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Knowledge transfer and policy learning in the context of urban resilience: A case study of water management in Mexico City and Rotterdam





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Foreword

During the time I was searching for an internship and subject for my Master thesis I came in contact with Jaap Veerman en Judith Blaauw from the Dutch Embassy in Mexico City. Judith introduced two subjects to me of which one was resilience of cities on water management. When I was searching for more and more information on resilient cities, my excitement grew also. The combinations with knowledge transfer made it complete for me. I was looking for a subject that included the knowledge I had gained in my time in The Netherlands and everything I knew from there by growing up in the city of Rotterdam, and to use this in a totally different situation with different systems, at the same time also trying to understand how their systems work. I was curious to combine the knowledge of the other systems with the knowledge I already gained and what was familiar to me. And all these things preferably abroad. So the only thing that crossed my mind from the moment I had spoken to Judith was: this is it!

The next step was receiving approval from my study at the Utrecht University and I needed to search for a supervisor. This was easier said than done. However, to my delight I did not find one but two persons who wanted to supervise me together, namely Frans Sengers and Arjan Wardekker. Frans could help me with his experience in cities and transition studies, and Arjan with his experience in the field of resilience in cities. Now I had my approval and my supervisors, Frans and Arjan in The Netherlands and Judith in Mexico, so I could start with writing my proposal.

My proposal was approved and my internship at the Dutch Embassy in Mexico City could start. I want to thank for all the support I got from the entire team at the Dutch Embassy for making this project possible and providing working facilities. Especially, the support of Judith, my supervisor, and Jaap, the head of the Economy and Trade department at the embassy. Thanks to them I was present at a lot of activities and I could learn more than I had expected beforehand. Judith was always open for my views and therefore we had an open communication and a good collaboration for which I want to thank her. The main activity during my time in Mexico City was the water workshop. Due to Victor Rico Espínola who organised this workshop I always felt welcome to join and I want to thank him for sharing his expertise and for his hospitality. Also the Dutch parties presented in this workshop were kind in including me in their thinking process and sharing their knowledge. In addition, I want to thank the interviewees for participating in the data collection.

Finally I want to thank my parents for their encouragement and my supervisors for their guidance and support. I was always welcome to ask questions and receive feedback even during my time in Mexico. They helped me with improving myself and therefore with getting this thesis to the next level. In short, during my time of writing my Master thesis I had the chance to experience a lot of amazing and learning moments and the feeling of 'this is it!', stated the same way, only now I can say 'this was it!'.



Summary

Urbanisation is a global multidimensional process paired with migration of people, changes in the capacity to sustain ecosystem services, and increasing uncertainty due to climate change. A consequence is water scarcity and floods. Urban water reforms should result in resilient water resource management that explicitly takes into account complexity, uncertainty and immediate and long term change. In order to increase the process of resilient solutions, global and local connections are necessary to exchange knowledge for the development of policies within cities. Policy will not move without the process of knowledge transfer and learning across cities. This resulted in the main focus of this research, namely, how knowledge transfer and policy learning between cities could be facilitated to promote urban water resilience in which a case study of Mexico City and Rotterdam was used. To understand the process of knowledge transfer and policy learning between cities a knowledge transfer model was developed to address this process to promote urban water resilience. The model was divided in four phases, namely, the exploration and marketing phase (1), the contact phase (2), the adoption phase (3), and the process of reflecting and internalization (4). Phase one stands for marketing on strengths of own system or exploring complementary knowledge for weaknesses of own system. Phase two stands for the first meetings between the actors in which creating a shared vision on the project is central. Phase three is the implementation of the innovation. Phase four stands for internalization of the transfer and reflecting on the process. A qualitative research is performed to study the model that existed of interviews and the method participant observer. According to the case and interviewees the mechanisms of phase one and two of the knowledge transfer model are crucial for preventing most obstacles that can arise within the implementation phase. A mutual understanding on struggles and histories helps with building trust especially with a lack of geographical proximity. A shared vision and committed local leaders are important requirements to secure and strengthen the process of implementation in the long term. Lastly, in the reflecting and internalization part, both cities gained knowledge and can use this knowledge in the next policy learning process. This process extends by creating networks of cities that allow a faster learning experience due to knowledge transfers and combining the existing and new knowledge to promote the development of urban water resilience.



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1. Introduction

Today, more than half of the world's population and three-quarters of Europe's population live in cities and these numbers are still rising (Keiner & Kim, 2007). Cities were under intensive pressure to accommodate the needs of rapidly growing production activities. The adaptations which were made and the expansions of cities gave rise to sprawling metropolises and a range of social and environmental problems (Knight, 1995). That means that most challenges ahead will be the result of global urbanization phenomena and that their effects will be mainly in urban areas. In other words, the causes of these problems are largely situated in cities but also the solutions to them. In this light of current climate crisis, environmentally triggered natural disasters, and the explosion and stagnation of the human population in various parts of the globe, awareness for sustainability issues is highly needed (Keiner & Kim, 2007).

1.1 Urban resilience

Since the end of the 1980s, the mass media influenced national policy responses by their extensive coverage of global warming and related issues that created public concern and a call for political commitment. Climate change became a matter of scientific and policy attention, and debates surrounding climate change have focused on the challenge of mitigation (Weingart, Engels & Pansegrau, 2000). Mostly, the issue has been how to promote and govern a transition towards sustainability (Markard, Raven & Truffer, 2012). Even though the normative concept of sustainable development is already well established at the global, transnational, national, regional, and local levels of politics, concrete steps towards more sustainable societies are still lagging far behind the intentions of the concept and also behind the expectations established at international summits (Keiner & Kim, 2007). In addition, the global climatic system and human society are continuously changing systems. They sometimes evolve in response to impacts emerging from the other system and sometimes they evolve autonomously (Keiner & Kim, 2007). A changing, uncertain world in transformation demands action to build the resilience of the social-ecological systems which embrace all of humanity (Folke *et al.*, 2002).

The idea of resilience is that a system is more adaptable against increasing risks due to climate change in a sustainable manner. In literature on cities and climate change there is an increasingly important notion for resilience (Leichenko, 2011). 'Cities must become resilient to a wider range of shocks and stresses in order to be prepared for climate change; and efforts to foster climate change resilience must be bundled with efforts to promote urban development and sustainability.' (Leichenko, 2011; p. 164). Furthermore, as stated by Ernstson *et al.* (2010): 'Urbanization is a global multidimensional process paired with increasing uncertainty due to climate change, migration of people, and changes in the capacity to sustain ecosystem services' (p. 531). Hence, resilience is largely seen as a response to climate change uncertainties and socio-economic insecurities (Davoudi, Brooks & Mehmood, 2013). Regarding a 'resilient city', the concept can be addressed as '...a complex and multidisciplinary system requiring an integrated approach to allow analysts to deal with many uncertainties and vulnerabilities which are not always easy to predict..', which '...includes (1) adaptation, (2) spatial planning and (3) sustainable urban form..' (De Jong *et al.*, 2015; p. 11).

Cities are a phenomenon consisting of multiple socio-technical systems combined with the need to manage climate change (Davoudi, Brooks & Mehmood, 2013). Urban water systems can be understood as such systems, in which technology provides a critical interface between the social and ecological structures, as the system consists of many different structures; these may be technical (e.g. pipe, dams, pumps), ecological (e.g. green infrastructure, rivers, wetlands), or social (e.g. knowledge, values, rules) (Ferguson, Brown & Deletic, 2013). Urban water systems are under increasing pressure due to climate change, population growth, ongoing urbanization, environmental pollution and resource limitations (Brown, Keith & Wong, 2008; Ferguson, Brown & Deletic, 2013). In many places, water scarcity and uncertainty are forcing a re-think about the way governments manage their water resource management systems (Rijke *et al.*, 2013). Urban water reforms should result in resilient water resource management that explicitly takes into account complexity, uncertainty and immediate and long term change (Folke *et al.*, 2005).

1.2 Networks necessary for sustainable development

The importance of international and transnational cooperation for enhancing systems and networks in cities for creating resilience is widely recognized (c.f. Bathelt, Malmberg & Maskell, 2004; Betsill & Bulkeley, 2006; Boschma, 2005; Bulkeley & Tuts, 2013; Ernstson *et al.*, 2010; Ishinabe, 2010; Leichenko, 2011; McCann, 2011; Reed *et al.*, 2013; Van Ewijk *et al.*, 2015). However, there is a lack of theory that links the scale of the city



(resilience in cities) to the scale of systems of cities (resilience of cities). More precisely: theory concerning the dynamic interlinkages between social and technological networks and how these dynamic networks influence ecological networks and the capacity to generate local-to-regional ecosystem services (Ernstson *et al.*, 2010). In addition, global and local connections are necessary to exchange knowledge for the development of policies within cities. Without the process of knowledge transfer and learning across cities, policy will not move (Van Ewijk *et al.*, 2015; McCann, 2014). In an attempt to address this crucial gap of knowledge transfer between cities, it is important to study the mechanisms and the different actors that are involved in transfers (McCann, 2011). This research is focused on a knowledge transfer between Mexico City and Rotterdam to implement a water square in Mexico City. The central research question is:

How can knowledge transfer and policy learning between cities be facilitated to promote urban water resilience using a case study of Mexico City and Rotterdam?

The case study involves the project of a water square in Rotterdam; the Benthemsquare. The water square combines water storage with the improvement of the quality of urban public space. The Dutch Embassy located in Mexico City is connecting this city with Rotterdam for knowledge transfer on urban water systems to enhance resilience. This provided the opportunity to study this transfer. Both cities face the challenge of water resilience at a high level (100 Resilient Cities, 2015), and on the other hand there are cultural challenges that they have to negotiate in order to productively facilitate the knowledge transfer (Van Ewijk *et al.*, 2015).

Mexico City has been faced with wet years and floods alternating with episodes of drought. The city is located in the lower part of the Mexico Valley Basin around 2,200 metres above sea level, in the central part of the trans-Mexican volcano belt. The basin is surrounded by mountains that reach just above 5,000 metres. The lake system used to act as natural drainage for precipitation run-off, which was carried down by rivers and streams from the higher elevations that surround the basin. The hydraulic cycle of the lake system has been extremely and irreversibly transformed (see Figure 1). Yet, despite some achievements in water management, Mexico City has been unsuccessful in dealing with structural features of the water system that make the city vulnerable to floods and changes in water availability through the irreversible transformation of the hydrological cycle of the basin (1), and the unequal access to supply and to drainage services (Lankao, 2010).



Figure 1: Tenochtitlan was the start of creating the city on a lake in the Aztec times (on the left) and the expansion of city that is now known as Mexico City (on the right).

Source: <http://www.latinamericanstudies.org/tenochtitlan.htm>. Photographer: Iwan Baan.

Rotterdam has a harbour which is one of the largest in the world, and commerce, transportation, and agriculture are major sectors of a Dutch economy still dependent on the careful control of flowing water. However, sometimes the Dutch lost control over their water systems, and the sea or rivers had broken through the dikes. The Dutch achieved control over water flows through collective action, often involving very many people (De Graaf & Van der Brugge, 2010).

In other words, Rotterdam and Mexico City both cope with vulnerability against floods. Even though both cities have a different history in flood prevention and one has more successful experience in their development against flood risks, they are both still searching for new solutions that are more resilient. The project which involves the implementation of a water square in Mexico City, can help the city to gain knowledge in water storage, to improve adaptation against the heavy rain falls and dry periods. But also because the project is focussed on using the water squares as public spaces for social activities which is of high relevance for cities due to their limited space (De Urbanisten, 2013). In addition, it improves the knowledge of

Rotterdam due to the geographical location of Mexico City which is not common worldwide. The challenge and differences between the cities made this an interesting case on how the efforts of these cities can be combined.

1.3 Research questions

The water square is an urban water system in which the development of public space is the urban or social component and water is the ecological and technical component. In other words, urban water systems can be understood as social-ecological systems, in which technology provides a critical interface between the social and ecological systems. A social-ecological system - the dotted line within Figure 2 - consists of three variables, namely *actors*, *processes* and *structures*. The system operates within a *context*, i.e. the city. Two different contexts with their systems are linked within a knowledge transfer between cities. Therefore, to answer the main question it is necessary to understand these systems and how they operate within their context. Figure 2 is used to introduce sub questions regarding urban water systems that describes three different types of variables an urban water system contains (Ferguson, Brown & Deletic, 2013).

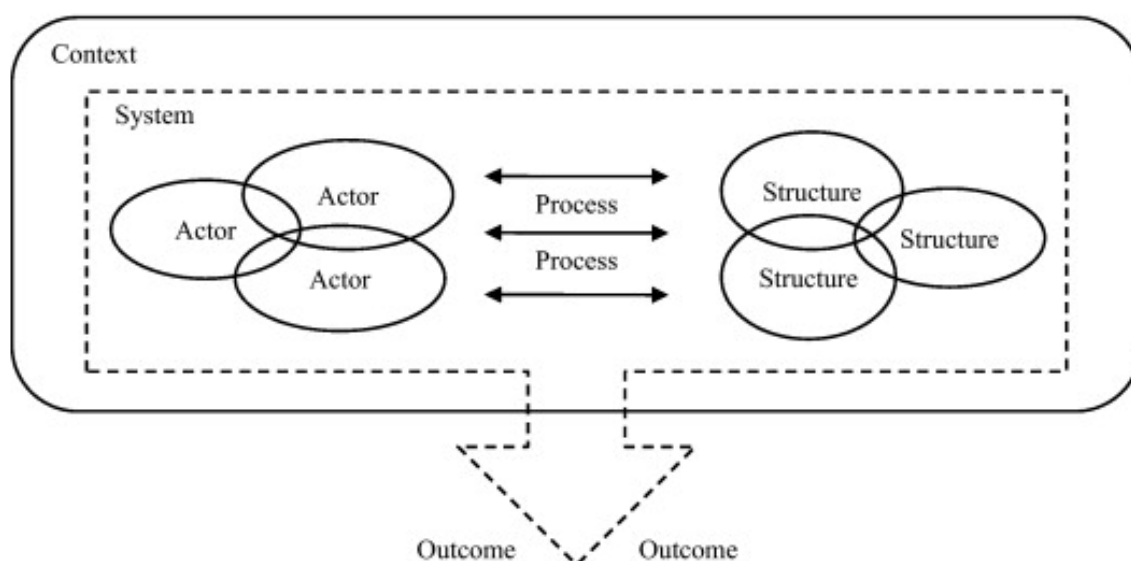


Figure 2: Types of variables in an urban water system. Source: Ferguson, B. C., Brown, R. R., & Deletic, A. (2013). Diagnosing transformative change in urban water systems: Theories and frameworks. *Global environmental change*, 23(1), 264-280.

The sub questions are developed from the explanations of the variables. *Processes*, which are social or biophysical (ecological or technological), produce and reproduce the system structure. *Actors*, which are individuals or organizations, influence system *structures* by shaping processes through their practices, and on the other hand, their practices are shaped by *structures*. Hence, there is a vice versa process in shaping and influencing between structures and actors¹ (Ferguson, Brown & Deletic, 2013). The interaction between these different variables can also be influenced by another city's urban water system to stimulate more growth in urban resilience. In city-to-city learning it is important to focus on how cities implement and forward knowledge within their systems, which leads to the sub questions:

What are the mechanisms of the in- and out-flow of knowledge in city-to-city learning?

In social-ecological systems such as water servicing, actors fundamentally shape the functionality of the system by their implicit and explicit choices about infrastructure and technology, e.g. design standards, licensing agreements, funding priorities (Ferguson, Brown & Deletic, 2013). The actors of the socio-ecological systems need to interact within city-to-city learning. Therefore, a sub question is made to view the interaction and how

¹ This is what Anthony Giddens has called 'duality of structure' (Giddens, 1984)



in turn this will influence the structures of the systems. The sub question is focused on mapping the different actors within the systems:

What kinds of actors are involved in the process of city-to-city learning?

The three variables - actors, processes and structures - shape the internal dynamics of the entire social-ecological system, which should be seen in a much wider societal or environmental *context*. The system's context creates conditions which influence its functioning but are derived outside its boundaries, e.g. from political, economic, social or environmental domains.² Every city has its own characteristics that influence its system (Ferguson, Brown & Deletic, 2013). Therefore the next sub question is:

How is the process of knowledge transfer being influenced by structural particularities in city-to-city learning?

The interaction between the variables within the urban water systems which are part of the wider context of both cities leads to an *outcome*. The outcome is a more resilient city on water management. However, it is not clearly defined how city-to-city learning fits into the concept of resilience thinking. This leads to another sub question that is about the concept of resilience:

How to conceptualize urban resilience in the context of city-to-city learning?

