Future-proofing the Sponge City Programme

Improving governance capacity through leadership

使海绵城市面向未来
通过领导提高治理能力

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Photo: satellite image of Chongqing, one of the Sponge City Programme's pilot cities. The Yangtze River (brown water) and Jialing River (blue water) meet at the urban centre. Credit: ESA.

Colophon

天下莫柔弱於水,
而攻堅強者,
莫之能勝
Nothing on earth is as yielding as water,
and yet,
for breaking down the firm and strong,
it has no equal

老子 (Lao Zi), founder of Taoism

Abstract

Sufficient governance capacity is required to be able to alleviate urban flood risk. The Chinese Sponge City Programme (SCP), which aims to address flood risk, experiences governance issues that jeopardize its longevity. In this research, governance efforts in the SCP are assessed through the lens of the Governance Capacity Framework (GCF) to identify supporting and limiting governance conditions in the SCP. The latter are subsequently addressed with governmental actors' leadership functions, which are able to make changes by utilizing their influential power on the decision-making process and thereby improve governance capacity of the programme. Capacity was found to perform well with topics concerning strong-willed and decisive control through authority, while topics about decentralization and participation were found to be relatively limiting. The most urgent matter to improve is the attraction of currently underdeveloped private-public partnerships (PPPs).

Within the top-down Chinese planning context, making changes needs to come from the highest government levels: actors who are best suited to improve governance capacity in the SCP are at the ministerial level. In particular, utilizing their leadership functions that can increase engagement between sectors and stakeholders are crucial to improve governance capacity. Still, the municipal level deserves special attention: it is the level at which the SCP is implemented. When municipalities are enabled by higher levels of government to hold a larger extent of discretionary power, they can make better use of their leadership functions. This would be beneficial to the SCP, as the municipal level has the ability to increase local engagement.

Keywords: Sponge City Programme, governance capacity, leadership, flood risk management, China

Preface

I have written this thesis to conclude my Spatial Planning master programme at Radboud University. It has always interested me how humans adapt to their surroundings. In the Netherlands, where I grew up, water has always been a vital part of history and has shaped our identity due to our geographical traits. We fought against water to such an extent that it has become part of our cultural heritage. We've had historical losses due to flooding and the battle is ongoing, although now, learning to live with water has become more prominent instead of just fighting it.

Another interest of mine, or call it an obsession, is China. From its rich history and ancient culture to its interesting modern-day society, the country feels like a rough diamond that is taking the world by storm. Learning the Chinese language has taught me much about the Chinese, as every single written character has meaning behind it that makes sense within the cultural context. Both the Dutch and Chinese have had long traditions of managing water and it is no surprise the two countries tend to look at each other in that regard. Living with water, even in urbanized areas, is increasingly becoming the norm for both. Working together to adapt our cities to flood risk is something I hope to contribute to in my career after finishing my studies. Diving into governance specifics of the Chinese Sponge City Programme from my Dutch point of view was therefore a welcome opportunity for this research, and the 'Cities, Water and Climate Change' specialisation provided the perfect foundation to do so.

I would like to express my gratitude to some people that have been significant to me in this period of writing, which was admittedly rough at times because of the pandemic. First my mother, Karin, who has always been supportive (and patient!) during my years of studying. The same applies to Laura, my girlfriend, who can reduce stress with a single smile. My father, Gary, who is unfortunately no longer with us but has often been in my thoughts while writing this thesis, as I know exactly which encouraging words he would have said to me. And of course, my supervisor, Erwin: besides the useful feedback he provided and the time he took during our meetings, the conversations we had were simply very enjoyable and expressed with a genuine interest. Thank you all, and I hope you will enjoy reading my thesis.

List of abbreviations

ADB	-	Asian Development Bank
CCP	-	Chinese Communist Party
CDB	-	Chinese Development Bank
CLT	-	Complexity Leadership Theory
DEV	-	Developers
DFID	-	Department for International Development
EXCOM	-	Executive Companies
GCF	-	Governance Capacity Framework
GDP	-	Gross Domestic Product
IIM	-	Importance-Influence Matrix
INV	-	Investors
IWRM	-	Integrated Water Resources Management
LFF	-	Leadership Functions Framework
LID	-	Low Impact Development
MOF	-	Ministry of Finance
MOHURD	-	Ministry of Housing and Urban-Rural Development
MUN	-	Municipalities
MWR	-	Ministry of Water Resources
NBS	-	Nature-based solutions
NDRC	-	National Development and Reform Commission
OECD	-	Organisation for Economic Co-operation and Development
P1, P2, P3	-	Participant 1, 2, 3 (interviewees)
PROV	-	Provinces
RES	-	Residents
RMB	-	Renminbi
SC	-	State Council
SCP	-	Sponge City Programme
SDG	-	Sustainable Development Goals
UNDP	-	United Nations Development Programme
UNFCC	-	United Nations Framework Convention on Climate Change
WEF	-	World Economic Forum

List of figures and tables

Figures

(For tables, see next page)

Tables

Contents

Research design

Introduction, literature review and methods

Photo: walkway bridge over Minghu Wetland Park, Liupanshui city (Turenscape).

