FLOOD RESILIENCE IN URBAN PLANNING AND DEVELOPMENT

THE IMPLEMENTATION OF CLIMATE ADAPTATION STRATEGIES IN ROTTERDAM AND NEW YORK CITY

GRADUATION PLAN

E Gaaff
1363247

1st mentor: dr. Ir. T. Daamen, Assistant Professor Urban area Development & Programme Manager Master city Developer (MCD), Department Real Estate and Housing, Faculty of Architecture
2nd mentor: dr. T. Tasan-Kok, Associate Professor and lecturer sustainable urban development and multi-level governance, University of Utrecht, Roosevelt Academy, Delft University of Technology
3rd mentor: Prof. dr. Jesse M. Keenan, Research Director Center for Urban Real Estate (CURE.), Columbia University

Urban Adaptation Strategies Laboratory
Master Real Estate & Housing
Faculty of Architecture and the built environment, Delft University of Technology

June, 17th 2014, Delft

Contact information:
E J E Gaaff
Balistraat 5
2585XK Den Haag
egaaff@gmail.com
+316 11482873

Cover illustration: Own illustration (Holocaust Monument [Berlin], 2012)

ABSTRACT

How can we make our cities sustainable considering the effects of climate change and increased urbanization? This is the main challenge urban planners are dealing with today. The challenge is reflected in the large number of city authorities that have developed strategies for dealing specifically with increased vulnerability to climate change effects. These urban adaptation strategies propose changes to social, economic and physical urban systems in an effort to make the city resilient to the consequences of climate change.

This thesis studies the implementation of climate change strategies and the adaptations proposed in planning policy. The focus of the study lies on cities in delta regions. Here, the most pressing effect of climate change can already be observed in an increased amount of flood events. Thus, within the broad field of adaptation strategies for the urban environment, this thesis concentrates specifically on the topic flood resiliency.

In this study, we focus more precisely on the implementation of adaptation strategies in New York City (NYC) in the United States, and the Dutch port city of Rotterdam. The study examines what policies the planning authorities of these two cities have adopted to stimulate the adaptation of the existing city into a more flood resilient urban environment. Consequently we analyze how these policies penetrate the practice of a waterfront regeneration projects in the respective cities. To do this two case studies are conducted in which we examine the development process, paying specific attention to the interaction between the actors and the adopted policy instruments.

The findings will be used to analyze the effectiveness of the adaptation strategies of these two cities, and to compare project outcomes with strategic goals. Where possible, recommendations will be done as to how city authorities in NYC and Rotterdam can improve their process of strategy implementation.

Flood resilience, Urban planning, Climate Adaptation, Policy Implementation, Comparative multiple case-study

TABLE OF CONTENTS

1. INTRODUCTION

To come to an understanding of the background of this study, this chapter first presents the personal motivation and fascination for the topic of urban climate adaptation. This is followed by with a brief outline of academic discourse in this field, indicating the relevancy of the subsequently defined knowledge gap and research goal.

A. MOTIVATION

The translation of social and economic systems into the physical environment is a captivating process. Especially urban areas, forming the nodes of societal networks, layered spatial arrangements and increasing economic relevance are intriguing. Balancing this multitude of objectives and interests makes urban development management a very delicate but crucial process in shaping sustainable cities.

The increasing issues of water management in the urban environment are currently addressed by various cities worldwide. Water takes a crucial role in this challenge of adaptation. Context determines whether cities deal with increasing water shortage, excess or quality issues. Either way, measures to improve water management are generally seen as a burden for urban development and vice versa.

Even though water is indispensible for human life, a proper balance in the living environment is crucial. In the Netherlands, water management has always been a driving force in spatial planning and has thus shaped not only our physical, but also social and political environment. The polder tradition has turned the predominant source of danger into a system that provides spatial quality, shapes social structures and stimulates economic activity. This integration in Dutch policy of water management and spatial planning is often seen as a source of inspiration for the future of adaptation in various cities around the globe. Nevertheless, over recent decades efforts regarding the incorporation of water management solutions in urban development project are often seen as a burden where market dynamics prevail.

This report is based on the notion that the solution is to be found in a shift of focus in development practice, away from immediate risks and costs and towards a more long-term investment perspective. Rather than in investigating the problems and increasing challenges, this research is built on the belief that the solution lies in the uncovering of shared opportunities and mutual benefits of urban development and building flood resilience.

The focus of this research is developed in consultation of various experts and professionals from practice, as well as scientific background. Therefore, scientific as well as professional relevance is ensured. A list of consulted individuals and attended events on this specific topic can be found in the appendix.

"Water is our connecting factor" (source: Helpdesk Water (2008)).

B. PROBLEM DEFINITION

With regard to increased globalization and the anticipated effects of climate change the need for improving of flood resiliency in urban planning is widely acknowledged. This is supported by the findings of a study on current academic discourse (see chapter 3) as well as consulted scientific specialists and planning practitioners (see for an overview Appendix I). Thus, various cities have developed strategies aimed at climate adaptation and more specifically improving flood resilience while simultaneously providing added quality to the urban fabric. While the technical and scientific solutions for the integration of water management measures and area development are considered widely available, the strategies now face difficulties in their implementation (Timmermans *et al*. [2013], Rijke [2007]). As Zevenbergen mentions in the Water & the City conference proceedings (2013, p. 22): "*Perhaps the hardest part of a [flood resilient urban development] project is implementing it with all stakeholders involved and with funding from public and private parties. The current need for integration is increasing the level of complexity*."

Thus, it is the complexity of the development process, marked by the long-term timespan, conflicting interests of various stakeholders and the coverage of different scale levels and policy domains that now seems to hamper the ambitious goals from being realized. The process of implementation is defined here as the realization of proposed goals resulting from adaptation strategies in the built environment.

Noticing the multitude of adapting and strategy-formulating cities, a comparison of the approaches they take in implementing these strategies is believed to provide valuable lessons, not only for the studied case cities but also for other delta cities worldwide and the practice of strategic urban planning in general.

C. NEW YORK CITY AND ROTTERDAM

This study focuses on the current adaptation strategy and development practice in New York City (NYC) and Rotterdam, The Netherlands. These cities have both gained interest in each other's methods in urban planning (Heurkens, 2012; Daamen, 2011) and approach to climate adaptation (Rotterdam Climate Initiative, 2014; C40 Cities, 2014; NUWCReN, 2012). Like many other adapting cities, NYC can learn from the Dutch tradition of uniting water management with spatial development in integrated design solutions (Meyer, Morris, & Waggonner, 2009; Meyer & v.d. Burg, 2005). The 'Rebuild by Design' competition for instance, features a Dutch consulting or design firm in almost all participating teams (Rebuild by Design, 2014). Rotterdam on the other hand has recently been faced with severely diminished financial resources. Where public investment initiated and shaped in area development as well as climate adaptation before, the city now needs to find new ways to stimulate the private sector to realize its objectives (Gemeente Rotterdam, Concern Rotterdam. Overheidsorganisatie voor Rotterdammers, 2012). NYC, even though the city has seen a recent shift in policy towards a slight increase in government control, forms a classic example of neoliberal urban planning, limiting public intervention where possible (Fainstein, 2001). Thus, the comparison of these cities in this context seems valid. Besides, there are a number of other similarities and differences that give rise to the cities' special position with regard to this research.

Firstly, the geographical situation as urbanized deltas makes that increased chance of flooding is a pressing matter in both cities. However there are differences as to the causes and nature of these floodings, as will become clear in the introductions of the respective city chapters of this report. Furthermore, the governments of the cities have both developed ambitious strategies to adapt to the effects of climate change. They are taking leading roles and form examples in international city-networks for urban climate adaptation. The respective climate adaptation strategies studied are PLANYC for greater New York, and Rotterdam Adaptatie Strategie (RAS) for Rotterdam, report covers of which are depicted in figure 1.

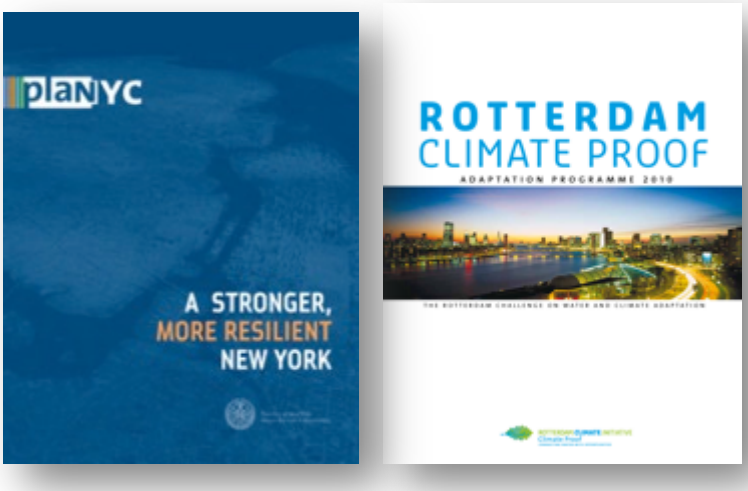


Figure 1. Climate adaptation strategies of New York City and Rotterdam

In the field of urban development management, the approach to public planning and condition of the local land and property market differ largely. However, both cities have adopted a similar position in their public responsibilities for the realization of adaptation in spatial development. This approach is best described as stimulating private initiative and investment in building resilience while limiting public spending. This can take the form of providing information on risks and technical solutions, revising legislation or offering procedural and management support throughout the development process.

Based on the preliminary literature review and consultation of experts and practitioners, table 1 lists the assumed differences between the cities and according strategies.

Table 1. Main differences New York City and Rotterdam in building flood resilience

	Rotterdam	NYC
Main flooding causes	Land subsidence, rising sea levels, river flooding	Rising sea levels, storms
Historic response to flooding	Prevention	Insurance
Relation to water	Living with	Fighting against
Adaptation speed	Slow	Fast
Strategy formulation	Proactive	Reactive
Flood resilience measures mapped	By functional environment	By neighborhood/district
Urban development	Small interventions	Large developments
Adaptation focus on	Maintenance and renovation works	New-build projects and repairing works
Funding	Not incorporated in strategy	Proposal incorporated in strategy
Collaboration focus	Individual citizens and public parties	Private parties, communities and local authorities
Realization initiative	Top-down	Bottom-up
Real estate market/land prices	Weak	Strong

D. RESEARCH GOAL

This study will investigate specifically the implementation of the planning objectives proposed in the adaptation strategies in development practice. For both Rotterdam as well as New York City the advancement of this implementation seems to be hampered (Jacobs, 2014; Keenan J. , 2014). This is further tested in literature and expert consultation, as will be further elaborated upon in the theoretical background described in chapter 3. Concluding, the causes for these obstructions are not clear. Initial examination of this issue points to the inability of the proposed climate adaptation policies to truly change development practice. Therefore this research is aimed at *providing insight in the influence of climate adaptation policy on urban development processes*.

2. RESEARCH DESIGN & METHODOLOGY

The knowledge gap and according research goal as introduced in the previous chapter form the basis for the research approach, as described in this chapter. First, a conceptual framework and key definitions provide a background for the set of research questions, as formulated in section B.
Consequently, the chapter goes on in explaining how we aim to find answers to these questions, elaborating on the research design and methods by which the study will be carried out. Lastly, we reflect on the validity of the methods used, and potential limitations to the generalization of the conclusions.

A. CONCEPTUAL MODEL & KEY DEFINITIONS

On the basis of the planning practitioners consultation (see Appendix I), complemented by findings from theoretical literature, a conceptual model is constructed. This illustrates the concepts and relations studied in this research. The conceptual model is model is illustrated in figure 2. The arrows depict the studied relations – how actors behave regarding the implementation process and how city authorities try to influence this behavior.

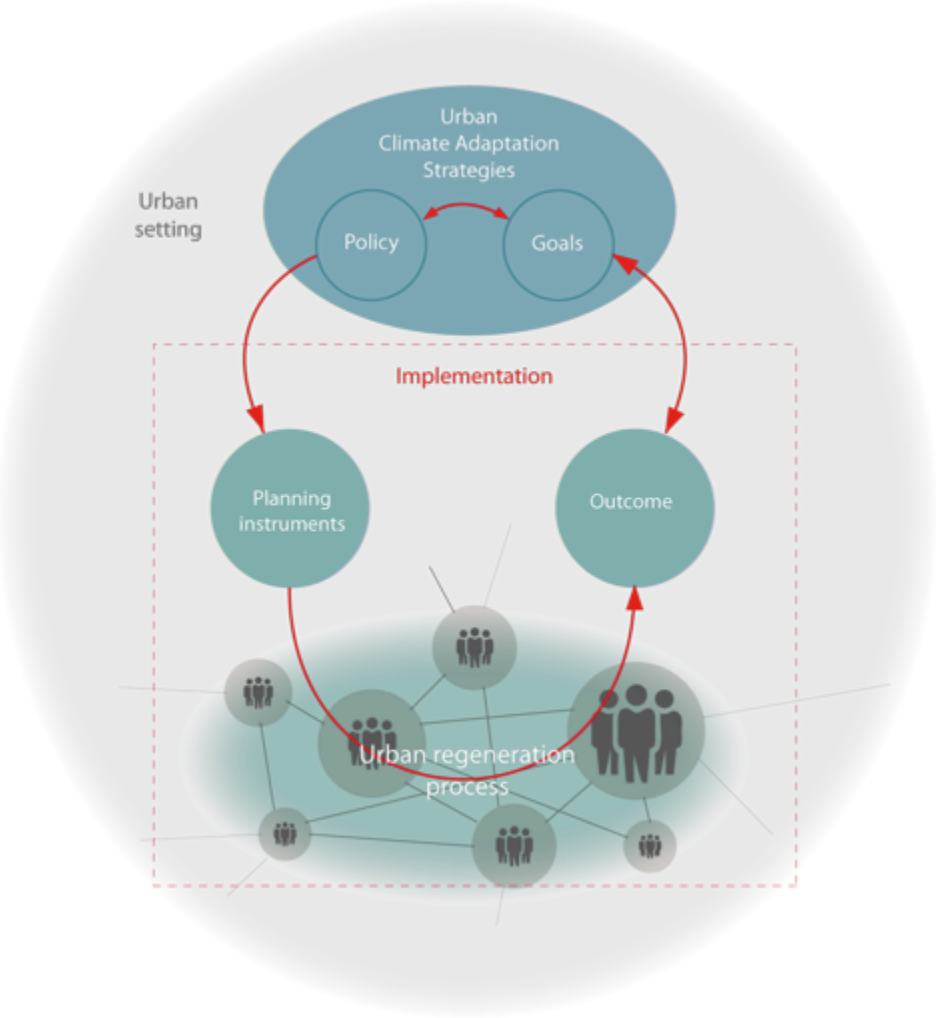


Figure 2. Conceptual model implementation of adaptation strategies in urban planning reality

The key definitions, as used in this research are:

- Resilience
  The capacity of a social, economic, and environmental system to respond to disturbance of its operations by the negative impacts of an external (anticipated) event. Based on IPCC (2014) and Keenan (2014b)).

- Adaptation
  Building resilience by proactively adjusting the current structure of a system in order to enhance its capacity to respond to anticipated effects of external change as well as limiting the impact these effects on the system's operations.

- Actor
  An organization or representative individual actively involved in urban development projects. Based on Heurkens (2012).

- City authorities

  Governmental bodies assigned with formal authority as well as public responsibility for a specific urban region.

- Planning policy

  The approach public parties take in intervening in land and property development market to carry out plans and achieve desirable societal objectives.

- Planning policy instruments

  Public actions or initiatives intended to affect the decision environment and behavior of market actors in the development process to achieve planning goals. Based on Tiesdell & Allmendinger (2005, p.57/58)

- Urban planning
  The determination and formulation of a set of explicit interventions by governmental parties in the land and property development market of a demarcated city region, intended at changing the future physical, economic and social environment. Based on Adams (1994, p. 2), Healey, McNamara, Elson, & Doak, (1988) and Tiesdell & Allmendinger (2005).

- Urban development project

  An explicit and defined set of physical interventions in a geographically distinct urban area. This definition thus considers the realization of material objects like buildings, infrastructures, and public spaces as the fundamental feature of urban development projects. Based on Daamen (2010).

- Urban Development process

  The course of events describing the realization of an urban development project, marked by the behavior and interaction of actors involved.

- Governance

  A system's capacity to organize collective action toward specific goals. Adopted from Hillier (2002, p. 4)

- Facilitate

  The public policy of actively stimulating socially wanted spatial developments while limiting public spending, by enhancing market actors' development opportunities and abilities to invest. Based on Heurkens, (2012) and Heurkens, De Hoog, & Daamen (2014).

- Strategy
  A plan providing a certain system with a direction, a guide or course of action into the future and according propositions for adjustments to its current structure, expressed in words and images in distinctive documents. Based on Daamen (2010).

- Implementation
  The controlled operationalization of proposed changes in a system.

- Climate adaptation strategy
  A document, used as a planning instrument, formulating a strategy regarding the adaptation to the anticipated effects of climate change, with the intention to stimulate actors in taking action on achieving these goals.

- Waterfront regeneration

  Urban development projects located in abandoned ports and industrial 'brownfields' along waterways, aimed at enhancing the social, economic and environmental environment of these areas. Based on Hoyle & Pinder (1992) and Daamen (2010, p. 19).

- Private sector-led urban development projects

  An urban development project in which private actors take a leading role and public actors adopt a facilitating role to manage the development of an urban area, based on a formal public-private organizational role division. Adopted from Heurkens (2012, p. 57).

B. RESEARCH QUESTION AND OBJECTIVES

Today, many cities around the globe face the challenge to become more resilient to the anticipated effects of climate change and increased urbanization. Hence, the predominant goal of this study is to contribute the body of knowledge regarding to the process of adaptation and more specifically cities building their resilience to the effects of climate change.

Within the broad scope above, this study focuses on the implementation of flood resilience measures in urban redevelopment. In the scientific discourse it is generally understood that the current challenge of building flood resilience lies in the application of adequate governance (Timmermans, Vercauteren, Hasman, Gonzales, & Papenborg, 2013; Rijke, 2007; OECD, 2009; Veerbeek, Ashley, Zevenbergen, Rijke, & Gersonius, 2010; MCD, 2013). This notion is underwritten by consulted planning professionals, as listed in the appendix.

Thus, this research aims to answer as to how cities can stimulate the realization of a flood resilient urban environment. This illustrates the main objective to **identify successful policies and planning instruments for city authorities to implement urban adaptation strategies aimed at flood resiliency in urban development practice.**

The focus of this research is on the cities of Rotterdam and New York City (NYC), both internationally understood as leading examples in climate adaptation. As explained in the introduction, the choice for this comparison is furthermore rooted in similarities and differences in their environmental situation, urban planning practice and approach to adaptation. Thus, **how do city authorities in Rotterdam and NYC implement their adaptation strategies and stimulate the process of building flood resilience?** The study aims to get insight in if, and how strategic policies and corresponding changes in planning instruments are affecting development practice.

This results in the following main research questions:

A. "How do urban strategies aimed at flood resilience affect urban development projects?"

1. **What are predominant socio-cultural, economic and physical factors shaping the current development environment in the two cities?**
2. **What are current strategies for building flood resilience in the two cities? What are their goals and what policy changes and according planning instruments do they propose?**
3. **What adjustments are made to planning policies and what planning instruments are applied to stimulate flood resilient area development?**
4. **How do changes in planning policy and corresponding planning instruments, aimed at increasing flood resilience, influence the process of urban area development?**
5. **To what extent does this outcome, in terms of development plans, answer to the strategic goals of building flood resilience?**
6. **Are the policy changes as proposed by the strategies effective in meeting the goals of building flood resilience?**

B. "How does the implementation of urban adaptation strategies in Rotterdam and NYC work?"

This research is focused around the implementation of planning strategies rather than on environmental factors at work. Nevertheless, the social, economic and spatial patterns of both cities need to be mapped in order to get an understanding of the adaptation policies and forces in the development process. From the cities' adaptation strategies, the predominant goals regarding flood resilience can be distilled. These are most likely to differ between the two cities, as their environmental, social, economic and political

situation differs. Considering the proposed objectives to be appropriate for the respective settings, the aim of this research is to test if the proposed policy adjustments result in the achievement of these goals. Thus, if the implementation of the adaptation policies is effective.

The research approach is illustrated in figure 3. Starting, a literature review allows the building of a theoretical framework. This enables processing, structuring and interpreting of the findings of the described steps. This framework enables comparison of the findings in both cities through:

- Providing insight in urban planning practice in the two cities and consequently categorize planning policies
- Categorizing planning policy adjustments
- Structuring the description and findings of the development processes

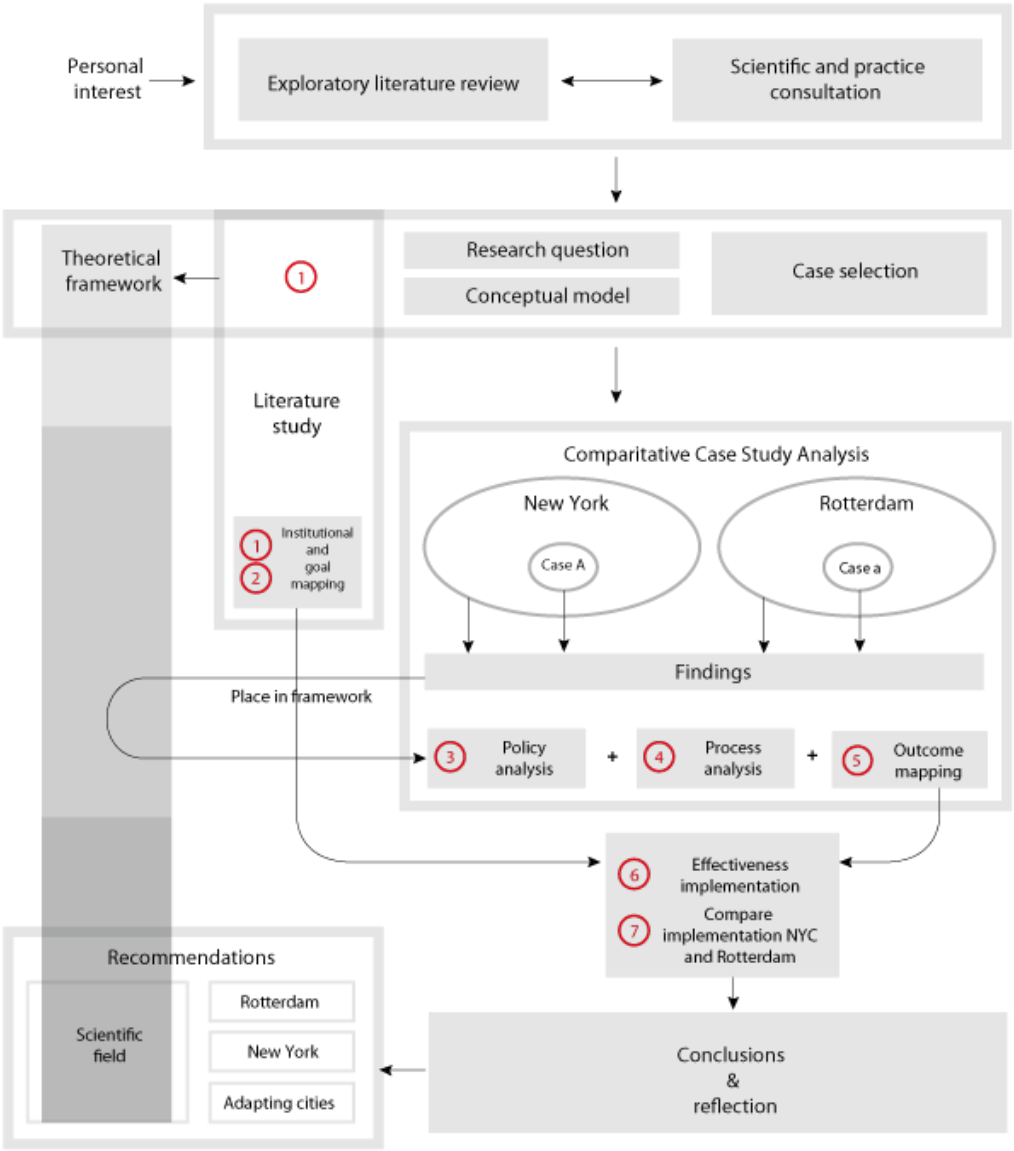


Figure 3. Research approach

The theoretical frameworks form the background for the analysis of the implementation of the strategies. The examination of this implementation process is focused around the case study of the development process of waterfront regeneration projects. The steps to come to a proper overview of the development processes follow imply (A):

1. An examination of the urban planning environment of Rotterdam and NYC
2. An examination of Rotterdam's and NYC's adaptation and development strategies
    a. Distilling the flood resilience goals of the respective cities
    b. Listing of the proposed
3. Investigating to what extent city governments of Rotterdam and New York City (NYC) translate the proposed adjustments in urban planning policy in practice
4. Examining if and how these policy adjustments influence the development process of waterfront regeneration projects
    - Project description (history, location, plans)
    - Map actor-networks (interests, power, relations)
    - Process description (challenges, conflicts, opportunities)
5. Evaluating if the project outcome is to achieve the flood resilience objectives
6. Reflecting if the proposed policy adjustments have, trough effective implementation, lead to the achievement of the strategic goals.