To answer the research questions, a model is created with different stages for knowledge transfer between cities that is built on scientific research. However, before the model is introduced, first a more in-depth review on the concept of resilience is discussed. Then, the model is introduced with four different phases and the theory behind the phases. Next, the case is explained in more detail in the method section. In addition, a qualitative research is performed to study the model with the different stages for knowledge transfer using the case study of the water square in Mexico City with collaboration of Rotterdam. The qualitative research exists of interviews and the method participant observer. For the results, both methods are combined to explain the different phases within the model. Next, the results in comparison to the theory and the limitations of the study are explained in the discussion. Lastly, conclusions are drawn on knowledge transfer between cities to promote urban resilience.

² This is what would be called 'landscape' in the multi-level perspective, which is a perspective widely used in research on 'transitions' towards sustainable socio-technical systems (Geels, 2002)

2. Theory

In this chapter the concept and principles of resilience and the process of knowledge transfer are being described. More emphasis is required on the elements of city-to-city learning and policy transfer within the principles for building resilience. Therefore, in the following paragraph a figure is presented for the process of knowledge transfer between cities, from beginning through development to potential results (Figure 4). Lastly, the figure is explained in more depth.

2.1 Resilience thinking

The concept of resilience emerged in the 1970s, introducing the notions of dynamic equilibria and multi-stable states (Holling, 1973). Resilience can be defined as: 'the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks' (Walker *et al.*, 2004). It examines how societal systems – including politics, culture, institutions and economics – and technical systems co-evolve over time, i.e. transitions that result in structural changes in the way a society or a subsystem of society operates (Rijke *et al.*, 2013). Furthermore, resilience relates to three basic characteristics: (1) the magnitude of shock that the system can absorb and remain within a given state, (2) the degree to which the system is capable of self-organization, and (3) the degree to which the system can build capacity for learning and adaptation (Carpenter *et al.*, 2001; Holling, 2001 as cited by Folke *et al.*, 2002). Therefore, management is a key element when it comes to building or damaging resilience. Figure 3 is a resilience management framework which includes risk analysis as a central component. Risk analysis depends on the characterization of the threats, vulnerabilities and consequences of adverse events to determine the destruction of critical functionality (Linkov *et al.*, 2014). Resilience is a way of responding to uncertainties in a system. However, it is important to notice that there are multiple equilibria and that instabilities can change a system into another stability domain (Davoudi, Brooks & Mehmood, 2013). In other words, resilience makes a system more flexible which is necessary in a changing, uncertain world due to climate change (Folke *et al.*, 2002; Leichenko, 2011).

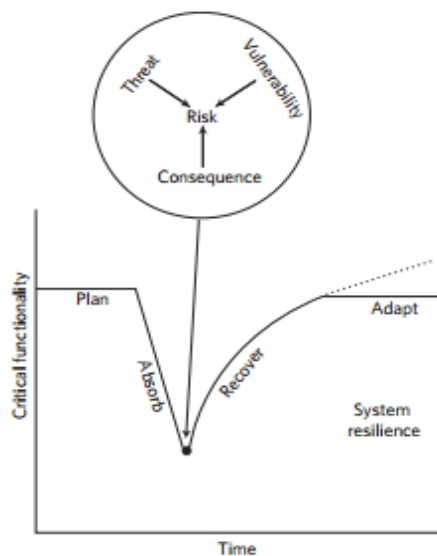


Figure 3: A risk analysis as a central component in a resilience management framework, which is dependent on characterization of adverse events to determine the expected loss of critical functionality. *Source:* Linkov, I., Bridges, T., Creutzig, F., Decker, J., Fox-Lent, C., Kröger, W., ... & Nyer, R. (2014). Changing the resilience paradigm. *Nature Climate Change*, 4(6), 407-409.

A resilience approach to sustainability focuses on how to build capacity to deal with unexpected change, which moves beyond viewing people as external drivers of ecosystem dynamics and rather looks at how humans are part of and interact with the biosphere. A resilience thinking approach tries to investigate how these social-ecological systems can be managed to ensure sustainable and resilient supply of essential ecosystem services



on which humanity depends (Simonsen *et al.*, 2014). The study of Simonsen *et al.* (2014) described seven principles for resilience thinking, which are:

1. Maintain diversity and redundancy: 'In a social-ecological system, components such as species, landscape types, knowledge systems, actors, cultural groups or institutions all provide different options for responding to change and dealing with uncertainty.' (p. 4)
2. Manage connectivity: 'High levels of connectivity can facilitate recovery after a disturbance but highly connected systems can also spread disturbances faster.' (p.6)
3. Manage slow variables and feedbacks: '... there are many ways in which all the variables in a system can be connected and interact with one another, and these different configurations provide different ecosystem services.' (p. 8)
4. Foster complex adaptive systems thinking: 'In order to continue to benefit from a range of ecosystem services, it is necessary '... to understand the complex interactions and dynamics that exist between actors and ecosystems in a social-ecological system.' (p. 10)
5. Encourage learning: 'Knowledge of a system is always partial and incomplete and social-ecological systems are no exceptions. Efforts to enhance the resilience of social-ecological systems must therefore be supported by continues learning and experimentation.' (p. 12)
6. Broaden participation: 'Participation through active engagement of all relevant stakeholders ... helps build the trust and relationships needed to improve legitimacy of knowledge and authority during decision making processes.' (p. 14)
7. Promote polycentric governance: 'Polycentricity, a governance system in which multiple governing bodies interact to make and enforce rules within a specific policy arena or location, is considered to be one of the best ways to achieve collective action in the face of disturbance and change.' (p.16)

In the perspective of cities and resilience thinking, it is important to notice that these principles can be strengthened by global interaction. Ernstson *et al.* (2010) describe it as cross-scale interaction, which '... can be a key in driving changes in slow variables to push urban systems across thresholds.' (p. 532). In addition, Bathelt, Malmberg & Maskell (2004) mention the importance of enhancing knowledge by investing in building channels of communication to selected providers located outside the local milieu. This approach for developing solutions is not common in strategic planning in urban water sectors. Transformation in an urban water system is required and would involve radical changes to the way in which water servicing is planned, designed, constructed, operated, managed, governed, and valued, in order to achieve more sustainable outcomes. However, transformation of social and biophysical structures and processes is hindered by a range of barriers; including institutional inertia and fragmentation lock-in due to technological path-dependencies, and inadequate organizational, professional and community capacity to engage new management practices (Ferguson, Brown & Deletic, 2013). An absolute condition for meaningful interaction in business and management is the existence of mutual expectations

Besides these described range of barriers there is also vagueness around the concept of resilience that creates a barrier in communication for mutual expectations in collaborations. The scientific literature gives an understanding of the concept of resilience, however, there is no one clear definition mentioned. In particular, resilience is increasingly being interpreted in a broader sense as a way of thinking, a perspective or even paradigm for analysing social-ecological systems. As such, it supports research efforts across disciplines and between science and policy (Folke *et al.*, 2002, Walker *et al.*, 2004). Even though increased conceptual vagueness can be valuable to foster communication, it is still important to have a clear concept when more parties are involved (Brand & Jax, 2007). In short, there can be said that there is a lack of balance between the original descriptive concept of resilience as first defined in ecological science and a more recent and vague notion of resilience used as an approach or boundary object³ by different scientific disciplines. Within various scientific disciplines the concept is being used as an approach to analyse ecological as well as social-ecological systems (Brand & Jax, 2007). In the case of multiple cities striving towards urban resilience, different interpretations of the concept by different parties within a city or across cities can cause additional problems.

³ Boundary object: Information that is described and used in different ways by different communities in light of their own biases, experience and needs (Star & Griesemer, 1989).



More emphasis is required on the elements of city-to-city learning and policy transfer within the principles for building resilience. Therefore, in the next paragraphs an explanation is given on how the process of knowledge transfer between cities generally begins, evolves and what can be attained by it.

2.2 The process of knowledge transfer

Currently there is a lot of theory around resilient systems in terms of what it should look like and how it should function. However, there is a lack of theory around the process towards such a resilient system. Ferguson, Frantzeskaki & Brown (2013) described a model of phases for setting up a strategic program for the process towards a resilient system. It is a sophisticated model towards creating a solid plan for a city to accomplish resilience. Nevertheless, Ferguson, Frantzeskaki & Brown (2013) did not describe the process during the implementations of the strategic program. In addition, global and local connections are necessary to exchange knowledge for the development of policies within cities (Van Ewijk *et al.*, 2015; McCann, 2014; Reed *et al.*, 2013). To conceptualize the whole process towards creating resilient systems for cities including knowledge transfer between cities to stimulate the learning process, I have developed a conceptual model with four phases. Figure 4 is a schematic model that is based on theories that are being described in the next paragraphs. It is mostly inspired by the theories of Ferguson, Frantzeskaki & Brown (2013), Van Ewijk *et al.* (2015), McCann (2014), and Boschma (2005). The figure shows a circular model of two cities in a knowledge transfer process. The mechanisms of the model are a conceptual contribution to current scientific literature on knowledge transfer between cities. In short, this model is a combination of existing scientific literature and it is focused on mechanisms of knowledge transfer between cities to create a learning process resulting in a higher understanding of resilient systems and therefore to enhance resilience systems in cities.

First, there are drivers from the system around the cities which cause both cities to want to move and start in phase one. Djordjević *et al.* (2011) showed that important drivers for resilience processes in cities could be climate change and urban development. The out-flow of knowledge is the left cycle in the model and the in-flow of knowledge is the right cycle. In phase one, the in-flow of knowledge involves the exploring phase and the out-flow of knowledge involves the marketing phase, in which creating awareness of strong and weak points of the city is central. Actors explore best practices of other cities and actors market best practices of their city for other cities to explore for policy learning. The second phase involves the contact phase for both the in- and out-flow of knowledge, in which first contact between the cities has taken place and understanding of the concept and situation is central before collaboration can start. The third phase involves the process phase, in which for the in-flow of knowledge adoption of the concept takes place. For the out-flow of knowledge this phase mostly concerns supervising the process and counselling when necessary. Hence, most knowledge is transferred from the left to the right. The red arrows from the contact phase to the process phase are the most interactive and intense phases between the cities; therefore these arrows are positioned directly next to each other. Lastly, the fourth phase stands for internalization for the city of the in-flow of knowledge side and reflecting on the existing knowledge of the concept for the city of the out-flow of knowledge side due to the experience of the process.

In all the phases there is a continuous interaction between actors on governmental, business and knowledge institution level. The collaboration between these three elements is the key to improving the conditions for innovation in a knowledge-based society. Industry operates as the locus of production; government as the source of contractual relations that guarantee stable interactions and exchange; and the university as a source of new knowledge and technology (Etzkowitz, 2003). The phases are explained more in-depth below.

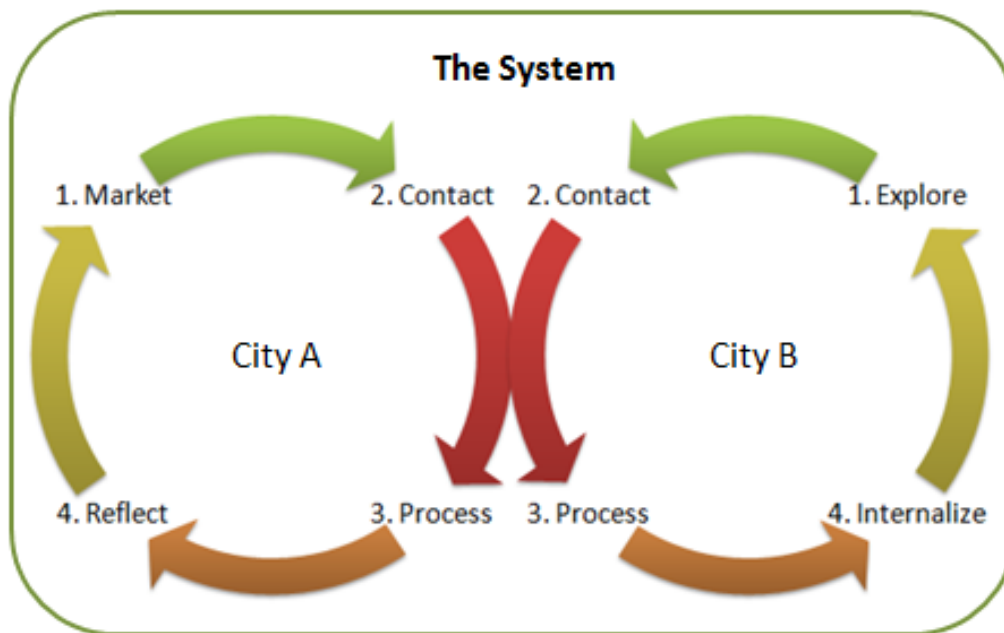


Figure 4: A circular model of the process of knowledge transfer. The figure pictures a left cycle for a city of the in-flow of knowledge and a right cycle for a city of the out-flow of knowledge.

2.2.1 Phase 1: Exploration and marketing of knowledge

It is necessary to enhance knowledge by investing in building channels of communication to selected providers located outside the local milieu (Bathelt, Malmberg & Maskell, 2004; Reed *et al.*, 2013). Knowledge-based development - i.e. the transformation of knowledge resources into local development - could provide a basis for sustainable development. However, cities have to realize the potentials of their respective knowledge resources, e.g. have an understanding of both the nature of their specific knowledge cultures and of their cities' development (Knight, 1995; Reed *et al.*, 2013). This context of a city is influenced by variables such as city specific history, ecologies, geographies and socio-political dynamics. For water systems it means that it is shaped by the dominant cultural perspective and historically embedded urban water values, expressed through institutional arrangements and regulatory frameworks, and physically represented through water system infrastructure (Brown, Keath & Wong, 2008). Understanding the context is an important starting point for both cities. For both knowledge flows, namely, it is necessary to be aware of this own context and set of knowledge to be able to search for channels that are complementary to its own set of knowledge or to be able to market on unique selling points.

Schlegelmilch and Chini (2003) stated that a high attractiveness of a unit's knowledge stock and a unit's high absorptive capacity positively affects the development of marketing capabilities for knowledge transfer. Furthermore, '[a]ppropriately developed knowledge transfer capabilities (in terms of channels, infrastructure and processes) have a positive impact on the effectiveness of marketing knowledge transfer.' (Schlegelmilch & Chini, 2003; p. 225). The ability to exploit locally created knowledge worldwide implies the ability to transfer knowledge within organizational networks characterized by separation through time, space, culture and language (Schlegelmilch & Chini, 2003). This is important for the second phase of knowledge transfer in Figure 3.

2.2.3 Phase 2: The contact between parties of different cities

Before collaboration between two (or more) cities is possible, a mutual understanding of the concept that needs to be implemented is necessary. An absolute condition for meaningful interaction in business and management is the existence of mutual expectations (Trompenaars, 1993); both cities need to think about the transfer, translation or transformation of policy models (McCann, 2014). In other words, during first contact moments the cities need to brainstorm for creating a project that is based on a mutual agreement. A strategic program should develop and communicate a shared urban water vision that is also an instrument to orient, coordinate and inspire action and secure long-term commitment for enabling the transition towards a resilient city (Ferguson, Frantzeskaki & Brown, 2013).



The strategic program needs the following characteristics (Ferguson, Frantzeskaki & Brown, 2013):

1. Emerged from self-identified needs of the community
2. Articulated in ways that have genuine meaning and connection for different actors in their everyday activities
3. Associated with clear and defined metrics
4. Broadly owned by a range of stakeholders, including the water profession, community, government and the private sector
5. Embedded in a broader sustainability agenda
6. Regularly reviewed and updated to reflect changing societal values, new knowledge and system conditions.

Finally a strategic program should facilitate social learning processes to connect outcomes from short-term initiatives with the long-term vision (Ferguson, Frantzeskaki & Brown, 2013).

Furthermore, the differences between the cities are relevant for the translation. It is critical for the competitive advantage of firms and regions to have knowledge creation and learning, or the capability to learn. To enable interactive learning and innovation some degree of proximity between actors is required to make the different parties connected (Boschma & Frenken, 2010). However, proximity too little or too much, may also have negative impacts on innovation due to the problem of lock-in (Boschma, 2005). On the other hand, it is being argued that the lower the organizational and institutional distance between units the higher the effectiveness of knowledge transfer will be (Schlegelmilch & Chini, 2003). Nonetheless, effectiveness is not properly used in this sentence, because lower organizational and institutional distance between units will smooth the knowledge transfer but not necessarily enhance effectiveness. Knowledge creation and learning often depend on combining diverse, complementary capabilities of heterogeneous agents within and between organizations. Furthermore, Boschma & Frenken (2010) mention that not any network relation will have a positive effect. A particular risk in networking is the risk of involuntary knowledge spillovers through which valuable knowledge leaks to other organisations and conflicts may arise. Therefore it is important that one should make a distinction between the drivers of network formation on the one hand in which the forms of proximity positively affect the establishment of networks, and on the other hand the effects of a network on innovative performance in which it is uncertain what the effects of proximity on network performance are (Boschma & Frenken, 2010).

