam city centre also exhibits the importance of taking the characteristic of *examining trends and future threats* into planning consideration. Actors from organisations responsible for scientific studies of climate change are actively involved in framing strategies for spatial development. This forms the most comprehensive framework of local collaboration in the case studies since it considers all of the six characteristics of resilience.

10 The figures of Tainan city centre and Nesselande are empty because strategies have not been developed to tackle climate-related flood risks



Figuur 55
A brief review of local collaboration in case studies

The assessment of the planning characteristics helps to answer the sub-question considering *how has the notion of resilience been absorbed and become part of the reasoning of planning?* As discussed before, collaboration is critical to form a framework in local policy-making that the notion of resilience is considered. The interpretation of resilience may differ according to the interests or the backgrounds of actors involved in collaboration. The use of resilience can be implicit. This means policy-makers may use the concept without directly using the terminology. For example, policy-making for flood risk management in the case of Kaohsiung city centre is mainly dominated by a group of water engineers of the municipality. The notion of resilience is often used as a synonym of adaptation. This represents more of a focus on adaptation for implementation, such as water retention ponds. In the STSP case, policy-makers often interpret resilience as a concept to mitigate and to adapt flood risks. As a result, strategies are implemented to strengthen the capacity of water defence (e.g., dikes) as well as water retention (e.g., the Spatial Agricultural Zone).

Six characteristics of planning are essential to promote resilience in local collaboration. The empirical study indicates a fact that characteristics of *considering the current situations, learning from previous experiences, setting goals* and *initiating actions* are evident in most of the cases. This matches the general understanding of planning to be functional in initiating guidance and policies for land use management according to the existing situations and the failures experienced in the past (UNECE, 2008, Mastop and Faludi, 1997). Strategies to achieve these characteristics can be managed by either a technocratic approach of the government or a more collaborative approach between public and private authorities. The characteristics of *examining trends and future threats* and *involving the public* are only evident in places where the local collaborative networks are more open to involve a wider set of actors. The use of these two characteristics is often dependent on the focus of the actors and their interpretations in coping with flood risks. Often, when policy-makers have more of a tendency to consider the uncertainty of climate change and the potential impact on flooding, they are more willing to formulate a collaborative network in which a wider range of actors are involved in policy-making and share responsibilities for spatial development.

The leading actors, mainly local governments, are important for framing local collaboration to tackle potential disturbances of flooding. The collaboration between the leading actors and other actors is often formed by a shared discourse, a vision or an agreement concerning spatial development. The collaboration may change over time depending on shifting interests of actors, changes of participants or the appearance of a new concept in policy-making (Sabatier and Jenkins-Smith, 1999). For example, in the case of Rotterdam city centre, the issue of urban regeneration was highlighted in the first episode when the city experienced an economic downturn due to the decline of the harbour industry. This focus remained until the mid 2000s when the issue of climate adaptation was increasingly important and became a primary focus in local policy-making. The discussion of urban regeneration, however, does not disappear. Rather, it is mainly

addressed within the consideration of climate adaptation to promote development of the city continually. The idea behind the climate knowledge economy is to stimulate urban development by highlighting the city's expertise in coping with the issues of climate change. This forms a new framework of collaboration. New actors, such as scientific research institutes, are involved in framing strategies for spatial development.

Although actors involved in local collaboration may change over time, the leading actors are often stable and not easily changed. This may result from a fact that the establishment of the leading actors often relates to planning culture, accepted modes of governance and social values Healey (2007). For example, in the case of Meinong, the actors of the national government are important in policy-making due to the lack of institutional capacity of the original Kaohsiung County Government. This situation continued after the municipality of Kaohsiung took over the role of the county government in 2010. The municipality of Kaohsiung, the leading actor in the case of Kaohsiung city centre, has not taken the lead in policy-making.