Introduction

"Make the mountain bow its head. Make the river yield its way."

In 1958, with these words, chairman Mao Zedong made clear he pursued forcing nature into obedience by the human will. In the decades that followed, China's answer to its rowdy rivers was to attempt to keep them under control with man-made structures such as dams, canals and levees (Chen et al, 2020). Fast forward to the 21st century: China's natural floodplains are increasingly being encroached and built up with ever-growing urban territories due to rapid urbanization (Qi et al, 2021). With less room for water to escape, flooding in Chinese cities has increasingly become a threat to human lives and assets. As recent as July 2021, in Henan province, floodwater swept the city of Zhengzhou: a cloudburst containing a year's worth of rain swept the city in only three days (Barrett, 2021), resulting in over 300 deaths. The mindset to solve such problems has shifted strongly since Mao Zedong's words in 1958, with 'nature-based solutions' (NBS) becoming increasingly important in Chinese urban planning to combat water issues. A noticeable shift in the change of course that the Chinese Communist Party (CCP) has taken regarding human influence on nature is their goal of an 'ecological civilization'. The CCP acknowledged that China's former growth model of *"inefficient and blind development"* (Wang-Kaeding, 2018) needed to change and thus added the term 'ecological civilization' to their constitution and overall development plan in 2012, where it emphasized integration into economic, political, cultural and social development. The term 'ecological civilization' quickly became a buzzword after president Xi Jinping used it on multiple formal occasions and at its core it encompasses the restoration of *"harmonious development between man and nature"* (Lin, 2021; Xiang-Chao, 2018). This line of thought eventually resulted in the Sponge City Programme (SCP) pilot initiative, which aspires sustainable water governance for Chinese cities to combat flooding.

1.1. The Sponge City Programme

The SCP is an urban planning concept initiative by the Chinese government that does not seek to make the river yield its way as was Mao's ambition, but to instead give

water room to flow and create green space to absorb floodwater, thus attempting to imitate natural hydrological and ecological processes (Liu et al, 2017; Barrett, 2021). In practice, this is done through implementing sponge city infrastructure such as permeable pavements and retention ponds in Chinese cities (figure 1). As of 2021, the Chinese government has spent over €12 billion on such infrastructure. By 2030, the goal is to have 80% of Chinese urban areas be able to absorb at least 70% of rainwater to prevent flash floods and riverine floods. The SCP's head architect, Kongjian Yu, stated the following which makes it apparent that the SCP attempts to solve flooding issues in a drastically different way:

"We thought we could use concrete to channelize a river. We thought we could use dykes to protect cities from being flooded. We were wrong. Floods are not our enemies; we can become friends with water. We must revive ancient wisdom to create a harmonious relationship between nature and man; between water and the city." (Kongjian Yu, WE Forum, 2019).
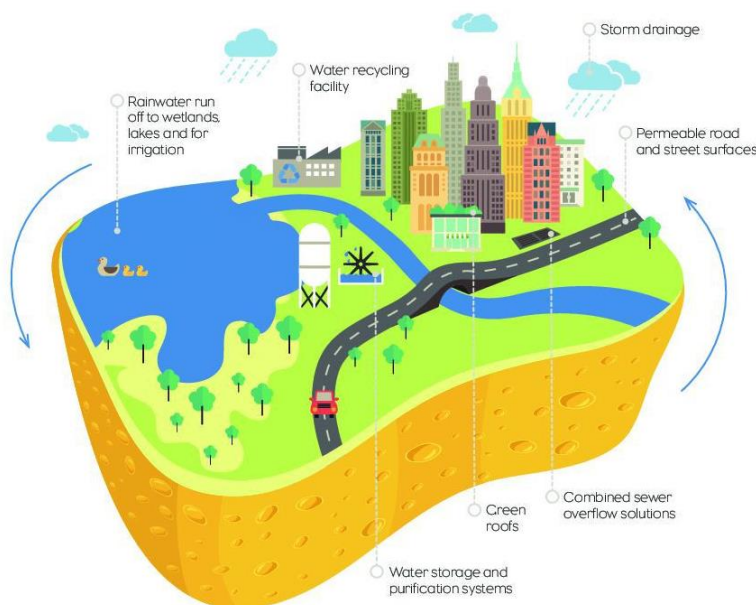
Figure 1: sketch of a sponge city with several nature-based solutions to deal with urban water related issues (Pattinson, 2016).

Besides having brought forth the idea of sponge cities, Kongjian Yu leads the Turenscape landscape design bureau, which is often hired by municipalities to design sponge city projects to blend in with their natural landscape. He defines his work as *"the art of survival"*, which accentuates thinking globally but acting locally (Daroy, 2018). Yu's thoughts about the connection between nature and man can be seen in the

name 'Turenscape' as well: 'tu' (土) is the Chinese word for 'earth' and 'ren' (人) means 'people'. A typical example of one of their SCP projects can be seen in figure 2 below.

Figure 2: Yanweizhou Wetland Park, Jinhua city. Part of the SCP, designed by Turenscape. The photo on the left is during the dry season, the photo on the right is during the monsoon season. The park allows the river to naturally flood when necessary. The elevated bridge remains accessible in any circumstances (Turenscape, n.d.).