Boschma (2005) makes a distinction in five forms of proximity. In this research the focus lies on cognitive proximity and institutional proximity. '[C]ognitive proximity indicates the extent to which two organisations share the same knowledge base; ...; institutional proximity, the extent to which two organisations operates under the same institutions.' (Boschma & Frenken, 2010; p. 121). Cognitive proximity is linked to this phase of the knowledge transfer figure, because the capacity of actors to absorb new knowledge is dependent on the distance between the cognitive base of a city and the new knowledge in order to communicate, understand and process it successfully (Boschma, 2005). Therefore, this study focuses on differences between cities to research the influence on knowledge transfer. Institutional proximity is discussed in the next phase due to its influence on the adoption process.

2.2.4 Phase 3: The adoption process

When after the contact phase the cities are settled for collaboration, the process of adoption of the concept can begin. In other words, after the brainstorm sessions for creating a proposal for a project that is based on a shared vision within phase two, the proposal can be developed into a project. Within this phase the city of the out-flow of knowledge is mostly supervising and counselling. This process is more radical for the city of the in-flow of knowledge due the policy transfer that takes place. Next, the concept policy transfer is explained and later the involvement of institutions in the process.

The term policy transfer is, as Stone (1999) noted, 'an umbrella concept referring to the practices of national policymaking elites who "import innovative policy developed elsewhere in the belief that it will be similarly successful in a different context." ' (p. 52, cited by McCann, 2014, p. 110). 'The study urban policy mobility differs from earlier studies of urban policy transfer because of its focus on the political processes by which practice and policy communities on the 'receiving location' reconfigure policies in line with locally different and sometimes conflicting interests.' (Van Ewijk *et al.*, 2015, p. 757). In short, it is about adapting policies to a specific local context instead of full standard packages of policies being transferred in total. As such, policies evolve through mobility (Van Ewijk *et al.*, 2015; McCann, 2014). This makes the process of knowledge transfer and learning across cities crucial, as without it, policy will not move. In summary, policy



mobility is both about the transfer from A to B, as well as diffusion and adaptation among other actors and/or localities, resulting in a multilevel phenomenon (Van Ewijk *et al.*, 2015).

The role of institutions

The specific local context is linked to the culture of a country. However, culture is defined by many factors, in which institutions are mostly visible as an important factor. From a social science perspective, it becomes critical to study the conditions under which institutions can stimulate the adaptive capacity of society to deal with the potentially serious and irreversible impacts of environmental change. Institutions need to support social actors to proactively respond to unpredictable changes (Gupta *et al.*, 2010). Textbox 1 shows a short description of possible influences of culture in general.

Textbox 1: Cultural influences

Cultural differences have a large influence on the process of policy mobility. Social interaction, or meaningful communication, presupposes common ways of processing information among the people interacting. These have consequences for doing business as well as managing across cultural boundaries (Trompenaars, 1993). In addition, the increasing globalization of industrial organizations and the growing interdependencies among nations, show the need for a better understanding of cultural influences on leadership and organisation practices. Leadership is culturally contingent, which means that views of the importance and value of leadership vary across cultures. For example, Latin America romanticize the concept of leadership in both political and organizational arenas to be important, while in The Netherlands people are sceptical about leaders and the concept of leadership for fear that they will accumulate and abuse power. There are also substantial differences in decision making practices. In organizations that function in high uncertainty avoidance cultures, the decision making is likely to be more formalized and analytical. In organisations that function in low uncertainty avoidance cultures, decision making is likely to be based more on intuition than formal analysis. Thus knowledge of uncertainty avoidance orientation of each firm would be very useful for both premerger assessment of possible problems and post-merger problem solving conflict resolution (GLOBE, 2004)

Institutions refer to underlying ideological values and norms. In addition, institutions are both the result of human interaction and they in turn shape human action. In other words, institutions carry the bias of previous interactions, views and power relations, a process called institutionalisation. Hence, institutions change and can be changed, however, this is not easily done. Therefore, it is a question whether institutions allow society to adapt fast enough to environmental change (Gupta *et al.*, 2010). Here, the knowledge transfer between different cities can play a crucial role; the possibility to combine insights to get to new results for resilience. This makes institutional proximity an important factor in the process of knowledge transfer.

Institutional proximity is associated with institutions at the macro level, in which both formal institutions as laws and informal institutions like cultural norms and values influence the way organisations coordinate their actions. As such, institutions are enabling mechanisms that provide stable conditions for interactive learning (Boschma, 2005). Institutional proximity can be measured by mapping the adaptive capacity of both cities. Adaptive capacity can be defined as the inherent characteristics of institutions that empower social actors to respond to short and long-term impacts either through planned measures or through allowing and encouraging creative responses from society both *ex ante* and *ex post* (Gupta *et al.*, 2010). Gupta *et al.* (2010) show that institutions that promote adaptive capacity are those institutions that (p. 461): Encourage the involvement of a variety of perspectives, actors and solutions (1), Enable social actors to continuously learn and improve their institutions (2), Allow and motivate social actors to adjust their behaviour (3), Can mobilize leadership qualities (4), Can mobilize resources for implementing adaptation measures (5), and Support principles of fair governance (6).

Variety implies that there is no single appropriate ideological framework, and requires an institution to envisage future expected and unexpected climate impacts through having a range of proactive strategies. The concept of *learning* is integral to adaptive capacity, because it allows for changed understanding based on experiences. A third quality of adaptive capacity is the ability of an institution to permit social actors to autonomously adjust their *behaviour* in response to environmental change. A fourth criterion is *leadership*, this is a driver for change, showing a direction and motivating others to follow (Gupta *et al.*, 2010). The type of



leadership regarding power distance and uncertainty avoidance are hurdles when a lack of proximity exists between cities on these variables (Dikova, Sahib & Witteloostuijn, 2010).

Next, institutions should be able to generate sufficient *resources*/incentives for actors to change norms and rules, implement those changed norms and rules and live up to them. Lastly, the assumption is that support adaptive capacity when they meet *fair governance* criteria, which stands for legitimacy, equity, responsiveness and accountability (Gupta *et al.*, 2010).

In short, policy transfer is about adapting policies to a specific local context instead of full standard packages of policies being transferred in total. This makes knowledge transfer and learning across cities crucial to move policy. The specific local context is linked to the culture of a country, in which institutions are mostly visible. Institutions refer to underlying ideological values and norms. Institutional proximity is necessary to combine insights for progress to resilience. The proximity can be measured by mapping the adaptive capacity of both cities. The adaptive capacity of a city can be defined by the inherent characteristics of institutions, which can be measured by the following dimensions: variety (1), learning (2), behaviour (3), leadership (4), resources (5), and fair governance (6).

2.2.5 Phase 4: Process of reflecting and internalization

Lastly, it will take time to internalize the concept for the city on the side of the in-flow of knowledge. At the end of this whole process the city has grown in knowledge due to policy transfer and the implementation experience. In addition, the city on the side of the out-flow of knowledge has also grown in knowledge, namely due to experience of the process of reframing knowledge into something useful for another situation. The knowledge becomes more robust by reflecting on the process and incorporating the new learning experience.

After the cycles are finished new processes with other cities can start again. The new and increased knowledge can be used in the new processes and knowledge will increase on both sides again. This process continues and also international common knowledge grows and helps the process of creating more resilience in cities around the world. This global networking is necessary to become more resilient against climate change, because it is by definition a global-scaled cause. Networks are dynamic, have quick reaction potential, are self-regulating, and allow a broad-based contingency to gain broad-based knowledge. In short, networks of cities overcome the territoriality trap of national governments, which struggle to respond to challenges about which they lack sufficient information and whose origin is far beyond their geographic reach (Keiner & Kim, 2007).

To summarize, the first phase is about exploring and marketing knowledge for building channels of communication located outside the local milieu to enhance knowledge. However, it is necessary for cities to be aware of their own context and set of knowledge to be able to search for channels that are complementary to their own set of knowledge or to be able to market on best practices. When one city reaches out for contact to the other city for a certain project, the second phase starts. During the first moments of contact it is necessary that during brainstorm sessions the cities create a shared vision on the concept that needs to be implemented for developing a proposal, i.e. a strategic program. After a shared vision is created between the actors involved, the proposal can be developed into a project and the adoption process can start. Within this phase packages of policies are being transferred to the specific local context. The specific local context is linked to the culture of the city and therefore also its institutions. This makes institutional proximity an important element within the transfer. The last phase of the knowledge transfer cycle stands for the time to internalize the concept for the city of the in-flow of knowledge which completes the policy transfer. Besides, the city on the out-flow of knowledge grows in knowledge by reflecting on the process and incorporating the new learning experience. After the cycles are finished new collaborations can start and the process continues. This results in a growing common knowledge on international level that helps the process of creating more resilience in cities around the world.



3. Method

This chapter elaborates on the case study of the water square. First the case study is introduced and described. The case is a water square in Rotterdam and the supplement for Mexico City to implement this water square is described. After introducing the case, the data collection and analysis of the interviews and participant observation are explained. The case study is performed for an exploratory research on knowledge transfer and policy learning between cities to promote urban resilience, because qualitative research provides the chance to explore decisions (Yin, 2013).

3.1 Case study

The research focus is a knowledge transfer between Mexico City and Rotterdam for a project to enhance resilience in Mexico City. Rotterdam and Mexico City both cope with vulnerability against floods. Even though both cities have a different history in flood prevention and one has already some successful experience in its development against flood risks, they are both still searching for new solutions that are more resilient. The challenge and differences between the cities make this an interesting case on how the efforts of these cities can be combined. Furthermore, the research is performed within an actor that is involved in the process, The Dutch Embassy located in Mexico City. This provided the opportunity to study the transfer more closely along with an outside perspective, because an embassy connects different actors to provide new business opportunities, therefore, its role is more focussed on supervising the process. The case is a project that involves a water square that is explained below.

Rotterdam Water City 2035 is currently a new program. The role of this project has been crucial in changing towards the transformative perspective. In this policy innovation niche, for the first time urban planners and urban water experts, developed a joint long term vision for the city. Because it was a non-official policy process, more radical ideas and a longer planning horizon were possible than in official policy documents. In this vision, water retention contributes to the upgrading of neighbourhoods by increasing living quality. However, despite the success of Rotterdam Water City 2035, integration of urban planning and water management is currently mainly limited to a number of demonstration projects (De Graaf & Van der Brugge, 2010). One of these demonstration projects is the Benthemsquare (Figure 5), i.e. the resilient water square of which a similar project will be implemented in Mexico City in collaboration with Rotterdam.

The water square combines water storage with the improvement of the quality of urban public space. As mentioned in the Introduction, Mexico City is located on land that was once a lake; runoff from the nearby mountains can lead to mudslides and diseases born from standing water. Additionally, it is focused on using the water squares as public spaces for social activities which is of high relevance for cities due to their limited space (De Urbanisten, 2013). The combination of improving on both social and ecological ground is necessary to enhance resilience; to make the paradigm shift from fighting against water to living with water, and from civil engineering to nature based solutions.

The water square is dry most of the time and is in use as a recreational space; it also generates opportunities to create environmental quality and identity to central spaces in neighbourhoods. When it is raining, there are three basins that collect rain water: two shallow basins for immediate surroundings will receive water whenever it rains, one deeper basin which receives water only when it consistently keeps raining. The rainwater is transported via large stainless steel gutters into the basins. Furthermore, there is a water wall which brings the water from further away into the basins. After the rain, the water of the two shallow basins flows into an underground infiltration device and gradually seeps back into ground water. In this way, the ground water balance is kept at level and can also cope with dry periods. The most frequently used method around the world (and also in Mexico City) is to drain water from these ground water areas during dry periods. However, with this method the ground sinks in during dry periods, which leads to the fact that that Mexico City also keeps sinking. The water of the deep basin of the Rotterdam water square flows back into the open water system of the city after a maximum of 36 hours to ensure public health (De Urbanisten, 2013).



Figure 5: Image of the Benthemsquare in Rotterdam. Source: <http://www.smart-cities.pt/en/noticia/roterdao-uma-praca-de-agua-multiusos-0109/>

Currently, a connection between Mexico City and Rotterdam has been made by the Dutch Embassy located in Mexico City. The focus of this alliance is knowledge transfer on the socio-technical system of water management. Rotterdam stands out in its performance on quality of life and low level of water pollution (Arcadis, 2015). Besides, both cities are totally different in their culture and geographical location which increased the validity of this study. With an effective translation of the knowledge of Rotterdam to Mexico City, it may become more likely that other connections between cities will also lead to an effective increase of knowledge on both sides due to the high probability that they will have the same or fewer differences to overcome. This makes the suitability to other contexts also higher.

3.2 Interviews

At the beginning two helicopter interviews were conducted to get a better overview of the case. These took place with a company that was involved in the project of the Benthemsquare and is involved in the project for Mexico City. For a better perspective on governmental institutions in Mexico and knowledge transfer of policies, an interview was conducted with an international governmental organisation.

3.2.1 Data collection

This study focused on the different stages of knowledge transfer mentioned in figure 4, namely: exploration and marketing of knowledge (1), the contact between parties of different cities (2), the adoption process (3), and the process of reflection and internalization (4). Interviews were conducted to study the fit of the different stages of the model on the case. First, questions were asked on the concept of resilience in general; how people see the concept and the importance of implementation of resilience in cities. After a better understanding of the vision of interviewees on the concept of resilience, the different phases were discussed. With first the focus on drivers to set up new projects, and on how the interviewees search or market for projects. Next, related to these questions, the involvement of stakeholders and actors was explored to get an overview of all actors and to study the interests of stakeholders in both cities. In addition, institutional differences influence the collaboration between the actors, which was an important subject to discuss with the interviewees to understand possible hurdles within the process between the cities. The interview questions are listed in the Appendix A.

A series of ten in-depth interviews was conducted with people of different actors that are involved in this case, but also people who work in actors that have high experience with processes concerning knowledge transfer between different locations globally, namely:

- Program Manager Latin America - VNG International
- Associate Professor of Environmental System Analysis - UNESCO-IHE
- Professor - LANCIS (UNAM)



- Designer - Taller Capital (UNAM)
- Project Director - AEP
- Associate Director City and Practice Management - 100 Resilient Cities
- Director Communication & Education - Ambiental
- Urban Development and Economic Director - CtsEMBARQ
- Project Officer International - The Netherlands Water Partnership (NWP)
- Advisor on Water and Sustainability - The Dutch Embassy in Mexico City

The interviews were semi-structured to allow for new or hidden themes, while keeping focus on the subject (Varvasovszky & Brugha, 2000). Depending on the expertise and knowledge of the interviewee more attention was given to certain phases of the model during the interview. The interviews were ranged between thirty minutes and one hour and were mostly done face-to-face, recorded and backed up by note taking. Rarely, when no other option was possible, interviews were done over the phone.

3.2.2 Analysing the interviews

The case study interviews were analysed to detect the influence of institutional differences on the process of knowledge transfer, the mechanisms of the in- and out-flow of knowledge (Figure 3), and to conceptualize urban resilience of city-to-city learning. The interviews were structured along the different topics. This way the data could be compared and analysed with the models described in the theory section. The axial coding was used to complement exploratory research during semi-structured interviews and to provide a means of standardized comparability amongst interviewees. During the time of coding the interviews, however, the coding scheme was altered to incorporate hidden themes uncovered during interviews. These were coded with the number zero, which was included in every column for possible hidden themes which could occur. The first and final coding scheme based on literature review is in Appendix B. In addition, the tables of the analysis of interviews are included in Appendix C.

In order to distil useful information to be purported to results, a database was constructed that consists of full codes, the categories of interest and the full quotes. Full interview transcripts were numbered and were referenced to with codes. Quotes from the interviews were labelled as follows, first the number of the interview, second which phase of the knowledge transfer model is concerned (Figure 4), third whether the quote answers the main question. For example, the quote 'The idea was that 9 chief resilience officers around the world along with key city staff attended an exchange in *city X* to look at water issues so all the people who were there had water issues in their city and were interested in exploring and it was an opportunity to exchange across the network.', this quote was coded as '3.3(GO-G)D1.1KT'. The first number 3 stands for the interview, the second number 3 for the third phase of knowledge transfer because this knowledge exchange did not involve a project but the meeting itself was the moment of the knowledge exchange. Then, GO-G stands between brackets, which means that there is a knowledge exchange between governmental actors globally. The D1 stands for the first institutional dimension 'the involvement of a variety of perspectives, actors and solutions'. Lastly, 1KT means that the quote gives partly answer to the main question and is correlated to the sub question about the mechanisms of knowledge transfer.

A quote was included in the results section if it provided either previously unmentioned insights or confirmed a previous finding. In the case of a new finding, a summary of the quote was included, together with the reference quote. In the case of a confirmed previous finding the reference to interviewee number was added to the present interviewee reference. An example coding, quote and in text use is available in Table 6 below.