These steps and comparison of the implementation (B) are depicted in figure 4.

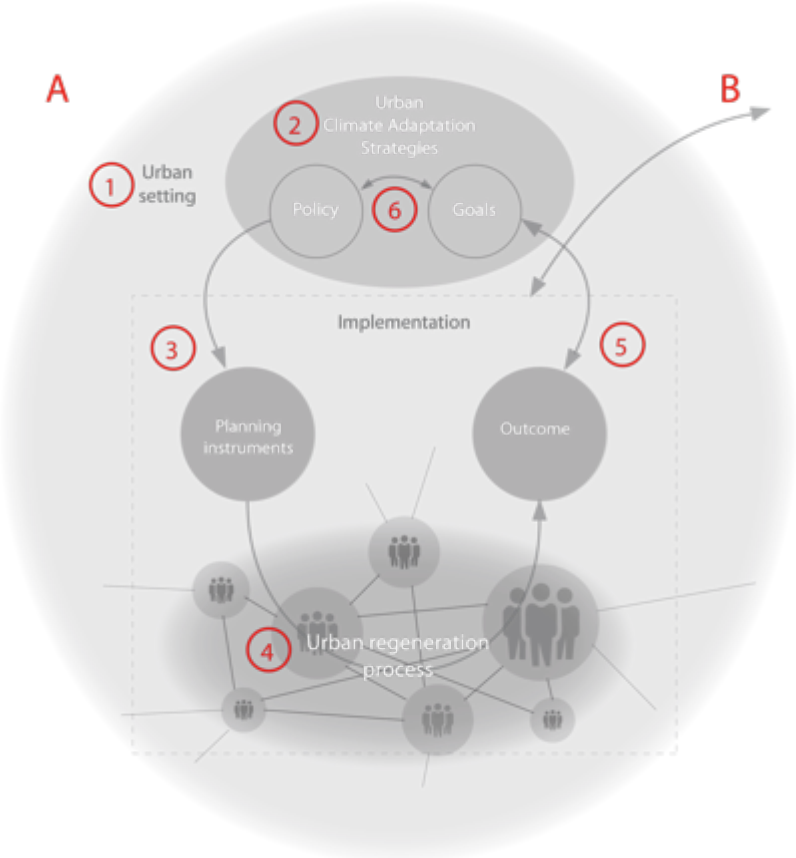


Figure 4. Research steps

In general, aim is to provide planning policy guidelines for adapting cities in responding to the anticipated effects of urbanization and climate change. These conclusions will furthermore be translated into practical recommendations for both studied cities. Lastly, the scientific domain is addressed by defining key lessons learned in policy implementation and proposing directions for further research.

C. RESEARCH STRATEGY & DESIGN

The research strategy is qualitative. Actors' perception of their role and the process will play a vital role in this research. This, because it are these perceptions that shape the actors' relations and behavior in a project. This approach reflects an interpretive research paradigm, where 'reality' is built up from the perceptions (De Lange, Schuman, & Montesano Montessori, 2011).

The research design is comparative. This is conform the definition as provided by Bryman (2012, p.72, p.74) who states that comparative research design entails "(…) Studying two contrasting cases, using more or less identical methods" or "(..) two or more cross-sectional studies carried out at more or less the same point of time". In this research the cases will be formed by the development process of selected urban development projects. The findings of the projects will be contrasted on the basis of the climate adaptation strategy under which they are carried out. This is further described in the paragraph Research approach.

D. RESEARCH METHOD

For this research two main research methods will be used, making it a 'mixed method design' (Van Thiel, 2010, p. 68). The sources to be consulted will in the first place consist of project documents and data. The examination of these written sources can be depicted as discourse analysis and content analysis (Bryman, 2012). The material gathered from these analyses is then supplemented by more in-depth information obtained through semi-structured interviews with involved actors or experts, as explained below.

Within the case studies crucial actors are selected and the research method of semi-structured interview is applied. Coolen (2013) describes a research interview as "… *a conversation between two people in which one person (the interviewer) tries to direct the conversation to obtain information for some specific purpose.*" The method of semi-structured interviewing enables the researcher to assess all categories of stakeholders whilst maintaining the ability to obtain in-depth information from the interviewees (Bryman, 2008). The semi-structured interview is especially appropriate in this research since the information needed from the involved actors (interviewees) can be quite sensitive. This kind of information is more likely to be shared in a conversation than in for example questionnaires with standardized forms.

E. DESK RESEARCH

The research is positioned at the interface of three overarching domains; urban planning, climate adaptation and strategic management. The within these domains the scope of this study is further narrowed down to the corresponding focus areas of, and urban area development, flood resilience and strategy implementation. First, a review of review of academic and professional literature is conducted to adequately place the research in current scientific discourse and theoretical models. Figure 5 maps the key contributors and their focus in the overarching domains. Accordingly, appropriate frameworks are selected to process the findings of the case studies. The results of this literature review are elaborated upon in chapter 3.

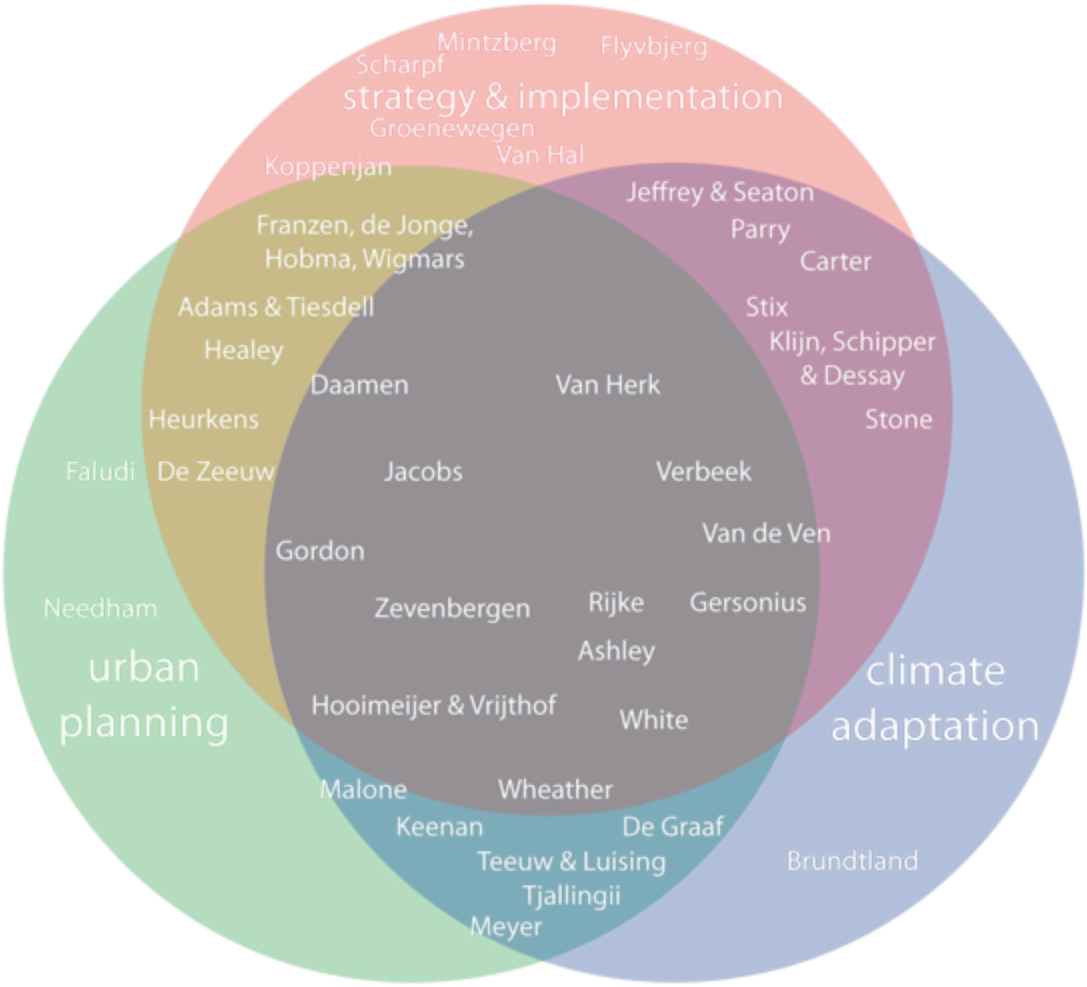


Figure 5. Key contributors scientific literature (own illustration)

Consequently, a study of available project documentation, as part of the case studies is carried out. This will be described in the next section.

F. CASE STUDY

A case study is a research method by which an example of a phenomenon is examined in real practice (Van Thiel, 2010, p. 99). To achieve a more thorough understanding of the effects of the changed planning policy and effects of the employed instruments, in both cities the process of area development project will be examined. This entails both the content analysis of case documentation and the prevailing adaptation strategies as well as semi-structured interviews with experts and key project actors, as depicted in table 2.

Table 2. Research methods applied to research steps

Research step / Method	Planning instruments (step 1, 2, 3, 5 and 6)	Area development process (step 3, 4 and 5)
Document analysis	Adaptation strategies	Case documentation
Semi-structured Interview	Professional and scientific experts	Key actors and stakeholders

DOCUMENT ANALYSES

The first part of the document analysis focuses on the general setting and goals and proposed policy changes of the adaptation strategies of the two cities. The distilled planning instruments will be set in the framework developed by Tiesdell and Allmendinger (2005), as explained in the section 3F. The cases' scope, the environmental, social and economical factors at work in the project, will be examined through analysis of the content of official documentation of public as well as private parties. An overview of the adaptation and planning strategies subjected to this analysis is provided in the respective city chapters. Key case literature will be defined in the next phase of the research.

SEMI-STRUCTURED INTERVIEWS

The result from the content analysis of the climate adaptation and redevelopment strategies is an overview of the changes city governments have made, or are intending to make, to their planning policies regarding area development.

PLANNING INSTRUMENT INTERVIEWEES

Consequently, we check with local politicians and practitioners if and how these changed policies are currently being worked through in planning instruments. To get to this overview, several key actors in the climate adaptation and urban development fields are to be interviewed. These are listed in table 3.

Table 3. Professional expert interviewees in NYC and Rotterdam (former administration are marked grey)

Organization	Person	Function	Location
US Department of Housing and Urban Development	Ir. H. Ovink	Principal 'Rebuild by Design'	NYC
Arcadis	E. Westerhof	Senior Planner, Water Management Arcadis US	NYC
	P. Dircke	Arcadis Rotterdam	Rotterdam
Jones Lang La Salle	F. Jenowein	Sustainability department	NYC
NYC government	S. Mahnovsky/J. Kahn/ E. Lindsey	Director/Program manager/Policy advisor Mayor's Office of Long Term Planning and Sustainability	NYC
		Member of city planning commission	NYC
	M.E. Rusz	Senior Architect/Urban Designer at New York City Housing Authority	NYC
	Amanda M. Burden	FAICP, Commissioner, Department of City Planning	NYC
	Seth W. Pinsky	President Economic Development Corporation	NYC
	Cas Hollaway	Commissioner Department of Environmental Protection	NYC
	Graham Higgins		
FEMA			
Metropolitan Waterfront Alliance (MWA)			
Municipality of Rotterdam	John Jacobs	Water management department Rotterdam, Program manager Climate adaptation Office Rotterdam	Rotterdam
Waterboards			Rotterdam
Rotterdam Climate Initiative	A. Molenaar		Rotterdam
Sustainable Solutions RDM	Duzan Doepel	Professor at Sustainable Solutions RDM, co-founder Urban Innovation Lab	Rotterdam

Research experts			
Organization	Person	Function	Location
Unesco-IHE	Dr. Ir. J. Rijke	Researcher Flood Resilience Group	Delft
	Prof. dr. Ir. C. Zevenbergen	Leading professor Flood Resilience Group, Board member Clean Tech Delta	Delft
Columbia University	K. Jacob	Geophysicist at Columbia University	NYC
	Prof. J. Keenan	Research Director Center for Urban Real Estate	NYC
VU University Amsterdam	Prof. dr. J. Aerts	Professor Department of Spatial analysis and decision support	Amsterdam

CASE INTERVIEWEES

The case studies are to offer insight in if and how the changes, as defined by the literature study, are becoming part of building practice. As mentioned, urban development projects are complex processes, and rather the outcome of interplay of the various stakeholders than the realization of one actor's vision. It is therefore all the more interesting to examine how much of the change, intended by the public strategies and corresponding policy adjustments, is perceived in development practice.

A preliminary list of case interviewees is to be found in the case sections of the city chapters. This list will be adjusted and extended as more information on the cases is acquired. Furthermore, interviewees may suggest other actors to be interviewed. The findings thus used to describe the development processes are structured by the network-approach, as developed by Koppenjan and Klijn (2004). This method is further explained in the next chapter.

CASE SELECTION

The case projects are intended to examine if, and how, the proposed policy changes of the strategies are implemented in planning process of practice of area development projects. The cases are selected to be comparable according to the following criteria:

- The projects make an alteration of the physical urban form
- The projects are located in flood-prone areas of the respective cities
- The projects are initiated after the presentation of the cities' flooding adaptation strategies

Note that the initiation of the projects does not need to originate as a result of the adaptation strategies. Nor need they be completed. In area development projects generally have a lengthy planning and realization process of at least multiple years. As the adaptation strategies are relatively recent, adaptive policies are recognized to not have been fully worked through in already realized projects.

The cases are chosen to reflect an important development challenge prevalent in both cities as well as other port cities: waterfront regeneration. Waterfront regenerations typically feature the following characteristics:

- The projects entail the adaptation of existing land and property
- The area houses or formerly housed port-related activities
- The projects have a mixed functional program
- Besides spatial interventions, the projects address regeneration of social and economical systems

Thus, the selected cases are to reflect these features. Waterfront regeneration is also chosen as it generally deals with both existing buildings as well as new structures, thus covering most planning policies and instruments to some extent. The content and process of waterfront development projects is considered particularly insightful (Daamen, 2010). Further characteristics that make this type of projects especially interesting for this study are elaborated upon in the section 3C.

Together, these requirements have lead to the selection of the regeneration of the RDM-campus/Heijplaat area in Rotterdam and Sunset Park in Brooklyn, NYC. The cases will be further presented in the respective city chapters. An initial overview of the key case actors to be interviewed can also be found there.

G. CONTENTS FINAL REPORT

Below, an overview and structure of the contents of the final report is presented. Black topics are (partially) featured in this proposal. Grey chapters are to be covered by carrying forward the research.

H. RESEARCH PLANNING

The study to be performed between February 2014 and January 2015. The first few months are dedicated to defining the study's focus, formulating research questions and establishing a theoretical framework. Congruently the research design is made and accordingly, appropriate case projects are chosen. The overall planning is depicted in figure 6. The arrows stand for formal presentation and feedback moments.

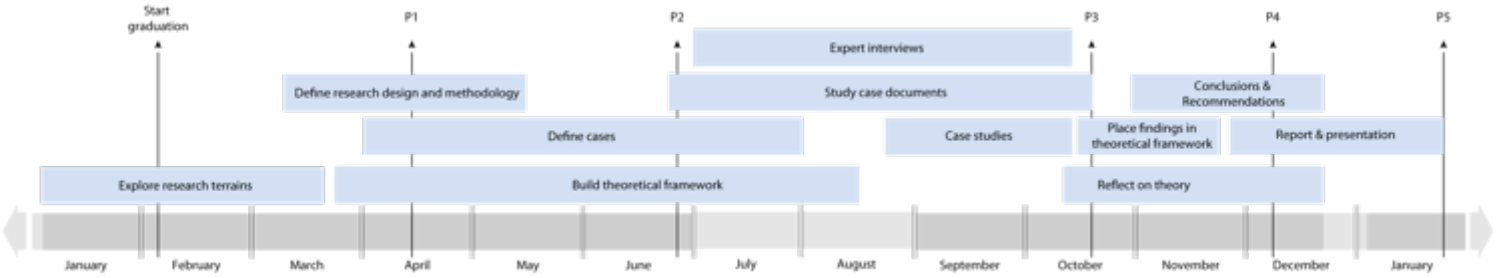


Figure 6. Planning graduation research (own illustration)

While literature study may be started, after the first half year the actual research is to take place. Expert interviews are to be kept over the summer and case studies are to take place in the early fall. Afterwards, findings are to be placed in the developed theoretical frameworks and compared. Ultimately, this results in conclusions and recommendations, which can be sharpened over the last month. A more elaborate planning of this phase is illustrated in figure 7.

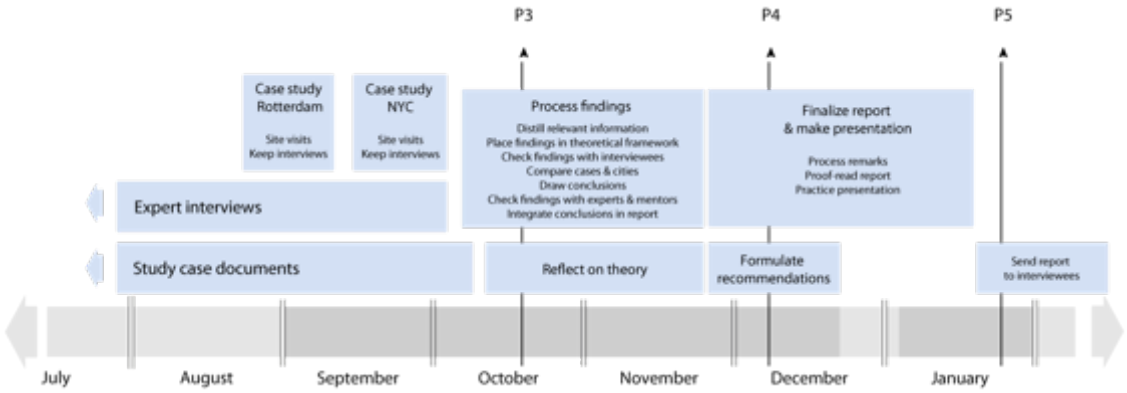


Figure 7. Planning second half graduation research (own illustration)

I. VALIDITY AND GENERALIZABILITY

The validity of a study checks if the concepts intended to study is measured through the research design. It is thus largely determined by the accurate and consistent measurement and processing of variables. First of all, the research methods as explained above are considered most applicable to study the content of the strategies as well as the process of area development. Triangulation, the use of multiple forms of information gathering (content analysis as well as semi-structured interviews) adds to the validity of the findings (Van Thiel, 2010).

To ensure internal validity of the results the quality of the examined documents needs to be ensured on the aspects of authenticity, credibility, representativeness and meaning (Bryman, 2012, p. 516). Furthermore, as the documentation will be in different languages, proper translation of key terms needs to be ensured for valid comparison. True understanding of the used terms is to be checked with experts or the document editors themselves. To measure if project outcomes will actually meet the envisioned goals of the strategies, indicators of effectiveness need to be defined. The validity of the findings on this aspect largely depends on the precise definition of these indicators. They need to be detectable in the written goals of the strategy as well as in spoken research material on the outcomes in the interviews with case actors.

The interviews consistency is obtained by addressing the same questions to the various interviewees (Van Thiel, 2010). This way different perceptions and opinions are measured. In the semi-constructed interviews therefore several general questions form the basis. This is supplemented with a topic list to ensure the discussion touches on all relevant themes. Besides, attention needs to be given to the formulation of the interview questions. Here we need to prevent the steering on specific anticipated answer patterns (Bryman, 2012). Besides, as interviews will be taken in Dutch as well as English, again proper translation of the terms is to be ensured.

External validity checks if the findings are generalizable to other cases of the studied concepts and phenomena. Every development process is different and largely shaped by factors like the behavior of individuals and local characteristics of the economic, social and spatial environment. This hampers the transferability of conclusions to other cases of area development. However we consider that by mapping these factors and placing them in a framework it is possible to distill more general conclusions. Thus the transferability and relevance of the conclusions to other cases of building flood resilience in area development projects within the two cities is aimed for.

A possible limitation to the generalizability of the conclusions and recommendations for other (delta) cities lies in the similarities of the two cities. For instance, New York and Rotterdam are both located in developed countries in the Western world. This will be reflected in certain processes or cultural aspects of development markets, shaping the environment of the case studies. Prior to the application of any of the conclusions or recommendations in other cities, the local development processes and differences in social structures should be taken into consideration. Besides, the structures of urban planning policies vary largely throughout the Western world and even within specific countries. While this difference is on the one hand part of the validation of a comparative research, it imposes difficulties on the further transferability of the conclusions to other cities or urbanized delta regions in Europe or the US.

Lastly, both cities have characteristics that set them apart from any other city in their respective countries or state. Rotterdam is one of the largest seaports in the world, thus forming one of the main drivers for the Dutch economy. Furthermore, Rotterdam aims to be a leading international example in climate adaptation of the urban environment. New York City on the other hand is a metropolis, and is a prominent global center for economic activity, culture and innovation. These characteristics imply both advantages as well as restrictions for adaptation to flooding. However, other cities in the Netherlands or the US may identify with most of the policies and processes as featured in this study. Therefore, keeping the specific features of Rotterdam and NYC in mind, the conclusions aim to be largely transferable to other cities in the US and the Netherlands that aspire to enhance their resilience to flooding.

3. THEORETICAL FRAMEWORK

The main progression of academic discourse, contemporary professional practice and scientific discussion regarding the focus subjects of this research are presented in this chapter.

A. URBAN PLANNING AND DEVELOPMENT IN A NETWORK SOCIETY

In current scientific discourse urban planning is interpreted differently by various authors. For instance, Healey *et al.* (1988) describe urban planning as "*an explicit program for the management of land-use and environmental change*". This first description seems fitting and applicable in describing a predominantly state-controlled spatial planning policy, an approach predominant in for example the Netherlands up to the 1990-ies. Adams (1994, p.2) on the other hand emphasizes the central role of the market process in development, referring to a more neoliberal approach to public planning policy. He defines urban planning as "*a form of state intervention in a development process dominated by the private sector*" (Adams, 1994, p. 2). Both perspectives however imply that in practice, urban planning is concerned with the drawing up plans and creation of visions for the future physical arrangement and condition of a community.

ECONOMIC MARKET THEORIES

In order to get an overview and compare interventions as a result of the adaptation strategies studied in this research, their according planning instruments are categorized. An appropriate framework is developed by Tiesdell and Allmendinger (2005). This model is based on the notion that a strict separation of market and state is often not achievable, in practice as well as theory (Alexander, A transaction costs theory of planning, 2001). Even though at first sight this seems contradictory with the urban planning defintion of Adams (1994), the model is considered usefull in classifying the intervening behaviour of public actors. This, because the model is based on the underlying notion that agencies, whether public or private, can actively shape the structure of the markets (Tiesdell & Allmendinger, 2005). Thus, although not the focus of this research, also corporate strategies could be considered a form of urban planning if they entail interventions in the development market. Congruently, Tiesdell and Allmendinger (2005) define *public* urban planning as "*...the set of intentional government interventions in the land and property development process intended to achieve desirable societal objectives."*. The model of Tiesdell and Allmendinger will be further explained in this chapter's section on planning instrument typology.

Academic discourse on the economic interpretation of the relationship between development markets and planning policy is dominated by three main approaches: neo-classical economics, welfare economics,[3] and increasingly new institutional economics (Adams, Dunse, & White, 2005). Neoclassical economics regards planning policy as directly affecting the overall quantity of market supply and demand, where welfare economics considers the extent to which planning policy is effective in overcoming failure of this market (Adams & Tiesdell, 2010). New institutional economics focuses on the capacity of planning policy to influence (reduce of increase) market transaction costs (Adams, Croudace, & Tiesdell, 2009), essentially changing the market environment. The approaches have in common to consider the dichotomous position of the market to planning. On the one hand the market is open to influence, while on the other hand profit is its main driver and, implying a limitation to external influence (Adams & Tiesdell, 2010).