The SCP was designed in 2013 and initiated in 2015 by the Ministries of 'Housing and Urban-Rural Development', 'Financing', and 'Water Resources', when several pilot projects were coordinated across the country with the support of national policies. According to Francesch-Huidobro et al (2015), the SCP is the first ever policy to address exactly who is in charge of flood risk management in China. It follows a top-down process: national authorities such as the ministries behind the SCP come up with principles and guidelines, after which provincial and local departments operationalize into their respective areas (Galderisi & Colucci), 2018). This operationalization is met with both a sense of freedom and restrictions: provinces and municipalities have the freedom to add modifications when implementing the SCP to serve their specific context, as long as they abide by *'Technical Guidelines for the Construction of Sponge Cities'* (Zhang et al, 2017).

Political pressure from above to integrate SCP plans is significant, but so is the financial incentive: pilot sponge cities receive a yearly amount of around CN¥500 million (€65 million) of funding (Dai et al, 2017). Currently, a discussion is ongoing if it is worth to maintain the SCP in this form, due to matters such as cost efficiency and other governance capacity issues (Sidner, 2018). It is normal for a pilot programme to come across various types of issues, since it's a form of experiment. The question is whether these are solvable. In this research, the SCP's governance capacity will be assessed and subsequently addressed with leadership functions to estimate the pilot's potential to scale up towards a long-term national policy.

1.2. Problem statement, research aim and scope

Governance capacity is required to enable effective change and continuously solve urban water governance challenges (Koop et al, 2017). The SCP shows governance weaknesses: lack of funding, limited stakeholder participation and lack of equity and transparency. SCP governance limitations are typical for Chinese government-initiated programs: it is centrally organized to such a degree that implemented projects lack localized governance (Yawen et al, 2019), there is no clear organization to coordinate different actors across sectors (Qi et al, 2021) and stakeholders 'at the bottom of the food chain' such as citizens have little or no opportunity to influence planning processes (Ehnert et al, 2018). The Chinese urban planning system is arranged to be as fast and effective as possible, with top-down structures keeping national government actors in control. While such strategies definitely have their benefits to implement plans quickly on the short-term, low participation from anything but the national government limits long-term longevity. For example, SCP funding issues have arisen since national government subsidies alone have proven to be insufficient (Qi et al, 2021). The SCP can thus be seen as a representative case study of Chinese governmental top-down planning processes.

However, even with its governance issues and conventional planning character, the SCP is a remarkable and ambitious programme that takes an important step in the right direction: it shakes up conventional urban planning methods, it makes China rethink what urban environments need to look like and shifts towards a focus on sustainability. During these times of climate change-induced increased urban flooding, such a programme is simply a necessity and must be encouraged. These are all reasons why this topic has been chosen for this research: it would be a shame if the SCP would be halted in its potential, or even cease to being used, due to governance limitations. This research aims to identify and understand both supporting and limiting governance capacity conditions found in the SCP, as well as how to address them through leadership functions in order to potentially improve those conditions. To accomplish this aim, this research will focus on the following elements:

1) Provide an institutional context of the SCP, since the programme affects and is influenced by different actors and stakeholders;

2) Utilize the Governance Capacity Framework (GCF) to identify supporting and limiting conditions present in the SCP, in order to find pathways where the programme can improve its capacity to enable effective change;

3) Identify leadership functions that are present in the SCP whom are able to follow those pathways to improved governance capacity, since such leaders hold the power to shape governance of the programme.

Since the spotlight is aimed at governance of the SCP, the scope of this research will encompass themes of governance only: effectiveness of the SCP regarding its ability to reduce flooding, technical evaluations of the programme or engineering-oriented performance assessments will not be addressed. For such studies, see for example Hu et al (2018), Zhou et al (2018) and Leng et al (2019).

1.3. Relevance

Societal relevance most noticeably lies in the impacts of urbanization and climate change on urban water management, in this case the increased flood risk in Chinese cities. According to Köster (2021), when not properly addressed, these impacts become a greater burden on Chinese society, both in terms of lives and assets. Further development of nature-based solutions is needed to combat future flooding issues. Moreover, if the SCP is successful, a snowball effect can occur: more Chinese cities can adopt SCP policies, or other countries could follow its example. The question if governance capacity of the SCP can be improved is therefore relevant for Chinese society and possibly other societies, as is analysing how this governance capacity can improve through leadership. Successful governance of the SCP could turn the programme into a long-term national policy, which can improve the lives of millions of Chinese citizens. Assessment of its governance capacity can create understanding of limitations and underlying processes, as well as shape interactions between actors and stakeholders (Koop et al, 2017). Addressing supporting and limiting governance conditions of this programme is important since policy actions can become ineffective due to governance gaps (Biesbroek et al, 2013; Eisenack et al, 2014).

Regarding scientific relevance, research has already been done and is still ongoing on how well sponge city infrastructure performs at a technical level. However, since the

first sponge city projects were implemented around 2015, questions and criticism surrounding the project have become more prevalent. Examples of these criticisms revolve around financial viability, equity, transparency and inclusiveness. Moreover, studies have shown (Bach et al, 2014; Barron et al, 2017) that research from various disciplinary approaches is needed for successful flood risk management. As for research into the SCP specifically, research is most common within the fields of engineering and ecology (Li et al, 2018) but a larger diversity of disciplines is already noticeable.