3.3 Participant observer method

Besides the interviews a close look was taken at activities to observe the circumstances and to compare situations with the interviews to strengthen the results, i.e. participant observation. As a methodology, 'participant observation is as concerned with the sociocultural and psychosocial background of human behaviour as with the behaviour. The goal is therefore maximal knowledge and understanding of human behaviour itself' (Pearsall, 1965, p.17). Within this research the participant observer method is used during activities of the case but also other activities are used to enhance the results and to reduce the effect of results from observing one case study by taking other information into account on the behaviour in and around the organisations without losing focus on a specific case.



3.3.1 Data collection

During the research, I was working within one of the actors that was involved in the case of the water square for Mexico City. The Dutch Embassy located in Mexico City provided the chance to observe the knowledge transfer more closely along with an outside perspective. Namely, an embassy connects different actors to provide new business opportunities, therefore, its role is more focussed on supervising the process. This gave me the opportunity to study a lot of different actors and other projects to observe the circumstances and to talk with a lot of people for their insights besides the interviews. This resulted in six main activities with observations.

In the context of the case of the water square, it means that also other cases were used in the research about the different stages of the knowledge transfer model (see Figure 4). The case of a project for Mexico City concerning the World Bank, SACMEX (the water organisation in Mexico City) and 100 Resilient Cities is such a project. The World Bank wants involvement of The Netherlands in this project. Another case was 'The Resilience Garage', in which the focus of the project is to build a new airport in Mexico City but in a resilient way. The Resilience Garage itself was a game to involve stakeholders and to get a better understanding of the resilience concept for further collaboration. Furthermore, there is a project within the Dutch Embassy which is called Holland Branding. For this project a few interviews were conducted for a better understanding of the differences between the countries to find gaps for branding The Netherlands in Mexico. These interviews gave relevant insights into the context of both cities. Below is a list of the companies and organisations that were interviewed:

- Manager of the department Economics and Commercial - EU Delegation
- Press and Public Diplomacy Officer - EU Delegation
- Chief Representative Officer - Nuffic Neso
- Head of External Affairs for Mexican & Greater Caribbean - Unilever
- Marketing Manager - Philips
- Director - Information Group of Reproductive Choice (GIRE)
- Consul - Dutch Consulate Cancún
- Consul - Dutch Consulate Monterey

Lastly, during the water workshop of the case in Mexico City the participant observer methodology gave me the chance to talk a lot with all the actors involved and to understand their insights even though they were not one of the interviewees. This provided me the chance to have a broader understanding of the situation besides the interviews. This was also the case in the other activities mentioned.

3.3.2 Analysing the participant observation data

The participant observation data are structured in a logbook. The observations were numbered according to the activity and to the observations within the event. Table 1 shows the lay-out of the table. The first number is the activity number of the event, the next column mentions the date of the event, the third column the activity, and the last column the different observations within the activity. Results are referred to by the activity number and observation number, for example, in Table 1 the observation 6 'Progression comes from own initiatives, not from the government' of activity 4 'Holland Branding Interviews' is referred to as 4.6. The table with the results of the participant observations are included in the Appendix D.

Table 1: Participant observations

Activity number	Date	Activity	Observation
4	3 rd of March – 7 th of March	Holland Branding Interviews	6. Progression comes from own initiatives, not from the government

4. Results

The results are presented according to the knowledge transfer model explained in the Theory section (Figure 4). The case study for developing a resilient water square in Mexico City in collaboration with Rotterdam is the case on which the model is tested. Besides this case, there are also some extra results that enhance the results of the case due to the participant observer method. Before discussing the model in more depth, it is important to notice that there are drivers within cities by which the attention for resilient systems has increased; the subject is on political agendas in some cities (Respondent 3). In other words, the necessity of resilience for sustainable water use is being noticed (Respondent 1, 2, 4, 6, 9). As one interviewee said, '[e]cosystems are degrading, water systems are degrading and now you see that institutions and people see that we need to do something about it.' (Respondent 1). Another interviewee mentioned, '[t]o ensure the water resources in quality and quantity for all the people, now and for the future generations.' (Respondent 3).

In Figure 6 the knowledge transfer model is presented with a summary of the case events. The different phases of the model are explained below for a closer view on the case and the mechanisms within the process of knowledge transfer. In the first phase the case is discussed on exploring and marketing of knowledge. Next, the second phase is focused on creating the shared vision during the first meetings in the water workshop between the actors. In the third phase the institutional proximity between Mexico City and Rotterdam is clarified. The end of the knowledge transfer model is represented in phase four that is about reflecting on the transfer and internalization of the project. Lastly, the model is presented again with the addition of a summary of the results.

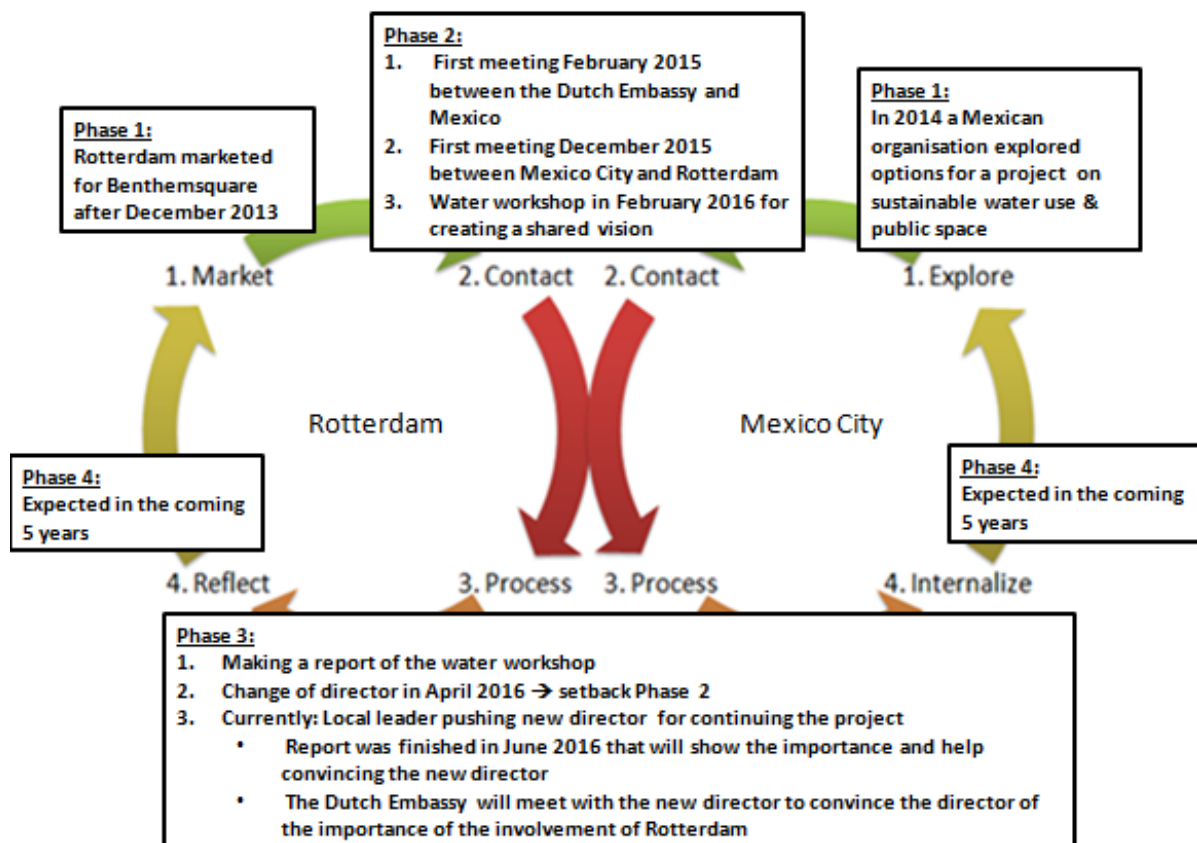


Figure 6: The knowledge transfer model with a summary of the case events



4.1. Phase 1: Exploration and marketing of knowledge

Within the case, an organisation in Mexico City was exploring options for building a water square that combined public space with sustainable water management. However, before an organisation can start to search for innovations that are useful for its situation it is important for an organisation to understand its own systems (Respondent 1,3). In other words, to set up resilient systems there needs to be an understanding of strong and weak points of the systems (Respondent 3,5), as an interviewee said (Respondent 5):

'One of the key things is that each organization recognizes their strengths and their weaknesses. And when you understand which are your weaknesses then you understand that you need help on those weaknesses.'

It is a time consuming process to understand the strengths and weaknesses of a city's systems before marketing or exploring knowledge, namely research on the city's systems is necessary to form a framework of strengths and weaknesses. This is a step that leads to the possibility of building channels of communication to selected providers outside the local milieu to enhance knowledge. In Textbox 2 the framework of Mexico City with the focus on water management and its weaknesses is described. In Textbox 3 the process of developing a marketing strategy combined with a framework of The Netherlands is described. Due to the size of Rotterdam in comparison to Mexico City information about The Netherlands is included.

In the next quote the way the organisation in Mexico City found the organisation in Rotterdam is described (Respondent 6):

'Given the vulnerability in terms of water in Mexico City, I thought that it would be interesting to integrate water but in a more responsible manner. So that is when I restarted with a research and that is why I was asking my colleague about a kind of project which mixed water management or responsible use of water on spaces and one of them pointed me to 'De Urbanisten'. So I presented them to my coordinator and she said, 'Oh perfect I have some good contacts at the Embassy, why don't you contact them and let's see if we can make the link through the Embassy', and that is how we did it.'

This quote showed that the organisation exactly knew what it needed to search for to enhance its current systems which is in line with what other interviewees said about first understanding its own systems. The organisation in Mexico City wanted these channels outside their local milieu to enhance their knowledge. Moreover, in the quote above, the organisation was searching for a cross-sectoral project. Namely, a project that combined public space and a sustainable water solution, i.e. a water square. This is a result that showed that a marketing strategy should contain themes to be found by other parties, which came also forward within an interview. Resilience is an interdisciplinary concept and in general projects are cross-sectoral as a result organisations search for projects by a certain theme (Respondent 8). In Textbox 2 is an example of a process of a marketing strategy that also confirmed this result (Observation 2,4,6).

In short, before cities can search for complementary knowledge or market their knowledge they need to focus on their own systems. This is the step that leads to the possibility for building channels of communication to selected providers outside the local milieu to enhance knowledge.

Textbox 2: Framework Mexico City on water management

Over the last few centuries, Mexico City has been faced with wet years and floods alternating with episodes of drought (see Figure 7). During the rainy season, certain parts of the city suffer from floods causing serious damage and danger. During the dry season, there is a serious lack of water, dehydration of vegetation and land subsidence. In other words, there is either too much or too little water in the city. The city is located in the lower part of the Mexico Valley Basin around 2,200 metres above sea level, in the central part of the trans-Mexican volcano belt. The basin is surrounded by mountains that reach just above 5,000 metres (Lankoa, 2010).

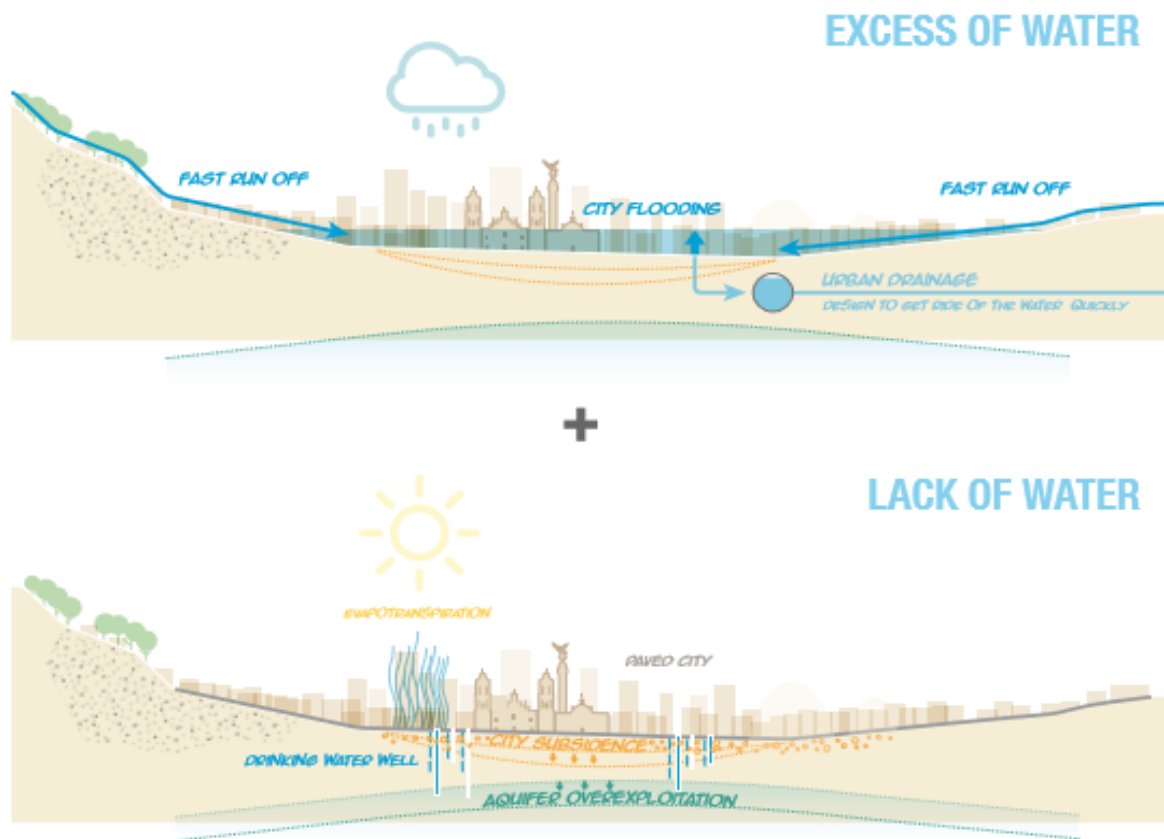


Figure 7: Schematized summary of water related problems Mexico City is facing today. Source: Marín Salinas, E., Boer, F., Van der Pas, B. & Rico Espínola, V. (in press). Towards a water sensitive Mexico City. Public space as a rain management strategy (Report).

The floods and droughts have been aggravated by environmental transformations and changes in the hydrological cycle along with land use changes induced by primary activities and urban growth. The lake system used to act as natural drainage for precipitation run-off, which was carried down by rivers and streams from the higher elevations that surround the basin. During the Aztec times in Mexico the capital was originally installed on a small island on the lakes of the Valley of Mexico. Later, the city expanded with drainage of the lake that resulted in a hydraulic cycle that has been extremely and irreversibly transformed. This created a paradoxical situation whereby, first, Mexico City has been unsuccessful in dealing with structural features of the water system that makes the city vulnerable to floods and changes in water availability through the irreversible transformation of the hydrological cycle of the basin; and second, the unequal access to supply and to drainage services (Lankao, 2010).

Textbox 3: Holland Branding (Observation 2,4,6)

The Dutch Embassy was setting up a project called Holland Branding to increase business opportunities for the Netherlands in Mexico. This long-term Holland Branding strategy is a tool for the embassy and Dutch business and knowledge institutions to materialize the opportunities into concrete projects. It started with brainstorm sessions within the Embassy to set up a plan for a shared vision on Holland Branding as an end result. This was discussed with all the employees involved in the focus sectors of the embassy, water is one of these focus sectors.

First, it is important to understand the strengths and weaknesses of The Netherlands before it is possible to search for market opportunities in Mexico. A strength of The Netherlands is its water systems. Today the Rotterdam harbour is one of the largest in the world, and commerce, transportation, and agriculture are major sectors of a Dutch economy still dependent on the careful control of flowing water. But water has not only been a blessing to the Dutch. At times they have lost control over it, and the sea or rivers have broken through the dikes. Devastating floods are traumatic events in the history of the country, and they remain a threat today. The sinking of coastal lands has continually increased the Netherlands' vulnerability to floods and made it more difficult to discharge drainage water. However, the Dutch have been able to cope with these problems through the centuries by increasing their control over water flows. This they have achieved through collective action, often involving very many people. (Kaijser, 2002).

Second, research was needed on the Mexican market. Attention was given to drivers for Mexico to set up new projects in the focus sectors. Regarding the water sector, these are mostly preventing floods, droughts and shortages of water. Besides the drivers for Mexico, it was necessary to set up the identity of the Netherlands, in other words, the Dutch approach. A SWOT analysis of the Netherlands in Mexico was made based on the information of the interviews to match the identity with the drivers of Mexico. Next, the information was formulated in general messages and themes were set up, in which the focus sectors were combined for a cross-sectoral approach. The different themes were Sustainable Design, Food Security, Urban Development, and a theme on the combination of energy offshore and water that still need to be named. In each of these themes urban water resilience plays a role.