INSTITUTIONAL MARKET THEORY

In explaining the intervention and outcomes of policy decisions on markets, the market theory on which this research is based is rooted in the new institutional strand of the economics market theories (Tiesdell & Allmendinger, 2005). According to this perspective, institutions, which can be either relationships, organisations and/or rules, reduce transaction costs of production and exchange and thus lower the costs of voluntary cooperation. Within the reasoning of new institutional economics, the following theories can be distiguished:

- Transaction costs theory
- Property rights theory
- Public choice economics
- Game theory

A supplementary perspective explaining the market is the 'political economy of institutionalism' (Adams, et al., 2003). In this approach, institutions are more broadly defined as shared and reinforced habits within a society of group (Hodgson, 1997, p. 679). This implies that markets can be seen as social constructs, in which the understanding of context, process and social relations is essential in explaining market operations (Tiesdell & Allmendinger, 2005, p. 62).

In development markets a structural framework can be defined, shaping agents actions while simultanesously being shaped by their behaviour. This framework is composed by actors'

- resources (for instance, knowledge, information, land, labour and capital)
- rules (agents' awareness of the framework's guidelines for socially acceptable behaviour)
- and ideas (background knowledge, used for strategy development) (Healey & Barrett, 1990).

The strands of theory from both the perspective of new institutional economics as well as political economy of institutionalism form the basis for the planning tool typology as developed by Tiesdell and Allmendinger (2005).

THE NETWORK SOCIETY

Over the last couple of decades, technological, economic and environmental developments have changed the structure of society (Florida, 2002; Castells, The rise of the network society: The information age: Economy, society, and culture (Vol. 1), 1996). One of the theoretical strands on the newly evolved societal structure is based on the concept of the 'network society', as introduced by Castells (1996). He described a network society as "*...a social structure based on networks operated by information and communication technologies based in microelectronics and digital computer networks that generate, process, and distribute information on the basis of the knowledge accumulated in the nodes of the networks.*" (Castells, 2006, p. 7).

This shift has considerable implications for various social structures and processes, not in the least affecting the usage and perception of space (Castells, 2006). In a network society physical proximity is considered less important for social organization and economic structures. Furthermore, stimulated by a positive economic climate and general social emancipation, patterns in space consumption have evolved from a quantitative focus to the search for high-quality location (Urry, 1995). Therefore, also the practice

of spatial planning has changed dramatically (Hajer & Zonneveld, 2000). Important contributors to the academic discussion of relating the network society to the goals and principles of planning practice are for instance Healey (1997) and Hall (1993).

As a result of this changing society, spatial planning finds not only its task changing, but also its tools, partners and working environment. Existing institutional arrangements are no longer capable to accommodate the intensified exchange between actors (Kickert, Klijn, & Koppenjan, 1997). As a result, planning authorities often found themselves not addressing the right actors on applicable topics in the right context (Kickert, Klijn, & Koppenjan, 1997). Therefore, planning parties in most Western countries are reconsidering their approaches to intervention in the development process. Common in recent experiments is the tendency towards more collaboration between public and private parties (Kickert, Klijn, & Koppenjan, 1997). As we will see further on, this is also perceived in both Dutch and Northern American spatial planning practice.

To translate this societal shift to urban planning in order to gain understanding of the development process, a network can be described as a formal structural system of interconnected nodes. Networks are open structures that evolve by adding or removing nodes according to the changing requirements of the programs that assign performance goals to the networks. In this respect, these programs are decided socially from outside the network (Castells, 2006). As described by Castells (2006, p.7), once programs are inscripted in the logic of a network, the network will "*...follow the instructions, adding, deleting, and reconfigurating, until a new program replaces or modifies the codes that command its operational system*.". It is exactly in this inscription, or implementation, of the planning policies and its according interaction with the development network where this study focuses on. Therefore, the interpretation of urban adaptation strategies and according planning policies as these programs and the development process as a network seems a valid approach for this research. The consideration of the development process as the interaction of network-actors has been formulated as the "actor-network approach" by Koppenjan & Klijn (2005), described the last section of this chapter.

DUTCH SPATIAL PLANNING AND DEVELOPMENT PRACTICE

Dutch spatial planning has traditionally been renowned for its effectiveness and comprehensiveness (Hajer & Zonneveld, 2000). Prevailing corporatist practices of negotiation, complemented with representative democratic political environment, generated involvement of various stakeholders while providing consensus on the outcomes (Hajer & Zonneveld, 2000). This integrated approach also implies technical, legal, political, economic, demographic, ecological, and socio-cultural aspects of a project all to be taken into account throughout the development process (Daamen, 2010). Planning practice in the Netherlands can thus be described as formalistic and rationalistic and are based on the Rhineland model of socio-political structures (Heurkens, 2012).

Often the approach is applauded for its integrated organization: *"… spatial planning is conducted through a very systematic and formal hierarchy of plans from national to local level, which coordinate public sector activity across different sectors …*" (European Commission, 1997, p. 36). This government-controlled planning approach can be understood to come forth from the socio-political concept of the welfare state (Tasan-Kok, 2012), predominant in the Netherlands. However, it is argued that since the 1990-ies this way of working is no longer effective due to changes in societal and institutional context (WWR, 1998).

First of all, the network society poses challenges to the principal focus of strategic planning on land-control plans. Land-use regulations are to take on a more complementary function in planning. Integration of planning with other socio-spatial processes needs to be sought. Also, regional, rather than national plans are considered to better fit the scale of current spatial processes, challenges and solutions. Therefore, answering to societal needs instead of administrative organization, these regional plans should replace national plans at the top of legal and political hierarchy (Hajer & Zonneveld, 2000). This approach would also bring more autonomy as well as authority to regional governmental bodies and their policies. This notion makes the focus of this research, urban strategies, in general covering not only the city itself, but also the wider urbanized region, all the more relevant.

NEOLIBERALIZATION

The rise of the network society, as well as (partial) departure from welfarist ideology towards a more liberal political inclination have started a shift towards the neoliberalization of public planning since the 1990-ies (Heurkens, 2012; Hajer & Zonneveld, 2000). Therefore, the system of planning in the Netherlands needs to be rethought fundamentally to ensure continued legitimate and reasonable effective spatial policy (Hajer & Zonneveld, 2000).

With regard to the former rigid and all-comprehensive approach, ever since the late 1970s academic discourse has emphasized the need for greater flexibility and the loosening of rigid rules in spatial planning (Healey & Williams, 1993). This, to allow for more initiative and influence of private market parties in the development process. This call is an answer to processes like globalization and an increase in the mobility of capital, resulting in large-scale capital investments in cities, often taking the form of large-scale property-development projects (Healey & Williams, 1993). This process of neoliberalization not only took place in spatial planning and can in general be described as a "*...prevailing pattern of market-oriented, market-disciplinary regulatory restructuring…*" (Peck, Theodore, & Brenner, 2009, p. 51). Since the 1980-ies, the neoliberalization of social, economic and political systems in the Netherlands has pervaded also urban planning and development.

Neoliberal planning however, is marked by an internal contradiction. Where liberal conviction is based on limiting governmental intervention as much as possible, planning as mentioned is exactly the practice of this intervention. Especially in urban development, mainly driven by market dynamics, this contradiction is problematic as it is generally understood that regulation here is necessary for proper functioning of the and urban environment and thus the spatial market itself. In the absence of control, private developers, builders and property owners are free in transforming the spatial environment, which in the urban context has a direct influence on other areas and buildings. Concluding, planning is a prerequisite for the sustained practice of neoliberal urban development (Peck, Theodore, & Brenner, 2009). Neoliberal planning therefore finds its legitimacy in encouraging and stimulating market dynamics by providing flexible and negotiable strategic planning (Peck, Theodore, & Brenner, 2009) as opposed to rigid and regulatory policies.

Moreover, since the 1980-ies urban planning is increasingly marked by the active involvement of a diverse group of stakeholders. Next to private organizations and (semi-)public bodies now also advocacy groups, individual residents and public-private partnerships take part the process of development. All these actors are at the same time growing increasingly dependent on the neoliberal debt-oriented economy, in being responsible for their own actions and investments. This trend has accelerated tendencies of entrepreneurialism, consumerism and property-led development. This in turn has further

emphasized the position and influence of private market actors on urban (Peck & Tickel, Neoliberalizing space, 2002).

As an effect of the need for a more local and interactive approach we can also see a shift towards more flexible, short- and middle-range planning (Tasan-Kok, 2012). Furthermore, the focus of planning practices shifted to development processes and projects (Albrechts, 2004; Healey & Williams, 1993). However, this raised the need for overarching projects in bridging the gap between spatial policies, plans, and projects (Albrechts, 2006). To find this coherence, 'strategic spatial planning' is proposed by planning scholars since the early 1990-ies (Albrechts, 2004; Healey, 1997). As a solution for the growing complexity and otherwise unguided development practice, coordinating strategies would form the umbrella of individual projects (Tasan-Kok, 2012).

NORTH-AMERICAN SPATIAL PLANNING AND DEVELOPMENT PRACTICE

The approach to spatial planning in the United States (US) has largely been shaped by the country's liberal socio-political background, also characterized as the Anglo-Saxon societal model (Fainstein, 2001; Hackworth, 2007; Heurkens, 2012). In practice, this entails limited power and position of planning institutions and policies due to the internal contradiction of neoliberal planning as described above. However, the purely regulative role of the planner to stimulate market dynamics now seems too limited (Peck, Theodore, & Brenner, 2009, p. 51). Firstly, neoliberal planning has been linked with the intensification of economical, social and spatial inequalities. Furthermore, the importance of involvement of local stakeholders in planning processes and fostering of bottom-up approaches in contemporary society is growing. Lastly, the increased emphasis on spatial quality of the urban environment asks for more coordination of development projects. Therefore, the rise of the network society has changed the task and effective approaches of *neoliberal* planning institutions as well. Thus, traditional neo-liberal planning practice has become ineffective in being too passive to deal with property-led urban development (Fainstein, 2001).

ROLL-OUT NEOLIBERALISM

Therefore, amongst various cities in the United States there seems to have been a shift in planning policy. From the neoliberal pattern of deregulation dominating most cities during the 1980s, an emergent phase of more public intervention can now be perceived. This 'roll-out neoliberalism' implies active state-building as well as regulatory reform (Peck & Tickel, 2002). This shift is marked by an increased focus on purposeful construction and consolidation of neoliberalized public organizations, regulatory relations and modes of governance rather than the avoidance and resisting of social-collectivist tendencies (Peck & Tickel, 1995). This policy shift reflects the need for a more active planning response to unwanted emerging spatial patterns of segregation and growing inequalities while at the same time creating quality of place (Hajer & Zonneveld, 2000).

FACILITATING PLANNING POLICY

Concluding, contemporary urban development is characterized by the interplay of influences and interests; project realization cannot solely rely on one actor (Heurkens, 2012). This, as a result from recent developments in society and according impacts on spatial planning. In realizing this, planning parties in most Western countries are reconsidering their approach to interventions in the development

process. Common in the policy shift and recent planning experiments in the Netherlands as well as the United States (US) is the tendency towards more collaboration between public and private parties (Kickert, Klijn, & Koppenjan, 1997). In the Dutch practice this new balance entails limiting public control and investment, whereas in the US an increase of public intervention is perceivable.

Thus, public planning policy in urban area development of both of the studied cities is moving towards a more *facilitating* approach (Schaller & Novy, 2010). This trend is the reason for the focus of this research on private-led urban development. In planning, 'leading' and 'facilitating' are relative terms. In essence, 'leading' indicates providing a main direction for projects and taking according actions whereas 'facilitating' then involves complementing and supporting these tasks (Heurkens, 2012, p. 57). In line with the respective national trends, for New York the shift to facilitating means a departing from former neoliberal policy, taking on a more active role in development projects while for Rotterdam it entails a reduction of public involvement and its dominating role. In practice, both shifts result in the cities' governments considering their responsibilities to lie in *actively stimulating socially wanted spatial developments while limiting public spending by enhancing market actors' abilities to invest*.

ORGANIZATIONAL LEARNING IN URBAN PLANNING

To cope with the uncertainties and dynamics coming forth from these trends is one of the most important challenges of urban development policies. It implies both the creation of new, flexible policies, as well as adjusting existing policies to the new situation. This adaptability of urban planning policy is largely based on the learning capacity of the public body on organizational-, team and individual level of responsible authorities (De Hoog, 2012). Learning in this context can be interpreted as the collecting and creation of knowledge resulting in a change of (public) activities in urban area development (De Hoog, 2012). It is a continuous and iterative process, connecting the application and building of knowledge. A certain awareness of this process stimulates involved actors to actively promote procedural changes by creating information-networks and arenas for interaction (De Hoog & Daamen, 2013). In order to judge the impact of certain policies, and learn from experiences, the potential effects of both policy frameworks as well as actor relations and behavior are to be explored (Heurkens, De Hoog, & Daamen, 2014). This need for organizational learning in area development underpins the aim of this research to add to the body of knowledge of regarding strategy implementation in urban planning.

Further in this chapter the theory used in this study to frame planning practice of Rotterdam and New York City (NYC) is described. Policies are categorized based on the distinctions proposed by Tiesdell and Allmendinger (2005). The network approach is selected to frame the cases' processes. This approach, developed by Koppenjan and Klijn (2004) and is based on behavioral, actor-network/network-actor theories (Boelens, 2010). To illustrate the reasoning behind the choice for these models, first overarching economic and later also organizational theories are briefly discussed.

The current urban planning policies of Rotterdam and NYC are further elaborated upon in the respetive city chapters.

B. CLIMATE ADAPTATION

CLIMATE CHANGE

Climate change can be described as shifts in the state of the global climate and according alterations in the mean and/or the variability of its properties, persisting over an extended period, typically decades or longer (IPCC, 2014). The Convention on Climate Change (UNFCCC) specifies the influence of human activity and defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.' (UNFCCC, 2014).

Regardless of their cause, the effects of climate change are currently observed and are expected to grow significantly in the future. These effects are affecting our spatial environment, bringing risks for social and economic systems. However, uncertainty about the severity and time frame of the effects still persist (IPCC, 2014). Furthermore, continued discussion about the effectiveness of proposed responses hampers action to be taken. To which extent the risks of climate change for social and economic systems are accepted is revealed by society's wish pay for precautionary measures. This is reflected by major differences between countries' response actions (IPCC, 2014). Nevertheless, it is generally understood that we should start making changes to the spatial environment regarding these impacts. Following the predominant academic view in this field, this research makes the distinction between adaptation, mitigation and coping as responses to climate change.

ADAPTATION

The IPCC (2014) defines climate adaptation as actions seeking "*...to moderate or avoid harm* [resulting from the process of climate change] *or exploit beneficial opportunities.*". These actions may come from human behavior or from natural systems. Keenan (2014a; 2014b, p.51) describes adaptation with regard to climate change as "*a framework for proactively addressing a series of accelerated challenges in the human, built, and natural environments which have little to no historical precedent in their degree or pace of relevancy*.". The common interpretation of adaptation thus implies working towards a *progressive* state wherein the future state is improved beyond its predicate state. In this research adaptation entails both *building capacity to respond to anticipated effects of external change as well as limiting the impact these effects*.

Besides adaptation, mitigation is the other major form of responding to climate change. Mitigation is concerned with preventing effects on the current state in limiting the external stimuli of change. Mitigation thus intends to solve the underlying problem or at least aims to limit the possibilities of it getting worse. However, there is still debate on the causes and driving forces of climate change. Besides, as there is little uncertainty regarding the occurrence of climate change, a sole focus on it's causes, neglecting reaction to the effects, seems too limited (Keenan, 2014b). Furthermore, mitigation strategies work on the long-term and their beneficial effects are hard to predict and measure. Therefore, adaptation investments can be considered to allow for more economic arguments in their decision-making. This explains why even though mitigation actions are essential in an integrated response to climate change, these are not the focus of this research. Nevertheless, many projects feature both mitigation as well as adaptation measures. For example, a green roof might help the building and its surroundings in dealing with increased rainfall but might congruently decrease environmental pollution.

Lastly, inaction or coping can be named as a response to climate change. This approach might be uninformed or can be rooted in a different perception of the problem or its effects. Inaction is not considered a sustainable strategy when it comes to public response climate change (OECD, 2009; Keenan, 2014b).

In line with the concept of adaptation, according to IPCC (2014) *planned* adaptation implies "*...decisions and measures within society that help to reduce the adverse impacts of climate change..."* as well as acting on "*...the potential to realise new economic opportunities*.".

ADAPTATION COMPARED

Monitoring, comparing and learning are important components of adaptation initiatives, especially considering the complexity of adaptation challenges across scales and in different contexts (IPCC, 2014, p. 27). The establishment of networks, alliances and collaborations between various cities reflects this need for learning and comparison of practices. However, a thorough understanding of each city's specific context, its systems and patterns of both urban development and water management is crucial for the proper application of practices that have been found successful in other regions. This stresses the relevance of this research in comparing international approaches and drawing lessons regarding their effectiveness. The implementation of adaptive strategies in general, building resilience of the urban fabric for the widespread effects of climate change is considered parallel with the particular focus on water management as addressed in this research. The conclusions of this research thus may also prove valuable for urban regions developing effective implementation procedures.

In the United States (US), active government response is primarily carried out on municipal level, which traditionally has relatively high autonomy within the country's political organization. Adaptation planning here mainly involves incremental adaptation assessment and planning. Proactive adaptation is occurring in energy and public infrastructure to protect long-term investments (IPCC, 2014, p. 22). National response mostly has resulted in strategies and visions, stimulating local government activities, and reconsideration of public emergency insurance schemes[1]. However, with the striking of Hurricane Katrina, Hurricane Sandy and several other extreme weather events, the need for a more comprehensive response has become apparent. On the other hand, in Europe, adaptation policy has been developed across all levels of government. Adaptation planning initiatives are being integrated into coastal and water management, into environmental policy, spatial planning and also into disaster risk management (IPCC, 2014, p. 19). This is also why the US has started several initiatives in importing European expertise to set up adaption programs (see f.e. Rebuild by Design, 2014; Dutch Dialogues, 2014).

CITIES AND CLIMATE ADAPTATION

Historically, the success of settlements is mainly determined by their capacity to adapt to changing physical, economic and social circumstances. In a globalized world, with cities competing for social, industrial and economic activity, disadvantaged areas, not able to adapt will inevitably struggle (White, 2010). Over recent decades, cities are facing increasing global competition for the settlement of residents, industries and businesses and attraction of economic activity and trade (Castells, 1996; Florida, 2005). These notions result in the necessity for cities to consider the effects climate change can have on their operations and, thus, position in the global market. Key lies in understanding that the significance

[1] Further elaborated upon in chapter 4.

of the effects of climate change is on not only found in the physical urban form, but also in its social and economic systems. Thus, anticipating climate change, cities are now facing huge challenges, as well as opportunities, to sustain and possibly enhance their competitiveness.

Several specific characteristics of urban areas makes their adaptation particularly relevant (Birkmann, Garschagen, Kraas, & Quang, 2010):

- Their location is often prone to natural hazards. It is no coincidence that two-thirds of all major cities worldwide are located in coastal areas with less than 10 m elevation (McGranahan, Balk, & Anderson, 2007). The strategic characteristics that stimulated the settlement of people and enabled economic activity in the first place now impose a threat.
- Cities form the center of socio-economic systems and host a large number of people and assets in a relatively small area.
- Urban areas are often marked by an increased vulnerability and instability, due to the density of space-usage and interconnectedness of processes.

Furthermore, cities shape social, spatial and economic development on local, regional and global scales. Urban regions form nodes of economic activity, decision-making and power and their dynamics are both the driver as well as the result of innovation, creativity and wealth (White, 2010). On the other hand, as a result of the multitude of human activities, cities are also the main source of environmental pollution. One can conclude that adapting cities is essential not only because of their vulnerability and global dependency of their performance, but also because of the opportunity to counter the process of climate change simultaneously by linking also mitigation responses.

However, the characteristics of urbanity not only change the consequences and risks of the anticipated effects but, perhaps more importantly, influence the ways these can be dealt with. Characteristics like density and the connectedness and interdependency of various systems pose several difficulties for the realization of climate adaptation. These characteristics for example hamper the direct application of national climate adaptation policies. Especially since up until recently strategies for climate change adaptation where foremost focused on rural areas (Birkmann, Garschagen, Kraas, & Quang, 2010). However, while many of the aspects of urban settlements imply the challenge of adaptation to be magnified and make finding solutions less simple, some might also provide increased opportunities for integrative solutions.

ADAPTATION STRATEGIES

As mentioned, the capacity of urban regions in adapting to changes in the social, economical and physical environment is crucial for their sustained existence (White, 2010). Often instigated by natural disasters, over the last couple of years practitioners in the water and environmental sector, relevancy of adaptation has been raised on the agenda of scientific advisors as well as city authorities. General understanding is that this adaptation challenge should be approached from an integrative perspective, combining changes in social and economic processes with adjustments to the physical urban fabric. This has lead to the development of climate adaptation strategies by various cities around the globe. With the formulation of these strategies the city has the opportunity to develop policies that enable both public and private actors to respond to a variety of interrelated challenges (Keenan, 2014b), for example increasing flood resilience while enhancing the urban environment and bringing back social segregation.

The strategies differ in the direct and indirect consequences of climate change they deal with as well as the proposed responses. However, typically a large part of the content of these strategies is focused on general goals and visions and thus is not city-specific. The next step of translating these ambitious statements to more concrete measures is often lacking (Birkmann, Garschagen, Kraas, & Quang, 2010). However, some cities *have* translated these general goals to the creation of new or adjustments of current policies. These cities, including NYC and Rotterdam, are leading examples for other adapting cities. The specific measures are often treated in a separate document and focus on one more-or-less demarcated effect of climate change, for example energy supply, food provision or water management. These reports mainly focus on responsibilities for public parties, but can also provide guidelines for private actors.

URBAN FLOOD RESILIENCE

One of the most prevalent effects of climate change cities are faced with lies in water management problems. Particularly the issue of increasing water excess and flooding, as examined in this study, is expected to form one of the most pressing challenges for cities located near the water. The IPCC lists flooding and its effects as both first and second key risk factor of climate change (see text box below). A multitude of reports are written on the increase of flood risks and its physical, social and economic (Shardul & Samuel, 2008; OECD, 2009) effects. Several studies correspondingly focus on propositions to concur these anticipated effects (OECD, 2009; Rijke, 2007).

The challenge imposed by flooding is most apparent in cities located in delta regions. Besides more frequent periods of extreme weather, bringing peak-loads of rainwater to disperse, deltas are confronted with both the gradual process of rising sea levels as well as the seasonal fluvial added water load. Moreover, most delta regions deal with the issue of land subsidence (OECD, 2009). However, the impact of flooding of cities is increased not only by the rising chances of these events, but also by the aggravation of the effects resulting from urbanization and concurring densification. This is aggravated by the expectation of cities located in delta regions to grow especially fast. More than 2/3 of all cities worldwide with a population of more than 5 million are located within coastal areas of less than 10 m

Global key risk factors climate change according to IPCC (2014):

i. Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea-level rise.

ii. Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions.

iii. Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.

iv. Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas.

v. Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings.

vi. Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions.

vii. Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.

viii. Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods.

elevation (McGranahan, Balk, & Anderson, 2007). This of course increases the number of people and assets exposed, and with that, the damage flooding events can impose (OECD, 2009). These developments imply that deltas' main advantageous characteristic; water, is now is seen as a threat for cities located in these areas. Quite a change considering that up until recently just this connection of water systems was the main driver for settlement and prosperity in these areas (Meyer, City and port: Urban planning as a cultural venture in London, Barcelona, New York, and Rotterdam: Changing relations between public urban space and large-scale infrastructure., 1999). Thus, the challenge for delta cities lies in re-establishing the beneficial relationship between the domains of land, water and climate (White, 2010).

Moreover, delta regions are traditionally places for import, export and commerce and often form crucial nodes for international trade (Meyer [1999], Daamen [2010], Aarts, Daamen, Huijs, & de Vries [2012]). Therefore the impacts of their systems failing are expected to be extensive and more widespread than of inland cities (OECD, 2009).

Together, these developments make that not only the probability, but also the consequences of flooding are rising rapidly. In port cities, by 2070 the value of assets exposed to a 1:100 year flooding event is projected to amount to roughly 9% of global GDP (Nicholls, 2008). As shown by previous projects of increasing flood resilience like the Thames Barrier and the Dutch Delta Project, implementation of protection programs takes 30 years or more (Nicholls, 2008). This indicates the level of urgency to take action in order to prevent major disasters in the coming century.