This finding refers to another sub-question considering *to what extent can planning policy-making help to promote the resilience of spatial development in coping with flood risks?* It is important to realise that planning tradition is critical in directing local policy-making to promote resilience. Planning tradition reflects social values, the priorities of spatial development and general beliefs concerning leadership. This is relatively stable and not always easy to change (Healey, 2007). For example, local collaboration in coping with flood risk is more evident in the Dutch cases than in the Taiwanese cases because planning in the Netherlands has a longer tradition of negotiation and collaboration to minimise water safety for spatial development. Planning collaboration in Taiwan is mainly formed with a specific intention to promote urban development. Other issues, such as flood risks, are seldom addressed in planning decision-making unless they may damage the interests of economic development.

The leading actors are critical in framing local collaboration. As discussed before, local planning decision-making may be more functional in framing development strategies in coping with flood risks if the leading actors are more willing to collaborate with different groups of interests in decision-making. The case of Rotterdam city centre is an example in which the leading actor, the municipality, is able to collaborate with different groups in decision-making. The development of climate adaptive strategies can therefore contribute to raising the profile of the city as a centre of expertise in dealing with flood risks and potential disturbances of climate change, thereby stimulating international collaboration, exchange of experience and economic development. Cross-actor collaboration is particularly critical in places where collaboration between government sectors does not function properly, such as the case of Meinong. The assessment shows that when there is a collaborative framework for planning involving multiple actors, this often results in more comprehensive strategies for dealing with flood risks. In strategies involving collaborative framework, these characteristics are more prominent.

Both Taiwan and the Netherlands are experiencing a transition in planning governance. The reform in Taiwan is mainly addressed in the institutions. The impact of this institutional change is different between Kaohsiung and Tainan. In the city of Kaohsiung, the reform seems not yet influenced on local policy-making. The local government, Kaohsiung City Government, seems remaining conservative in managing spatial development in its new territory. An interpretation of this is related to a fact that these expanded areas (mainly agricultural and high mountainous settlements) do not have close relationships to the development of the city. The lower involvement of the local government can create difficulties to implement integrated water management strategies, as shown in the case of Meinong. The situation is less exceeding in the city of Tainan. Both Tainan cases indicate a fact that the municipality is active to participate and even take leading roles in framing local collaboration with the national government. The original framework of regional-level governance may be considered as one of the reasons. Both the original County and the City Government were under the regional government authority, the Taiwan Province, before it was abolished in the late 1990s. Collaboration between these two local governments has begun before the reform. The administrative reform in this context can be more beneficial to promote comprehensive development of the metropolitan region.

The reform in the Netherlands is more about the scope of planning. As discussed in Chapter 5, the decentralised approach in planning is particularly apparent at the local level by opening the possibility for a wider set of actors to be involved in policy-making (Hajer and Zonneveld, 2000, Priemus, 2007). The impact of this newer approach in the city of Rotterdam is quite significant, especially in managing flooding issues in the areas where outside of the national dike ring protection (see section 8.2). In the case of Rotterdam city centre, policy-makers have constructed a clear direction and governance networks to promote spatial development in collaborating with different groups of interests, including the upper-level government, water boards, private enterprises and business communities. Strategies for climate preparations in Rotterdam have a strong marketing component. The exhibition of Rotterdam's floating pavilion at the 2010 Shanghai World Expo is one example where the city used the exhibition to showcase Rotterdam's expertise and capability to manage climate-related floods through engineering as well as spatial development and other adaptive strategies (Rotterdam Climate Initiative, 2010, 2009).

The different focus of the reform in Taiwan and the Netherlands may reflect to the way in which planning operates. Planning in Taiwan follows a more traditional view of land use management. The institutional reform has a clear intention of land use redistribution, which is more focus on physical development. Planning in the Netherlands is more close to the understanding of spatial planning that emphasises collaboration and negotiation in policy-making. The reform leads to a more open framework of cross-actor collaboration and is not necessarily linked to physical development.