Third, the marketing strategy was launched during a sustainability event in May 2016. A backdrop was shown during the presentation of the Ambassador (see Figure 7). The flyers and posters are still being made. The story on these flyers and posters for the different themes will be a golden thread within the embassy to bring together the different focus sectors and to market one story towards Mexico to brand the Dutch identity.



Figure 7: the backdrop for the presentation of the Ambassador of The Netherlands to promote Holland Branding

4.2 Phase 2: The contact between parties of different cities

In the Theory section this is described as the shared urban water vision that is necessary in a project to act as an instrument to orient, coordinate and inspire action to stimulate the process for a long-term commitment. In addition, the case showed that creating a shared urban water vision is a two-step process in which first the most important actors of both cities need to have the same vision and second the actors need to create a project together that is a tool to involve stakeholders (Observation 1).

This first step of creating the shared vision started at the end of 2014 when the Mexican organisation contacted the Dutch Embassy. In February 2015 the Dutch Embassy and the Mexican organisation met for the first time to discuss what the organisation was searching for regarding the water square in Rotterdam. Afterwards, the Dutch Embassy brought the organisation in contact with the company that designed the water square in Rotterdam followed with Skype and phone meetings till December 2015 when the first personal meeting took place. The Dutch organisation came to Mexico City to experience the city and organisation. At the same time, it was an opportunity to gain trust⁴ with the Mexican organisation. In addition, the time was used to share ideas and come to an agreement for further collaboration (Respondent 9). Furthermore, a next meeting needed to be planned for involving other actors that were necessary for the policy transfer.

The involvement of actors or stakeholders can be done in several ways, for example surveys, around perceptions, semi-structured interviews or round table discussions (Respondent 4). Within the case a round table discussion was used - a workshop - for which all the actors were invited to be part of setting up the project that is further explained below (Observation 1). In Textbox 3 another example of a round table discussion is explained that involved a game for creating a shared vision.

Textbox 4: Resilience Garage (Observation 5)

Another option for a first contact between parties is a new concept of the network organization 100 Resilient Cities, namely the Resilience Garage. This is a concept developed by a Dutch consultant, and it is a game called 'NEXUS!'. The game is set up to understand the concept of resilience more and to let people collaborate and communicate, which is necessary looking at the results showing that most people do not know exactly what resilience means. The Resilience Garage was organized for bringing parties together for a brainstorm session on the projects for a new and for the old airport in Mexico City.

The game has four countries and all have different possibilities for creating resources and the countries are of a different size. Due to the limited resources and different resources in every country there was a need for collaboration to survive and in order to build cities. Another conclusion of the game was that the time pressure in every round resulted in necessary and quicker decisions, therefore, time pressure is needed for decision making. However, a conceptual focus is important for making the decisions.



Figure 8: The 'NEXUS!' game during the Resilience Garage

⁴ Trust refers to the extent that people will be open to each other's views so real collaboration can take place.

The next meeting and the second step was a workshop - the water workshop - that involved more actors. The goal of the workshop was to create a project for a water square in Mexico City that has sustainable water use and that serves as a public area on which every actor could agree. Finding a project that connects the different actors is also an element that is mentioned in the Theory for creating a shared vision. The actors involved in the water workshop were: SACMEX, UNAM, the Resilience office, the Dutch Embassy, AEP, De Urbanisten and Deltares. SACMEX, UNAM, AEP and the Resilience office are the Mexican organisations (Respondent 6). SACMEX is the water authority in Mexico City, the UNAM is the public university, AEP a governmental organisation on public space, and the Resilience office is also a governmental organisation. Within the Dutch organisations De Urbanisten is a business, Deltares a knowledge institute, and the Dutch Embassy a governmental organisation (Observation 1). In Figure 9 the actors are presented with on the left side the Mexican actors and on the right side the Dutch actors; the red cycles are governmental organisations, the orange cycle a business actor, and the green cycles are knowledge institutions. The lines present communication and collaboration between the actors. Between the actors AEP, 100RC (resilience office), Embassy, De Urbanisten and Deltares the lines are thicker than between AEP, SACMEX and UNAM due to a stronger collaboration and communication. The dotted line from the UNAM to the Dutch actors is made because they are approached and can be approached by the Dutch actors but currently they are not structurally involved.

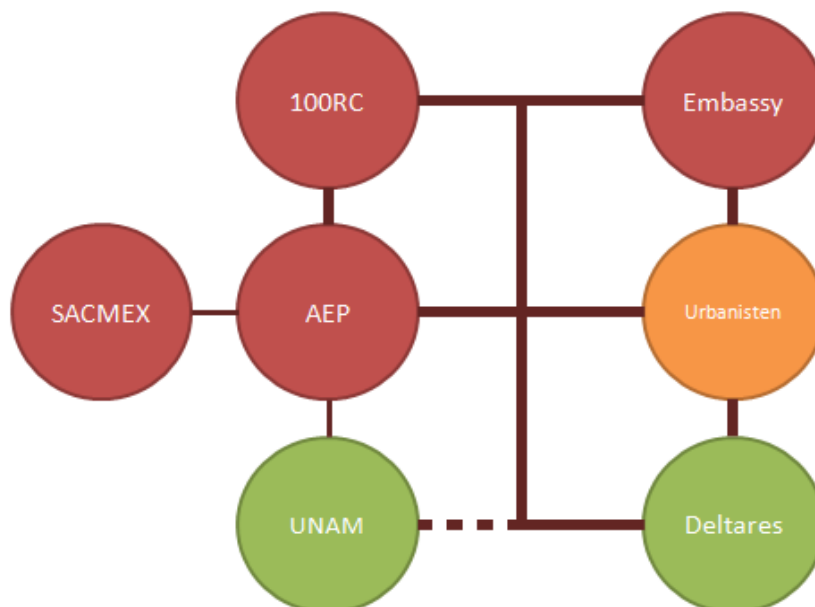


Figure 9: Actors involved in the water workshop - Mexican actors on the left and Dutch actors on the right. The red cycles are governmental organisations, the orange cycle a business cooperation, and the green cycles are knowledge institutions.

The water workshop consisted of four days in total. On the first day, the actors did a presentation for each other to give an introduction of who they are and what they do. In the afternoon after the presentations, most people left and only a few people stayed, namely one from the 100 Resilient Cities office in Mexico City, two from AEP, two from De Urbanisten, two from Deltares and myself representing the Dutch Embassy. The reason for leaving after the presentation was not made clear; it may be due to trust issues towards the Dutch counterparts (Observation 1). This distrust can arise due to a lack of geographical proximity (Boschma, 2005) between two cities and therefore the belief of a lack of understanding of the city's situation, i.e. the Mexican situation within the case. In other words, the Mexican actors expected a cognitive distance with the Netherlands due to a lack of geographical proximity. As an interviewee mentioned (Respondent 7):

'Knowledge from rich countries to poor countries does not translate easily. Because we have a very different political and cultural situation; we are in different stages. (...) For example The Netherlands is very small and we

have a lot of mountains. And then you get a lot of butts. And it is not that it can't be done. It is just that it is so far away.'

Nonetheless, the Dutch counterparts - De Urbanisten and Deltares - gained trust by working on understanding the city and its history during the workshop with help from AEP and 100 Resilient Cities of which the results were presented on the last day with the actors present again.

The Dutch counterparts tried to understand Mexico City by dividing the city into five areas with the same environmental and social needs. Next, possible solutions were made for every area and its needs by using cut and paste work and an app (Climate Adaptation App: CAPP) that consisted of different water technologies. In short, there was a map of Mexico City in poster format divided into five areas and every area had its characteristics. For these characteristics potential solutions - the images of water technologies retrieved and cut from the CAPP - were pasted on the different areas. Next, the information was structured for an overview of Mexico City and its different areas to see which area had the best potential for a water square but also the most impact in the area. This was presented on the last day and the actors agreed on the proposal that was presented in the end presentation. Focusing on the community needs per area of the city showed the Mexican counterparts the effort the Dutch counterparts had made with understanding their situation which gained their trust (Observation 1). In other words, for a city to trust another city it is important to show shared struggles and histories before accomplishments. Emphasizing accomplishments is mostly intimidating or suggesting superiority but by showing struggles within a process that are related to the struggles of the other city, it shows an understanding of their situation (Respondent 7,8, observation 3). As mentioned by an interviewee (Respondent 7):

'So when I spoke, I said we are very corrupt just like you. And they were very happy to hear that because that is an understanding. (...) And I know that due to the Second World War countries were very poor. However, when they come they don't talk about how they were poor. They talk about how they are now the rich countries of the world.'



Figure 10: Impression of the water workshop in Mexico City

In short, during the first contact moments between the actors it is important to create a shared vision that connects all the actors and that includes local needs. There are different possibilities to accomplish the shared vision. In the case a workshop of four days was used. In addition, distrust may arise with the city of the in-flow of knowledge when there is a lack of geographical proximity between the cities that results in the belief of a lack of understanding of the city's situation. For a city to trust another city it is important to show shared struggles and histories because it shows an understanding of their situation.

4.3 Phase 3: The adoption process

After the water workshop the actors were set for collaboration, i.e. the policy transfer could start. First some agreements were made at the end of the workshop for the next steps. The Dutch counterparts were going to set up a report of the past few days together with the Mexican organisation. With this report stakeholders could be involved. In June 2015 the report was finished (Respondent 9). For the adoption process a collaboration between actors on governmental, business and knowledge institution level is the key to improving the conditions for the policy transfer. However, according to Figure 9 in phase two not all actors on these levels were present during the water workshop. It appeared that there is no business corporation involved on the Mexican part. This is possible due to differences within the government systems, i.e. the Mexican government system works differently than the Dutch government system. The part of technical knowledge within The Netherlands is located in privatized companies or knowledge institutions (Respondent 9). In The Netherlands the water systems in a city exist of a number of different organisations that need to



collaborate, i.e. the government system is more decentralized. The Dutch government system is also known for the strong collaboration between different actors (Observation 4). A Mexican government organisation is a combination of technical and governmental departments. For example, SACMEX is the water organisation in Mexico City that contains governmental and technical knowledge. SACMEX, therefore, is almost independent and as a result more powerful and does not share its knowledge and expertise easily (Respondent 9), i.e. the government system is highly centralized. The organisation is only linked to the organisation AEP due to the reason that SACMEX is hard to reach (Observation 1, Respondent 5, 6, 9). In other words, the Dutch government system being more decentralized and the Mexican government system being highly centralized result in a lack of organisational proximity that can negatively influence the implementation of the innovation because organisational flexibility is required for the adoption (Boschma, 2005).

The high centralization of knowledge created a cognitive distance between the Mexican actors that made it difficult for the Dutch counterparts to collaborate with them. As explained before, the lack of proximity between the Mexican actors can exist due to the structure of the government system; on the other hand, it can also be the result of a lack of people who are able to connect different disciplines. In Mexico City there are people who are greatly educated in their discipline, however, there are not enough people who are interdisciplinary focused (Respondent 1,2). Therefore, it is hard to translate the knowledge of disciplines towards projects, i.e. sector specific knowledge towards themes for projects (Observation 1).

Currently, the five actors - 100RC, AEP, the Dutch Embassy, De Urbanisten, and Deltares - are just finished with the report based on the water workshop to involve stakeholders (Respondent 9). The main stakeholders for the project of the water square are government agencies. Other agencies need to be informed about the proposal to make sure the location is free to use in terms of site selection and political sensibilities (Respondent 6). In addition, involving stakeholders is a process on its own according to an interviewee (Respondent 6):

'So first we need to inform all these government agencies but at the same time we need to approach communities and we need to make sure to incorporate them into the design of the space. So in the end we learned that we design a process more than just a public space project or an architectural project.'

In the quote the community is also named as a stakeholder to involve. Even though the project is based on the community needs, interviewees said that it is still important to talk with the community of the area where the project is going to be (Respondent 1,2,4,5,6,7), for example as another interviewee mentioned (Respondent 1):

'And people, they create pressure. Awareness of the problem is also very important. If that is not there then it is very difficult to do something.'

In other words, local pressure is needed to implement a project according to interviewees. However, this does not mean only pressure from the community but also from local actors to overcome possible obstacles. During the adoption phase hurdles within the process will be faced. These hurdles can partly be eliminated by having the elements of the shared vision address phase two correctly; nonetheless, some hurdles are unexpected. As in the case of the water square, during the time of writing the report an unexpected change of director in the Mexican organisation happened. This pushed the process of the water square back to phase two because the agreements on the shared vision were made with another director. However, there is a local leader within the organisation supporting this project who is promoting the project to the new director. In other words, without the local leader the project would not be carried out while currently there is still a chance. Moreover, the report is finished and will show the importance of the project that can help convince the new director. Additionally, the Dutch Embassy will meet with the new director - a meeting planned by the local leader - to convince him of the importance of the involvement of The Netherlands (Respondent 9). This showed that local leaders are necessary within actors to push the process within their organisation.

After the moment of the change of director it was not clear if the project would be still implemented and currently it seems positive. Due to the importance of personal image and reputation in Mexico most new leaders do not want to continue with projects that started during the time of the previous leader. In addition, with a change of a governmental leader, the important decision makers within the organisation mostly change with them which results in parties who are working together with the government needing to set up new contacts all over again within the governmental organisation. This makes it hard to set up projects that involve



a longer time frame (Respondent 10). Nonetheless, there are strategies, as one interviewee mentioned (Respondent 5):

'We have a strategy for that. What we are doing is, we are trying to establish a committee that is depended on the project. So we call people from the academy, and comparable important leaders and personalities and we are going to invite them to take part in this committee to keep this project alive for years to come.'

A result of the changeable and unpredictable government system is a society that is generally reserved and wary towards others. In addition, due to the government system most progression comes from bottom-up initiatives. This is also a reason why it is necessary to have local leaders aboard. Without local leaders it is almost impossible to keep pushing longer term projects (Respondent 9, 10, Observation 4). In other words, there is a lack of institutional proximity between The Netherlands and Mexico regarding the elements of leadership and fair governance.

The differences in institutional environment between Mexico and The Netherlands, i.e. a lack of institutional proximity, created also a lack of proximity on organisational level and a cognitive distance between the Mexican actors that can negatively influence the implementation of the innovation. Nonetheless, a shared vision between the actors created in phase two can prevent possible obstacles due to the mutual understanding that has been developed or local leaders can help to overcome the setbacks occurring.

4.4 Phase 4: Process of reflecting and internalization

The case of the water square is still in development and currently in phase three. In addition, the 100 Resilient Cities network just reached its goal of a hundred cities and the network is still developing (Respondent 3). So unfortunately there is not a lot of information on this phase yet. Nonetheless, it can be said that the intensity of the interaction between the cities decreases in this phase. Rotterdam will reflect on the whole process and incorporate the new knowledge and experiences for the next knowledge transfer with another city. In addition, Mexico City needs time to internalize the policy transfer and the knowledge gained can be incorporated in other systems of the city or be used within a next knowledge transfer with another city. Both cities need to market individually and together the project to create new projects - new knowledge transfers - on the knowledge they gained. However, it can be expected that the highly centralized Mexican government system will influence the internalization process negatively due to organisational inflexibility.

The increasing number of knowledge transfers on urban resilience helps with defining the framework around the concept more precisely. Cities gain knowledge by experiencing more knowledge transfers on urban resilience. But this is not the situation yet; in other words, there is still vagueness around the concept of resilience. In the interviews the question was asked to explain the concept of resilience. This showed that indeed there was not one clear definition of resilience between the interviewees. One interviewee mentioned that there were some meetings where different organisations came together to discuss the definition of resilience to overcome this problem (Respondent 4).

An example of two people not really connecting on this definition while sitting next to each other and working together to set up a project, are these two quotes:

'For me resilience is the ability or the capacity to understand shock or sudden changes. And maybe not only sudden changes.' (Respondent 1)

'An adaptive system that changes all the time. There is a point where it really changes into another system. So how much a system can take its propriety and characteristics before it goes to another stage. And ones it gets irreversible it takes something like 10 years.' (Respondent 2)

Both interviewees were talking about change, only one is talking about understanding a change and the other one about the capacity of a system before it changes. However, the word *understand* used in the first quote makes the definition given broad and vague; therefore, the definition of quote two can fit within this definition. 'Understanding a change' can relate to the whole process of change and therefore also the part of adaptation and the capacity of a system. Nonetheless, this does not make the definition of resilience clear for both parties. This example showed that even though people have their own interpretation of the concept, it is necessary to discuss the personal interest with the concept because it differs per person and organisation. To date there is not one perfect definition of urban resilience; however, in the context of city-to-city learning it is necessary to

explicitly discuss the interpretations of the actors involved to create a shared framework to prevent possible misunderstandings.