INTEGRATED ADAPTATION STRATEGIES

The congruent processes of climate adaptation and urbanization both impose the need for change of the urban fabric. In most cities these processes are currently being carried out separately, both competing for scarce space. This approach is considered to be no longer sustainable in cities were increasing pressure is put on function and quality of the living environment. In recent years extensive investigation has been done on the potential benefits of the integration of water management and spatial planning to assist development of more resilient cities has been extensively investigated. The opportunities found to capture additional benefits are ample and indicate that integration of climate adaptation measures with spatial planning is indeed the way forward (Teeuw & Luising (2005), Van Hal, Diepenmaat, & Ettekoven (2011), Davoudi, Crawford, & Mehmood (2009)). The principle of this integration is illustrated in figure 8.

Figure 8. Integration of water management and spatial planning domain (own illustration)

In order to achieve this integration, comprehensive approaches for development policies at national, sectorial and project levels need to be set up (OECD, 2009). In some regions and cities a sense of urgency, often caused by recent extreme weather events, has started this process. This is currently resulting in the development of urban climate adaptation strategies. These strategies aim at improving climate resilience in general by means of urban planning and policy. This implies that not only spatial but also social, economic and political interventions

are envisioned. The content of these strategies varies according to the issues the respective cities are dealing with. The strategies thus encompass a broad long-term vision for future city development as well as more specific adaptation measures. In some of these strategies also proposals for legislative embedding, organizational structure and available funding schemes are featured. As mentioned, most of the strategies are initiated as a direct response to recent disasters, however, some are purely preventive.

With the formulation of these strategies cities have the opportunity to develop policies that enable both public and private actors to respond to a variety of interrelated challenges (Keenan, 2014b). For example, as focused on this research, increasing flood resilience and the urban area development.

Currently, Western countries are considered to have the technical and economic capacity to carry out the proposals of these strategies (Veerbeek, Ashley, Zevenbergen, Rijke, & Gersonius, Building adaptive capacity for flood proofing in urban areas through synergistic interventions, 2010). However, realization seems to be hampered. Several professionals, as well as scientific studies[2] conclude that the current challenge for implementation lies in the development of new forms of urban governance. They express the need for a paradigm shift in (urban) water management towards the improvement of planning processes, rather than the focus on the adjustment of physical structures (Birkmann, Garschagen, Kraas, & Quang, 2010). This implies the strategic linking of different spatial and temporal scales in adaptation planning. Another prerequisite is the acknowledgement of and communication between the various fields of knowledge and stakeholders involved in this challenge is crucial. Lastly, the integration of adaptation measures, translated in policies, tools and norm systems in the current urban planning structure is crucial (Birkmann, Garschagen, Kraas, & Quang, 2010).

"Digging and raising" (source: Helpdesk Water [2008])

[2] a.o. Birkmann, Garschagen, Kraas, & Quang, 2010; Rijke, 2007; Keenan, 2014; Timmermans, Vercauteren, Hasman, Gonzales, & Papenborg, 2013 and Veerbeek, Ashley, Zevenbergen, Rijke, & Gersonius, 2010

FLOOD RESILIENCE MEASURES; POLICY CONTENTS

The strategies and according proposed plans cover a range of policy options, including a combination of upgraded protection infrastructure, managing subsidence (in susceptible cities) and land use planning to both reduce vulnerability. Furthermore, new developments are to be focused away from floodplains, and preserving space for future infrastructure development, selective relocation away from existing city areas, and flood warning and evacuation (Nicholls, 2008). This study, focusing on urban development, considers mainly the measures for upgraded protection and land-use planning. Currently, within the domain of water management a shift is taking place in the view on how societies should deal with water issues. Where water management measures were previously often considered as a burden on the built environment (Teeuw & Luising, 2005, p. 11), nowadays water solutions for water excess or shortages are more and more perceived as opportunities (Veerbeek, Ashley, Zevenbergen, Rijke, & Gersonius, 2010). Potential benefits can be realized by proper design, extending water retention, preventing the diffusing of polluted water and bringing back the level of water usage (Teeuw & Luising, 2005). Crucial is the integration with other functions and a focus on benefits for other stakeholders. As a result, urban water management and, more specifically, flood resilience now has to deal with not only technical aspects, but institutional, socio-economical and ecological factors as well. For example, more room for surface water can be necessary to create extra retention space but can simultaneously add extra quality for the urban environment. This is a mere illustration of how the integration of water management measures can add to the sustainability of the built environment, more of which are provided by Teeuw & Luising (2005).

Zevenbergen (in Timmermans, Vercauteren, Hasman, Gonzales, & Papenborg, 2013). has indicated that flexibility in turn is a key factor in sustainable flood resilience measures . This, to respond to uncertainties regarding new conditions, technologies and dimensions of the projects. Furthermore, Timmermans proposes that in solving specifically the issue of the implementation process with stakeholders a learning culture amongst delta cities can help (Timmermans, Vercauteren, Hasman, Gonzales, & Papenborg, 2013). Special networks for adapting cities in delta regions, for example C40 Connecting Delta Cities and the Delta Alliance[3] reflect this need.

IMPLEMENTING ADAPTATION

Concluding, urban processes have been recognized by the water management sector in providing opportunities for the integration of watermanagement responses to climate change (Zevenbergen, Veerbeek, Gersonius, & van Herk, 2008). To achieve this, not only public policy and legislation need to be changed. All urban development stakeholders like building owners, urban planners, builders, professionals and other parties need t to recognize the urgency of building resilience and need to be stimulated in their efforts (Veerbeek, Ashley, Zevenbergen, Rijke, & Gersonius, 2010).

"What we need is a disaster!"; "A DISASTER! But I'm not going ot invest in it" (source Helpdesk Water, 2008)

[3] see also http://www.c40.org/networks/connecting_delta_cities and http://www.delta-alliance.org/

To obtain this sense of urgency is crucial in achieving cooperation in building resilience by actors whose primary concern does not lie in water management. This link between urgency and cooperation is clearly described by the receptivity model of Jeffrey & Seaton (2004). This model, illustrated in figure 9, describes the transitioning process actors need to go through to actively adopt the goals of the adaptation strategies in their practice. The various steps explain how this process of adopting a new way of working and, in our case the implementation of strategies aimed at building flood resilience, can be quite extensive.

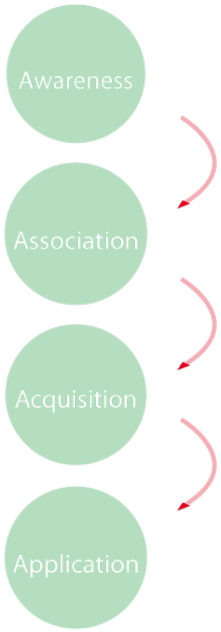


Figure 9. Phases in actor receptivity according to Jeffrey & Seaton (2004). (own illustration)

MAINSTREAMING SOLUTIONS

One approach to implement climate adaptations while taking into consideration the strategic aim of integration is proposed by (a.o) Veerbeek *et al* (2010), Keenan (2014) and Rijke (2007). This approach entails the mapping of possibilities to *mainstream* climate adaptation measures with ongoing economic and political cycles as well as those of urban renewal. This mainstreaming primarily intends to limit or disperse the costs, increasing the chances of implementation. Furthermore, it might provide valuable insight in the involved urban systems and networks. This, in turn, can lead to the identification of new stakeholders and possible collaborations bringing forth more advantageous and sustainable solutions for the urban environment.

By identifying appropriate entry points in various planning cycles to apply planning instruments, the chances of implementation and successful realization can be increased (OECD, 2009). In urban planning and development this approach implies adaptive measures to be integrated in the early project stages of design and problem definition instead of being added separately afterwards (Veerbeek, Ashley, Zevenbergen, Rijke, & Gersonius, 2010). To give an example, major building renewal cycles typically occur every 30-50 years. Significant infrastructure renewal cycles are planned at timescales of more than 100 years. Here a chance lies for public authorities to anticipate these works and enable adaptive measures to be integrated in the next design for renewal.

Mainstreaming in this sense is similar to the strategic management concept of implementation intention (Gollwitzer, 1999) which implies an anticipated future situation (opportunity) to be linked to a certain goal-directed behavior. Implementation intentions specify actions to perform for certain goal-directed behaviors when a certain situation is encountered (Gollwitzer, 1999).

URBAN FLOOD RESILIENCE FROM A PRIVATE ACTOR PERSPECTIVE

Private market actors on the other hand are also starting to realize the increasing need for adaptation (Jones Lang LaSalle, 2014). Their problem is not only that their buildings suffer from physical damages of flooding, but also in the case of offices or industrial buildings that business operations may be hampered. For now, owners and tenants rely on flood risk insurance for potential damages. Keenan (2014a) observes that most firms only adopt climate adaptive strategies when faced with known and immediate risks for their financial bottom line. Boardroom decisions of property firms predominantly rely on financial tools and metrics, typically targeted at return on investment within a three-year time horizon (Jones Lang

LaSalle, 2014). Thus, most investors and developers are still reluctant in making investments to prevent future losses that have a high uncertainty and are expected on the longer term. However, insurance generally cover not all losses. For example, the total economic damage of hurricane Sandy is estimated at $65 billion, of which only $30 billion was covered by insurance (Munich Re, 2013). Besides, insurance premiums are expected to rise in the coming years (Jones Lang LaSalle, 2014). Some private actors are departing from the short-term perspective to make their investment-decisions in property. They are taking initiative in identifying the long-term costs and benefits by using a broader set of metrics and leveraging commercial benefits and opportunities (Jones Lang LaSalle, 2014).

An obvious answer from private actors to flooding risks would be to relocate and leave the area. However, even though property prices may (temporarily) drop in affected areas, often occupiers choose to stay. For example, in Brisbane waterfront sites remain desirable premium locations for commercial office users despite recent floodings (Jones Lang LaSalle, 2014). Another example is provided by New York, where in the months after hurricane Sandy, an affected district of lower Manhattan experienced an *influx* of new tenants (The Alliance for Downtown New York, 2013). One can conclude that considerations on flood-resilience are not leading in the housing and locating decisions of commercial tenants. This is explained by limited options for alternative space, advantages of the location, the anticipation of price-level recovery and the reliance on insurance (Jones Lang LaSalle, 2014).

Where the benefits of adaptation measures to concur many other effects of climate change might be hard to identify, let alone quantify, financial impact of enhancing flood resilience is more clear. This, because private parties can make an estimation of future losses, based on property value, business operations and flood-risk maps (Jones Lang LaSalle, 2014). This information should be added to an estimation of future developments of insurance premiums as well as their damage coverage. Even though, as we saw, flood resilience is not yet one of the main drivers of property development and strategic business location, as risks are increasing, insurance costs are expected to rise and coverage to be limited correspondingly. This may lead to higher costs in case of flooding for the firm or building owner, which in turn could be transferred to tenants (Jones Lang LaSalle, 2014) but can congruently harm business operations. Keenan (2014a) notes that firms with more robust climate adaptive strategies are often those that are most vulnerable to immediate damage and are *aware* of this vulnerability. Therefore, private actors, developing and investing firms as well as individuals and tenants, are advised to start taking flood risks and taking adaptation measures into consideration regarding the location and vulnerability of their buildings (Jones Lang LaSalle, 2014).

C. WATERFRONT REGENERATION

Urban waterfronts are essentially the places where the challenges of urban flooding and increased urbanization meet. Many of these areas were former port facilities, now abandoned as a result of the containerization of trade since the 1960-ies. As a result, most of these areas now lie vacant and deal with a bad image. This image is caused by the fast decline of open space as well as the state of the buildings and strengthened by the lack of social control, which makes for an ideal location to carry out illegal activities. Furthermore, economic as well as social sustainability of the areas are further endangered by environmental issues of contamination and, with regard to climate change, the increased risk of flooding. Reflecting on these issues, while considering the opportunities of the locations being near the waterfront and often nearby the city-center, huge chances lie in the redevelopment of these of these areas. Possibilities to mainstream and integrate adaptive measures with the economic social enhancement of

these areas seem apparent. However, by adding these objectives the complexity of the development of these locations increases.

Over the last decades many cities have put considerable effort in these derelict waterfront areas. This has lead to many success stories, giving rise to the observation of the 'renaissance of the urban waterfront' (Breen & Rigby, 1996). Many of the projects are successful in that they turn the neglected port areas into attractive urban locations. However, the projects often failed to contribute to solving the wider problems port cities are coping with (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). This is explained by the understanding that many of these projects taking place through property-led development, which is mainly focused on physical outcome and economic gains of projects (Harvey, 1990). Specific common qualities of these kinds of projects, like the feature of cultural heritage, symbolic architecture, and high quality urban design ensured their attractiveness in terms of return on investment. The success of early waterfront redevelopments has thus lead to the copying of this concept throughout the western world and on a global scale (Harvey, 1990, p. 92). The social and cultural sides of these projects however are often underexposed. This, even though these aspects are considered crucial in responding to the disrupted urban systems at hand, given the intensive former usage and history of the locations (Harvey, 1990). This aspect depicts what furthermore makes urban waterfronts an interesting subject for this study. Their high visibility, which makes them 'magnified intersections of a number of urban forces' (Marshall, 2001, p. 7) that drive up political and economic stakes (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). As described above, financial mechanisms as well as public intervention is fundamental in the processes of these projects (Malone, 1996). This notion, that public intervention largely determines forces behind these projects sets them aside from 'regular' urban developments, especially in the United States. This, together with increased market interest limiting public intervention in these projects in the Netherlands, makes their processes and forces especially fit for comparison.

Hafencity; waterfront regeneration in Hamburg (own illustration)

D. STRATEGY AND IMPLEMENTATION

Goal of this study is to provide a basis for actors involved in urban planning and development projects to reflect on climate adaptation strategies and make their implementation more effective. The aim is to give a more complete view of the decisions and actions that shape this process of implementation. In order to come to this, we first need to consider the concepts of strategy and implementation, particularly in the context of urban planning and development projects.

STRATEGIES

Over the last couple of decades, organizational and management literature has given significant attention to strategies, and their respective goals and power. Even though several notions are common in the interpretation of the concept (see textbox), still various definitions exist. For example, Porter (1996) defines strategy as *"..the creation of a unique and valuable position, involving a different set of activities..."*. Mintzberg, Ahlstrand, & Lampel (2005) particularly stress the strategic process; a convergence of behavioral patterns. In noticing that intended strategies are not always realized in practice, base their interpretation on the distinction between *intended* strategies and *realized* strategies. They argue that when asked about strategies, most people would refer to intended strategies, or the concept of a *plan*: "*...a direction, a guide or course of action into the future, a path to get from here to there."*. However, a *pattern, described as a* "*...consistency in behavior over time."* is considered to be the realized form of strategy. Based on this distinction, strategies can be categorizes in (Mintzberg, Ahlstrand, & Lampel, 2005):

- deliberate strategies: intentions that are fully realized
- unrealized strategies: intentions are not realized
- emergent strategies: where a behavioral pattern realized was not expressly intended.

General understandings of the concept strategy:

- *Strategy concerns both organization and environment.* "A basic premise of thinking about strategy concerns the inseparability of organization and environment. . . . The organization uses strategy to deal with changing environments."
- *The substance of strategy is complex.* "Because change brings novel combinations of circumstances to the organization, the substance of strategy remains unstructured, unprogrammed, nonroutine, and nonrepetitive "
- *Strategy affects overall welfare of the organization. "...* Strategic decisions . . . are considered important enough to affect the overall welfare of the organization...."
- *Strategy involves issues of both content and process. ". . .* The study of strategy includes both the actions taken, or the content of strategy, and the processes by which actions are decided and implemented."
- *Strategies are not purely deliberate.* "Theorists . . . agree that intended, emergent, and realized strategies may differ from one another."
- *Strategies exist on different levels. "...* Firms have . . . corporate strategy (What businesses shall we be in?) and business strategy (How shall we compete in each business?)"
- *Strategy involves various thought processes.* " . . . Strategy involves conceptual as well as analytical exercises. Some authors stress the analytical dimension more than others, but most affirm that the heart of strategy making is the conceptual work done by leaders of the organization."

(adapted from Chaffee [1985 p.89-90], as presented in Mintzberg, Ahlstrand, & Lampel [2005])

This categorization may be valuable in interpreting the processes of implementation in our study. However, returning to the focus of this research, a 'climate adaptation strategy' in this sense seems to answer better to the concept of a *plan*.

STRATEGY IN PLANNING PRACTICE

While the term 'strategy' is often used in planning literature and practice, the often denote a slightly different concept than in the managerial and organizational field (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). First introduced in the 1960-ies (Sartorio, 2005), the concept gained renewed attention in the 1990-ies as increasing consideration was paid to the interaction and power relations between actors in the planning and development process. This can be described as a more empiricist approach in planning research, and gave rise to the term 'governance', which can be defined as '*the capacity to organize collective action toward specific goals'* (Hillier, 2002, p. 4). This notion explains how strategic planning (prescriptive) is complemented by strategic behavior (descriptive) of planning and development actors (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010, p. 21; Sartorio, 2005). This answers to the distinction Mintzberg, Ahlstrand, & Lampel (2005) make between intended and realized strategies. The understanding of actor behavior essentially shaping the outcome of a development process gave rise to the whish to coordinate this behavior. This resulted in an interest for 'strategic spatial plans' for cities and urban regions emerged in the 1990s (Healey, 1997; Healey, 2007).

In planning practice, the term strategic broadly refers to "*…the reshaping or repositioning of what an urban region or city has to offer as opposed to others, expressed in words and images inside distinctive documents and plans.*" (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010, p. 6). Yet, as Healey (2007) explains, the working of planning strategies is twofold. While actors are involved in producing the strategy, this vision is in fact already being shaped through their interaction with other actors in the process. Then, by framing these considerations answering to the envisioned future, a document or spatial plan is drawn up. It is the key considerations featured in these document that both allow for collective action to occur but have to be retained further on in the process (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). As this strategic frame is communicated with the public, it influences actor's perceptions and shapes their behavior. Thus, a strategy is shaped by human interaction and both entails a (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010):

- Product; the strategic frame *communicated* through language or images by speech, plans and other media.
- Process; the human interaction in *finding* the frame and then focused on *retaining* its *key considerations* through time (Healey, 2007, p. 185).

This again reflects the dichotomy of the concept 'strategy' as explained by Mintzberg, Ahlstrand, & Lampel (2005). The categorization of strategy presented by Mintzberg *et al.* is thus considered applicable for this study, focused on strategies in contemporary urban planning. The characteristic of urban development projects stresses the notion that strategies are *shaping while simultaneously being shaped* by actor behavior in the process of their implementation. Besides, the long-term span of planning and urban development makes strategies as subjected to change all the more plausible. Furthermore, the

categorization is based on the interpretation of strategy as a *collective effort emerging* between a plurality of actors (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). This reflects the concept of governance as well as essentially being bounded to activities in a certain urban area. Efforts are collective in their intention to realize a particular urban area development project. The ability and willingness to respond and interact with the strategies or policy programs reflects their capabilities (potential influence) and orientation (direction of their decisions and actions) in the overall development process (Scharpf, 1997; Scharpf, 2000). This answers to the model of actor-arenas, as elaborated upon in later sections.

However, as mentioned before, the interpretation of the term strategy as currently used in urban planning practice seems to answer better to the concept of a *plan*. This can be explained by the whish of actors creating the strategy to coordinate and control (spatial) processes, an aim inherent to the practice of *planning*. Hence, planning strategies are still often based on the assumption of full control and surprise-free implementation, even though this is virtually impossible due to the unpredictable environment they need to be realized in.

PLANNING STRATEGY AS PLANS

Typically organizational literature would refer to translating strategy into a plan as the first step of implementation (Mintzberg, 1994). Spatial planning strategies in general already contain propositions for policy changes. Thus, public planning policy is the way the strategies' goals are to be achieved in practice, comparable to the organizational term of a plan. Therefore, we look at what literature says about plans and their implementation. According to Mintzberg (1994), plans have the following functions:

- To codify the overarching strategy
- To elaborate on the overarching strategy
- To convert the strategy into organizational action and "routine"
- To communicate the visions and aims of the strategies
- To control devices, define goals, schedules, budges, etc.

The planning instruments studied in this study are considered to be the equivalent of these last 'devices' urban spatial planning.

PLANS AS PLANNING INSTRUMENTS

An urban planning strategy and its according policy changes on the one hand coordinates planning instruments for its implementation in development practice but on the other also forms one in itself. Plans, by coordinating otherwise independent actions of market agents, can be considered a principal directive market *shaping* tool (Tiesdell & Allmendinger, 2005). This typology is further elaborated upon in the last section of this chapter. In this study the cities' strategies are seen as a specific type of these plans. According to Tiesdell and Allmendinger plans provide three important in kinds of information decreasing uncertainty of market agents:

- general coordinating information on land value and possible development effect
- the indication of government intentions
- and information on regulatory policies.

However, the effect of plans on market agents behaviour and perceived risks depends largely on the authority of both plan as well as the institution by which it is developed. This authority is also socially constructed and is marked by a governments reputation in enforcing their intentions and the rigidity of the development system. For example, the content of statutory plans is taken as more reliable in more rigid systems like those at work in the Netherlands than in more discretionary systems like the UK (Alexander, 2001). In this context also the method of implementation and standing of plans play an important role. The following types can be distinguished (Tiesdell & Allmendinger, 2005):

- Development plans, representing commitment of the public agent by setting out intended public actions
- Regulatory plans, involving an element of compulsion by setting out the basis for (land use) regulation
- Indicative plans, mainly expressing ambitions and settin out guidance for market agents, which is essentialy advisory.

STRATEGY IMPLEMENTATION

The effective implementation of plans or strategies in urban planning policy often depends on the contribution of other planning tools. The implementation can be through voluntary action, compulsion by state or contractural regulation and/or through other forms of encouragement like financial incentives (Tiesdell & Allmendinger, 2005). Moreover, if the objectives as proposed in a climate adaptation strategy are likely to contradict with current market trends and behaviour. This implies a transformation in public policy may be necessary for effective implementation and embedding in local urban planning practice.

STRATEGY IMPLEMENTATION IN ORGANIZATIONS

In the field of project and organization management, much attention is spent on the development and content of strategies. However, less attention is given to the issue of implementation of these strategies (Pellegrinelli & Bowman, 1994). This, even though new strategies are known to encounter the following problems in their implementation in organizational environments (Pellegrinelli & Bowman, 1994; Argyris, 1985; Lindblom, 1979):

- Disruption of continuous operations
- Deviation from focus on efficiency current operations
- Risks regarding future practices
- Risks regarding redistribution of power

Through direct communication strategy implementation in organizations is generally entrusted to internal systems and procedures. However, this private market or project management approach is not directly applicable to public parties (Bryson & Roering, 1987). Typically project management (for example Hrebiniak & Joyce, 1984) approaches to strategy implementation thus imply:

- Clear internal communication, organizational structure and protocols
- Consistent understanding of the strategy throughout this organization
- Willingness of organization members to cooperate on proposed plans
- Ability of organization members to act on the proposed changes.

STRATEGY IMPLEMENTATION IN URBAN PLANNING

Once this organizational approach to strategy implementation is understood, it is clear how these conditions enabling implementation are not applicable in the case of urban planning or climate adaptation. Firstly, the 'organization' which is referred to in these prerequisites is hard to define. As we have seen in earlier sections of this chapter, current practice of urban planning as well as climate adaptation have no clear organizational structure or boundaries. Both processes are shaped by the process of interaction within continuously changing and evolving actor networks. The structure, relations and according protocols are therefore also subject of constant change. To bypass this objection in order to make the organizational implementation approach applicable in this study, the 'organization' is for now interpreted as 'all parties active in the urban system'[4]. For now we disregard that with this interpretation obviously questions could be raised on the applicability of earlier used terms like structure and procedure.

Since there is no singular communication channel between the city governments and urban actors, it is not likely the strategy is communicated throughout all layers of the various urban systems. Moreover, as explained in the preceding section, the contents and effects of climate change are still under discussion. This calls into question the definition of the problem to be tackled as well as the proposed strategic plans. Thus, thorough understanding of the strategies amongst all urban system actors is improbable to say the least.

Besides, even though in gaining receptivity (Jeffrey & Seaton (2004), see figure 9) the willingness of private actors to cooperate in sustainable initiatives may increase, their dedication is often limited and bounded by financial aspects. Collaboration needs to be stimulated, and links to social and economic benefits are crucial. This is also connected to the ability of the organization-or system actors to act on achieving strategic goals. As mentioned, the outcome of an area development project is shaped by the interaction process of various actors and not a simple translation of a design in physical entities. Therefore, to influence the outcome of area development it is not merely the plans that need to be alligned with strategic objectives, but also the actor relations and interactions or in general process design. As explained, usually in urban planning as well as climate adaptation not one actor has the capacity and competence to design and realize a significant change, let alone dominate the process and other actors' behaviour.