This research will provide insight from the discipline of spatial planning with a governance-focused scope to add towards integrated trans-disciplinary scientific information on the SCP. According to Koop et al (2017), more integrated approaches to urban water governance are needed since the ones available tend to be focused on technical aspects with not enough regard to governance processes. Assessing governance capacity fills that gap in the case of the SCP. They also argue that so far in literature, little effort has been put into consistently assessing urban water governance capacity, even though cities are increasingly recognized as crucial to addressing climate-related issues. Moreover, Meijerink & Stiller (2013) argue that leadership has been relatively neglected within climate adaptation literature. Including leadership as a means to address governance capacity of climate adaptation adds to that gap. Lastly, it is noteworthy that these research frameworks are about addressing Chinese-style governance with western-style research methods, possibly leading to new insights.

Lastly, for both societal and scientific relevance applies the following: the field of urban water governance is dynamic due to continuously changing circumstances, making newer research generally more relevant as time goes by.

1.4. Research questions

An overarching project that is coordinated top-down across sectors such as the SCP comes with governance capacity challenges. To be able to grow from a pilot programme to a national policy, its governance capacity must be sufficient to enable effective change. In this research, these governance capacity challenges will be identified with the Governance Capacity Framework (GCF) (Koop et al, 2017).

Moreover, improving governance conditions can potentially be carried out by various types of leaders with governing power. Thus, identified supporting and limiting governance conditions will be addressed with the Leadership Functions Framework (LFF) (Meijerink & Stiller, 2013). The following **main question** is formed:

MQ. To what extent is governance capacity of the Sponge City Programme capable of managing flood risk and how can leadership make a difference?

First, an overview is made of how the SCP is arranged. The institutional context such as involved actors and stakeholders surrounding the programme are analysed and mapped. Moreover, relevant regulatory frameworks such as laws and regulations will be discussed. This overview will serve as a base for the rest of this research, since the SCP operates within these mechanisms of governance. Moreover, since leadership is prevalent in a hierarchical programme such as the SCP, leadership functions are examined and categorized as follows by use of the leadership functions framework by Meijerink & Stiller (2013): *political-administrative, connective, adaptive, enabling* and *dissemination* (see §2.10.1. and §3.1.). Identifying these leadership functions in the SCP will serve as a base to address the programme's governance capacity. The **first subquestion** will look into those matters:

SQ1. What is the institutional context and leadership structure of the Sponge City programme?

Second, governance capacity of the SCP will be assessed with the Governance Capacity Framework by Koop et al (2017) through three separate dimensions: *knowing, wanting* and *enabling*. Each dimension will have various governance conditions and indicators to create a score. The goal is to create an integrated, empirical understanding of governance conditions that determine the capacity which is needed to enable the SCP goals. By using this framework, supporting and limiting governance conditions can be identified with five-step Likert scores ranging from -- (very limiting) to ++ (very supporting). The **second subquestion** will address this part of the research:

SQ2. How does the Sponge City Programme's governance capacity perform?

Third and final, leadership functions will be used to address supporting and limiting governance capacity conditions that have been identified, since those leadership positions hold the power to improve governance conditions. The **third subquestion** supports this section:

SQ3. **To what extent can leadership play a role in improving the Sponge City Programme's governance capacity conditions?**

1.5. Reading guide

See table 1 below for a reading guide that briefly elaborates the contents of each section.

Section	Contents
Introduction	**Research outline** Problem statement, relevance, aim and research questions
Theoretical framework	**Literature review** Relevant theories, concepts, ideas, models and discussions from previous literature
	Conceptual model Visualization of findings from literature combined with research design
Methods	**Research strategy** Plan of approach and operationalization
Analysis	**Institutional and structural background of the SCP** Includes actor and stakeholder analyses, including their level of importance, influence, and leadership functions
Assessment	**Governance capacity** Utilizing the GCF to pinpoint supporting and limiting governance conditions of the SCP
Synthesis	**Leadership linked to governance capacity** Findings from the analysis and assessment linked
Conclusion	**Main research question answered** To what extent is governance capacity of the Sponge City Programme capable of managing flood risk and how can leadership make a difference?
Discussion	**Meaning, importance and relevance of results** Includes reflection, interpretation, limitations and recommendations

Table 1: a reading guide of this research's contents in an overview.

Literature review

In this chapter, relevant theories, ideas, concepts, frameworks and discussions from previous literature will be elaborated. Findings from literature will be visualized into a conceptual model at the end of the chapter to show how this research gives meaning to these findings in its research design.