Furthermore, one interviewee already mentioned an aspect for progress that can be reached by reflecting on cases and implementing the new knowledge, which was:

'It is totally important to exchange information and knowledge although it is also critical taking into account the particularities of each city. Even though the resilience initiative is of course a very remarkable international initiative, some people still think that it is still lacking precisely that adaptation layer. So that the strategies make sense in each city. So it is a real challenge for the resilience strategy, to come up with a toolkit that is really adaptable to the realities of each place.'

The quote shows that conceptual development is still highly needed in the field of resilience in which networks can allow a faster learning experience due to knowledge transfers and combining the existing and new knowledge. In addition, the knowledge transfer model is a tool for supporting this process.

4.5 Key elements of the model

Below the model for knowledge transfer between cities is being introduced again, however, now filled in with some key elements. In phase one for both cities it is crucial to focus on strengths and weaknesses before the cities can market on cross-sectoral themes or explore for complementary knowledge. In the second phase during meetings with actors of both cities, it is important to focus on shared struggles and histories for a mutual understanding and to gain trust. In addition, a shared vision between the actors needs to be created to prevent misunderstandings during the adoption phase. Moreover, a mutual understanding and a shared vision can help with an institutional gap between the cities due to a better understanding of both systems and agreements. In addition, local leaders are necessary to push the process forward during obstacles within phase three. Lastly, in phase four the cities are focussed on their own process again. The city of the in-flow of knowledge needs time to internalize the policy transfer and the city of the out-flow of knowledge reflects on the process to incorporate the new learning experience with the existing knowledge. Both cities will use the new knowledge for other systems within the city and to create new knowledge transfers with other cities for a new learning processes.

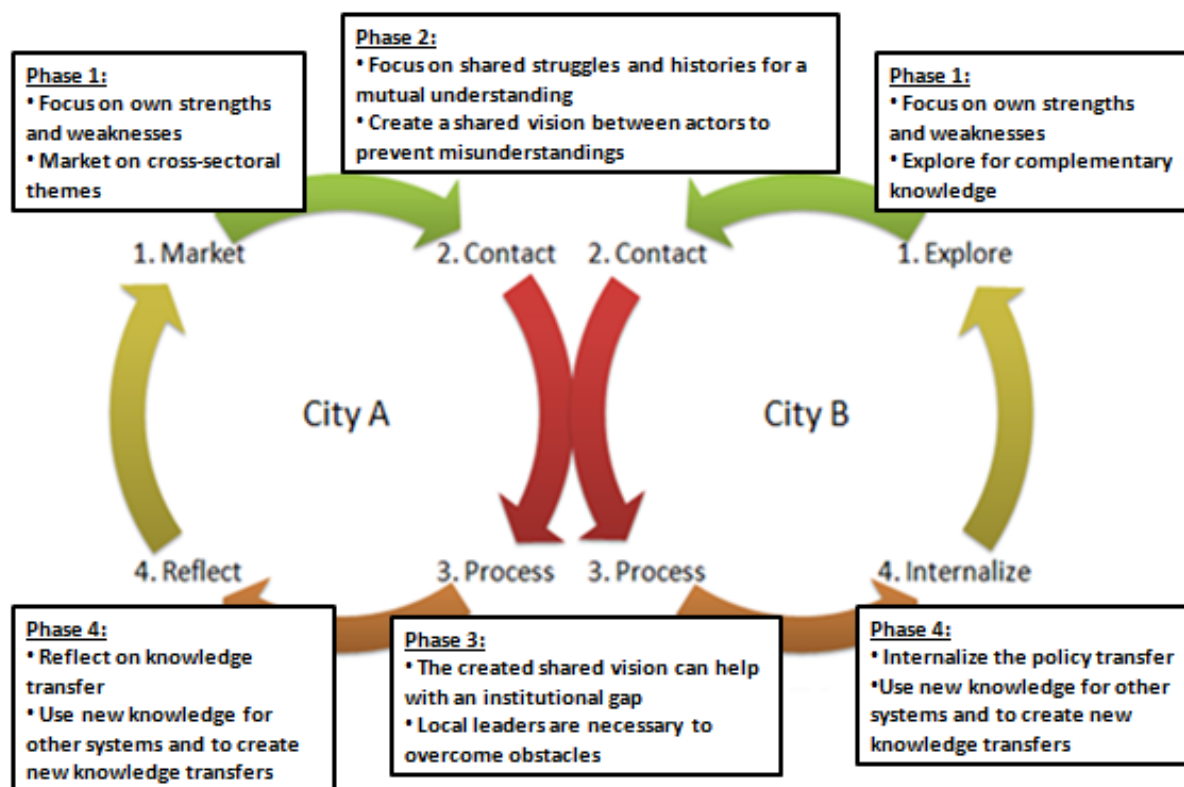


Figure 11: The knowledge transfer model with the key elements



5. Discussion

Interpretations of the case study findings are linked to existing theories and to the knowledge transfer model to illustrate specific theoretical implications and contributions to academic literature. Next, a critical reflection on research limitations is described and lastly recommendations for practitioners are explained.

5.1 Linking case study to theoretical framework

Resilience is still evolving as a concept for sustainable development. For most interviewees and people involved within the participant observations, the definition therefore is vague and also the approach for using the concept as a tool is unclear. The attention for resilience has grown in scientific literature; however, most literature is about defining the concept and the content of resilience as an approach to understand the outcome of resilient systems and what such systems should look like. An example are the seven principles for resilience thinking that are described in Chapter 2.1 in the Theory. These principles for a resilience thinking approach were aimed at investigating how social-ecological systems can be managed in a resilient way (Simonsen *et al.*, 2014). Interviewees were mostly focused on only one principle, namely 'Encourage learning' in which the focus was on educating society to create the need of resilient systems. In the same line of thinking, according to Reed *et al.* (2013), learning processes are important for gaining new knowledge of its functions and vulnerabilities and initiate collaborative action that may lead to change. The capacity to learn is cited as a key characteristic of resilience and forms a central aspect of research and practice on resilience in socio-ecological systems (Reed *et al.*, 2013). This is also in line with Van Ewijk *et al.* (2015) and McCann (2014) who point out that global and local connections are necessary to exchange knowledge for the development of policies within cities. In other words, it is important to notice that the seven principles can be strengthened by global interaction in the perspective of cities and resilience thinking. Policy learning was also a central point within this research only in a broader context. In this research current scientific literature was put in a broader perspective of creating learning processes across cities worldwide to enhance the development of resilient systems described within scientific literature. This global networking is necessary to become more resilient against climate change, because it is by definition a global-scaled cause. Multiple policy learning processes across cities will result in a growing international common knowledge and will help the process of creating more resilience in cities around the world due to the exposure to multiple views and framings of resilience and ways to enhance it from diverse contexts. As Keiner & Kim (2007) mentioned, networks of cities overcome the territoriality trap of national governments, which struggle to respond to challenges about which they lack sufficient information and whose origin is far beyond their geographic reach. In other words, large scale urban resilience can more likely be created with the use of networks on a global scale due to a faster learning experience as a result of knowledge transfers and combining of the existing and new knowledge.

A model for knowledge transfer and policy learning of four phases was introduced to create this broader perspective. The first phase was described as the exploration and marketing of knowledge. In this regard, it was expected that the main focus within this phase would be on marketing existing knowledge of resilient systems of a city and exploring resilient systems outside the current systems of a city for complementary knowledge. However, this phase mostly consisted of research on the cities' own systems to understand its strengths and weaknesses. This is in line with the study of Ferguson, Frantzeskaki & Brown (2013). The researchers described a model of nine phases for setting up a strategic program for the city for a process towards more resilient systems. In short, there is a long process of research and creating a focus in the city's vision before the city can start with the first phase of marketing and exploring of knowledge that is described in the model in this research. In addition, Ferguson, Frantzeskaki and Brown (2013) described six characteristics for a city's strategic program that incorporates the shared vision within the city. These six characteristics were also used in this research, only in the perspective of a shared vision between two cities for creating a project that involved a knowledge transfer. Also within the perspective of this research almost all characteristics reappeared. Namely, the needs of the community (1), meaning and connection for different actors (2), associated with clear and defined metrics (3), broadly owned by a range of stakeholders (4), and embedded in a broader sustainability agenda (5). Characteristic number four however came back in phase three, because within the case first decisions needed to be taken about the project, i.e. creating a shared vision between the actors, before the report could be made to use for creating interest and involvement of stakeholders. Lastly, characteristic six - regularly reviewed and updated for reflection - was not mentioned by



interviewees and also no observations were found. An explanation can be that the case and the other participant observations were not developed far enough to already reflect on their previous work.

Phases two and three of the knowledge transfer model are intensive interaction phases between the two cities. During these phases cultural differences between the cities will play a certain role especially in phase three during the implementation of the innovation. Boschma (2005) described five different types of proximity that can enhance or counteract the policy learning process between cities due to the degree of difference. Mexico City and Rotterdam are different in many aspects and therefore it was more the question whether the lack of proximities would not be too great for a successful knowledge transfer. Within the model most attention was paid to two proximities, namely the cognitive proximity and institutional proximity. It was expected that a lack of cognitive proximity could play a role in developing a shared vision between the actors of the cities within phase two which did not occur. However, the Mexican actors expected a cognitive distance due to a lack of geographical proximity between Mexico City and Rotterdam that resulted in an attitude of distrust of the Mexican actors towards the Dutch actors during the water workshop. Also an institutional gap would play a large role during the implementation within phase three. The process within the case was indeed influenced by a lack of institutional proximity. The institutional environment of both cities influenced their organisational structures in such a way that it resulted also in a lack of organisational proximity. In addition, the institutional environment in Mexico City caused a cognitive distance between the Mexican actors. According to the seven principles for resilience thinking a polycentric government system is necessary for a resilience system (Simonsen *et al.*, 2014), which is not applicable for Mexico City. The highly centralized government system resulted in the cognitive distance between the actors that can negatively influence the policy learning process. In the same line of thinking, Gupta *et al.* (2010) described six elements to increase the adaptive capacity and limit the possibility of complications. The lack of two of those elements resulted in complications within the case, namely, leadership and fair governance. The type of leadership regarding power distance and uncertainty avoidance are hurdles when a lack of proximity exists between cities (Dikova, Sahib & Witteloostuijn, 2010). An example is the change of director due to governmental authority that created a setback to phase two for the case. Another example is the position taken by the water authority SACMEX in Mexico City that kept its distance to the actors of the case even though the organisation had a broad range of valuable knowledge. These complications are further discussed in 'Limitations of the research'.

5.2 Limitations of the research

Different limitations were found within this research. First the limited access to some actors is described; next limitations of the knowledge transfer model are explained and lastly the influence of cultural differences and an institutional gap.

The access of the different actors could have influenced this research. As described above, the water authority SACMEX in Mexico City was hard to reach during this research. Only the first day during the water workshop SACMEX was present and after the workshop the communication for involvement was mostly conducted through one person of AEP with the contact person within SACMEX. This resulted also in difficulties for me to approach the organisation for an interview and the outcome was also no interview. However, other interviewees have spoken about SACMEX and I got the chance to experience SACMEX in a few participant observations that confirmed the perspective of the interviewees. Furthermore, there were difficulties with arranging interviews with both chief resilience officers, the one in Mexico City and the one in Rotterdam. The issue was not that they were hard to approach but more their work schedule. As a result I did not get the chance to interview the chief resilience officer of Mexico City; however, I have spoken to him multiple times during activities in Mexico City, for example the water workshop and resilience garage. Unfortunately the chief resilience of Rotterdam is also not included within this research. The resilience office of Rotterdam was not directly involved in the case and therefore there were no moments of contact. It was also not possible to arrange an interview during my time in The Netherlands due to the chief resilience officer's busy work schedule with mostly travelling days. The information from the resilience office in Rotterdam would have been mostly valuable within phase one, namely, how do they promote Rotterdam internationally and how do they market the Benthemsquare in Rotterdam. Nonetheless, this information was also covered by the engineers of the Benthemsquare. The director of De Urbanisten was interviewed at the beginning of this research for a helicopter interview and in addition the four days of the water workshop provided the chance to experience this organisation and to ask multiple questions during the progress. This also applies to the actor Deltares in the water workshop. In addition, an interview took place with the 100 Resilient Cities network located in New York for an overall view of the resilient cities and their intentions.



Another limitation lies in the fact that not all phases of the knowledge transfer model were covered during this research. Phase four was not reached in the case during the time of this research, neither in the participant observations. Even though there is a lack of information on phase four within this research due to time constraints, most parts of the other phases were observed at the time of their occurring; this may be seen as an advantage as opposed to observing past the time of occurring. This leads to the effect that this research is not repeatable in the same context. In this research only one case study was used to study the model. The model was tested and useful within this case; in another study it should become clear whether this model is also useful in other situations. On the other hand, the participant observations also confirmed the results of the case and therefore reduced the effect of only one case study result by taking other information into account, without losing focus on the specific case. Also the knowledge transfer model is a simplistic reproduction of the reality and that can be seen as a limitation. The model however allowed for a nonlinear process that occurred in the case due to the setback from phase three to phase two. The phases were also important as mechanisms to support the knowledge transfer process in the case. In other words, the model was helpful to structure the analysis and to identify the process in both progresses and setbacks. As a result further research is necessary to establish the generalization of the model and on phase four of the model.

Lastly, the case has just started with phase three, i.e. the policy transfer from one city to another city. The institutional gap can cause obstacles and therefore organisations will experience difficulties during this phase. Most interviewees had problems with understanding the role of institutions that limited the amount of results in this phase. Therefore, most of the characteristics for the adaptive capacity of institutions mentioned in the theory did not reappear in the results. Only one element was mentioned as a characteristic an institution should have according to an interviewee, namely the role to encourage the involvement of a variety of perspectives, actors and solutions. The characteristics of fair governance and leadership reappeared in the case results, i.e. interviewees might not have discussed these characteristics explicitly, but it was still clearly present and relevant in the process of the case itself. The other three elements were not mentioned. Further research within this phase may help with developing mechanisms for bridging the institutional gap - a toolkit - to make knowledge adaptable to the particularities of cities. In addition cultural and language differences can have led to observer errors in this research. Understanding the way of working of both countries was shown to be crucial to understand the respective needs in collaboration. Frustration can arise when both parties do not understand each other's way of working. During the time I was planning interviews I personally experienced some of these cultural differences. For example, one time an interview appointment appeared to be a lunch instead of the interview I was looking for because Mexicans are more focused on social relations. But it was a great lunch.

5.3 Recommendations for practitioners

Phase one can be divided into two parts in which first a city needs to focus on own strengths and weaknesses and second a city needs to market or explore knowledge. It is recommended to first research the city's systems to form a framework of strengths and weaknesses. Next, the city needs to decide on the focus of its strategy, in other words, which strengths are unique selling points and which weaknesses need to be strengthened. For the marketing this research suggests a strategy based on cross-sectoral themes. To strengthen weaknesses a city searches for projects to implement that form a complement to its current knowledge. Like the water square in the case projects are cross-sectoral and therefore marketing on themes will reach a wider audience.

In phase two the first moments of contact will take place. These moments are for developing trust and a mutual understanding. The belief of a lack of interest in or understanding of the city's situation can cause distrust by the city of the in-flow of knowledge. For a city to trust another city it is important to show shared struggles and histories because it shows an understanding of their situation and the feeling of equality. This is also a crucial step for a mutual understanding and creating a shared vision. It is recommended to create a shared vision between the actors that are involved before the implementation of a project to prevent misunderstandings later in the process. There are different possibilities to accomplish the shared vision as for example within the case a workshop was arranged. Also using or creating a game in the second phase is a tool to involve all actors of both cities and to create a shared vision and understanding between them; this can take place during a workshop. For the city of the out-flow of knowledge it is crucial to understand the local needs and the environmental situation of the other city, to be able to transfer their knowledge in a useful project for the city of the in-flow of knowledge.

For phase three, a mutual understanding and a shared vision can help with an institutional gap between the cities due to a better understanding of both systems and agreements. During the implementation



of the innovation an institutional gap can cause obstacles within the process. Most of those obstacles can be prevented by a shared vision. Even so obstacles can still arise that cannot be controlled by a shared vision. For these obstacles committed local leaders are necessary to push the process forward. A shared vision and committed local leaders are important requirements to secure and strengthen the process of implementation in the long term.

In phase four the cities need to focus on their own process again. The city of the in-flow of knowledge needs time to internalize the policy transfer and the city of the out-flow of knowledge reflects on the process to incorporate the new learning experience with the existing knowledge. Both cities can use the new knowledge for other systems within the city and to create new knowledge transfers with other cities for new learning processes.