This touches upon the last, and perhaps most important reason why this typical approach to strategy implementation is not applicable for climate adaptation strategies in urban planning. When we look at all proposed conditions, we can see that they are based on the assumption that the party developing the strategy is in the position to impose actions on the actors in the organization or system. As explained earlier, city governments (at least in western countries) are not in this position. As actor, they are part of the urban system, but do not have the power nor desire to enforce extensive changes in the behavior of system actors. However, as public body they have certain legislative and procedural tools to guide

[4] This interpretation is linked to the theory or institutionalism in that the term 'institution' is often associated with 'organization'. This can be explained by considering organizations as social entities that are capable of purposeful action (Scharpf, 1997). Formal organizations can be distinguished from a random collection of people by the presence of some system of authority and administration, guided by a managing body (Mintzberg, 1989).

actions and stimulate certain behavior of the other parties. This also explains how strategies in this context should be seen as providing guidelines and setting intentions rather than directing plans.

Now the project management approach to strategy implementation is explained not to be appropriate, question remains what approach is considered more viable.

IMPLEMENTATION THROUGH CHANGING PARADIGM

The approach to strategy implementation as described above is also often found to fail in organizational settings (Pellegrinelli & Bowman, 1994) when the new strategy entails a substantial shift. The use of existing structures and procedures in the implementation process is understood to be the main cause of this hampering. This, because the structures and procedures themselves need to be subjected to change. This fundamental change in approach is considered necessary to solve the underlying problems the strategy aims to tackle (Pellegrinelli & Bowman, 1994; Lindblom, 1979).

In this light, the recent shift of role of public intervention in urban development combined with can be interpreted as exactly this change in approach. By the adoption of the new facilitating role the long-standing convictions of a directing and controlling municipality in the Netherlands on the one hand, as well as private market actors providing socially wanted and sustainable solutions in New York City on the other hand are simultaneously rejected. As we have seen in the previous section, this new way of working in area development is directly applicable to new forms of collaboration needed for adaptation and building resilience.

Implementation of the strategies in by public organizations and/or in complex environments are most likely to take place through the process of incremental or emergent change (Bryson & Roering, 1987; Lindblom, 1979; Quinn, 1980; Mintzberg & Waters, 1985). This change is to take place at the boundaries of the existing paradigm, defined as '*the set of beliefs and assumptions held in common and taken for granted in an organization'* (Johnson, 1987). In our case organization can again be interpreted as all actors active in the urban system. In implementing the strategy thus lies the challenge to stretch the current convictions and perceptions of these actors. To stimulate the implementation of strategies the developing party thus needs to build incentives and stimulate the other parties to depart from current behavior and look beyond the existing paradigm (Argyris, 1985).

E. ACTOR-NETWORK APPROACH

Actor-network theory is based on the notion that communication and decision-making in a project's process is shaped by individuals or groups of individuals, each of which is tied to particular networks of relationship (Crane & Livesey, 2003). In line with the concept of the network society and the emergence of strategic planning, Albrechts (2006) points out that in political decision-making, spatial plan-making and project implementation efforts the actors involved tend be organized in separate 'networks' and 'arenas' (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). Hence, this research is based on the supposition that actor-network theories indeed are most applicable in describing the process of urban development.

SOCIAL INSTITUTIONS

This approach follows the sociological account of institutionalism as developed by Giddens (1984) and introduced earlier in this chapter. Healey (1997; 2007) considers this theory of structuration a useful theoretical tool to develop a closer understanding of processes of urban development (Healey & Barrett, 1990). This, because institutionalism focuses on the dynamic relationship between 'agency and structure', the interaction between actor's behavior and the specific environment in which this takes place (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010). An understanding of this interaction is crucial in that it provides insight in how broader economic and political mechanisms that are presumed to govern actor behavior actually influence this process.

In social institutionalism, it is assumed that individuals' activities are 'structured' to both consistent and socially appropriate behavior. These structured courses of action within a community are referred to as being *social institutions* (Hall & Taylor, 1996). These institutions constitute the written and unwritten preconditions for human interaction (Scharpf, 1997). According to Scharpf (1997) these social institutions can take on three forms:

1. formal rules: for example the laws which have to be followed in a certain society to avoid a legal penalty
2. informal rules: generally respected social norms, violation of which is sanctioned by social penalties like the loss of reputation and hierarchic position, community disapproval, withdrawal of cooperation and rewards etc (Scharpf, 1997, p. 38).
3. symbolic systems: communicative systems, letters and numbers, paradigms and cognitive scripts (ideas, guides) and moral frameworks like values and desires.

Together, these institutions form a systems or 'structures' of rules, which could be described as 'culture' (Giddens, 1984; Hall & Taylor, 1996).

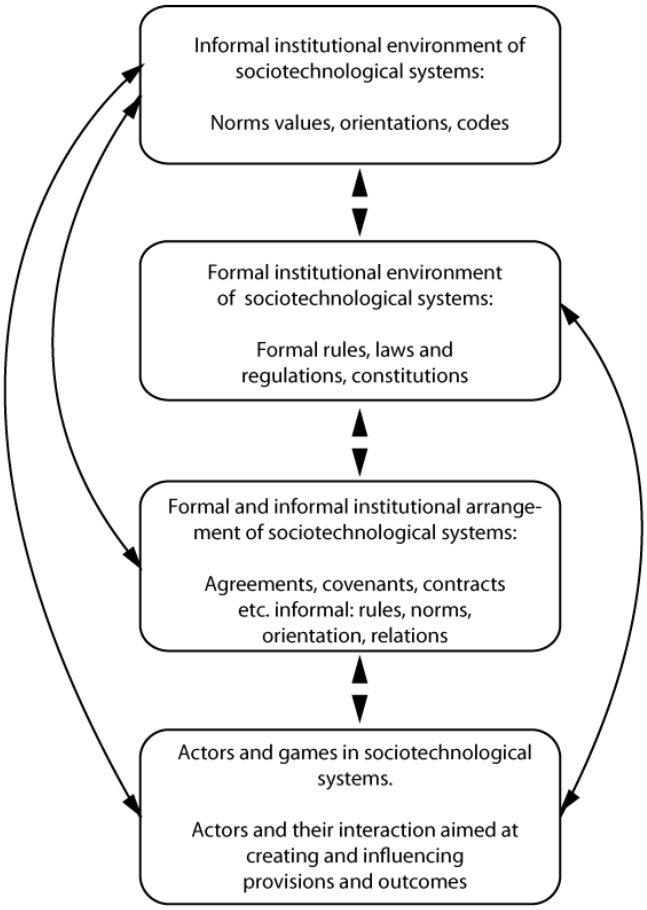


Figure 8. Levels of institutions according to Koppenjan & Groenewegen (2005). (own illustration)

The levels of the institutional model of Koppenjan and Groenewegen (2005) are highly similar. However, within they distinguish a separate level formed by actors and their behavior. Figure 8 illustrates this structure. Both models are based on the notion that the different levels of institutional environments

influence each other. Therefore, these models, developed to explain the influence of institutions on technological developments in society form the background for the concept of implementation in this research. Taking the four-tier model as a starting point, strategies and policies are now developed and form the formal institutional arrangements. We now want to see how these influences the informal systems of actor behavior and interaction.

THE ACTOR-NETWORK APPROACH

To structure the examination of the case processes the actor-network approach, as developed by Koppenjan & Klijn (2004), is adopted. The network approach provides theoretical background and a normative basis for analysing and assessing complex processes of problem solving in network settings or so-called '*wicked problems'.* Actors' perceptions, interactions and institutions play the leading part in this approach, rather than the process content or outcome (Koppenjan & Klijn, 2004, p. 9). This network conception of actor relationship decenters the project as the central node of interaction, since the network can be entered simultaneously from many different perspectives.

Whilst the actor-network approach is mainly a tool for designing and guiding the development process, it can similarly be used as a framework for evaluating processes in describing actor behaviour, strategies and relations (Koppenjan & Klijn, 2004). The mutual dependency of actors for their goal achievement is the starting point of the network approach. Over the course of the process, patterns in actor interaction will evolve, building and solidifying sub-networks within the larger process network (Koppenjan & Klijn, 2004).

First step of the network-approach is the mapping of stakeholders, their interests, characteristics and position in the project. This is to identify actors' problems, perceptions and dependencies (Koppenjan & Klijn, 2004). This provides a basis for an impression of their relations. The actor analysis thus results in an overview of means and dependencies that provides a basis for the next step, defining mutual challenges and goals. Following step is a game analysis. Here sub-groups of actors, or decision-making arena's are set. An arena can be defined as collectivity of actors with a common intent (Daamen, Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts, 2010, p. 32). The topics to come to a development plan (for instance, parking and housing typology) typically overlap several arenas. This analysis also features the definition of stagnation issues within the network. Last is the network analysis, which considers the relations of the different actors, their behaviour and influence on the process and outcome. The findings of these analyses provide valuable insight in the typology of actors and their behaviour regarding power and influence. This in turn uncovers the underlying forces and strategies during negotiations (Koppenjan & Klijn, 2004).

In this research, the network-approach is taken used to frame the development process of the case studies. Special attention is given in how the planning instruments coming forth from the adaptation strategies influence this process and its environment.

F. PLANNING POLICY INSTRUMENTS

Referring to Tiesdell & Allmendinger (2005, p.57/58), planning tools or instruments are defined as "*...policy actions or initiatives intended to affect the decision environment and behavior of market actors and to achieve desirable societal objectives.*".

PLANNING INSTRUMENTS

According to the theory of Tiesdell and Allmendinger (2005), particular planning instruments are considered to have specific effects on the decision environment of land and property market actors. Urban planning is thus recognized to have impacts that go beyond the obvious effect on supply and demand. It can play a crucial role by, for instance, providing authoritative information, reducing risks and determining the number and range of participants involved in a project.

These intended effects form the basis of the classification of the tools. Hence, according to Tiesdell and Allmendinger (2005) planning tools are either intended to:

I. shape markets,
II. regulate markets,
III. stimulate markets,
IV. or develop the capacity of market actors

I. SHAPE MARKETS

Planning tools intended to shape markets (figure 10) alter the decision-environment of market parties by limiting uncertainties regarding external effects. Main examples are strategies and plans formulated by public authorities. The impact of external influences (for instance, the strenth of property rights, law enforcement and the availability of information) might be hard to identify, due to the imperfect nature of the development market and heterogenity of land and property as commodities. However, the effects can be significant. We have already elaborated on plans as planning tools in section 3D.

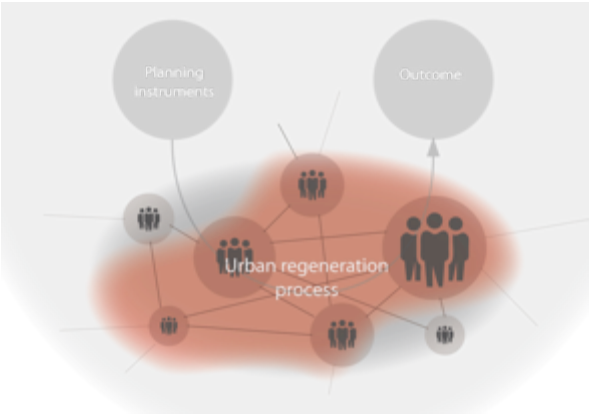


Figure 10. Market shaping (own illustration)

II. REGULATE MARKETS

Planning tools intended for market regulation (figure 11) are aimed at regulating and controlling market actions and transactions. Regulations affect decision-making by defining the boundaries of the actor's opportunity space, thus restricting the set of choices available. In the context of area development, these regulating tools often take the form of public rights on land ownership and/or usage, accompanied with permits granting exeption on these rules for development rights.

Figure 11. Market regulation (own illustration)

Regulations can take many forms. They can be imposed by the state and universally applicable or bi-lateral, only applicable to parties withn the contract. Regulations can be enforced by law when they are subject to legal sanctions. These can be called regimes. Cultures on the other hand are regulations not enforced by law but subjected to social sanctions like the loss of privileges, disapproval or the harm of self-interest. In general, stricht regulatory planning in combination with a rigid statutatory system is considered to provide assurance of authoritative information to base development decision-making on (Alexander, 2001).

III. STIMULATE MARKETS

Planning tools intented to stimulate (figure 12) development also change the contours of the decision-making space of market actors. However, the focus is here on increasing the opportunities of these actors through either fiscal measures or direct state intervention. Fiscal measures respectively encourage or discourage and actor activity through subsidies or taxes. Examples of direct intervention are the provision of public infrastructure and the acting on expropriation rights (Tiesdell & Allmendinger, 2005).

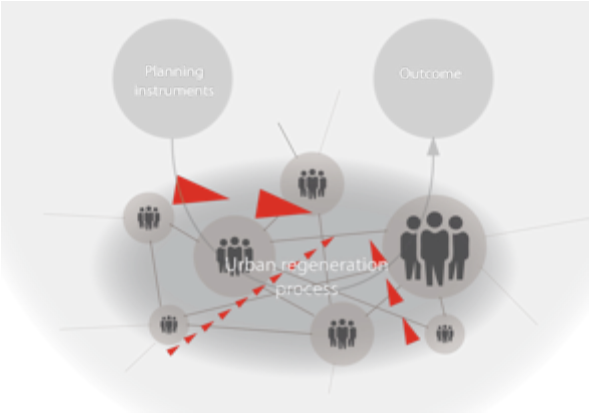


Figure 12. Market stimulation (own illustration)

IV. DEVELOP THE CAPACITY OF MARKET ACTORS

Capacity building tools (figure 13) are aimed at enhancing skills, knowledge, networks, communication and working practices of market actors. While these can be considered a special form of stimulation tools, a separate category is validated by the core objective to improve the effectiveness of the other planning tools. Capacity building tools focus more on social processes like building relations, trust and social capital among the range of involved actors. Three interrelated subtypes of social capacity are distinguished (Tiesdell & Allmendinger, 2005):

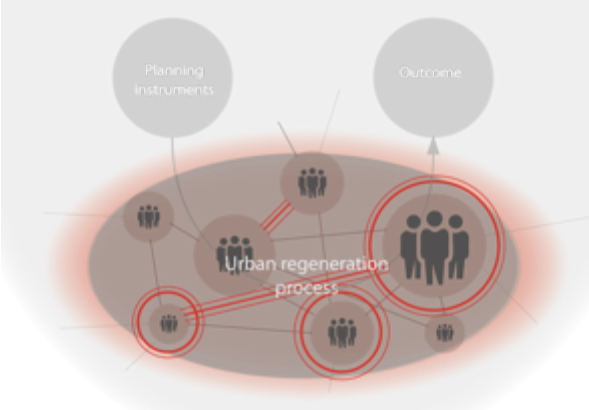


Figure 13. Capacity building (own illustration)

- Actor-network relations: the establishment of (in)formal stakeholder arenas for the exchange of information, enlargement of pool of available resources and creation of new solutions by synergy
- Social capital: building social institutions as means of reducing costs, uncertainties and risks of market parties.
- Cultural perspectives: overcoming narrow problem and solution perspectives resulting from the various professional fields and organizational backgrounds of market actors.This may be an important challenge especially in urban area development where discussions among actors are often characterized by linearity, narrow-mindedness and box-like thinking (Landry, 2000).

An overview of this categorization of planning instruments according to is developed by Heurkens, De Hoog, & Daamen (2014), as listed in table 4.

Table 4. Planning instruments in area development classified by the typology of Tiesdell and Allmendinger (2005) **according to Heurkens, De Hoog, & Daamen (2014).**

Market effect	Planning instrument	Market effect	Planning instrument
Shaping	Municipal policies (social, economic and ecological) Visions (city, living, area) Convenants (regional agreements) Area prioratization (designation of VIP-areas) Spatial principles (memoranda, programme of requirements) Master plans (non-binding) Visual quality plans (non-binding)	**Stimulating**	Subsidies (ecological, social) Premium (demolition) Tax regulations Financial constructs Acquisition (land or tenancy) Expropriation (land ownership) Investments (services, infrastructure) Maintenance (public space) Public real estate (leverage)
Regulating	Structure visions Zoning and land use plans Environmental permit Building regulations Tendering (procedure) Development agreements (contracts)	**Capacity-building**	Collaboration models (formal and informal) Networks (active and passive) Process management or support Area managers Municipal information points

IMPACT OF PLANNING TOOLS

For assessing the effect of the various planning tools on market parties' decision-making, Tiesdell and Allmendinger (2005, p.72/73) distinguish the following forms of impact:

- Impact on demand for an activity; covering spatial and temporal incidence of demand and other spatial effects
- Impact on supply for an activity; covering spatial and temporal incidence of supply and other spatial effects
- Impact on risk and confidence; taking into consideration the predominant factors of risk in a certain project
- Impact on information/uncertainty; focusing on quality of the information supplied, asymmetries in availability, authoritativeness and reliability
- Impact on financial appraisal; considering the time-frame of costs and returns as well as the number and range of participants.

According to Heurkens, De Hoog, & Daamen (2014), the facilitating role of public parties should be an integral part from project initiation to realization of public planning policies. This touches upon the aim of facilitating in creating and strengthening relations between actors in a certain area by enhancing their development opportunities. The actor relations build trust and commitment and thus are to take away uncertainties and risks for investing parties. Besides, this interaction can result in creative solutions which could improve the business case for development. A practical example of facilitating by initiating could be consultation of the market to explore potentials of certain areas.

AP Photo / Charles Sykes, *A parking lot full of yellow cabs is flooded as a result of Hurricane Sandy in Hoboken, NJ.*, www.msnbc.com, NBC UNIVERSAL, retrieved through http://www.msnbc.com/ on April 8th, 2014

4. ADAPTATION IN NEW YORK CITY

New York City (NYC), with its waterfront spanning more than 500 miles, has always been shaped by the water (DCP, 2013). The waterfront is longest and most diverse of any city in the United States and forms one of the main physical assets of the city. The buildings and urban areas along the water are characterized by the open views. This is considered to add largely to spatial quality of this otherwise dense city. However, it also implies risks with regard to rising sea levels and increased fluvial discharge (DCP, 2013).

When Hurricane Sandy struck the city in October 2012, the city was already looking into ways to adapt to the anticipated effects of climate change, especially with regard to increasing flood resilience (DCP, 2013). However, the damage and disruption Sandy caused brought renewed sense of urgency to this work. Besides the fresh wounds of Sandy, changes in federal flood insurance policies and the updating of flood zoning maps ask to fast-track the process of building the resilience of waterfront communities.

In 2008, in preparation for the PlaNYC report, the New York City Panel on Climate Change (NPCC) was conducted. This group of climate scientists and risk management experts projected a rise in sea levels of more two feet (~60 cm.) in 2050 for the city to deal with. This will expand the zones at risk of coastal flooding and lead to larger impacts on the neighborhoods already at risk. Besides rising sea levels, the risk of flooding in NYC mainly comes from the increase in the number and severity of extreme weather events like tropical storms, hurricanes and so-called Nor'easters. Most of the city, with exception of the harbor areas, which are typically built on reclaimed land, is founded on stony underground. This relieves the city from the issue of land-subsidence, prevalent in most delta-cities.

Congruently, the Federal Emergency Management Agency (FEMA), one of the most influential public bodies on US water management, is in the process of updating its risk maps. Most influential are the 100-year floodplain maps, which depict the zones that have a risk of flooding once every century. This is based on the Base Flood Elevation (BFE), the anticipated height of floodwaters in a storm that has a 1-percent annual chance of occurring (DCP, 2013).

These maps form the basis for the premiums of the National Flood Insurance Program (NFIP), as explained in the textbox. As the maps are updated, the floodplain zones are largely increasing. The city expects that the number of residents living in the 100-year floodplain zone actually lies around 450.000, more than double the number using the old maps (DCP, 2013). A preliminary version of the updated FEMA 100-year floodplain map is depicted in figure 14.

THE NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

FEMA administers the National Flood Insurance Program (NFIP), through which private properties' flood losses are covered by insurance premiums paid by property owners. New or substantially improved buildings in the 100-year flood zone are required to maintain flood insurance to obtain loans from federally insured banks, as well as to be eligible for federal disaster assistance. At the same time, coastal communities participating in the NFIP are required to match their local codes with FEMA's requirements. FEMA reports that, as of May 2011, over 20,000 communities in coastal areas are participating in the NFIP, including New York City. (DCP, 2013)

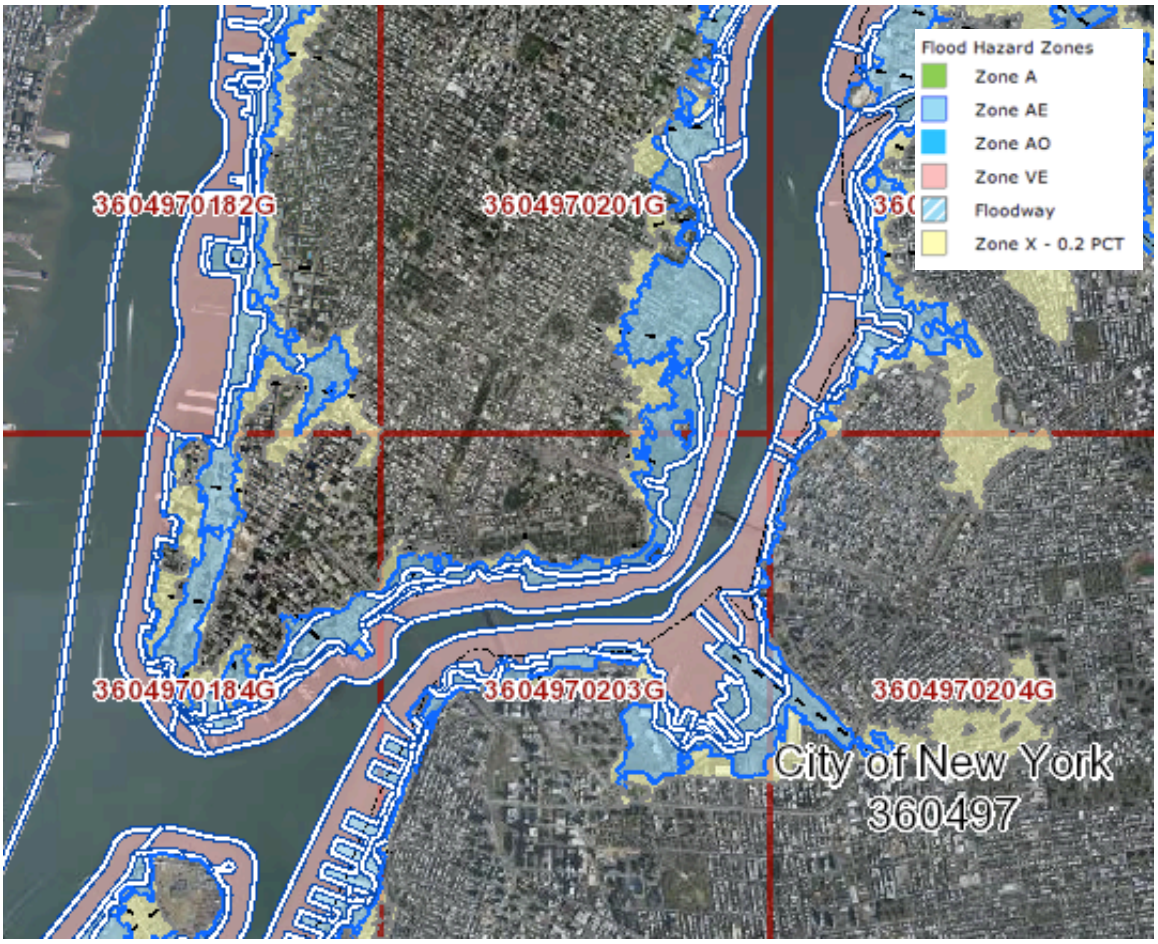


Figure 14. **Preliminary Flood Insurance Rate Map (FIRM) of lower Manhattan and parts of Brooklyn** (FEMA, 2013)

It is understood by the city's government that it is impossible to eliminate or even mitigate all consequences related to this increased change of flooding. Therefore, the city has adopted plans to become more resilient (DCP, 2013). This implies neighborhoods being able to withstand and recoup from these extreme weather events, quickly 'bouncing back' to normal daily life. Besides improving social and physical emergency infrastructure one of the main elements of this building resilience lies in the adaptation of existing structures and public space, well considered zoning and setting more extensive requirements for new constructions in flood-prone areas.

An example is the elevation of the height of flood-proof level of buildings in these zones; adding so-called 'freeboard'. This flood-proof level has historically been set at FEMA-designated flood elevation level. This implies a change in building codes, increasing the elevation by one or two more feet to add a margin of safety addressing uncertainties in flood modeling and sea level rise (DCP, 2013). While this measure seems obvious from a flood resilience point of view, elevating buildings brings its own difficulties. Not only is it technically a huge challenge, especially for existing buildings, it can also impose limits to the otherwise vibrant public realm. Visual connectivity of ground floor level activity will be changed, in turn distorting pedestrian experience of the neighborhoods. Thus, here the challenge of finding integrated solutions, building flood resilience as well as *adding* quality to the urban environment is clearly perceptible (DCP, 2013).