2.1.   Urbanization

China has lifted an enormous amount of the population out of poverty since the 1980's, approximately 800 million people (Jiang, 2020). This led to a swift rise of the middle class. Spectacular economic growth averaged an almost 10% annual GDP increase, which is accompanied by a rapid urbanization rate: from 20% living in cities in 1980 to over 60% in 2020 (Chen et al, 2019). Experts believe that percentage will rise to approximately 70-75% at the end of the 2050's (Shi et al, 2006; United Nations, 2018). In the last 35 years, more than 40,000 square kilometres of new urban land was created, with the number of cities going up from 193 to 653, making China one of the fastest urbanizing countries in the world (Liu et al, 2018). To meet rising demands for living space, much of China's natural floodplains surrounding urban areas have now been occupied (Yin et al, 2014) with drastic forms of land readjustment: Chinese urban land has multiplied by more than five times since the 1990's (Xu et al, 2016). Exacerbated flooding and urban expansion into floodplains are directly connected (Du et al, 2018).

2.2.   Water and climate change

In the same time period as China's rapid urbanization, climate change has become a more pressing issue due to more severe natural hazards and extreme weather events, such as heavy rain (O'Gorman, 2015). Warming of the atmosphere increases its capacity to hold water, thus impacting the water cycle by accelerating the process of evaporation and redistribution of moisture, often in the form of altered precipitation intensity and patterns (United Nations, n.d.). In China, more frequent extreme rainfall is being reported every year, especially rainfall of short duration but high intensity (Dai, 2017; Li, 2013). This trend is expected to continue for the following decades (Yin

et al, 2014). Cities in particular are vulnerable to the impacts of climate change due to dense population concentrations and valuable infrastructure (Hallegatte & Corfee-Morlot, 2010). Wang & Liu (2020) therefore suggest that Chinese policymakers re-establish harmony with nature, improve their flood risk management and increase governance capacity as a response. This requires significant governance efforts by the Chinese government through environmental programmes. Moreover, in 2015, the UN (United Nations) member states agreed on 17 SDGs (Sustainable Development Goals) to be able to achieve the goals set in the 2030 Agenda for Sustainable Development (UNDP, 2015). Among these are SDGs that are relevant for urban water governance in China, i.e.: *"ensuring availability and sustainable management of water and sanitation for all"* (SDG 6) and *"making cities and human settlements inclusive, safe, resilient and sustainable"* (SDG 11). These SDGs are prominently featured as global and can thus be applied to both developed and developing countries. China is one of the countries that has pledged to implement these SDG's (Jiang, 2020) and the SCP can surely be seen as an effort to contribute towards these goals.

2.3. Urban water issues

Fuelled by the combination of urbanization and climate change, waterlogging has become more and more prevalent in various Chinese cities (Wu et al, 2019; Yin et al, 2014). According to Dai (2017), China is prone to natural disasters, of which water and climate -related disasters are most frequent, such as storms, landslides and floods. Every year, most Chinese administrative regions (e.g., 26 out of 31 regions in 2016) suffer from flooding, causing the loss of human lives and financial assets. There is also no country in the world more exposed to flooding in terms of assets: by the 2070s, $12 trillion is expected to be at risk (Nicholls, 2007). An estimated 1 percent of China's GDP is lost yearly to flooding (Wang & Liu, 2020). More than 640 cities are subject to flooding, with two thirds of the Chinese urban population living in flood prone areas. Inadequate drainage structures are one of the most important causes to urban flooding next to urbanization and climate change: in many Chinese cities, drainage is outdated and can't deal with increased rainfall intensity accordingly (Tai, 2018). Drainage was often designed to deal with an average flooding recurrence interval of less than 50 years (i.e., a one in 50 years chance of flooding). According to Fuldauer (2019), many

Chinese cities disregarded entire natural water systems and filled them with concrete during their development process, while drainage systems were often not a part of new urban planning strategies and could therefore not keep up with above-ground expansion. The average permeability of cities is around 15%, while an unpaved surface area averages more than 90% permeability (Smith and Ward, 1998). This reduced permeability allows for flooding hotspots. Shepard (2016) states that half of China's cities do not meet national standards for flood prevention safety, which is one of the issues that the SCP aims to address. According to Mirza (2003) and Jha et al (2012), poor urban planning, a deficit of flood risk management and lacking adaptation, both structural and non-structural, have contributed to the increase of urban floods in number and severity, while Xue et al (2005) state that many Chinese cities have become extra vulnerable to flooding due to land subsidence. Hydrological conditions have been altered by human activities such as dredging up floodways and excavating sand, consequently hindering rivers' capacity to form a buffer zone for riverine flooding (Zhang et al, 2008). Thus, the two main causes of flooding in Chinese cities are pluvial flooding and riverine flooding which are both intensified through urbanization and climate change-induced extreme weather events.

A large part of the Chinese urban population lives near the coast, lakes and rivers, of which the Yangtze and Yellow River have the largest populations right alongside the river banks. This places many Chinese cities at risk from interrelated flood risks (Liao & Wishart, 2021). Additionally, due to China's 'hukou' household registration system, there is a substantial number of urban citizens without access to facilities as well as services such as flood insurance (Miller & French, 2012), leaving them extra vulnerable. Furthermore, flooding is not the only major water issue facing China's urban areas: over 50% of Chinese cities experience water scarcity and more than 400 cities are reliant on groundwater resources, which too is linked with urbanization and climate change (Sidner, 2017). Even though the SCP most noticeably tries to combat flooding issues, dealing with water scarcity is part of the programme as well: a sponge is able to not only hold water, but to release it as well.