In addition, Taiwan and the Netherlands are also different in terms of the role of the state in managing flooding issues. Strategies for flood risk management in Taiwan mainly follow the engineering approach. The national authorities of water engineering often plays a leading role to initiate strategies that always have a clear task of physical implementation. Most of them are infrastructures to improve the robustness of water defence. This is shown clearly in the national project, *Regulation Project for Flood-prone Area*, that was proposed to facilitate flood-vulnerable areas with a more defensive infrastructure for water protection (Water Resource Agency, 2006). The role of the state in the Netherlands is not only about physical implementation of mitigation strategies but also about framing collaboration to develop adaptive strategies and scientific knowledge. For example, the multi-layer safety approach was developed to integrate different types of measures, so the probability and the consequences of flooding can be minimised. This approach is advantageous to deal with flooding issues according to local circumstances, and to be cost-efficient if only smaller areas are considered (Hoss et al., 2011). The *Room for the River (Rumite voor de Rivier)* was developed in the late 2000s to offer more space for water by changing current river conditions, engineering infrastructure and land use strategies (Ruimte voor de Rivier afdeling Communicatie, 2007). This programme has a multi-level governance process that enabled the establishment of integrated plans and designs (Rijke et al., 2012). The *Knowledge for Climate (Kennis voor Klimaat)* programme is an important scientific initiative funded by the state to develop applied knowledge of climate impact and to ensure climate adaptability can be considered in governance decision-making. The collaborative network includes the Dutch national government, local municipalities, business communities and scientific research institutes.

The lessons learned from the study can finally lead the discussion to the main research question – *how spatial planning can promote resilience in the context of flood risks and climate change?* The study substantiates the impact of the notion of resilience as it is addressed in local policy-making implicitly. Policy-makers may use the underlying ideas of the notion without referring to the terminology directly. Although the word resilience is more commonly used, how spatial planning is used to promote the concept seems still questionable. In a real situation, urban resilience is often addressed in combination with other concepts, such as adaptation and mitigation. The word resilience has not always appeared in policy-making. In fact, it appears only rarely. The interpretation of resilience also depends on the focus, the preferences, the training backgrounds of policy-makers and the levels of government. The different interpretations of resilience may lead to confusions or even conflict between actors involved in policy-making. For example, the local government may have more of a focus on promoting resilience by developing adaptive strategies. This may result from a consideration that mitigation is mainly important at higher levels of policy-making and is not always sufficient to prevent some disturbances from occurring (Howard, 2009). Local adaptive strategies may sometimes conflict with the mitigation strategies initiated by the upper-level government.

In spite of having some ambiguities, the study still acknowledges that the notion of resilience is not just rhetoric – it has a real potential to be a generative concept that encourages collaboration and integration in policy-making. This is particularly important for dealing with complex issues, such as climate-related disturbances, that cannot be managed by a single group of professions. Collaboration is critical in spatial planning. At the local level, the use of resilience can help to promote both vertical and horizontal collaboration. As shown in the case of Rotterdam city centre, local collaboration can be a benefit to urban development by presenting the expertise in institutions to deal with the issues of climate change. The uncertainty of climate change and flooding increases the difficulty of developing general strategies that are applicable for different cities. Because there is no single solution, collaboration is critical for developing locally specific strategies. Cities should not try to adopt plans and practices directly without considering their particular environmental situations, institutional frameworks and public expectations carefully. Direct transfer might cause the cities to become more vulnerable to flooding.

A major contribution of the study is to situate the discussion of spatial planning in places outside of the European continent for assessment. Different from Dutch planning, planning in Taiwan maintains a more traditional view of land use management, although it is increasingly difficult to direct spatial development completely by government policies. A lesson learned through the empirical study is that a wider consideration of planning is as important in the Netherlands as it is in Taiwan. In this context, it is important for policy-makers in Taiwan to have a broadened understanding of planning considering both the process of decision-making and the implementation in local practices in facing the complex issues like climate-related flood risks. The analytical framework proposed in the study also provides an applicable way to support policy-makers when formulating comprehensive networks of planning collaboration. The six characteristics of planning especially relevant to resilience can also be helpful in examining the strengths and weaknesses of local collaboration. This can be used as criteria to identify shortcomings and to improve strategies of collaboration.