A specific recommendation for the case is that the Netherlands can play an important role for Mexico in collaboration between the different actor levels and disciplines. As mentioned before, Mexico has highly educated people but they have a lack of interdisciplinary people who are able to connect the disciplines and translate the knowledge to projects. This provides opportunities for The Netherlands, because Dutch organizations and professionals have a well-functioning collaboration system between the different actor levels. This is also an aspect from which the Mexicans can learn from the Dutch. Even though the knowledge transfer is not completed and the implementation still needs to start, there are some aspects that can be expected the cities will learn from. For the Mexicans it is recommended to pay attention to the expertise of the Dutch on the subjects of working with water instead of working against, for example gaining knowledge in water storage, to improve adaptation against the heavy rain falls and dry periods. In addition, the experience of the Dutch in collaborating with multiple actors. On the other hand, for the Dutch it is recommended to absorb the knowledge of the Mexicans on their expertise on the city's unique geographical situation and its institutional environment.



6. Conclusion

Most of the world's population lives in cities and the number is still growing. Urbanisation is a global multidimensional process paired with migration of people, changes in the capacity to sustain ecosystem services, and increasing uncertainty due to climate change. A consequence is water scarcity and floods. Urban water reforms should result in resilient water resource management that explicitly takes into account complexity, uncertainty and immediate and long term change. To increase the process resilient solutions, global and local connections are necessary to exchange knowledge for the development of policies within cities. Policy will not move without the process of knowledge transfer and learning across cities. This resulted in the main focus of this research, namely, how knowledge transfer and policy learning between cities could be facilitated to promote urban water resilience in which a case study of Mexico City and Rotterdam was used.

To understand the process of knowledge transfer and policy learning between cities a sub question was formulated about the mechanisms of the in- and out-flow of knowledge in city-to-city learning. To address and unpack these mechanisms, a knowledge transfer model was developed to determine the process to promote urban water resilience. The model was divided into four phases, namely, the exploration and marketing phase (1), the contact phase (2), the adoption phase (3), and the process of reflecting and internalization (4). According to interviewees it is crucial for a city to understand its own systems on strengths and weaknesses before exploring or marketing knowledge is possible. In addition, the case showed that a city needs to focus on cross-sectoral themes for marketing a city's knowledge due to organisations that explore knowledge within themes or projects because resilience is an interdisciplinary concept. The second phase is called the contact phase; the case and interviewees showed that this is mostly about creating a shared vision between the actors involved. At the beginning of the phase it is still about first meetings between the main actors, but the focus switched early to understanding each other's struggles and histories for a mutual understanding to gain trust and to create a shared vision for a project to develop. The case showed that with a lack of geographical proximity it is crucial to create a mutual understanding by focussing on shared struggles and histories to gain trust because the Mexican actors expected a cognitive distance with the Dutch actors due to the lack of proximity that resulted in distrust. For the process of adopting the policy transfer, Rotterdam and Mexico City need to overcome an institutional gap between them that can cause obstacles. Some obstacles can be prevented by a mutual understanding that is created within the shared vision; nonetheless, some hurdles are unforeseen. According to interviewees the key in overcoming obstacles are local leaders. Lastly, the process of reflecting on the knowledge transfer and internalization of the policy transfer is necessary before a new process can start for the individual cities with other cities. However, within this research not a lot of information could be gathered on the last phase due to the fact that the case is still in phase three. Nor was it possible to gather a lot of information with interviewees.

In addition, within city-to-city learning there is an interaction between actors of different systems of the cities. This resulted in a sub question focused on the kinds of actors that are involved in the process of city-to-city learning. According to scientific literature, a collaboration between actors on governmental, business and knowledge institution level is the key to improving the conditions for the policy transfer. However, in the case there were three Mexican governmental organisations, one Mexican knowledge institution, one Dutch governmental organisation, one Dutch business corporation, and one Dutch knowledge institution. It appeared that there is no business actor present on the Mexican part. This is possible due to differences within the government systems of Mexico and The Netherlands that also relates to the third sub question about the influence of institutional proximity on city-to-city learning. The institutional environment of Mexico results in a highly centralized government system in which technical departments are included within governmental organisations. On the contrary, The Netherlands' institutional environment is more decentralized, therefore, it consists of a government system of more different organisations that need to collaborate. The differences in the structure of the organisations result in a lack of organisational proximity between Rotterdam and Mexico City that can negatively influence the implementation of the policy transfer. Organisational inflexibility can influence the internalization of the innovation in Mexico City. In addition, the high centralization of knowledge created a cognitive distance between the Mexican actors that makes it difficult for the Dutch counterparts to collaborate. The cognitive distance between the Mexican actors also relates to a lack of educated interdisciplinary people in Mexico, which is important for highly interdisciplinary challenges such as urban water resilience. People are greatly educated in their disciplines, but due to the lack of interdisciplinary people there are difficulties with translating knowledge towards projects, i.e. sector specific knowledge towards



themes for projects. In short, the differences in institutional environment between Mexico City and Rotterdam caused a lack of organisational proximity between the cities and a cognitive distance between the Mexican actors that can negatively influence the policy transfer due to the centralized knowledge in Mexico City and the lack of collaboration and communication between the actors involved.

Because of the vagueness around the concept of resilience a sub question was included about the way urban resilience could be conceptualized in the context of city-to-city learning. An increasing number of policy learning experiences across cities on urban resilience helps with defining the boundaries around the concept of resilience more precisely, i.e. cities gain knowledge by experiencing more knowledge transfers on urban resilience and by combining existing with new knowledge. Unfortunately, this is not the situation yet and cities still have difficulties with defining urban resilience. It can be said that within the context of city-to-city learning, cities that are involved within a knowledge transfer process need to conceptualize their own boundaries of urban resilience for the specific policy transfer to prevent possible misunderstandings due to different interpretations. This framework will help both cities in their next policy transfer with conceptualizing a new framework that includes the next or other city's interpretation and this process can repeat itself, i.e. learning-by-doing by combining past experiences and anticipating on new experiences. This global networking is necessary to become more resilient against climate change, because it is by definition a global-scaled cause. Multiple policy learning processes across cities will result in a growing international common knowledge and will help the process of creating more resilience in cities around the world due to the exposure to multiple views and framings of resilience and ways to enhance it from diverse contexts. In other words, large scale urban resilience can more likely be created with the use of networks on a global scale due to a faster learning experience as a result of knowledge transfers and combining of the existing and new knowledge.

To conclude, the mechanisms of phase one and two of the knowledge transfer model are crucial for preventing most obstacles that can arise within the implementation phase. For cities it is necessary to understand their *own* systems on strength and weaknesses before it is possible to market or explore knowledge for building channels of communication to selected providers outside the local milieu to enhance knowledge. Next, creating a mutual understanding on struggles and histories helps with building trust especially with a lack of geographical proximity and creating a shared vision helps with preventing possible misunderstandings. The obstacles that can arise within the implementation of the policy transfer mostly appear due to differences between the cities' institutional environment for which local leaders are necessary to create solutions. In addition an interdisciplinary approach needs to be facilitated to connect knowledge of different organisations and to translate knowledge towards shared visions; a highly centralized government system can result in a cognitive distance between actors that forms an obstacle to this interdisciplinary approach. Lastly, in the reflecting and internalization phase, both cities will have gained knowledge and can use this knowledge in the next policy learning process. Again, this process extends by creating networks of cities that allow a faster learning experience due to knowledge transfers and combining the existing and new knowledge to promote the development of urban water resilience.



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8. Attachments

A. Interview questions

[Intro]

Introduce myself, study and mostly my research. Explain the structure of the interview.

1. What does (a concept such as) resilience mean to you? What could it mean for water management?
 - Can you maybe be more specific? What do you think are important social elements to enhance resilience development? What should organizations do to strengthen resilience/urban sustainable development?
 - o *Maintain diversity and redundancy*
 - o *Manage connectivity*
 - o *Manage slow variables and feedbacks*
 - o *Foster complex adaptive systems thinking*
 - o *Encourage learning*
 - o *Broaden participation*
 - o *Promote polycentric governance*
2. Is knowledge transfer (city-to-city learning) something that's currently on the (political/policy/corporate) agenda?
Why? What makes it important / unimportant?

[Phase 1: Marketing/exploring knowledge]

It is necessary to enhance knowledge by investing in building channels of communication to selected providers located outside the local milieu. Cities have to realize the potentials of their respective knowledge resources, e.g. have an understanding of both the nature of their specific knowledge cultures and of their cities' development. This context of a city is influenced by variables such as city specific history, ecologies, geographies and socio-political dynamics.

3. What are important elements for you to promote resilience? What are elements that make you interested in a project, so that you want to participate?
 - a. *Ecological*
 - b. *Urban*
 - c. *People*
4. Can you explain how you search or market knowledge?
 - How do you select something that is complementary to your own set?
 - How much can it differ from your own values? Like working together with other cultures? Do you have preferences? Why?
5. What are drivers to set up a project? Do they influence the direction of a project?

[Phase 2: Contact phase]

A strategic program should develop and communicate a shared urban water vision that acts as an instrument to orient, coordinate and inspire action and secure long-term commitment for enabling the transition towards a resilient city.

6. From your own experience which characteristics do you think are necessary in a strategic program?
The strategic program needs the following characteristics:
 - (a) *Emerged from self-identified needs of the community*
 - (b) *Articulated in ways that have genuine meaning and connection for different actors in their everyday activities*



- (c) Associated with clear and defined metrics
- (d) Broadly owned by a range of stakeholders, including the water profession, community, government and the private sector
- (e) Embedded in a broader sustainability agenda
- (f) Regularly reviewed and updated to reflect changing societal values, new knowledge and system conditions.

7. How are stakeholders involved in projects for water management?
8. Can you mention actors that are playing an important role in the process of knowledge transfer for water management? Examples of organizations you worked together with?
9. What do you think about the current cooperation between government, business and knowledge institutions within your sector? Can you mention a good/bad example?

[Phase 3: The process - institutional proximity]

Policy transfer is about adapting policies to a specific local context instead of full standard packages of policies being transferred in total. This makes knowledge transfer and learning across cities crucial to move policy. The specific local context is linked to the culture of a country, in which institutions are mostly visible. Institutions refer to underlying ideological values and norms. Institutionalization is an important process to have a successful knowledge transfer, because then the new values and norms are embedded in society. An institutional difference between cities is necessary to combine insights for progress to resilience. The proximity can be measured by mapping the adaptive capacity of both cities. The adaptive capacity of a city can be defined by the inherent characteristics of institutions, which can be measured by the following dimensions: variety (1), learning (2), behaviour (3), leadership (4), resources (5), and fair governance (6).

10. What kind of role do you think an institution plays in a country? And with knowledge transfer between cities?
 - What do you think are important characteristics of an institute to enhance adaptive capacity for the process towards resilience?
 - o Encourage the involvement of a variety of perspectives, actors and solutions
 - o Enable social actors to continuously learn and improve their institutions
 - o Allow and motivate social actors to adjust their behaviour
 - o Can mobilize leadership qualities
 - o Can mobilize resources for implementing adaptation measures
 - o Support principles of fair governance
11. Can you tell something about the governance structure of your city (on water management)?
If this is not clear: ask specific for the role of certain organizations
 - How does the structure of knowledge transfers of Mexico look like?

[Phase 4: Internalization/robustness]

Finally a strategic program should facilitate social learning processes to connect outcomes from short-term initiatives with the long-term vision.

12. Can you mention examples of successful / unsuccessful knowledge transfer or learning among cities (from your own experience? What happened?)
13. Is knowledge transfer important for building water resilience? Why? / Could you give some examples from your experience/case/city/country?



B. Coding scheme interview

First coding scheme

Interview	Main question	Concept		Actor		Mechanisms		Differences	
1.	0. No	0. Other		0. Other		0. Other		0. Other	
	1. Yes	1. Resilience	G P1 P2 P3 P4 P5 P6 P7	1. Global	G B GO I1	1. In-flow	G E C P I2	1. Institutional	G V L BH LS R FG
		2. Knowledge		2. Local	G B GO I1	2. Out-flow	G M C P O	2. Geographical	G S1 S2 D W I3
		3. Both							

Coding scheme acronyms and symbols	
G	General
B	Businesses
GO	Government
I1	Institutions
P1	Resilience principle 1: Maintain diversity and redundancy
P2	Resilience principle 2: Manage connectivity
P3	Resilience principle 3: Manage slow variables and feedbacks
P4	Resilience principle 4: Foster complex adaptive systems thinking
P5	Resilience principle 5: Encourage learning
P6	Resilience principle 6: Broaden participation
P7	Resilience principle 7: Promote polycentric governance
E	Phase 1: Exploring
M	Phase 1: Marketing
C	Phase 2: Contact
P	Phase 3: Process
I2	Phase 4: Internalization
O	Phase 4: Optimization
V	Institutional dimension 1: Variety
L	Institutional dimension 2: Learning
BH	Institutional dimension 3: Behaviour
LS	Institutional dimension 4: Leadership
R	Institutional dimension 5: Resources
FG	Institutional dimension 6: Fair governance
S1	Size of the city
S2	Sea level of the city
D	Demography of age levels
W	Wealth
I3	Infrastructure (water)



Final coding scheme

Interview	Mechanisms		Question	
1.	0. Other		0. No	G KT A1 IP CR
	1. Phase 1	G E M		
	2. Phase 2	G C A MT ST SU RE	1. Yes	G KT A1 IP CR
	3. Phase 3	G B-L I-L GO-L B-G I-G GO-G		
	4. Phase 4	I1 R		

Coding scheme acronyms and symbols	
G	General
E	Exploring
M	Marketing
C	Strategic program: Needs of the community
A	Strategic program: Connection for different actors
MT	Strategic program: Clear and defined metrics
ST	Strategic program: Broadly owned by stakeholders
SU	Strategic program: Broader sustainability agenda
RE	Strategic program: Reviewed for reflection
B	Businesses
GO	Government
I	Institutions
-L	Local actors
-G	Global actors
D1	Institutional dimension 1: Variety
D2	Institutional dimension 2: Learning
D3	Institutional dimension 3: Behaviour
D4	Institutional dimension 4: Leadership
D5	Institutional dimension 5: Resources
D6	Institutional dimension 6: Fair governance
I1	Internalization
R	Robustness
KT	Sub question: Mechanisms knowledge transfer
A1	Sub question: Involvement actors
IP	Sub question: Institutional proximity
CR	Sub question: Concept resilience



C. Interview analysis

For me resilience is the ability or the capacity to understand shock or sudden changes. And maybe not only sudden changes.	1.0.1CR
The problem for me is that I only know it from the theoretical point of view and mostly ecology. So recently I am trying to get to know more about Resilience from institutions. And how they deal with change.	1.2A.1CR
Ecosystems are degrading, water systems are degrading and now you see that institutions and people see that we need to do something about it.	1.1G.1KT
An adaptive system that changes all the time. There is a point where it really changes to another system. So how much a system can take its propriety and characteristics before it goes to another stage. And ones it gets irreversible it takes something like 10 years.	2.0.1CR
For me the different components are... let all the different interactions of ecological, economic and social work at the same time and place.	2.0.1CR
I am thinking about a list of all the different things I can mention. I think one thing that is very important is knowledge about the physical, biophysical systems. Some systems are more resilient to certain aspects. So that knowledge is very important.	1.1G.1KT
And people, they create pressure. Awareness of the problem is also very important. If that is not there than it is very difficult to do something.	1.2ST.1KT 1.2C.1KT
And it is a lot about joint learning. They need to cooperate. Willingness to cooperate between different actors.	1.3(G)D2.1IP 1.3(G)D2.1KT
From a social point of view, I think the key point is equity. To look at different places. Looking at places where people use different resources.	2.3(G)D5.1IP
At a small scale I would say: personal interest. And the world needs to become more interactive. I think: we are all inhabitants of this world, so we need to cooperate with everyone and not only focus on our own. And we need to work together with the decision makers and connect with the communities. But it start with a personal interest.	2.1G.1KT 2.2C.1KT 2.2ST.1KT
The organization I work for its mandate is help to build capacity in other organizations. So we are supposed to do this, however it will not start without personal interest	1.1G.1KT
Collaboration also often starts because you are already working with an organizations and they start to work with another one etc. Automatically when you start collaborating with one organization, you will collaborate with more.	1.1G.0KT
Another important driver are donors. They require us to show impact. We need to show our impact with the funds. Impact on policies or people etc. All the time we are looking for funds and therefore also at our target groups and how they are going to benefit and which policies etc. So in that we are also forced to work together with some people.	1.1G.0KT 1.1G.0A
I generally work with people from the environmental and health sector and from there you go to the other sectors. It is mandate to get this specific national benefits to get support of the government.	2.2A.1A 2.2ST.1A 2.2SU.1A
I also work together with communities. For long term it is important to work together with the local people. The only problem is that it takes time.	2.2C.1A 2.2ST.1A
We do it in different ways in different projects. Mostly we do workshops with stakeholders, to ask them what they need and what their priorities are. Also already in the proposal phase.	1.2ST.1KT 1.2A.1KT
However, I have been in situations where the stakeholders are sitting back and asking why are we not doing this or having done that. Then I always think about were the line is for a researcher and were the responsibility starts of the stakeholders. If stakeholders need that information, than they are also responsible to absorb that information and implement it.	1.2MT.1KT
And the idea is that we work directly with city governments, and the idea is that we provide certain tools to help the city government look at resilience.	3.2MT.1KT 3.2MT.1A