2.4. Climate adaptation with nature-based solutions

To counter urban water issues, climate adaptation strategies need to be implemented (Oulahen et al, 2018). In this research, these strategies will be defined according to the UNFCC (United Nations Framework Convention on Climate Change):

"Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change." (United Nations, 2021).

Because of the growing urban population, climate change adaptation in cities is now a key factor for strategies to minimize flood risk and other water related issues (Shalaby & Aboelnaga, 2017). Governments worldwide have gradually been putting more emphasis on taking better care of the environment with new development concepts such as nature-based solutions (NBS; sometimes also referred to as 'low-impact development' or 'LID').

As for China, awareness of the environment had become a larger talking point to everyday citizens, leading up to more than 800 environmental protests in China between 2010 and 2020 (Shen, 2020). The country has been experiencing a metamorphosis regarding environmental care and urban regeneration (Tai, 2018). Restructuring space has taken a greater role compared to just stimulating growth and has evolved to a national strategy level, with both national regulations and urban planning policies paying greater attention to sustainability in general. With that new way of thought in mind, and due to effects of urbanization and climate change leading to greater flood risk in Chinese cities, the SCP was implemented to combat water issues. Since the SCP tackles these issues by incorporating natural attributes of the environment (green spaces and blue systems such as wetlands) instead of fighting it, it is considered a nature-based solutions programme (Liao & Wishart, 2021). The European Commission considers all 'solutions that are inspired and supported by nature' as nature-based solutions, as long as they benefit biodiversity (European Commission, 2020). Nature-based solutions are thus placed in a continuation of grey-green infrastructure hybrids. Often, existing grey infrastructure (e.g., buildings) are 'greened' (e.g., gardens placed on rooftops). Recovery projects such as the recovery of natural processes are often considered more impactful (Martin, 2021).

Nature-based solutions can thus be placed on a scale ranging from grey, to hybrids of green and grey, and completely green (figure 3).

Figure 3: nature-based solutions from grey to green infrastructure (Naylor et al, 2017).

Generally, nature-based solutions aim to strengthen conservation and preservation of natural landscapes with sustainable design that lowers the impact on an entire ecosystem (Qin et al, 2013).

2.5.   Government, governance and the common good in planning

First, the terms *government* and *governance* will be defined to clarify their usage in this research. This essentially boils down to *structure* versus *process*, respectively. Richardson (2012) describes the shift from government to governance as a shift from a hierarchical structure to interaction in networks. Government refers to an authority that holds the function of governing in the form of control or rule, a structure that works with procedures. See it as a line of formal institutions from top-down to bottom. Governance is a multi-layered network rather than a line, while working with processes (Rosenau & Durfee, 1999) and is broader than government in its definition as well: the word governance is derived from the Greek terms for 'to steer' and 'pilot', referring to the multi-stakeholder process of guiding a society in a certain direction by leadership of the government (Fasenfest, 2010). In short, governance includes a network of government layers, institutions, the private sector, civil society. Under liberal democratic beliefs, leadership of the government would be 'the will of the people', ruling themselves (in)directly. However, according to researchers such as Dimitrov (2014), China is a communist autocracy at heart in its style of governance. Others (e.g., Sigley, 2016; Lo, 2015) call it a hybrid socialist-neoliberal form of

governance that acts authoritarian yet grants its subjects their own autonomy to some degree. This is particularly true for Chinese environmental policy, which is described as top-down and non-participatory, even though the situation 'on the ground' is considered ambiguous, showing both authoritarian and liberal features (Qi et al, 2008). According to Lo (2016), local actors in environmental policy are often not controlled by the national government, and therefore enjoy a relatively large amount of freedom and flexibility despite the authoritarian rule at its core. Dai (2017) agrees that China is organized in a top-down hierarchy where the national government imposes decisions on local governments, which they subsequently are required to implement. When local governments change plans or priorities, this is usually preceded by incentives by the national government in the form of legislation or policy documents. For the SCP, the same conditions apply, starting out as a national government initiative and implemented at local levels.

The OECD mentions that governance is the next issue that the Chinese government needs to address in order to progress on their development path. Since 2003, the OECD and Chinese ministries established their ties and mutual trust with the combined effort in the China Governance Project, which aimed to better understand Chinese governance challenges and to organise meetings to discuss such issues. According to the OECD (2005), good governance is essential for a society to reach its objectives and ensure sustainable development. One of the most used ways to assess quality of governance is the government's capacity to achieve dependable and steady implementation of policy (The World Bank, 2007). According to Wuijts et al (2018), governance approaches are the most effective in dealing with water issues. Takala (2017) adds that shifting towards sustainability needs focused governance to do so, or as Pahl-Wostl (2017) puts it: *"governing the transformation of governance is the key challenge in moving towards more sustainable governance"*. Thus, a strong emphasis on the process of transformation and dynamic potential of governance.