§ 11.2 Methodological reflection: the analytical framework

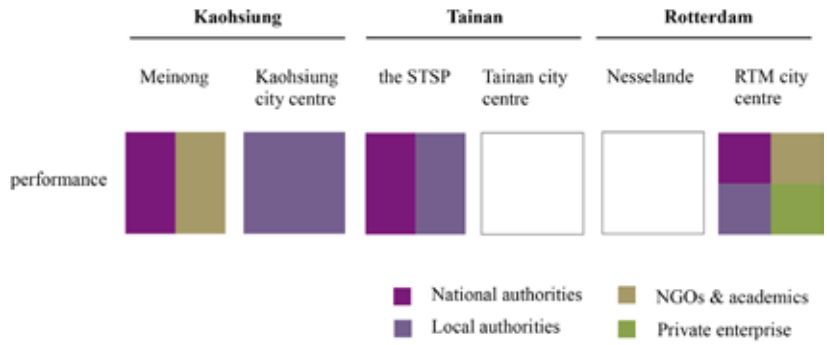
The analytical framework in the study was developed to examine planning policy-making and spatial development in the empirical study. This framework is based on Healey's view of planning governance. The methodological reflection begins by highlighting the limits of conformance and performance in studying planning (Mastop and Faludi, 1997, Mastop, 1997, Faludi, 2000). Next, the discussion illustrates how Healey's idea of episode can be used in evaluating planning performance. Finally, the thesis discusses how comparative

analysis can be used to identify the crucial elements in planning policy-making to tackle the uncertain disturbances of climate change. The analytical framework combines the concept of resilience with theories of spatial planning, governance and evaluation. This is a specific contribution of the thesis.

The discussion of planning conformance and performance was developed in the late 1990s to measure a more dynamic system of planning that represents a complex process with multiple actors involved in decision-making concerning spatial development (Mastop and Faludi, 1997, Mastop, 1997, Faludi, 2000). Scholars highlight the importance of examining both a technical process to produce material development (i.e., conformance) and a deliberation process in which policy-makers are involved in collaborating and integrating activities (i.e., performance). The consideration of planning performance is emphasised in the discussion to understand collaboration in planning decision-making.

The idea of conformance and performance highlights the importance of examining the process of planning decision-making. However, no clear method for assessment has previously been developed in considering changes in decision-making. As shown in Figuur 56, the assessment can only present the actors involved in planning decision-making. The network of local collaboration may change over time depending on shifting interests of actors, changes of participants or the appearance of a new concept in policy-making. These changes are difficult to examine using the theory of conformance and performance alone. The discussion of episodes is introduced in this context to examine the shifting paradigm (e.g., actors, objectives, policies and physical development) of planning decision-making. According to Healey's view of local governance, the process of policy-making can be differentiated into specific episodes in which policy-makers share visions, agreements or general considerations for spatial development. This offers a possibility to understand the overall process of planning decision-making by examining planning performance addressed in each individual episode (see Chapter 6, 7, 8).

The study indicates that a shift in policy-making may result from a disruptive event, such as a flooding disaster, or from a continual discussion on a specific issue, such as the considerations of climate change. A shift caused by a disruptive event often leads to a new episode in which policy-making is fundamentally different from the previous one in terms of actors, coalitions and priorities, as in the cases of Kaohsiung. A shift as a result of continual discussions may result in a smoother change from one episode to another, as in the cases of Rotterdam. The interests from the previous episode may remain but are no longer the main focus of policy-making in the new episode.