The other thing we do is we help with strategy partners (is what we call them) but essentially they are consulting to provide some kind of guidance to the resilience office of the city to be able to develop at least two phases of work, a phase 1 and 2.	3.1G.1KT
And the third thing we are doing is, we are looking at engaging the private sector and private sector partners, so we call them platform partners but essentially we have a bunch of agreements with the private sector but also academia and NGOs that provide certain services towards cities. So they provide these services because they are in the network, so it could be for example acasees is in the network, Deltares, MIT.	3.1G.1KT 3.1G.1A 3.2G.1KT
It depends on uuhh.. basically there is a stage one where they look at some useful tools, some resilience assessment tools, to be able to determent, perhaps 3 to 5 areas that they want to down further into, so we call them discovery areas, so for the city that works more on air quality issues etc.	3.1G.1KT
Sorry I needed to add that the fourth component of our work is the network in itself. So the facilitation of learning and opportunities for different scenarios to come together and work together.	3.0.1KT
I think that we were interested in working across the different regions of the world. We were interested in working in different side cities and in different kind of structures and with facing different kinds of risks. So I think there is a compliance between city leadership and their interest and their ability to be a good partner with us.	3.0.1KT 3.1G.1KT
(political agenda)I think in some cities yes. And I am probably hard press this moment to provide specific examples, but yes I think we see one institutionalization that's in certain offices. So the city exactly building an resilience office into their governmental structure.	3.1G.1KT
Well there are definitely a lot of different organisations with different definitions of resilience. I think that is certainly an issue. There was some meetings where different organisations came together to discuss the definition of resilience. So yes I wouldn't disagree with that there are definitely different definitions out there.	3.2MT.1CR
Yes we see them definitely engage in different forms. The Resilience Garage was one way. But part of the phase one methodology is stakeholder engagement, so there is.. indicates Mexico City there was definitely a lot of round table discussions, different actors who were invited from different governments sectors while from the private sector from NGOs and civil society tend around specific scenes. Sometimes in groups together of different areas of the government.	3.2ST.1A
So that was definitely more workshop than round tables but other cities have done surveys, around perceptions, semi-structured interviews. So they definitely looked at it from different ways.	3.2ST.1A
During phase 1 is a time were the resilience office looks at different tools to do an assessment of resilience and they develop a plan. After what we call phase 1.	3.1G.1KT
And then that plan assessment allow them to lay out three, four or five areas that they are interested in exploring more in depth and so that is what phase two is about, it is exploring different areas of resilience in more depth. So again, that could be looking at water and social cohesion. For example Mexico City resilience assessment is public so you could have probably look to better understand what those discovery areas look like. Or those areas where they delve into further during phase 2.	3.1G.1KT
So it is not necessarily that they are going to build initiatives together that they would execute. So a lot of it is learned in collaboration.	3.0.1KT
The idea was that 9 chief resilience officers around the world along with key city staff attended an exchange in X to look at water issues so all the people who were there had water issues in their city and were interested in exploring and it was an opportunity to exchange across the network. So there was some learning from that.. I can probably share that document with you.	3.3(GO-G)D1.1A
Resilience involves the recover capacity of a system after a major change. In the case	4.0.0CR



of water management it means the ability of the resource be available to the population for a long time	
The most important thing is to recognize first that the water resource is not renewable and scarce	4.1G.1KT
We are currently working on a project for exchanging experiences on the management of water resources under climate change, Chile - Mexico, to publicize successful community experiences for the efficient use of water	4.2C.1KT 4.4I.1KT
In the case of Mexico City a serious situation is that comes water from other localities and people who live there are left without water. It is a very costly process economical and environmentally	4.1G.1KT
People should understand that the water they use and wasted is necessary for other people	4.2C.1KT
All the people are responsible for the use of water, also the government	4.2A.1KT
Environmental education is necessary in all levels: schools, communication media and public spaces to communicate people about the environmental cost of water	4.2C.1KT 4.2MT.1KT
The governmental institutions have the responsibility of management of water, however in many cases is most important the economical interest instead the environmental	4.1G.1KT
To ensure the water resources in quality and quantity for all the people, now and for the future generations	4.1G.1KT
In Mexico city there is the SACMEX, Sistema de Agua de la Ciudad de México, Water System of Mexico City that operates the water distribution in the city	4.0.0A
To share successful experiences in capturing rainwater, knowledge of how they have done in other places is shared so that people can replicate the example.	4.1M.1KT 4.2ST.1KT
Some organizations teach in different communities the use of Eco technologies like capture of rain water	4.2C.1KT
I think it depends, because sometimes if you adapt to the new situation it doesn't mean that that situation is better than the one before. I think there need to be like a close observation of the situation that disturbs the order and depending on that you can decide whether it is better to adapt to the new state or to return to the state before.	5.2G.0CR
One of the key things is that each organization recognize their strengths and their weaknesses. And when you understand which are your weaknesses than you are equal that you understand that you need help on those weaknesses. So that's the way how they can be really flexible	5.1E.1KT
Definitely SACMEX, that's the most important one character. And then the academy and the institute of engineering, they have a lot to do and a lot to say.	5.2A.1A 5.2ST.1A
And the people, they don't have a lot to do when they should have to be more involved. The thing with it is that they know or in their heads, the society understand that the government has o bring them water and sewage. And that's it. As long as they have it, it is ok. They don't understand that there are other ways of participating. And how active they can be, and how much they could help in other ways of managing water. So I think there is a very important gap in which there can build a lot of incidents from the water management and strategies. It is a good target to make society become more involved in this understanding in how water can be managed.	5.2C.1KT
And then when you go to the government, you need to be very well prepared and to understand that your project at least in the staging, which we are in Mexico City, cannot cancel how the system works, how the water system works, but it has to be a parallel solution.	5.2A.1A
I think that the first thing is socially, that the people get a benefits. Because the really big problem is that people don't have water and they have floods. People are suffering from water scarcity and floods. So that's the first thing we put forward. And the last thing and that is something they haven't even talked about is, is financially.	5.2C.1KT
Oh and also, the scale is very important. The scale of the project. Because we have	5.2MT.1A



worked in several scales and we noticed that large scale projects.. the city is not prepared for those projects. They still don't understand that this kind of water management solutions work or not. So whatever we bring is like really nihil, nobody has done it before and they are going to try if it works. So when you bring a very large scale project they will say no definitely. Due to the risk. And that is probably why they haven't talked about the financial part, even though it is important but they know that in some way they will be able to cover the costs.	5.0.1KT
Up to now we have 12 workshops with the community, with them bringing the problems first and their solutions. And now we are incorporating all these proposals into our solution.	5.2C.1A
We have a strategy for that. What we are doing is, we are trying to establish a committee that will be depend the project. So we call people from the academy, and like important leaders and personalities and we are going to invite them to make part of this committee for keeping this project alive for years to come.	5.2A.1A 5.2ST.1A
The interesting thing is how you take the situation and who you ask for advice and also local experts, which is really important and then it leads to a kind of project. I think that was a really good way of approaching. And then the proposal is from inside and outside.	5.2A.1A 5.ST.1A 5.2C.1A
Also the thing is that, or at least the important the thing is, somehow indicated authority, because sometimes they think there is no expertise in Mexico and that we are ignored. And they don't see that, but of course there is a lot of expertise in Mexico.	5.2A.1A 5.ST.1A 5.2C.1A
Well.. I have my own interpretation. Super broad. But I think that resilience to me and to my close colleagues is a conceptual framework to detonate public works and to rebuild and reimagining the city. Visa vise for reality, for climate change. Let's put it simple, it is a excuse to rebuild the city and to get going the mechanism the city has to rebuild itself in preparation for unforeseen events. It is in a way, we don't have to wait for these catastrophes to occur, we can work on the city to at least mitigate the impact of disasters. But to me it is more of an excuse or a conceptual framework to get going to get the machinery of the city going and rebuilding itself.	6.0.1CR
But I do think increasingly it will become part of a political agenda.(...) I think it is in the political agenda. It is still a very new concept and many people are still not aware of what it means, but Mexico City is doing an effort even though it is a small one.	6.0.1CR
Maybe there is a question we need to ask ourselves in terms of can public spaces become a sort of safe point when disasters happen and at least here in Mexico City we have two major urban vulnerabilities, one is earthquakes and the second one is water.	6.0.0
So I just went to their website, because my coordinator wanted a water park. But given that vulnerability in terms of water in Mexico City I thought that it would be interesting to integrate water but in a more responsible manner. So that's when I restarted with a research and that is why I was asking my colleague about kind of project mixed water management or responsible use of water on spaces and one of them pointed me to De Urbanisten. So I presented them to coordinator and she said, 'Oh perfect I have some good contacts at the Embassy, why don't you contact them and let's if we can make the link through the Embassy', and that is how we did it.	6.1E.1KT
It's been fantastic. I think it is been incredible. It is been a way in which we have learned that we have more in common to The Netherlands than other countries, for example Spain, in terms of geologic and hydrologic conditions. Even though we are more than 2000 meters above sea level and this was a lake, we are not a country like the Netherlands, we are not besides the ocean. But at the same time we suffer from the same stresses, which are subsidence and floods. So we share those experiences even though geographic positions are very different we can still learn from each other. So that was an interesting exploration, but of course it is just the beginning and we also need to explore what other cities are doing and that is a good thing from the resilience program. It is a platform of exchange.	6.2G.1KT



So you know.. we need to first inform all these government agencies but at the same time we need to approach communities and we need to make sure to incorporate them into the design of the space. So in the end we learned that we design a process more than a just a public space project or an architectural project. We end up designing a process that begins with this very administrative part of informing these government agencies and then getting in touch with local communities and then making sure to listen to them and incorporate their knowledge of the space and translate those into what we as a designers think is the best design solution.	6.2ST.1KT
SACMEX of course, they were involved from the very beginning and they were very supportive of this project. Although at the beginning it was hard, especially at the beginning with the coordinator. (...) And of course UNAM and the Resilience office in this exploration. Of course, the Dutch Embassy. Basically, they are the actors involved in that water research.	6.2A.1A1
I think it is crucial that institutions learn to collaborate with and open up these processes also with civil society. Basically, open it up to people and designers to come up with ideas and visualizations of the city. I think instantly that the role of institutions should be to encourage such participations. Perhaps it is not entirely up to institutions to come up with these visions. It is for institutions to collaborate not only with civil society but also with other cities and what cities have been learning. And in a way the city needs to become an orchestrator of such participations. And then the real challenge is to condense all those experience into something a legacy document that can be used by future participants.	6.3(I-G)D1.1IP
In terms of, I don't want to say failure, but things that needs attention, is precisely that like how can such a global initiative can then be down size them, operate them at the local level and with the reality with each city and the particularities of each state. (...) it is totally important to exchange information and knowledge although it is also critical taking into account the particularities of each city. Even though the resilience initiative is of course a very remarkable international initiative some people still think that it is still lacking that precisely that adaptation layer. So that the strategies make sense in each city. So it is a real challenge for the resilience strategy, to really come up with a toolkit that is really adaptable to the realities of each place.	6.4R.1CR
From rich countries to poor countries do not translate immediately. Because we have a very different political and cultural.. we are in different stages.	7.2G.1IP
So when I spoke, they invited me because we are very corrupt just like you. And they were very happy to hear that because that is an understanding. So you can put actions to over think that.	7.2G.1IP
And I know that due to the Second World War they were very poor. However, when they come they don't talk about how they were poor. They talk about how they are now the riches countries of the world. And we see that you are the richest countries of the world.	7.2G.1IP
When the Netherlands come.. they are very small and we have a lot of mountains. And then you get a lot of butts. And it is not that it can't be done. It is just that it is so far away.	7.2G.1IP
I am also involved in water and mining. So we are also working on cross-over themes. For as water, you can link with other sectors. Therefore makes the strength of your approach. Water also gives an influence on the earth and the cultural sector. It also has an effect on the energy, on the mining industry and in the food and drinking water. So we try to make some kind of link with different sectors. And we look also to the needs of sectors to use their water better.	8.1M.1KT
We are more in precompetatief phase for the sector and country where opportunities lie and which countries focus countries of the government. (...) In these countries, means so to be able to develop activities for the sector to these markets enter. And that is our role, so we are trying to develop these pre-competitive activities for the sectors, such as missions, conferences, workshops. All activities necessary to create that platform, to create the platform for the sectors. To jump to	8.2C.1KT



these markets. To the profession is going to perform. We make it easier for the sector to increase the opportunities there. (...) We will help the parties to make their chances further insight. (...) What do you want to organize the people. we should do a visibility study, we need to do a reconnaissance .. And then we put together to discuss local network what can be done further. And if it is a concrete project, it stops our role.	
In 2014 a Mexican organisation explored options for a project on sustainable water use & public space. First meeting February 2015 between the Dutch Embassy and Mexico. First meeting December 2015 between Mexico City and Rotterdam Water workshop in February 2016 for creating a shared vision. Making a report of the water workshop. Change of director in April 2016 → setback Phase 2. Currently: Local leader pushing new director for continuing the project. Report was finished in June 2016 that will show the importance and help convincing the new director. The Dutch Embassy will meet with the new director to convince the director of the importance of the involvement of Rotterdam	9.0.0
A Mexican government organisation is a combination of technical and governmental departments. For example, SACMEX is the water organisation in Mexico City that contains governmental and technical knowledge. SACMEX, therefore, is almost independent and as a result more powerful and does not share its knowledge and expertise easily.	9.3(G-L).1IP
The fickleness of Mexican government / politics. (..) And also has to do with (especially when it comes to municipal cooperation), you have to deal with the fact that .. until 2018 because the law is changed .. the mayor and their team (because every mayor has his own team), but three years in power. (...) This means that every three years, a huge loss of knowledge because then there will be again a new mayor with new priorities where there is not a long-term real find in place and often there are often radically disrupted by the new administration on new municipal administration, radical break with the previous municipal administration whether it be of the same or any other party. So that's a pain in the Mexican context.	10.3(I-L).1IP



D. Logbook

Observation Number	Date	Activity	Observation
1	2 nd of February – 5 th of February	Water workshop AEP	<ol style="list-style-type: none"> 1. Actors of K,B & G of both countries were present on the first day 2. After presentations in the morning of the first day, all actors left except for the Dutch parties and AEP the organizer of the workshop 3. Pictures help for a better understanding of situations 4. Dutch counterparts were trying to understand the situation of Mexico City in this week 5. To structure the information and to set up solutions, they used simple cut and paste work. 6. The Climate Adaptation App (CAPP) was a useful toll 7. Primary focus Mexicans: streets/urban than green 8. Conclusions: <ul style="list-style-type: none"> - knowledge and designers are present in Mexico - projects mostly fail due to a lack of making it concrete - partnerships are not solid - government do not always want to collaborate due to ego - most parties were not present during the workshop after the presentations on the first day → The Dutch needed to 'solve' it and prove themselves to the Mexicans
2	February	Brain storm meetings Holland Branding at the Embassy	<ol style="list-style-type: none"> 1. Focus needs to be on how Mexico can shine, it is not about the Netherlands 2. Search for identity of the Netherlands to fit the Mexican market 3. Identify what drives the Mexican people
3	22 nd of February	Meeting SACMEX, World bank & 100 Resilient Cities for a project in Mexico City	<ol style="list-style-type: none"> 1. Way of presenting is differently: <ul style="list-style-type: none"> - Mexicans more text, Western society more pictures and figures - most people busy with cellphones 2. Focus on the story of the city 3. You need to sell yourself to the other party, even though they approached you to help them
4	3 rd of March – 7 th of March	Holland Branding Interviews	<ol style="list-style-type: none"> 1. Make laws as a framework to work with the government on longer projects 2. Drivers: fear, population & equality, large diversity, health. 3. Image The Netherlands: liberal, bicycles, self-critical, open, wealth & work with fun, justice, equality, tolerant, multicultural, direct & risk avoidance, reliable, honest, value of



			woman, humble, quality, integrated approach 4. Image Mexico: divers & inequality, family focused, young society, large country, title & status are important, hard workers, security as handicap, proud & nationalistic, mistrustful, friendly, indirect & social 5. The laws are good, but they are not guaranteed 6. Progression comes from own initiatives, not from the government
5	21 st of April – 22 nd of April	Resilience Garage	1. A new concept of a Dutch consultant with 100 Resilient Cities 2. A game to understand the concept of Resilience more and to let people collaborate & communicate 3. Conclusion game: - you need to collaborate to survive - time pressure is needed for decisions - a focus is necessary
6	April - May	Developing strategy Holland Branding	1. Brand in themes