Another way to look at urban governance is to focus on the transformative power of cities that are directed towards the common good. Downing & Thigpen (1993) emphasize the necessity of the common good trumping personal gains. Since Chinese society is collectivist in nature instead of individualistic, opportunities arise to implement policies for the common good in China. Although this collectivist

characteristic of Chinese society is somewhat stereotypical and naturally does not consider all citizens, the core norms and values of collectivism are embedded in Chinese urban planning discourse (Wang, 2020). Arguably, due to the global effects of climate change, the common good has shifted towards a higher level than on a city or nation scale: to the benefit of all humanity or even the planet. Still, Häikiö (2007) argues, such a large cause needs to be addressed at a local level too. Moreover, Næss (2009) adds that while working towards the common good is a noble cause, it may not become the tyranny of the majority. Minority groups in society need to be protected, or the good would not be 'common'. The New Leipzig Charter (2020) provides three principles of to ensure the common good:

1) participation and integration, which is defined as acting in the public interest with services and infrastructure while keeping inclusiveness, affordability, safety and accessibility in mind. For sustainable development, Häikiö (2007) argues that active citizenship and participation in planning processes contribute towards this principle, as it adds a basis for legitimacy and justification for actions that are being taken by decision-makers.

2) multi-level governance, which is about all levels over government taking responsibility and contributing to the common good by tackling complex challenges together. Important aspects of multi-level governance are 'subsidiarity', in which allocation of authority is appointed to the lowest government level that is practical, and 'proportionality', meaning balanced decision-making proportional to an objective can only be fair after thorough assessment and analysis of various interests (Bossdorf, 2021).

3) a place-based approach, meaning the tailoring of spatial development to the needs of a specific area. One way to do so is by using local values as a guiding tool for planning processes. Bradford (2005) states that local knowledge, collaboration between civil society and governments, finding a balance between local and overarching policies, and recognition of local governments as key actors are critical aspects of realising a place-based approach.

Subsequently, the principles of the common good need to be applied to two dimensions of the city according to the New Leipzig Charter (2020):

1) the just city, which is achieved by transforming an area that enables equality of opportunity and environmental justice for all societal groups. Fainstein (2005; 2013)

is one of the most notable urban planners who introduced this concept. She argues that all urban policies should adhere to a normative framework in which equity, democracy and diversity are key responsibilities for decision-makers.

2) the green city, which, as the name implies, revolves around transforming urban environments into climate resilient areas with high regard for the natural ecology in terms of (among others) air, water and soil. Nature-based solutions are typically used towards such goals. Besides increasing resilience to climate change-induced risks, natural urban greenery is integral to both human physical and mental health (Momm-Schult et al, 2013) as well as to flora and fauna (Jim & Chen, 2008). Green city planning is seen as new paradigm by researchers such as Pankaja & Nagendra (2015), which must guide urban environmental planning to a more secure future.

2.6.   Actors and stakeholders in public policy

Understanding stakeholder interests and priorities is essential to find solutions that are widely accepted by decision-makers as well as the communities that are affected by policies (Li et al, 2019). The potential of stakeholder participation to positively influence the outcome of projects is recognized across various disciplinary approaches, including urban planning (O'Donnell et al, 2018). One of the emerging challenges that threaten continued implementation of the SCP is the competing interests of stakeholders and their restraint to make compromises, which hinders financial flow into the SCP (Qi et al, 2020). To overcome this challenge, they suggest stakeholders should participate in planning processes of the SCP and create mutually beneficial collaborative strategies more often, since the programme does not yet include active stakeholder engagement and participation, most noticeably when it comes to local residents. It must be noted that setting up trustful connections in China between governmental, commercial and public stakeholders is extra challenging due to the sheer pace of urban development compared to the west. Possibilities for collaboration between stakeholders are further reduced because of mandatory requirements found in the SCP guidelines, such as the goal of reducing runoff water by a high percentage. Therefore, Qi et al (2020) argue in favour of increased flexibility that allow collaboration on locally agreed SCP development paths. Analyses of stakeholder roles

can improve the project scope. Thus, a thorough stakeholder analysis is recommended to provide specific directives for implementation of projects in the SCP.

2.7. Water governance and IWRM

Water governance is a vast concept and what it means exactly varies from one institution to another. The Water Governance Centre (2013) summarizes it as *"all you need to give water its place in society"*, a rather broad way of looking at it. When zoomed in on this concept, it refers to how water related topics such as flood risk and water resources management are organized, as well as the interactions between all those involved, such as organizations and stakeholders (Havekes et al, 2013). As the OECD is the world's leading organisation in water governance, their definition will be used in this research:

"Water governance is the range of political, institutional and administrative rules, practices and processes (formal and informal) through which decisions are taken and implemented, stakeholders can articulate their interests and have their concerns considered, and decision-makers are held accountable for water management." (OECD, 2015).

Water governance is a fast-expanding field of academic knowledge which has developed a lot in the last 10 to 15 years (Pahl-Wostl, 2017). According to Edelenbos (2012), governing water has traditionally been a technical expertise with old-fashioned hierarchical government approaches. However, according to Lange et al (2013), governing water has evolved into more non-hierarchical variations around the world with horizontal cooperation and participation: from government to governance.

In China, however, a clear hierarchy with a strong government presence does not simply evolve due to the country's firm belief in traditions. According to Wang et al (2017) water management has been handled by the Chinese central government since ancient times and not much has changed regarding the centralized government as the most prominent form of state governance.