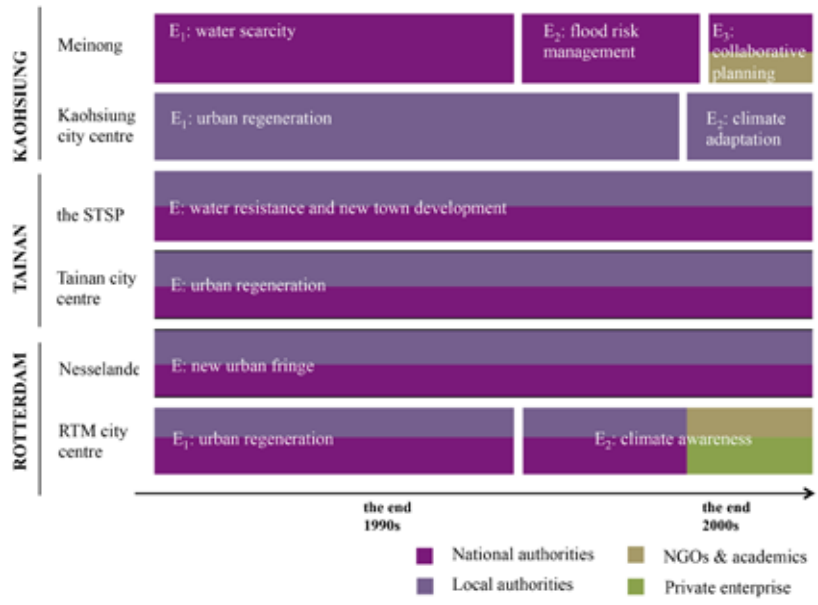


Figuur 56
Diagram representing planning performance in the case studies (showing only actors involved in planning decision-making)

The number and duration of the episodes may vary from one case to another. This represents the endurance of planning performance in the cases. As shown in Figuur 57, local policy-making in the cases of Kaohsiung is less stable and more sensitive to changes in coalitions and networks according to external factors, such as the opinions of local coalitions or the occurrence of extreme events. The cases in Tainan and Rotterdam, by contrast, are less likely to shift to a new episode without a significant change in policy direction.

The study also indicates that comparative analysis is important to unearth the crucial role of planning in promoting urban resilience in the context of flood risk and climate change. By examining the findings from the studies of episodes in each case, the comparative analysis leads to two conclusions. First, local governance is addressed differently in each case even though they have a shared institutional framework at the national level. Second, a multi-actor collaborative network is important for local decision-making to initiate strategies that can be more comprehensive in dealing with the uncertainty of climate change and flooding.

A lesson learned from the comparative analysis is that knowledge exchange related to the local collaborative framework in coping with flood risks is more essential than local planning strategies for flood risk management. In other words, climate knowledge exchange should focus more on the experiences of framing collaboration with a wide set of actors involved in local policy-making rather than the direct import of practical strategies for implementation. This is because the factors in decision-making, such as governance resources, social values, coalitions and objectives, may differ from one place to another. A direct import may be less useful or even cause a place to become more vulnerable to the impact of climate change. Although the research framework was primarily developed to evaluate spatial planning and its contribution to resilience, the criteria could also be used to develop guidance on how to increase the contribution of planning to resilience in other cities.



Figuur 57
Diagram representing the episodes of policy-making in the case studies

§ 11.3 Critical reflection and future work

This section reflects on the lessons learned from the study and identifies issues for future research in the area. The discussion builds on the experiences of the study and is presented in three parts: the selection of case studies, the urban-regional governance and the analytical framework.

The cases used in the study have illustrated the diversity of local collaborative frameworks in policy-making to tackle climate disturbances. The primary focus was on Taiwanese cases, and the Rotterdam cases were secondary. As a result, there is more analysis on the Taiwanese cases than the Dutch cases. The Dutch case studies are both from Rotterdam, so there is no comparison with other cities in the Netherlands. The city of Rotterdam is not a typical example of practices related to climate adaptive strategies. It is one of the leading cities in developing policies on water management and spatial planning (van den Berg et al., 2010). As a consequence of the city's critical location, policy-making related to the issues of urban resilience, climate change, adaptation and mitigation is more advanced in Rotterdam than in most other Dutch municipalities (Stead and Tasan-Kok, 2013).

An important lesson from the study is that the selection of the cases should be based on the willingness of policy-makers to cooperate in the research process. Another important lesson is that the cases should be comparable in some respects. If the cases are not very similar, then it causes problems in comparison. Another line of research could compare the city of Rotterdam with other cities which are similarly advanced in coping with the issues of flood risk and the impact of climate change. For example, a study comparing Rotterdam with its partner cities in the C40 network may be useful in examining how local policy-making performs in the cities that are committed to taking the issues of climate change into consideration. A recommendation for future studies is related to how local policy-making performs in dealing with specific types of climate disturbances or other extreme events. This was partially addressed in the national comparison between the cities of Kaohsiung and Tainan. International comparison on the specific issue of climate change may provide a more detailed understanding of the critical factors that can support a more adaptive approach to land use management.