A. URBAN DEVELOPMENT POLICY

New York City has long been seen as the archetype of neoliberal urbanism (Hackworth, 2007; Harvey, A brief history of neoliberalism, 2005), as explained in the previous chapter. The ideology of market competition, freed from any state interference or actions of social collectivities, with economic growth as its main driver is very much evident in the city's skyline and layout. However, former NYC Mayor Bloomberg, since taking office in 2002, set out a new approach to urban planning for the city. This swift directly reflects the highly centralized political power structure (Fainstein, 2001) of the city. Before, NYC's planning policy was focused on deregulation, tax incentives, and privatization to stimulate development and attract businesses. Bloomberg departed from this strategy, emphasizing the need for public-sector intervention and investment. This shifted the role of city government in area development projects to a more pro-active one. This new style of governance, the "Bloomberg way" (Brash, 2006), fits the description of "roll-out neoliberalism" (Peck & Tickel, Neoliberalizing space, 2002). This more active form translates in the introduction of new institutions, policies and governmental bodies and –procedures (Schaller & Novy, 2010). This comprehensive urban planning policy was particularly aimed at providing opportunity for capital accumulation through property-led regeneration and place-making (Brash, 2006; Fainstein, The return of urban renewal: Dan Doctoroff's grand plans for New York City, 2005).

Under Bloomberg's administration, a top-down development agenda was created, consisting of a multitude of area re-zonings, several urban redevelopment schemes and plans to improve the city's public space and infrastructure (Schaller & Novy, 2010). This, to prepare for future population growth, stimulate economic development and enhance attractiveness to investors, residents and visitors. As explained later, the redevelopment of New York's waterfront neighborhoods is seen as a crucial part of this new approach (Schaller & Novy, 2010).Focusing on spatial quality and according adjustment of planning tools, the city's competitive position is to be strengthening by its spatial opportunities and urban planning. For instance, a reform of former extensive zoning regulations is both targeted at increasing pedestrian experience, as well as reducing the procedural bureaucracy involved with development (The Wall Street Journal, 2012).

In the early days of the new city administration, appointed in 2013, mayor Mr. de Blasio seems to focus more on minority groups and social sustainability rather than climate adaptation. This could lead to a shift in the development agenda from property-led waterfront regeneration projects to more social housing programs. However, the increase in pro-active public planning seems to prevail, as the importance of partnerships with private sector and community participation is stressed (The New York Observer, 2014).

WATERFRONT REGENERATION

The natural harbor New York is situated in was once one of the main drivers of the region's economy and provided the basis for the city's rise as a global metropolis. However, the containerization of trade and transportation in the 1950-ies lead to the relocation of the port-industry, leaving many of the inner-city docks idle (DCP, Vision 2020: New York City comprehensive waterfront plan, 2011). Up to the 1990-ies, these areas, marked by vacancy and pollution, formed an unattractive zone and barrier between the city and the water. Over the last two decades, the City has started to open up this connection once again, reducing pollution levels and stimulating redevelopment. This, considering the potential added value of

water for the quality of the living- and business environment. The unique relation of the city, literally surrounded by it, is considered an asset that could play an important role in strengthening the City's global position (DCP, Vision 2020: New York City comprehensive waterfront plan, 2011). Nevertheless, during the 1990-ies, public parties only took on a rather passive role in this redevelopment (Bowles & Kotkin, 2003). It was not until the election of M. Bloomberg as Mayor in 2002, that waterfronts were designated to be a major focus for policy efforts, driving the urban and economic development of the city. This was first laid out in the 'New waterfront regeneration program' (2002). Within only a few years, the vast number of sixty-one waterfront projects all along the city's shoreline were started (O'Brien, 2005). Most of these developments are property-led regenerations of abandoned industrial districts or terrains. New functions are predominantly commercial, residential and recreational (Schaller & Novy, 2010).

The waterfront redevelopments are generally applauded for their attention to quality of the urban space and environmental sustainability. The new plans are pedestrian-orientated, feature mixed-use neighborhoods and largely increase the amount of green space in the area (Schaller & Novy, 2010).

Waterfront redevelopment, according to vision 2020 entails: Infrastructure must be created where none currently exists; in some cases roads must be built or reconstructed; and neighborhood amenities, public transportation, and institutions such as schools must be developed. (DCP, 2011, p. 175)

B. STUDIED STRATEGIES

Hurricane Sandy stressed the potential effects of climate change for the city. This reinforced actions in both research and policy fields; assessing exposure, mapping risks, and developing mitigation and adaptation strategies. PlaNYC - a greener, greater New York (2007) and is developed as the main climate adaptation strategy for New York City. This strategy and proposed actions are based on environmental analysis reports like the ones of the intergovernmental panel on climate change regarding the *Physical Science Basis*, *Mitigation of Climate Change* and *Impacts*, *Adaptation and Vulnerability* (IPCC, 2014). The updated version PlaNYC – a stronger more resilient New York (2013), considering the impacts of Sandy, is especially aimed at building resilience and adaptation rather than mitigating measures like reducing greenhouse emissions. According to Keenan (MCD, 2013), the implementation of these strategies stands or falls with detailed and up-to-date information on risks and vulnerability and feasibility of necessary investments. He furthermore stresses that an integrated approach in which public and private sector actively cooperate is crucial. In waterfront regeneration areas, by focusing on value creation, the opportunity exists to link the building of flood resilience to development forces. Furthermore, as these areas are typically characterized by economic and social deprivation, adaptation would give the chance to also solve these issues in the process.

Main actors involved in making the climate adaptation strategies and translating propositions to planning policies:

- State & Federal government
- City government
- New York City Economic Development Corporation (EDC)
- New York City Department of City Planning (DCP)
- District & neighborhood government
- FEMA
- Metropolitan Waterfront Alliance (nonprofit organization)

PlaNYC is used as the background for further recommendations on specific adaptation aspects, featured in separate strategies. In the field of flood resilience this resulted in Designing for Flood Risk (2013). The initial waterfront revitalization plan together with the climate adaptation strategies form the basis for the 'Coastal climate resilience. Urban Waterfront Adaptive Strategies' report (2013). An overview of the strategies in climate adaptation, building flood resilience and waterfront developments is given in table 5.

Table 5. Adaptation and waterfront strategies NYC

Strategy	Main focus
PlaNYC: a greener, greater New York (2007/2013)	The relation between climate change and the city.
Designing for Flood Risk (2013)	*Designing for Flood Risk* focuses on preparing buildings to withstand the threat of coastal flooding, while ensuring that they support everyday livability and quality of life. (DCP, 2013)
Vision 2020 – New York City Comprehensive Waterfront Plan and **New York City Waterfront Action Agenda (2011)**	Housing & development agenda for attracting businesses, visitors and middle- to high income residents . (This report is part of the Waterfront Vision and Enhancement Strategy [WAVES]).
The New Waterfront Revitalization Program (2002)	Coordinating and stimulating property-led waterfront regeneration projects throughout the city.
Coastal climate resilience. Urban Waterfront Adaptive Strategies (2013)	Identifying and evaluating potential strategies for increasing the resilience of waterfront communities to coastal flooding and sea level rise.

These strategies are selected as the main providers of policy changes in the area of building flood resilience. Their predominant goals and proposed planning instruments will be distilled to assess their influence on development process of the case project.

C. CASE PROJECT

The case in NYC has been selected in consultation with Prof. dr. J. Keenan (Research Director Center for Urban Real Estate, Columbia University). The area selected is Sunset Park, a waterfront district located in Brooklyn (see figure 15). Like many other parts of Brooklyn like Red Hook and Navy Yards, Sunset Park was one of the districts that were highly affected by Sandy in 2012. The current FEMA flooding map of the area is depicted in figure 16. It has furthermore been featured as an important area for waterfront regeneration in the City's various development strategies. A further overview of the waterfront redevelopment opportunities in Brooklyn, as identified in Vision 2020, can be found in the appendix.

Figure 15. Location of Sunset Park in NYC (source: Sunset Park website, 2013).

Sunset Park is an industrial district, a cluster of City-owned and managed industrial properties on the Brooklyn waterfront. Sunset Park has suffered from substantial disinvestment over the past several decades. The physical development of Sunset Park, Over 100 years ago development of the area started. Sunset Park traditionally houses different manufacturing and distributing industries. Today, the main challenge is to adapt and re-use the outdated industrial buildings and according spatial layout. Aim is to develop Sunset Park into a contemporary district for mixed, dense and environmentally sustainable industry.

Figure 16. Sunset Park cutout of NYC flood risk map (source: FEMA, 2013).

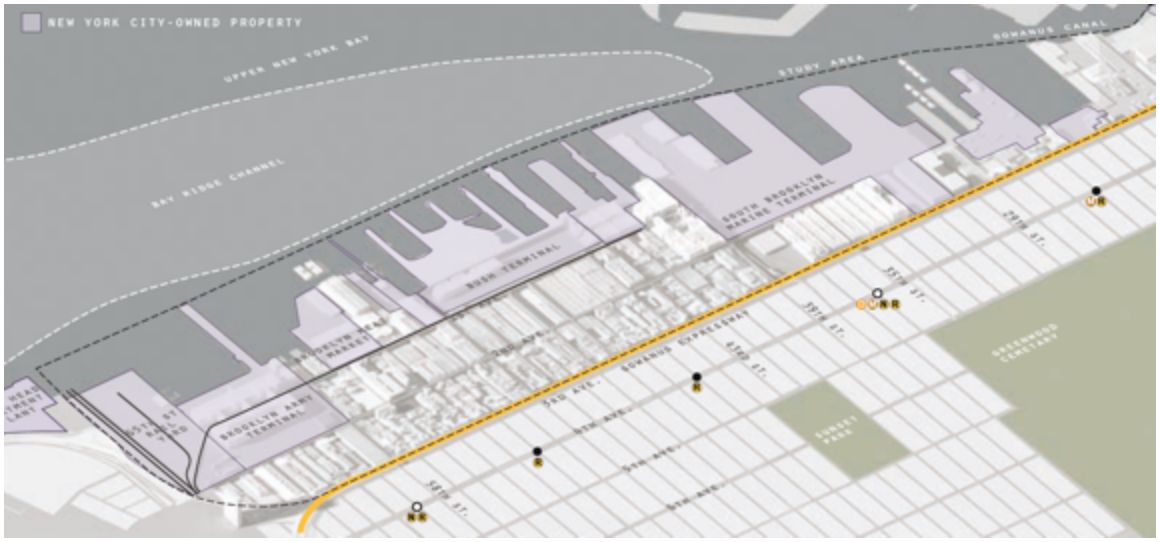


Figure 17. Sunset Park with its City-owned areas (source: NYCEDC, 2009).

Sunset Park extends from Erie Basin to Owls Head, covering an area of nearly 600 acres. Figure 17 illustrates Sunset Park and its relatively large amount of city-owned areas. The area is currently characterized by small-scale centers of industrial activity, water-dependent facilities, manufacturing districts and vacant sites and brownfields of significant size (DCP, 2011). Sunset Park was initially designated by the Comprehensive Waterfront Plan[5] as one of the six Significant Maritime and Industrial Areas (SMIA's). Of these SMIA's, Sunset Park features some of the largest vacant sites but also the highest employment density (DCP, 2011).

The Sunset Park Waterfront Vision Plan (NYCEDC, 2009) provides an area vision and investment strategy. It features recommendations for investments over the coming twenty years, and focuses on projects implementable on the short-term. The strategy is developed to stimulate physical developments and provide policy-based plans that connect enhancement of public access to the waterfront with sustainable industrial growth. The predominant goal of the regeneration project is to balance neighborhood whishes, city needs, and chances for industrial development.
Besides the transformation of the industrial sites, the regeneration of Sunset Park covers the extension and enhancement of park space. As a response to the City's policy of encouraging sustainable design, several environmentally conscious elements are considered, also including for example on-site storm water retention.

Main actors in the Sunset Park regeneration are:

- Sunset Park Working Group:
  - New York City Economic Development Corporation
  - Mayor's Office of Industrial and Manufacturing Businesses
  - New York City Department of Small Business Services
  - New York City Department of City Planning
  - Southwest Brooklyn Industrial Development Corporation
- Housed businesses
- Brooklyn Community Board; Residents and businesses of surrounding neighborhoods
- Development firms

[5] the predecessor of the New Waterfront Revitalization Program (DCP, 2002) and Vision 2020 (DCP, 2011)

While opportunities of the area are predominantly sought in enhancing industrial and economic activity, the challenge lies in simultaneously providing safe and attractive public access to the waterfront. Therefore, the waterfront, housing both industrial and public activities, requires a delicate balance between vehicular and pedestrian circulation. Closely related is the construction of the Brooklyn Waterfront Greenway Masterplan, a continuous public route of greenway connecting Brooklyn waterfronts.

The transformation of the Industry City properties, along the South Brooklyn Marine Terminal is a good example of one of the current development projects in Sunset Park that could be studied. The complex is recently bought by by Jamestown Properties, in a partnership contract with real estate financiers Angelo Gordon and Belvedere Capital (The Real Deal, 2013). The complex consists of 16 bulidings with a total of 6 million square feet of floor space. Buyers are looking into transformation into a mixed-use complex of office, manufacturing and cultural facilities. What makes this project especially interesting for this research is that Hurricane Sandy damaged several of the buildings of this development (The Real Deal, 2013).

5. ADAPTATION IN ROTTERDAM

From an international point of view Rotterdam has one of the highest safety levels for its levees. The protected areas have a flooding chance of 1:4.000 to 1:10.000 years. Though, given the gradual but persistent issue of land-subsidence and considering the effects of climate change combined with the increase in assets and the number of people they protect, the pressure on these dikes increases. Figure 19 illustrates the extent to which the protected areas can be affected by a failing of regional flood defence systems in the Rotterdam region. Therefore the national water management body 'Rijkswaterstaat' has developed a national strategy, complemented with area-specific programs, to provide continued safety: the 'Deltaprogramma' (Rijkswaterstaat, 2013). This strategy combines the heightening and strengthening of levees with deliberately leaving areas open for temporal inundation; *giving room* for the water.

However, large parts of the city of Rotterdam lie outside of the system of embankments. These areas presently house 40.000 residents and the entire port, which forms the city's main economic driver and is the largest harbor of Europe. As these areas have higher ground levels, the risks for flooding are different. Obviously they are more susceptible to frequent flooding as sea levels rise and fluvial discharge increases, however, the impacts are generally less dramatic as the water can also recede easily (van Barneveld, 2013). The chance for victims is thus limited and consequences mostly bring direct and indirect economic and environmental damage (van Barneveld, 2013).

As will be elaborated upon in the following section, Rotterdam still deals with the consequences of the financial crisis of 2008, predominantly marked by a shattered land- and development market. Nevertheless, aiming at future growth of the port industry and according local recovery of property market, the city has ambitious development and densification plans. Considering most of the new developments (80%) are located in the outer-dike areas and scenarios for sea level rise fluctuate between 35-85 cm (~1-3 feet), a strategic approach to building flood resilience of the city is crucial.

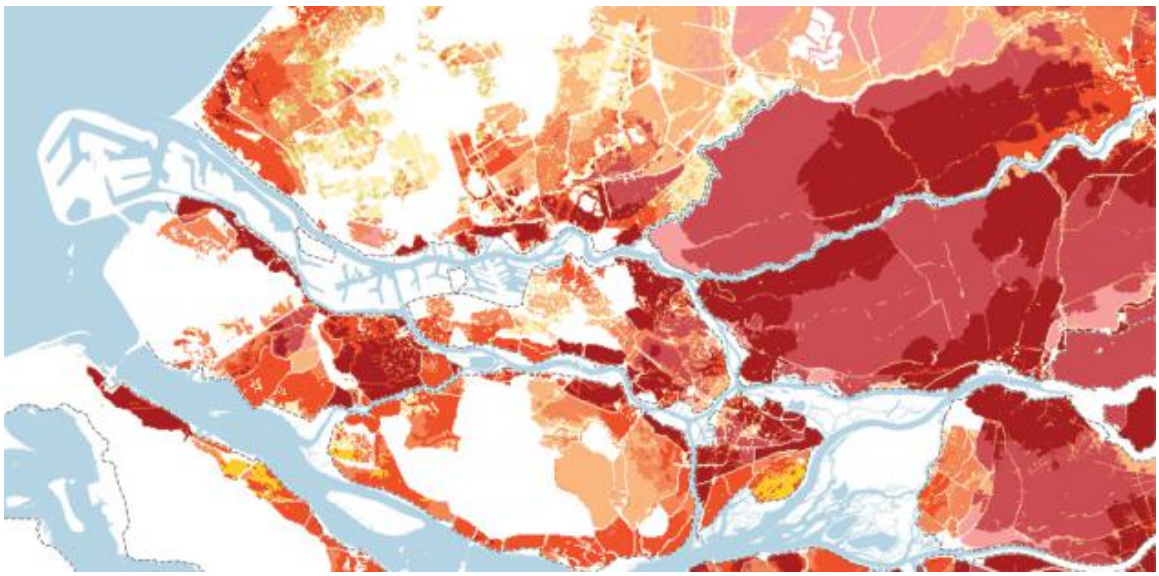


Figure 19. Vulnerability of embanked areas for failing of flood defence system in the Rotterdam region (source: Rijkswaterstaat, 2013) .

To map the risks Rotterdam uses newly developed 3D models and computation models. This enables setting priorities and adequately match design solutions to the predominant cause of the flooding at hand (Gemeente Rotterdam *et al*, 2013). The city expressively strives to realize its ambitions in water management by linking necessary measures to urban developments and other programs in the urban environment *(mainstreaming)*. However, in some districts it has already become apparent that this policy is not effective enough to provide safety and achieve the ambitions of the city (Gemeente Rotterdam *et al*, 2013). Thus, water poses spatial challenges and opportunities for the city (translated and rephrased from Gemeente Rotterdam *et al*, 2013):

- Every development offers chances for water retention. Water management should be an integral part of design and planning from the early stages of development throughout.
- Many areas in Rotterdam face social and economic challenges, leading to investments in the spatial quality of these areas. Water can contribute here, by making the neighborhood more attractive and the city environment more livable.
- Water retention can be added to programs for green infrastructure, child-friendly neighborhoods, sewage replacements and maintenance of public space. This offers many possibilities on small scale by for instance removing pavement and giving room to park areas.
- Prioritize the design of water resilient open space. The system of discharge of precipitation should be taken into consideration.
- Spatial developments can influence ground water flows. Especially in urban areas with multi-layered use of ground and multitude of cables and networks in the ground this poses significant risks. In the design, the effects on groundwater should be taken into consideration.

"Individual ways of water resilient living" – "The ship of the government is taken by the waves" Source: Helpdesk Water, 2008.

A. URBAN DEVELOPMENT PRACTICE

This part describes the current efforts of the municipal department of urban development, Stadsontwikkeling Rotterdam. It builds on the current situation of urban planning and development in the Netherlands, as described in chapter 3. As already mentioned there, urban development in the Netherlands, and in particular in Rotterdam, is facing major challenges. Cities face issues like climate adaptation, food supply and sustainable energy, while being confronted with a changing economic system, fluctuating market demand and shifting societal needs and preferences. The search for new ways of working and initiatives, focusing on area potentials, changing development roles, methods and planning instruments is therefore deemed crucial for effective planning of the port-city, strengthening its competitive position (Gemeente Rotterdam, 2012).

This raises the need for a new approach to urban planning, as suggested by Boelens (2010). He states that spatial planning practices in the Netherlands should be based on an actor-oriented, rather than government-oriented, perspective. This, as opposed to the postmodern planning strategies, predominant in the Netherlands since the 1980-ies. These last heavily promoted private investment and initiative, with public parties' interventions limited to set guidelines and boundaries. While this clearly departs from the former state-controlled planning methods, Boelens (2010) argues there was no real shift in the planning paradigm. This, because the new approach was still based on the effects of public interventions, rather than actor behaviors and networks. Furthermore, postmodern planning practices have been considered less fruitful in promoting sustainable collaborations. In current Dutch practice of spatial planning and urban development several new planning concepts have developed. Most are based on the notion that market parties (developers, companies, investors, and institutions) and individuals (entrepreneurs, community organizations and residents) are increasingly taking the initiative to invest in (urban) areas (Heurkens, De Hoog, & Daamen, 2014). Subsequently the practices of planning by invitation (Van Rooy, 2011), planning in coalitions (de Zeeuw, Franzen, & van Rheenen, 2011), organic area development (Buitelaar, Feenstra, Galle, Lekkerkerker, Sorel, & Tennekes, 2012) and privately-controlled area development (Heurkens, 2012) can be defined.

Over recent years, due to various cost-reducing programs, municipal services in Rotterdam are reduced and integrated in the single cluster of Stadsontwikkeling Rotterdam. Main strategy therefore is to play a *facilitating* role in urban development challenges (Heurkens, De Hoog, & Daamen, 2014) as already elaborated upon in chapter 3. In Rotterdam practice this implies the abandonment of the prior directing role of the municipality, demanding new forms of public management (Gemeente Rotterdam, 2012). Of course, supporting developments and facilitating private initiatives is not new for the municipality of Rotterdam. However, the decreasing financial means and corresponding more receding role has lead to an increased focus on the formalization of this role and its potential to substitute other policies (Heurkens, De Hoog, & Daamen, 2014).

Stadsontwikkeling Rotterdam is currently experimenting with new methods, tools and collaboration models to show market parties the chances that lie in investments in area development. However, to accommodate these initiatives more freedom for the private parties is wanted. They need to be enabled to act more autonomously in public space. This translates in the need for less restrictive legislation and time-consuming procedures. The new role for the municipality in urban development is thus focused on facilitating initiatives of private market parties, supporting the process with minimum financial support (Heurkens, De Hoog, & Daamen, 2014). By anticipating and responding to the initiatives of private

parties the city authorities of Rotterdam now expect to reach their goals in strengthening the regional economy and enhancing the attractiveness of the living environment, despite the limited resources of the municipality (Gemeente Rotterdam, Concern Rotterdam. Overheidsorganisatie voor Rotterdammers, 2012).

However, in reality these experiments show that the municipality still needs to act in a more pro-active fashion rather than merely responding by offering support (Heurkens, De Hoog, & Daamen, 2014). Market parties still need more financial and procedural incentives stimulation in their decision-making to invest in area development. Thus, the municipality of Rotterdam has set the internal organizational goal to take on a facilitating role in area development, but still has to define what this role exactly entails and how these policies will translate to actual projects (Heurkens, De Hoog, & Daamen, 2014).

The analysis of Heurkens, De Hoog and Daamen (2014) concludes that not one specific category of the planning instruments framework of Tiesdell and Allmendinger (2005), but rather a mixed typology of public interventions on the development market is needed for effective area management. Besides acting on regulating and shaping policies, Stadsontwikkeling Rotterdam has indicated to continue initiating public interventions in area development, be it in reduced amount. This initiating role, enlarging area potentials and providing financial possibilities for the market, can be considered a stimulating form of planning policy (Tiesdell & Allmendinger, 2005). With the provision of subsidies and the construction of public facilities in an area private parties are stimulated to participate in the development, thus profiting from public investments.

This role will be limited to areas where from a societal perspective change is necessary, but where private parties see no potential for development or investments. Often this can be achieved with existing planning instruments, but in some cases it may be necessary to look into new collaborative and financial models to answer to changing societal demands (Heurkens, De Hoog, & Daamen, 2014). This, to ensure actual realization by creating a economically feasible business case for all investing parties. In these kinds of areas it may be necessary for the municipality to initiate the process of development, and (financial) resources may be deployed to support or even organize this process (Heurkens, De Hoog, & Daamen, 2014). Nonetheless, keeping in mind the stark reduction of financial means of the municipality, this approach should only be taken in areas where economic potential is low, social need for change is high and the impact of investments is believed to be substantial (Gemeente Rotterdam, Concern Rotterdam. Overheidsorganisatie voor Rotterdammers, 2012).

WATERFRONT REGENERATION

Due to the trend of decontainerization and, more recently, the development of the Maasvlakte I and II, much of the port-industry has left the inner-city harbors. This abandonment brings vacancy and detoriation of large parts of the city. In congruence with New York and many other port cities, this process is responded to by the municipality by regeneration strategies, defining these harbors as high potential areas for housing, business and commercial developments. An important partner for the municipality in these areas is the city's port governing agency the 'Havenbedrijf Rotterdam'.