The discussion of the government level in the study is based on the existing administrative framework in Taiwan and the Netherlands. Two government levels are addressed in Taiwan (national and local), and three government levels in the Netherlands (national, regional and local). This approach is sufficient for the discussion of the study but also offer less room to take the issue of urban-regions into consideration. Discussions of urban-regions are essential in both Taiwan and the Netherlands. In Taiwan, the issue of urban-regional development is mainly considered as a responsibility of the local government after the regional government was abolished in the late 1990s. In a real situation, however, local policy-makers often concentrate on spatial development of the cities and have fewer interests in framing urban-regional strategies. The situation increases the difficulty to manage issues that require large-scale considerations such as natural landscape protection and flood risk management. This is discussed early in Chapter 5. In the Netherlands, in spite of having the provincial governments, actors who should be involved and take responsibilities to initiate urban-regional strategies are unclear. The discussion of the Randstad region presents an example. Major cities have devised their interpretations of regionalism and their position in this region, while many public entities in the Randstad are addressed and form a complex pattern in policy-making.

The analytical framework of this study has provided a useful structure to examine policy-making and spatial development in coping with climate disturbances and flood risks form the perspective of resilience. The criteria used in the assessment framework could be used to help identify practical strategies for promoting resilience in spatial planning. These are equally applicable to different levels of government. Although this framework is able to identify the transitional patterns of the individual cases, it is more difficult to use it to unearth the factors that cause a shift in policy-making, mainly because the transitions often differ from one case to another and are difficult to generalise. For example, scientific scenarios are an important factor in the case of Rotterdam but not a factor that leads to a transition in policy-making in any of the Taiwanese cases.

A lesson learned from the study is considering the importance of identifying factors that lead to new arguments in decision-making and therefore result in a shift in episodes. These can include the appearance of new considerations, external disturbances, a shift in the interests of actors or changes in participation. The comparative analysis is primary useful in situations in which cases are more similar. In this respect, the assessment can help to unearth the implicit ideas that are nevertheless important for transitions. The recommendations for future studies from this perspective are mainly related to research design. First, it is important to be aware of the differences of local policy-making in individual cases. The analytical framework needs to recognise these differences in local policy-making. A different source of framework is required for further studies that aim to elaborate the transitional pattern in local policy-making. Second, it is crucial to limit the diversity of case studies in order to discuss the factors of planning transitions. However, this may be difficult to manage beforehand, as shown in this study. Despite the limitations of the study, the research framework has been useful in illustrating the relationships between spatial planning and resilience and how shifts in policy-making have occurred.

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Appendix I List of Interview

Code	Function/Title	Government level	Year	Name
M1	NGO coordinator	Local	2010	Mr. Wen
M2	NGO leader	Local	2010	Mr. Lu
M3	Water engineering officer	National gov. (WRA07)	2012	Mr. Chen
M4	NGO coordinator	Local	2010	Mr. Wen
M5	Fireman	Local gov.	2012	Mr. Cheng
M6	Water engineering officer	National gov. (WRA07)	2012	Mr. Huang
M7	Academics/NGO leader	Local	2012	Mr. Ting
M8	Academics	Local	2010	Mr. Song
M9	NGO leader	Local	2011	Mr. Lu
M10	NGO coordinator	Local	2012	Mr. Wen
M11	Mayor of Kaohsiung	Local gov.	2011	Ms. Chen
M12	NGO leader	Local	2012	Mr. Lu
M13	NGO coordinator	Local	2011	Mr. Wen
K1	Water engineering officer	Local gov.	2011	Mr. Cheng
K2	Local planner	Local gov.	2011	Mr. Wu
K3	NGO leader	Local	2011	Mr. Lu
K4	Local planner	Local gov.	2011	Mr. Wang
K5	Water engineering officer	Local gov.	2012	Mr. Lin
K6	Water engineering officer	Local gov.	2011	Mr. Lin
K7	Academics/NGO leader/Local government consulter	Local	2011	Mr. Ting
K8	Water engineering officer	Local gov.	2012	Mr. Cheng
K9	Local planner	Local gov.	2010	Mr. Wu
K10	Local planner	Local gov.	2010	Mr. Kao

Code	Function/Title	Government level	Year	Name
K11	Planner in collaboration with KWF	Private company	2010	Ms. Kun
S1	Local planner	Local gov. 2011	2011	Mr. Chen
S2	Water engineering officer	National & Local gov. (responsible to the STSP development in the CEPD)	2011	Mr. Pong
S3	Water engineering officer	National gov. (WRAP)	2011	Mr. Yang
S4	Local planner	Local gov.	2011	Mr. Wu
S5	Planning academics	NCKU	2011	Mr. Kung
S6	Local planner	Local gov.	2011	Mr. Hsu
T1	National planner	CEPD	2010	Mr. Cheng
T2	Architect	Private company	2011	Mr. Shen
T3	Local planner	Local gov.	2011	Mr. Wu
T4	Planning consulter/ academics	NCKU	2011	Mr. Wang
T5	Planning academics	NCKU	2011	Mr. Lin
T6	Planning academics	NCKU	2011	Mr. Kung
T7	Head of the Tourism Bureau	Local gov.	2011	Mr. Chen
N1	Local planner	Local gov.	2011	Ms. Mans
N2	Local planner	Local gov.	2012	Mr. van Veelen
N3	Urban planner and architect	Private company	2012	Mr. van Pijpen
R1	Academics	TUDelft	2012	Mr. Meyer
R2	Local planner/academics	Local gov. (ds+V/TUDelft)	2012	Mr. van Veelen
R3	Local planner	Local gov. (ds+V)	2010	Mr. van Veelen
R4	Local officer for public work	Local gov. (GW)	2010	Ms. Nijhuis
R5	Local planner	Local gov. (ds+V)	2010	Mr. de Greef
R6	Local officer	National & Local gov. (Knowledge for Climate, KvK)	2012	Mr. Molenaar
R7	Officer of the project	Local gov. (Knowledge for Climate, KvK)	2012	Mr. van Nieuwaal
R8	Planner and architect	Private company	2012	Mr. van Pijpen

Appendix II Semi-structured Interview Questions

For local groups in Taiwan

訪談問題

1. 貴單位的發展歷程為何？主要關心的項目有哪些？就氣候變遷和水災議題而言，貴單位目前致力於哪些相關議題？請舉例說明（如：水利設施，河川，都市水域，海岸侵蝕，氣候災害等等。）

2. 在環境與水災議題上，貴單位在過去推動了哪些相關計畫？目前進行中的計畫與關心重點為何？未來的發展願景與推動方向？

3. 從貴單位的角度而言，造成都市淹水最主要的原因有哪些？ 目前的空間政策對易淹水都市空間的態度為何？請就相關議題提出建議。

4. 在推動環境議題的經驗中，遇到哪些阻力/助力？貴單位參與相關計畫的哪些部份？推動計畫順利發展的關鍵因素是什麼？請舉例說明。

5. 氣候變遷與水災議題是否對都市規劃造成影響？對民間團體而言影響為何？貴單位曾否就相關議題與都市規劃團隊進行合作與交流，請舉例說明 （如：公部門投資與預算經費，相關研究案與執行計畫的補助，相關空間政策的制定與執行，大型公共建設，計畫藍圖，未來都市發展方向）。

6. 您認為，都市居民對氣候變遷與都市水災害議題的態度為何？居民如何面對近年來發生的水災？貴單位是否協助居民與政府進行協調及空間規劃發展？在相關議題上所辦演的角色為何？