The leading waterfront regeneration strategy in Rotterdam is 'Stadshavens Rotterdam - Creating on the Edge' (Stadshavens Rotterdam, 2006). The targeted locations are all located in outer-dike areas, as illustrated in figure 20. Predominant theme in the various areas and projects featured in this strategy is innovation, accentuating new solutions in energy transition and water management. Aim is to fully integrate these innovations in designs for the developments and their urban environment. The Stadshavens Rotterdam strategy aims at strengthening the position of both port and city by enhancing the economic structure and creating high quality working and living environments. Given the outer-dike situation, water retention is not a focus here. However, adaptive building and flooding safety are to play an important role in the design. For instance, in the Rijnhaven area features experiments with floating constructions (Stadshavens Rotterdam, 2013).

Stadshavens developments are intended to experiment with innovative water management solutions, but also make active use of these innovations in creating jobs and setting Rotterdam's international image as modern, adaptive water-city (Stadshavens Rotterdam, 2006).

Figure 20. Map of Stadshavens locations (white outline) and inner-dike areas (white with blue-dotted outline). Own illustration, adapted from Stadshavens Rotterdam, 2006.

B. CLIMATE ADAPTATION STRATEGY.

As early as 2002 the municipalty of Rotterdam, together with the waterboards (local governmental bodies responsible for water management) active in the Rotterdam region, has developed the WaterPlan (Gemeente Rotterdam *et al*, 2002). This strategic report, followed by the Waterplan 2 in 2007 (Gemeente Rotterdam *et al,* 2007) and its reassessment in 2013 (Gemeente Rotterdam *et al,* 2013). This last reassessment incorporated notions of the overarching climate adaptation strategy, the 'Rotterdam Adaptatie Strategie' (RAS).

The RAS, a result of Rotterdams climate adaptation program 'Rotterdam Climate Proof' (RCP), defines future challenges as the result of climate change for the city of Rotterdam. Furthermore, responsive and adaptive measures are proposed, as well as important actors to be involved in the process. The RAS functions as an umbrella document, setting general guidelines and directions but leaving specific focus areas and studies to separate reports like the Themarapport Waterveiligheid (English: Theme Report Water Safety by van Barneveld [2013]).

Implementation of the strategy is proposed as a joint activity of two municipal departments: the Municipal Public Works Department and the Department of urban development.
In addition, collaboration is sought with the Municipal Health Service (GGD), the Sports and Recreational Department, the Water Boards, various government bodies, NGOs and knowledge institutes (Rotterdam Climate Initiative, 2014).

De RAS explicitly states that even though the strategy forms a framework for government activities, building climate resilience of the city needs all urban parties to engage in this process and pro-actively collaborate. The strategy thus forms a starting point for discussion between planning parties and coordinated acting of development actors. The municipality thus understands its role in achieving the strategic goals to provide a framework, by adjusting legislation and defining policy, but more importantly to facilitate the process, by supporting the various actors and their interaction and, when necessary, initiating development.

Main actors involved in making the climate adaptation strategies and translating propositions to planning policies:

- Rotterdam Climate Proof (RCP); The Rotterdam Climate Initiative creates a platform for government, organizations, companies, knowledge institutes, and citizens to collaborate in making the city more sustainable. Main aims are to achieve a fifty per cent reduction of CO_2 emissions, adapt to climate change, and promote the economy in the Rotterdam region (Rotterdam Climate Initiative, 2014).
  Collaborating organizations are:
  - Port of Rotterdam, the
  - City of Rotterdam,
  - employers' organization Deltalinqs, and
  - DCMR Environmental Protection Agency Rijnmond.
- Waterboards
- Environmental Protection Agency Rijnmond (DCMR)
- Social housing associations

An overview of the strategies in climate adaptation, building flood resilience and waterfront developments is given in table 6.

Table 6. Adaptation and waterfront strategies Rotterdam

Strategy	Main focus
Rotterdam Climate Change Adaptation Strategy (RAS)	The relation between climate change and the city.
Rotterdamse adaptatiestrategie Themarapport waterveiligheid	Translating overall climate adaptation guidelines of the RAS to the specific focus of water safety, both quantity as well as quality.
Waterplan II (2007), with reassessment report in 2013	Working on water for an attractive and climate resilient city.
Rotterdam Stadsvisie 2020	Housing & development agenda for attracting businesses, visitors and residents
Stadshavens Rotterdam 1600 ha. – Creating on the edge	Defining former port areas to be redeveloped with a focus on innovative solutions in energy and water management.

C. CASE PROJECT

The project currently selected as case project in Rotterdam is Heijplaat. This choice is still under consideration as the comparability, mainly in scale, with most New York projects is low. However, the influence of adaptation measures to build flood resilience on the process of development forms an interesting case. The project has been selected in consultation with J. Jacobs (program manager Climate Adaptation office Rotterdam).

Figure 21. Heijplaat (white outlined) in the Stadshavens area. Own illustration, adapted from Stadshavens Rotterdam, 2006.

Heijplaat, is an outer-dyke area and part of the Stadshavens, as illustrated in figure 21. It is a small housing district, originally built in the 1920-ies for the employees of the Rotterdamsche Droogdock Maatschappij (RDM). This ship-building company had its main wharf on the adjacent docks. The neighborhood is thus located relatively far out of the city center but up to today houses a tight community with schools, shops and churches in the area itself (Heijplaat community association, 2014). In recent years, the former docks of the RDM have been redeveloped and now house a higher-education organization, congress center and several start-up businesses. This is also starting to attract some hospitality functions like cafés and restaurants to the area. The connection with other parts of the city is improved by the establishment of a waterbus as part of the public transport network. The area of development is depicted in figure 22.

Most of the buildings in Heijplaat are currently owned by social housing association Woonbron. Considering the technical state of the homes and increasing functional requirements, some years ago Woonbron together with the municipality made plans to demolish most properties and redevelop the site according to new designs. This lead to strong opposition and general distrust of the local residents towards the municipality. Furthermore, as the area is located in outer-dike area, new development meant that the terrain needed to be elevated almost entirely. This made financial feasibility inconceivable. However, it was just this issue of adaptation that led to a new plan (Jacobs, 2014). The responsibility to bring back the vulnerability of the community was taken on by the municipality. In collaboration with various stakeholders in the area, a new plan was created. This combined the redevelopment of the old housing, the construction of a new adjacent housing district and the building of a small embankment as flood defense (van Barneveld, 2013). As a result of the embankment and the use of adaptive building, the land doesn't have to be elevated, saving the housing association huge investments. The plans, made in collaboration of all main actors (see below) are formulated in a cooperation agreement. As of now, the flood defense is being constructed, but the realization of the housing program is at a stand-still as Woonbron is dealing with legislative and financial difficulties.

Main actors:

- Municipality of Rotterdam
- Rotterdam Stadshavens department
- Woonbron
- Port of Rotterdam
- Eneco (energy supplier)
- Heijplaat community association

Figure 22. Overview of the developments of Heijplaat (source: Arcadis, 2011).

BIBLIOGRAPHY

- Adams, D. (1994). *Urban planning and the development process.* Oxford/New York: Routledge.
- Adams, D., & Tiesdell, S. (2010). Planners as market actors: Rethinking state–market relations in land and property. *Planning Theory & Practice , 11* (2), 187-207.
- Adams, D., Allmendinger, P., Dunse, N., Houston, D., Tiesdell, S., Towned, J., et al. (2003). *Assessing the impact of planning, housing, transport and regeneration policies on land pricing.* Report for ODPM, University of Aberdeen and Glasgow.
- Adams, D., Croudace, R., & Tiesdell, S. (2009). *Discovering Property Policy.* London: RICS.
- Adams, D., Dunse, N., & White, M. (2005). Conceptualising state-market relations in land and property: the growth of institutionalism—extension or challenge to mainstream economics? In D. Adams, C. Watkins, & M. White (Eds.), *Planning, Public Policy and Property Markets* (pp. 37-55). Oxford: Blackwell.
- Albrechts, L. (2006). Bridge the gap: From spatial planning to strategic projects. *European Planning Studies , 14* (10), 1487-1500.
- Albrechts, L. (2004). Strategic (spatial) planning reexamined. *Environment and Planning B , 31*, 743-758.
- Alexander, E. (2001). A transaction costs theory of land use planning and development control: towards an institutional analysis of public planning. *Town Planning Review , 72* (1), 45-75.
- Alexander, E. (2001). A transaction costs theory of planning. *Journal of the American Planning Association , 58* (2), 190-200.
- Alexander, E. (2008). Between state and market: A third way of planning. *International Planning Studies , 13* (2), 119-132.
- Arcadis. (2011). *Bestemmingsplan Nieuwe Dorp Heijplaat (ontwerp) [English: Zoning Plan New Village Heijplaat (design)].* Retrieved May 25, 2014, from Rotterdam Stedelijke Ontwikkeling [English: Rotterdam Urban Development department]: http://www.rotterdam.nl/Clusters/RSO/Document%202013/Bekendmakingen/Bestemmingsplannen/DEELGEMEENTE%20CHARLOIS/3.%20Nieuwe%20Dorp%20Heijplaat_Toelichting.pdf
- Argyris, C. (1985). *Strategy, change and defensive routines.* London: Pitman Publishing.
- Buitelaar, E., Feenstra, S., Galle, M., Lekkerkerker, J., Sorel, N., & Tennekes, J. (2012). *Vormgeven aan de Spontane Stad: Belemmeringen en kansen voor organische gebiedsontwikkeling.* Planbureau voor de Leefomgeving and Urahn Urban Design, The Hague.
- Balica, S., Wright, N., & Van der Meulen, F. (2012). A flood vulnerability index for coastal cities and its use in assessing climate change impacts. *Natural hazards , 64* (1), 73-105.
- Birkmann, J., Garschagen, M., Kraas, F., & Quang, N. (2010). Adaptive urban governance: new challenges for the second generation of urban adaptation strategies to climate change. *Integrated Research System for Sustainability Science* (5), 185-206.
- Bowles, J., & Kotkin, J. (2003). *Engine Failure.* Center for an Urban Future.
- Boelens, L. (2010). Theorizing practice and practising theory: Outlines for an actor-relational-approach in planning. *Planning Theory , 9* (1), 28-62.
- Bruggeman, W., Haasnoot, M., Hommes, S., te Linde, A., & van der Brugge, R. (2011). *Verkenning van mogelijke fysieke en sociaaleconomische ontwikkelingen in de 21ste eeuw op basis van KNMI'06 en WLO-scenario's, voor gebruik in het Deltaprogramma 2011-2012.* Deltares & Planbureau voor de Leefomgeving ([PBL], Engish: Planning Bureau Living environment), Delft.
- Bryman, A. (2012). *Social Research Methods.* Oxford: Oxford University Press (Fourth edition).
- Bryson, J., & Roering, W. (1987). Applying private-sector strategic planning in the public sector. *Journal of the American Planning Association , 53* (1), 9-22.
- Brash, J. (2006). *The Bloomberg way: Development politics, urban ideology and class transformation in contemporary New York City.* PhD thesis, City University of New York.

- Breen, A., & Rigby, D. (1996). *The New Waterfront: A worldwide urban success story.* London: Thames & Hudson.
- C40 Cities. (2014). *Connecting Delta Cities*. Retrieved June 2, 2014, from Networks: http://www.c40.org/networks/connecting_delta_cities
- Castells, M. (2006). *The network society: From knowledge to policy.* (M. Castells, & G. Cardoso, Eds.) Johns Hopkins University.
- Castells, M. (1996). *The rise of the network society: The information age: Economy, society, and culture (Vol. 1).* Massachusetts and Oxford: Blackwell.
- Chaffee, E. (1985). Three Models of Strategy. *Academy of Management Review , 10* (1), 89-98.
- Coolen, H. (2013). *Semi-structured interviewing.* College slides, Faculty of Architecture, Delft Technical University, Department of Real Estate & Housing, Delft.
- Crane, A., & Livesey, S. (2003). Are You Talking to Me? Stakeholder Communication and the Risks and Rewards of Dialogue . In J. Andriof, S. Waddocl, B. Husted, & S. Sutherland Rahman, *Unfolding stakeholder thinking 2: Relationships, communication, reporting and performance* (pp. 39-52). Sheffield: Greenleaf.
- European Commission. (1997). *The EU compendium of spatial planning systems and policies, regional development studies 28.* Luxembourg: Office of official publications of the European Communities.
- EDC. (2011). *Waterfront Action Agenda; Transforming New York City's Waterfront.* New York City Economic Development Corporation, NYC.
- Dutch Dialogues. (2014). Retrieved June 7, 2014, from http://dutchdialogues.com/
- Davoudi, S., Crawford, J., & Mehmood, A. (2009). *Planning for climate change: strategies for mitigation and adaptation for spatial planners.* Earthscan.
- Daamen, T. (2010). *Strategy as force. Towards effective strategies for urban development projects: the case of Rotterdam CityPorts.* Amsterdam: IOS Press.
- Daamen, T. (2011, October 03). *Reisverslag Boston & New York City.* Retrieved 12 28, 2013, from Leerstoel Gebiedsontwikkeling : http://gebiedsontwikkeling.nu/auteur/132-tom-daamen
- DCP. (2011). *Vision 2020: New York City comprehensive waterfront plan.* Department of City Planning (DCP), New York CIty, New York.
- DCP. (2013). *Coastal climate resilience. Urban Waterfront Adaptive Strategies.* Department of City Planning (DCP), The City of New York.
- DCP. (2013). *Coastal climate resilience: Designing for Flood Risk.* NYC Department of City Planning (DCP), NYC.
- DCP. (2002). *The New Waterfront Revitalization Program.* Department of City Planning, The City of New York.
- de Zeeuw, F., Franzen, A., & van Rheenen, M. (2011). *Gebiedsontwikkeling in een andere realiteit, wat nu te doen?: Handreikingen voor de praktijk.* Praktijkleerstoel Gebiedsontwikkeling TU Delft, Akro Consult, Deloitte Real Estate Advisory, Delft.
- De Hoog, W. (2012). *Learning within Urban Area Development: the case of HafenCity Hamburg.* Department of Real Estate & Housing, Architecture faculty, Delft University of Technology, Delft.
- De Hoog, W., & Daamen, T. (2013). *Leren van leren in gebiedsontwikkeling.* Department of Real Estate & Housing, Architecture faculty, Delft University of Technology, Delft.
- De Lange, R., Schuman, H., & Montesano Montessori, N. (2011). *Praktijkgericht onderzoek voor reflectieve professionals* (Vol. chapter 1). Apeldoorn: Garant.
- De Roo, G., & Porter, G. (2007). *Fuzzy Planning. The role of actors in a Fuzzy Governance Environment.* Aldershot: Ashgate.
- Fainstein, S. (2001). *The City Builders: Property Development in New York and London.* Kansas: University Press of Kansas.
- Fainstein, S. (2005). The return of urban renewal: Dan Doctoroff's grand plans for New York City. *Harvard Design Magazine , 22*, 1-5.
- FEMA. (2013). *Coastal analysis and mapping.* Retrieved June 1, 2014, from Preliminary Flood Insurance Rate Map (FIRM): http://www.region2coastal.com/preliminaryfirms

- Florida, R. (2005). *Cities and the creative class.* New York: Routledge.
- Florida, R. (2002). *The rise of the creative class: and how it's transforming work, leisure, community and everyday life.* New York: Basic Books.
- Franzen, A., Hobma, F., De Jonge, H., & Wigmans, G. (Eds.). (2011). *Management of urban development processes in the Netherlands. Governance, design, feasibility.* Amsterdam: Techne Press.
- Gemeente Rotterdam. (2012). *Concern Rotterdam. Overheidsorganisatie voor Rotterdammers.* Board of Mayor and Aldermen, Rotterdam.
- Gemeente Rotterdam, HHSK, WSHD, & HHD. (2007). *Waterplan 2.*
- Gemeente Rotterdam, HHSK, WSHD, & HHD. (2002). *Waterplan Rotterdam.* Gemeente Rotterdam, Hoogheemraadschap van Schieland en de Krimpenerwaard (HHSK), Waterschap Hollandse Delta (WSHD) en Hoogheemraadschap van Delfland (HHD).
- Gemeente Rotterdam, HHSK, WSHD, & HHD. (2013). *Herijking Waterplan 2 - Werken aan water voor een aantrekkelijke en klimaatbestendige stad.* Gemeente Rotterdam, Hoogheemraadschap van Schieland en de Krimpenerwaard (HHSK), Waterschap Hollandse Delta (WSHD) en Hoogheemraadschap van Delfland (HHD).
- Giddens, A. (1984). *The Constitution of Society.* Cambridge (UK): Polity Press.
- Gollwitzer, P. (1999). Implementation intentions: strong effects of simple plans. . *American Psychologist , 54* (7), 493-503.
- IPCC. (2014). *Climate Change 2014, Impacts, Adaptation and Vulnerability.* Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.). Cambridge, United Kingdom and New York, NY, USA.: Cambridge University Press.
- Hackworth, J. (2007). *The neoliberal city: governance, ideology and development in American urbanism.* Ithaca, NY: Cornell University Press.
- Hajer, M., & Zonneveld, W. (2000). Spatial planning in the network society-rethinking the principles of planning in the Netherlands. *European Planning Studies , 8* (3), 337-355.
- Hall, P. (1993). Comments on Dutch planning. In A. Faludi (Ed.), *Dutch Strategic Planning in International Perspective.* Amsterdam: SISWO.
- Hall, P., & Taylor, R. (1996). Political Science and the Three New Institutionalisms'. *Political Studies , XLIV*, 936-957.
- Harvey, D. (2005). *A brief history of neoliberalism.* Oxford, UK: Oxford University Press.
- Harvey, D. (1990). *The Condition of Postmodernity: An enquiry into the origins of cultural change.* Oxford: Blackwell.
- Heurkens, E. (2012). *Private Sector-led Urban Development Projects: Management, Partnerships and Effects in the Netherlands and the UK.* Phd dissertation, Real Estate & Housing department, Architecture faculty, Delft University of Technology, Delft.
- Heurkens, E., De Hoog, W., & Daamen, T. (2014). *De Kennismotor Initiatieven tot faciliteren en leren in de Rotterdamse gebiedsontwikkelingspraktijk.* Department of Urban Area Development, Master Real Estate & Housing, Faculty of Architecture, Delft University of Technology, Delft.
- Healey, P. (2007). *Urban Complexity and Spatial Strategies: Towards a relational planning for our times.* London: Routledge.
- Healey, P. (1997). *Collaborative Planning—Shaping Places in Fragmented Societies.* London: MacMillan.
- Healey, P., & Williams, R. (1993). European urban planning systems: Diversity and convergence. *Urban Studies , 30* (4/5), 701-720.
- Healey, P., & Barrett, S. (1990). Structure and egency in land and property development processes: some ideas for research. *Urban studies , 27*, 89-104.
- Healey, P., McNamara, P., Elson, M., & Doak, A. (1988). *Land use planning and the mediation of urban change: The British planning system in practice.* Cambridge: Cambridge University Press.
- Heijplaat community association. (2014). Retrieved May 21, 2014, from http://www.heijplaat.com/

- Helpdesk Water. (2008, March 20). *Helpdesk Water, Inspiratie.* Retrieved April 14, 2014, from www.helpdeskwater.nl: http://www.helpdeskwater.nl/onderwerpen/water-en-ruimte/klimaat-o/inspiratie/cartoons/
- Hillier, J. (2002). *Shadows of Power: An allegory of prudence in land-use planning.* London: Routledge.
- Hillier, J. (2002). *Shadows of Power: An allegory of prudence in land-use planning.* London: Routledge.
- Hoyle, B., & Pinder, D. (Eds.). (1992). *European Port Cities in Transition.* London: Belhaven.
- Hodgson, G. (1997). *Economics and evolution: bringing life back into economics* (2nd edition ed.). Cambridge: Polity Press.
- Hopkins, L. (2001). *Urban development: the logic of development plans.* Washington DC: Island Press.
- Hrebiniak, L., & Joyce, W. (1984). *Implementing strategy. New York: Macmillan.* New York: Macmillan.
- Jacobs, J. (2014, May 21). Exploring discussions on Rotterdams Climate Adaptation and case projects. (E. Gaaff, Interviewer) Delft.
- Jeffrey, P., & Seaton, R. (2004). A conceptual model of 'receptivity'applied to the design and deployment of water policy mechanisms. *Environmental Sciences , 1* (3), 277-300.
- Johnson, G. (1987). *Strategic change and the management process.* Oxford: Basil Blackwell .
- Jones Lang LaSalle. (2014, April). *Global Sustainability Perspective.* Retrieved May 16, 2014, from http://www.joneslanglasalle.com/GSP/en-gb/Pages/Global-Sustainability-Perspective.aspx
- Keenan, J. (2014). *Adaptive capacity of commercial real estate firms to climate change in NYC.* Columbia University, Center of Urban Real Estate (CURE), New York City.
- Keenan, J. (2014). Many Birds with One Stone: Adaptation and Economic Development. In MASNYC, *Ideas for New York's new leadership* (pp. 50-52). New York City: The Municipal Art Society of New York (MASNYC).
- Kickert, W., Klijn, E., & Koppenjan, J. (Eds.). (1997). *Managing Complex Networks: Strategies for the Public Sector.* London: Sage.
- Koppenjan, J., & Groenewegen, J. (2005). Institutional design for complex technological systems. *International Journal of Technology, Policy and Management , 5* (3), 240-257.
- Koppenjan, J., & Klijn, E. (2004). *Managing Uncertainties in Networks.* London: Routledge.
- Landry, C. (2000). *The creative city: a toolkit for urban innovators.* London: Earthscan.
- Lindblom, C. (1979). Still muddling, not yet through. *Public administration review* , 517-526.
- NUWCReN. (2012). *Flood preparedness in The Netherlands a US perspective.* (B. Kolen, S. Hommes, J. Trainor, K. van Ruiten, & G. Shaw, Eds.) Netherlands US Water Crisis Research Network.
- NYCEDC. (2009). *Sunset Park Waterfront Vision Plan.* New York City Economic Development Corporation (NYCEDC) , The City of New York.
- Newman, P. (2008). Strategic spatial planning: Collective action and moments of opportunity. *European Planning Studies , 16* (10), 1371-1383.
- Nicholls, R. (2008). *Ranking port cities with high exposure and vulnerability to climate extremes: exposure estimates .* OECD Environment Working Papers, http://dx.doi.org/10.1787/011766488208. OECD Publishing.
- Munich Re. (2013). *Significant natural catastrophes 1980-2012.*
- Malone, P. (1996). *City, Water, Capital.* London: Routledge.
- Marshall, R. (2001). *Waterfronts in Post-Industrial Cities.* London: Spon Press.
- MCD. (2013). Symposium De klimaatbestendige stad (English: Symposium The climate resilient city). *Master City Developer (MCD).* Gouda.
- McGranahan, G., Balk, D., & Anderson, B. (2007). The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization , 19* (1), 17-37.
- McHarg, I. (1969). *Design with Nature.* New York City: The Natural History Press.
- Meyer, H. (1999). *City and port: Urban planning as a cultural venture in London, Barcelona, New York, and Rotterdam: Changing relations between public urban space and large-scale infrastructure.* Rotterdam: International Books.
- Meyer, H., & v.d. Burg, L. (Eds.). (2005). *Atlas of Dutch Watercities.* Amsterda: SUN.

- Meyer, H., Morris, D., & Waggonner, D. (2009). *Dutch Dialogues. New Orleans – Netherlands, Common Challenges in Urbanized Deltas.* Amsterdam: SUN.
- Mintzberg, H. (1989). *Mintzberg on Management.* New York: The Free Press.
- Mintzberg, H. (1994). *Rise and fall of strategic planning. .* Simon and Schuster.
- Mintzberg, H., & Waters, J. (1985, July-September). Of strategies, deliberate and emergent. *Strategic Management Journal* .
- Mintzberg, H., Ahlstrand, B., & Lampel, J. (2005). *Strategy Safari: A Guided Tour Through The Wilds of Strategic Mangament.* Simon and Schuster.
- O'Brien, E. (2005, July 1). N.Y.C.'s riverfront revival: City pledges $36M for waterfront development bond buyer. *Bond buyer* , 1.
- OECD. (2009). *Integration climate change adaptation into development co-operation: policy guidance.* OECD, Retrieved on 19-03-2014 through www.oecd.org/env/cc/44887764.pdf, Paris.
- Quinn, J. (1980). *Strategies for change: Logical incrementalism.* New York: Irwin.
- Peck, J., & Tickel, A. (2002). Neoliberalizing space. *Antipode , 34* (4), 380-404.
- Peck, J., & Tickel, A. (1995). The social regulation of uneven development: "Regulatory deficit," England's South East and the collapse of Thatcherism. *Environment and Planning , A* (27), 15-40.
- Peck, J., Theodore, N., & Brenner, N. (2009). Neoliberal urbanism: Models, moments, mutations . *SAIS Review , XXIX(1),*, 49–66.
- Pellegrinelli, S., & Bowman, C. (1994). Implementing strategy through projects. *Long Range Planning , 27* (4), 125-132.
- Porter, M. (1996). What Is Strategy? *Harvard Business Review* (November-December), 61-78.
- Sunset Park website. (2013). *Sunset Park as featured in New York Times*. (C. W.-P. Frank M. Pohole, Producer) Retrieved June 16, 2014, from http://www.sunset-park.com/main/images/29limap.jpg
- Sartorio, F. (2005). Strategic Spatial Planning: A Historical Review of Approaches, its Recent Revival, and an Overview of the State of the Art in Italy. *disP , 162* (3), 26-40.
- Schaller, S., & Novy, J. (2010). New York City's waterfronts as strategic sites for analyzing neoliberalism and its contestations. In G. Desfor, J. Laidley, Q. Stevens, & D. Schubert, *Transforming urban waterfronts: fixity and flow* (pp. 166-187). New York: Routledge.
- Scharpf, F. (1997). *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research.* Oxford: WestviewPress.
- Scharpf, F. (2000). Institutions in Comparative Policy Research. *Comparative Political Studies , 33* (6/7), 762-790.
- Sijmons, D. (1991). *Het casco-concept. Een benaderingswijze voor de landschapsplanning.* Dutch National Government, Ministery of Agriculture, Nature & Food Quality, Utrecht.
- Shardul, A., & Samuel, F. (2008). *Economic Aspects of Adaptation to Climate Change Costs, Benefits and Policy Instruments: Costs, Benefits and Policy Instruments.* OECD.
- Stadshavens Rotterdam. (2013). *Bidbook Rijnhaven: Metropolitan delta innovation.* Municipality of Rotterdam.
- Stadshavens Rotterdam. (2006). *Stadshavens Rotterdam 1600ha Creating on the edge - vijf strategieën voor duurzame gebiedsontwikkeling.* Projectbureau Stadshavens Rotterdam.
- Rebuild by Design. (2014). Retrieved June 2, 2014, from http://www.rebuildbydesign.org/
- Rijke, J. (2007). *Mainstreaming innovations in urban water management - Case studies in Melbourne and the Netherlands.* Master thesis, Delft University of Technology, Water Resources Management, Faculty of Civil Engineering, Delft.
- Rijkswaterstaat. (2013). *Deltaprogramma 2013 - Probleemanalyse Rijnmond-Drechtsteden.* Programmateam Rijnmond-Drechtsteden, Rijkswaterstaat.
- Rotmans, J., van Asselt, M., & Vellinga, P. (2000). An integrated planning tool for sustainable cities. *Environmental Impact Assessment Review , 20* (3), 265-276.
- Rotterdam Climate Initiative. (2014). Retrieved May 16, 2014, from http://www.rotterdamclimateinitiative.nl/en/
- Rotterdam, G., HHSK, WSHD, & HHD. (2007). *Waterplan 2.*

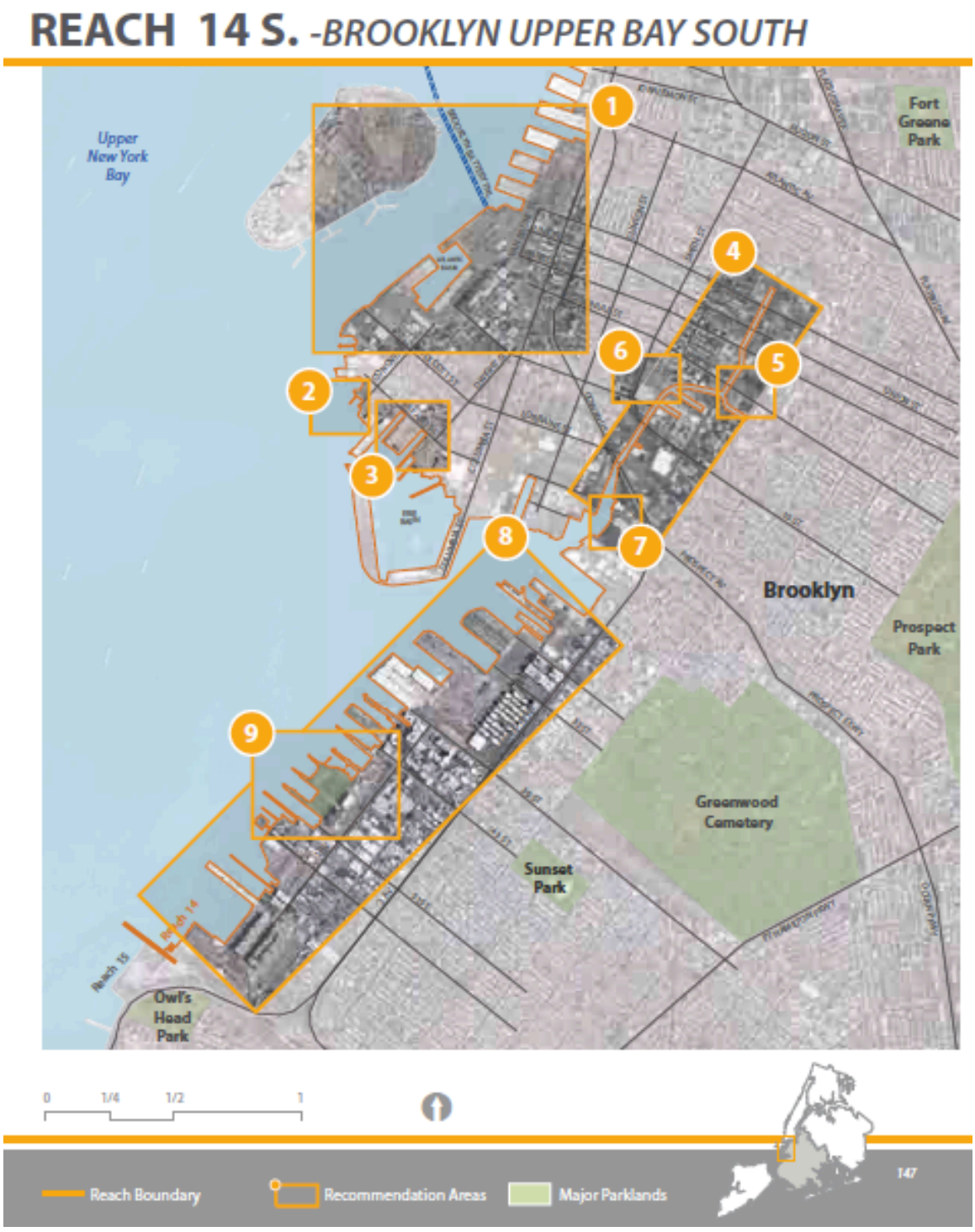
- Tasan-Kok, T. (2012). Introduction: Contradictions of Neoliberal Urban Planning. In p. a. Contradictions of neoliberal planning. Cities, T. Tasan-Kok, & G. Baeten (Eds.). Dordrecht: Springer.
- Teeuw, P., & Luising, A. (2005). *Water duurzaam in het ontwerp .* Delft: MTO department Faculty of Architecture, Delft University of Technology.
- Tiesdell, S., & Allmendinger, P. (2005). Planning tools and markets: towards an extended conceptualisation. In D. Adams, C. Watkins, & M. White (Eds.), *Planning, public policy & property markets* (pp. 56-76). Oxford: Blackwell Publishing.
- Timmermans, J., Vercauteren, C., Hasman, R., Gonzales, J., & Papenborg, L. (2013). Water & the city conference proceedings. Delft: Delft University of Technology.
- The Wall Street Journal. (2012, January 19). *Zoning Laws Grow Up*. (J. Iovine, Producer) Retrieved June 3, 2014, from The Wall Street Journal, Life & Culture: http://online.wsj.com/news/articles/
- The Alliance for Downtown New York. (2013). *Back to business: the state of lower Manhattan four months after hurricane Sandy.* New York City.
- The City of New York. (2007). *PlaNYC: a greener, greater New York.*
- The City of New York. (2013). *PlaNYC: a stronger, more resilient New York.*
- The New York Observer. (2014, February 08). *Bill de Blasio Appoints Members of Housing 'Dream Team'*. (J. Colvin, Editor) Retrieved May 24, 2014, from http://observer.com/2014/02/de-blasio-appoints-members-of-housing-dream-team/
- The Real Deal. (2013, August 19). *Jamestown to nab stake in massive Sunset Park industrial site*. (J. Strickland, Editor) Retrieved June 12, 2014, from The Real Deal; New York Real Estate News: http://therealdeal.com/blog/2013/08/19/jamestown-to-nab-stake-in-massive-sunset-park-industrial-site/
- UNFCCC. (2014). *Article 1*. (U. N. Change, Producer) Retrieved June 6, 2014, from https://unfccc.int/essential_background/convention/background/items/2536.php
- Urry, J. (1995). *Consuming Places.* New York: Routledge.
- WWR. (1998). *Ruimtelijke ontwikkelingspolitiek.* Wetenschappelijke Raad voor het Regeringsbeleid (WWR). The Hague: Sdu Uitgevers.
- White, I. (2010). *Water and the city* (Vol. The natural and built environment series). Oxford: Routledge.
- Van Rooy, P. (2011). Uitnodigingsplanologie als sociaal-cultureel perspectief. *Building Business , 13* (10).
- van Barneveld, N. (2013). *Rotterdamse adaptatiestrategie - Themarapport Waterveiligheid.* Rotterdam Climate Initiative; Gemeente Rotterdam.
- Van Dam, S., Bakker, C., & Van Hal, J. (2012). Insight into design, use and im plementation of home energy management systems. *Journal of Design Research , 10* (1/2), 86-100.
- Van Hal, J., Diepenmaat, H., & Ettekoven, J. (2011, August). Samenwerkingsvormen gericht op de ontwikkeling van duurzame innovaties. *Building Business* , 48-51.
- Van Thiel, S. (2010). *Bestuurskundig onderzoek, een methodologische inleiding. Bussum, Couthino.* Bussum: Coutinho.
- Veerbeek, W., Ashley, R., Zevenbergen, C., Rijke, J., & Gersonius, B. (2010). *Building adaptive capacity for flood proofing in urban areas through synergistic interventions.* Article in monograph or in proceedings, Delft University of Technology, Faculty of Civil Engineering and Geosciences, Delft.
- Veerbeek, W., Ashley, R., Zevenbergen, C., Rijke, J., & Gersonius, B. (2010). *Building adaptive capacity for flood proofing in urban areas through synergistic interventions.* Article in monograph or in proceedings, Delft University of Technology, Faculty of Civil Engineering and Geosciences, Delft.
- Aarts, M., Daamen, T., Huijs, M., & de Vries, W. (2012). *Port-city development in Rotterdam: a true love story.* Faculty of Architecture, Department of Real Estate & Housing. Delft: Delft University of Technology.

APPENDIX I. CONSULTATION DEFINITION AND RELEVANCE TOPIC

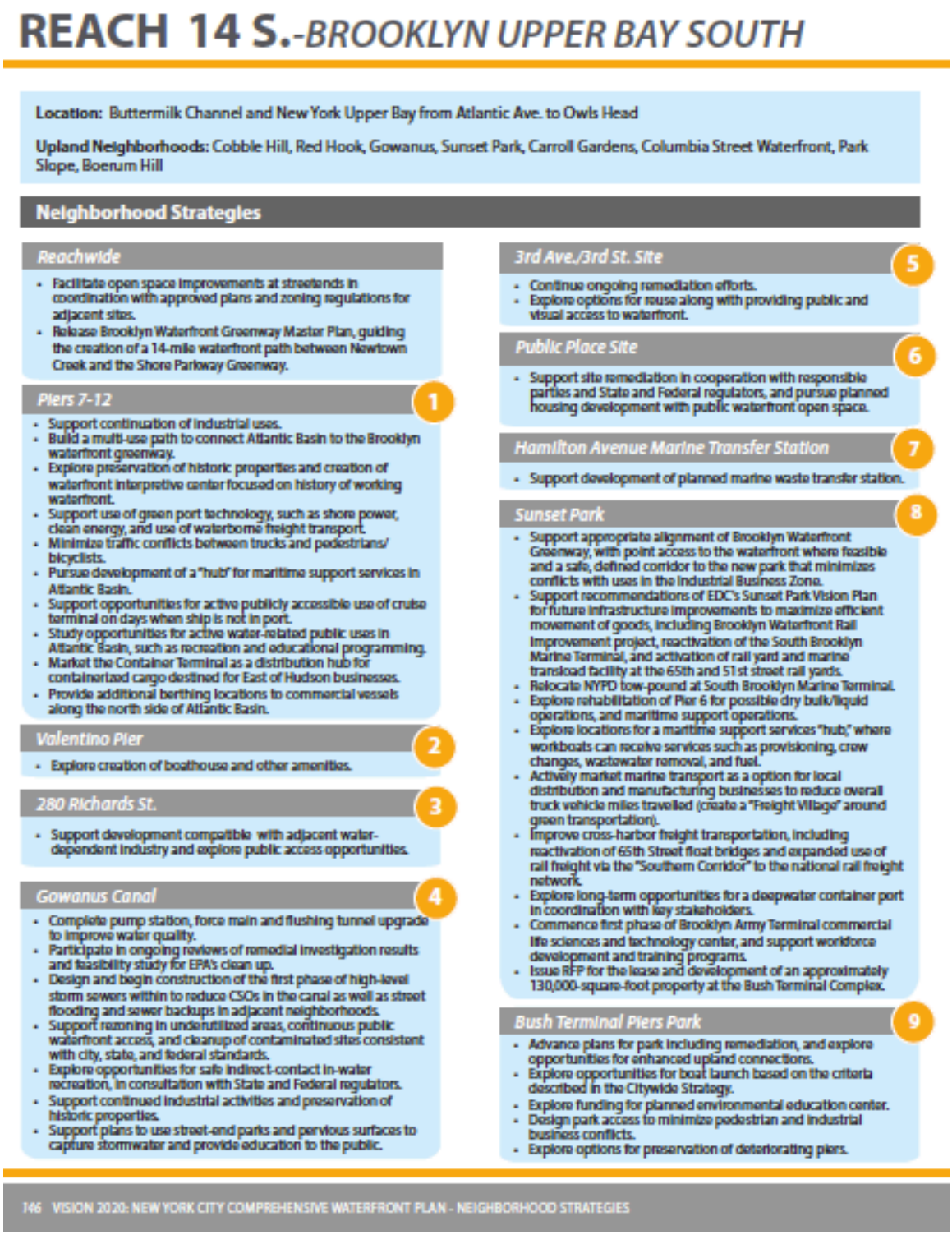
Date	Event	Consulted	Main topic	Location
01/29/14	**Conference 'Delta cities battling with climate change' by Museum of flood disaster**	A. Molenaar J. van Alphen	Progress Rotterdam in climate change. Strategy Delta Commission & program. Integrated approach Room for the River project.	Ouwekerk (NL)
02/14/14	**PhD Defences J. Rijke and S. van Herk Inspiration and Network Event**	R. Ashley	Urgency plans and strategies building flood resilience. Difficulty now to be found in implementation through governance rather than technical solutions.	Delft (NL)
03/06/14	**Symposium 'De Klimaatbestendige Stad'** (English: The Climate Resilient City) by	J. Keenan	Comparison advancement and public plans NYC and the Netherlands.	Gouda (NL)
03/21/14	**Conversation**	J. Rijke	Governancing development and realization of integrated water management solutions. spatial planning solutions. Problem definition of implementation in planning practice.	Delft (NL)
03/27/14, **05/21/14**	**Conversation** **Conversation**	J. Jacobs	Discussing implementation challenge of climate adaptation strategy in Rotterdam. Embedding climate change strategies in public planning practice. Case study definition and overview.	Delft (NL)
03/27/14	**Conversation**	F. van der Ven	Integration of water management solutions in the urban environment. Progress in the Netherlands, tools and methods. Current research.	Delft (NL)
03/28/14, **03/21/14**	**Conversation** **Conversation**	P. van Veelen	Comparison of NYC approach to flood resilience. Alignment concurrent studies, exploring possible collaborations and overlap. Influence of different situation of the cities. Limiting case studies and testing of effectiveness.	Delft (NL)
04/09/14, **05/09/14**	**Conversation** **Conversation**	H. Meyer	Possibilities of building flood resilient urban environment. Possibilities for comparison of NYC and Rotterdam. Feedback on research proposal. Focus on spatial scale levels of implementation adaptive solutions.	Delft (NL)
04/28/14	**Conversation**	E. Westerhof	Overview of (Dutch) progress Rebuild by Design.	NYC/ The Hague

APPENDIX II. BACKGROUND MATERIAL NYC CASE

Waterfront Redevelopment Opportunities in Brooklyn, NYC (source: DCP, Vision 2020: New York City comprehensive waterfront plan, 2011).



Waterfront Redevelopment Opportunities map in Brooklyn Upper Bay South, NYC (source: DCP, Vision 2020: New York City comprehensive waterfront plan, 2011).



REACH 14 S.-*BROOKLYN UPPER BAY SOUTH*

Location: Buttermilk Channel and New York Upper Bay from Atlantic Ave. to Owls Head

Upland Neighborhoods: Cobble Hill, Red Hook, Gowanus, Sunset Park, Carroll Gardens, Columbia Street Waterfront, Park Slope, Boerum Hill

Neighborhood Strategies

Reachwide

- Facilitate open space improvements at streetends in coordination with approved plans and zoning regulations for adjacent sites.
- Release Brooklyn Waterfront Greenway Master Plan, guiding the creation of a 14-mile waterfront path between Newtown Creek and the Shore Parkway Greenway.

Piers 7-12 1

- Support continuation of industrial uses.
- Build a multi-use path to connect Atlantic Basin to the Brooklyn waterfront greenway.
- Explore preservation of historic properties and creation of waterfront interpretive center focused on history of working waterfront.
- Support use of green port technology, such as shore power, clean energy, and use of waterborne freight transport.
- Minimize traffic conflicts between trucks and pedestrians/ bicyclists.
- Pursue development of a "hub" for maritime support services in Atlantic Basin.
- Support opportunities for active publicly accessible use of cruise terminal on days when ship is not in port.
- Study opportunities for active water-related public uses in Atlantic Basin, such as recreation and educational programming.
- Market the Container Terminal as a distribution hub for containerized cargo destined for East of Hudson businesses.
- Provide additional berthing locations to commercial vessels along the north side of Atlantic Basin.

Valentino Pier 2

- Explore creation of boathouse and other amenities.

280 Richards St. 3

- Support development compatible with adjacent water-dependent industry and explore public access opportunities.

Gowanus Canal 4

- Complete pump station, force main and flushing tunnel upgrade to improve water quality.
- Participate in ongoing reviews of remedial investigation results and feasibility study for EPA's clean up.
- Design and begin construction of the first phase of high-level storm sewers within to reduce CSOs in the canal as well as street flooding and sewer backups in adjacent neighborhoods.
- Support rezoning in underutilized areas, continuous public waterfront access, and cleanup of contaminated sites consistent with city, state, and federal standards.
- Explore opportunities for safe indirect-contact in-water recreation, in consultation with State and Federal regulators.
- Support continued industrial activities and preservation of historic properties.
- Support plans to use street-end parks and pervious surfaces to capture stormwater and provide education to the public.

3rd Ave./3rd St. Site 5

- Continue ongoing remediation efforts.
- Explore options for reuse along with providing public and visual access to waterfront.

Public Place Site 6

- Support site remediation in cooperation with responsible parties and State and Federal regulators, and pursue planned housing development with public waterfront open space.

Hamilton Avenue Marine Transfer Station 7

- Support development of planned marine waste transfer station.

Sunset Park 8

- Support appropriate alignment of Brooklyn Waterfront Greenway, with point access to the waterfront where feasible and a safe, defined corridor to the new park that minimizes conflicts with uses in the Industrial Business Zone.
- Support recommendations of EDC's Sunset Park Vision Plan for future infrastructure improvements to maximize efficient movement of goods, including Brooklyn Waterfront Rail Improvement project, reactivation of the South Brooklyn Marine Terminal, and activation of rail yard and marine transload facility at the 65th and 51st street rail yards.
- Relocate NYPD tow-pound at South Brooklyn Marine Terminal.
- Explore rehabilitation of Pier 6 for possible dry bulk/liquid operations, and maritime support operations.
- Explore locations for a maritime support services "hub," where workboats can receive services such as provisioning, crew changes, wastewater removal, and fuel.
- Actively market marine transport as a option for local distribution and manufacturing businesses to reduce overall truck vehicle miles travelled (create a "Freight Village" around green transportation).
- Improve cross-harbor freight transportation, including reactivation of 65th Street float bridges and expanded use of rail freight via the "Southern Corridor" to the national rail freight network.
- Explore long-term opportunities for a deepwater container port in coordination with key stakeholders.
- Commence first phase of Brooklyn Army Terminal commercial life sciences and technology center, and support workforce development and training programs.
- Issue RFP for the lease and development of an approximately 130,000-square-foot property at the Bush Terminal Complex.

Bush Terminal Piers Park 9

- Advance plans for park including remediation, and explore opportunities for enhanced upland connections.
- Explore opportunities for boat launch based on the criteria described in the Citywide Strategy.
- Explore funding for planned environmental education center.
- Design park access to minimize pedestrian and industrial business conflicts.
- Explore options for preservation of deteriorating piers.

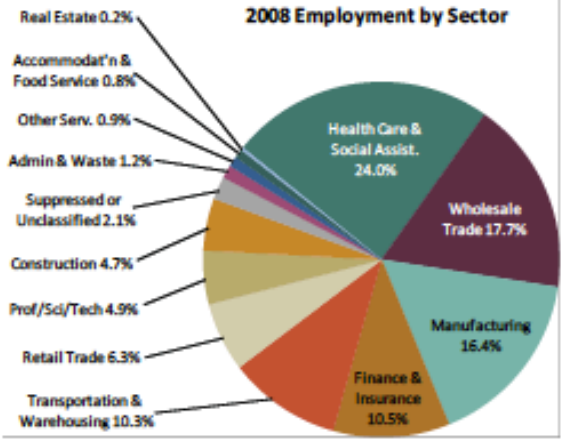
Waterfront Redevelopment Opportunities map in Brooklyn Upper Bay South, NYC (source: DCP, Vision 2020: New York City comprehensive waterfront plan, 2011).

Sunset Park Significant Maritime and Industrial Area, Brooklyn

Source: NYS Department of Labor, Quarterly Census of Employment and Wages, 2000 & 2008

Private firms and jobs located in the Sunset Park SMIA: 2000 and 2008

	2000				2008				Δ 2008-2000			
	Firms		Employees		Firms		Employees		Firms		Employees	
	#	%	#	%	#	%	#	%	#	%	#	%
Sunset Park Total	551	100	12972	100	534	100	14362	100	-17	-3.1	1390	10.7
Industrial Firms	437	79.3	8211	63.3	375	70.2	7290	50.8	-62	-14.2	-921	-11.2
Non-Industrial Firms	114	20.7	4761	36.7	159	29.8	7072	49.2	45	39.5	2311	48.5



Nearly 600 acres, the Sunset Park SMIA extends from Erie Basin to Owls Head, an area characterized by water-dependent facilities, concentrations of industrial activity, well-buffered manufacturing districts, and vacant sites and brownfields of significant size. A small portion of the SMIA abuts the Gowanus Canal, a waterway that was designated a Superfund Site in 2010.

Sunset Park has some of the largest vacant sites but also the highest job density of all of the SMIAs. From 2000 to 2008, this SMIA's employment grew by 10 percent to reach a total of over 14,000 employees (although this marks a 20 percent reduction in employment from 1992). Sunset Park's well-diversified base, with commanding growth in non-industrial sectors, is one of the significant factors contributing to the high employment density.

VISION 2020: NEW YORK CITY COMPREHENSIVE WATERFRONT PLAN 171

Sunset Park as Significant Maritime and Industrial Area (source: DCP, Vision 2020: New York City comprehensive waterfront plan, 2011).

GRADUATION PLAN

E Gaaff
1363247

Urban Adaptation Strategies Laboratory
Master Real Estate & Housing
Faculty of Architecture and the built environment, Delft University of Technology

June, 17th 2014, Delft

Contact information:
E J E Gaaff
Balistraat 5
2585XK Den Haag
egaaff@gmail.com
+316 11482873