7. 貴單位過去是否與其他相關團體合作推動環境發展，氣候變遷與水災害等相關議題？現行的合作主要在哪些面向？未來的合作藍圖為何？請舉例說明。

8. 您認為民間團體和NGO組織如何在氣候與水災害相關議題上對台灣的環境做出貢獻？

For government officials in Taiwan

訪談問題

1. 我們知道，氣候變遷和水災害議題近幾年非常受到重視。請問，氣候變遷和水災議題是否也對都市空間規劃政策產生影響？若是，在哪些方面？

2. 造成都市淹水最主要的原因有哪些？ 制度面上的相關權責與主管機關為何？

3. 在治水議題上，規劃專業者傳統上是否參與都市水災與相關議題的決策？ 既有的空間發展策略是否考量到氣候變遷與水災等議題？未來的發展策略為何？請簡述規劃專業者目前在氣候變遷與水災議題決策與執行面的角色。

4. 近年來受到重視的氣候變遷與水災議題是否對都市規劃造成影響？ 在哪些方面？請舉例說明 （如：公部門投資與預算經費，氣候相關空間政策的制定與執行，大型公共建設，計畫藍圖，或未來都市發展方向）。

5. 考量政策執行與都市發展的面向，目前的空間政策是否有對易淹水都市空間擬定相關的氣候變遷與水患政策？ 請舉例說明。

6. 市民對氣候變遷與都市水災害議題的感受為何？ 是否有民間團體關心這些議題在空間上的影響？有哪些？此外，易淹水地區的居民/團體是否支持並配合針對氣候變遷與水災議題所擬定的空間發展策略？

7. 市府與規劃團隊是否計畫發展氣候相關的知識經濟策略？ 對氣候變遷與都市水患的態度為何？請舉例說明。

8. 在氣候變遷與都市水災的議題上，市府是否與其他國內外城市進行交流與合作？ 未來有哪些合作計畫？

For interviewees in NL

Interview questions for government officers

1 As we know, climate change and flooding issues have recently become very important. Whether the climate-related flood risks impact on current planning decision-making? If so, to what extend spatial planning has been involved?

2 What are the major issues cause flood occurrences in the city? Which authorities could be responsible to cope with?

3 Did spatial planning use to participate in flooding issues? Does it been involved in coping with climate change and flood risks? Please give examples and illustrations.

4 Does climate and flood threats shift the existing structure of planning decision-making? To what extend? Please give some examples (e.g., government investments, policy-making, infrastructure programmes, government guidelines for urban development).

5 Regard to planning implementations and planning practices, do planning strategies in the city set up projects or pilot studies for flood resilience? Please give a summary.

6 Whether and how citizens consider the impacts of climate change and flood risks in built environment? How does the local feedback in terms of climate change and flooding issues? Do the residents like new ways of planning strategies?

7 Have planning authorities considered the marketing perspectives of climate knowledge or water experiences? Please give a short illustration.

8 Does any national or international cooperation occur in relation to climate change and flood risks? Does the city have exchanged or shared previous experiences with other flood-threatened cities?

9 Any recommendations of spatial planning for climate-related flood risks.

Curriculum Vitae

Peiwen Lu was born in Kaohsiung, Taiwan. She earned her Bachelor degree of Geography in National Taiwan University (2003) and her Master degree of Architecture in National Cheng Kung University (2005). Three years of lovely working experiences in private firms (Environmental Dimension Studio) and research institutes (Institute of Earch Science, Academia Sinica) did not stop her following her dreams to go abroad for further study. She went to study sustainable urban design in Lund University, Sweden (2008), and then began her PhD at Department of Urbanism in Delft University of Technology, the Netherlands (2009).

Peiwen was active in both teaching and research. She has been a tutor in design studios and has co-supervised two master students in the period of her PhD study. She was involved in many working projects concerning the issues of climate change, risk management and urban resilience. Publication is a key focus in her academic journey. From 2009 to 2014, she has had four peer-reviewed journal papers in the field of architecture and urban planning. She has also publications in books, scientific reports and conferences. Her excellent performance brought her full financial supports from the Taiwanese Government and private foundations.