Several institutions and researchers have engaged in what defines good water governance. Most noticeably the OECD (2015), which has provided a framework to encourage good practice of water governance at all government levels to be able to facilitate change, when necessary, named 'the principles on water governance'. This

document encourages clearly distinguishing roles and responsibilities, managing water at the appropriate scale, policy coherence across sectors, adapting the governance capacity of authorities to the level that water governance demands, stakeholder engagement and more. It is pointed out that technical solutions to water issues often already exist and are well-known, but implementing them through policy across sectors remains a challenge. A total of twelve
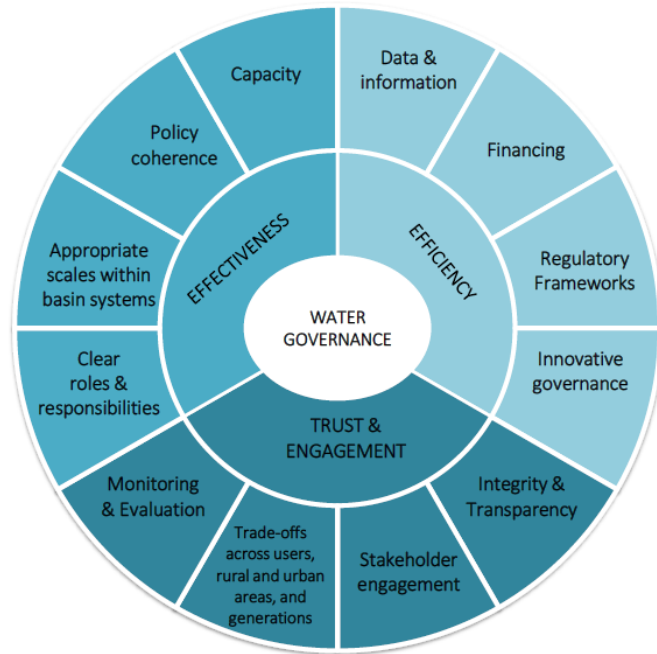
Figure 4: OECD principles on water governance (OECD, 2015).

principles are clustered around three main aspects: 'effectiveness', 'efficiency' and 'trust and engagement' (figure 4). Effectiveness is measured by the input from governance to specify clear sustainable water policy goals, to implement them and to what extent expected targets are met. Efficiency relates to maximising the benefits of sustainable water governance at a minimal cost to society. Lastly, trust and engagement involve ensuring inclusiveness of stakeholders, democratic legitimacy and fairness of outcome to society as a whole.

China is an OECD member and considered a 'key partner' by the organization (OECD, n.d.). Since 2016, China has formally committed to adhering to the principles across sectors and water-related activities by joining the Global Coalition for Good Water Governance (Akhmouch, 2017). The OECD (2016) specifies policy recommendations to urban water governance as well, while highlighting SDG 11: 'making cities inclusive, safe, resilient and sustainable'. The OECD points out that in cities there will increasingly be risks of 'too much water', 'too little water' and 'too polluted water' and are thus in need of governance frameworks that are able to foster resilience and the ability to adapt in changing circumstances due to urbanization and climate change.

These realisations have led more and more institutions such as the OECD to develop approaches shape of 'Integrated Water Resources Management' (IWRM). The

frameworks that the OECD provides can be classified as IWRM. According to Grigg (2008), IWRM can be defined as a planning framework that deals with organizing and operating water systems to integrate and balance the goals of all relevant stakeholders. This integration must be established between policy sectors, water sectors, government authorities, organizational levels, management functions and phases, geographic units, as well as professions and disciplines. The Global Water Partnership (GWP) accentuates the process and its goals: to achieve maximized social and economic welfare in an equitable way without damaging ecosystems, the process of IWRM is used to coordinate water, land and resources management (Global Water Partnership, 2017). Some researchers (Biswas, 2008; Grigg, 2014; Jonker, 2002) have criticised and attempted to alter the definition of the GWP, however. Biswas (2008) calls the GWP's definition inoperable in its implementation capacity due to being 'vague'. Remarkably, this vagueness has contributed to its popularity in many countries: according to Biswas, countries justify their water policies by adhering to the GWP's definition of IWRM, which is easily done thanks to vague and broad character of the definition. Grigg (2014) agrees, arguing that the GWP's definition is too open for interpretation: step-by-step guidelines are preferable. Lastly, Jonker (2002) tried to make adjustments to the GWP's definition by shifting the focus from water management to the management of activities by people, with the goal of preventing too much interference of natural water processes.

2.7.1. Limiting conditions

Limitations in governance have many synonyms, such as barriers, gaps, restrictions and obstructions. They boil down to the same thing: an occurrence or circumstance that impacts the process of governance in a negative manner. According to Dhakal & Chevalier (2016), water governance is being held back by its separated nature: segments of the urban water system are regulated by various agents such as water suppliers and local governments. This is called 'institutional fragmentation' in other literature (Eisenack et al, 2014; Edelenbos & van Meerkerk, 2015). It views this institutional fragmentation as an issue due to the lack of control and communication that it leads to. For water governance in particular, with its many involved government levels and various sectors such as urban planning and infrastructure,
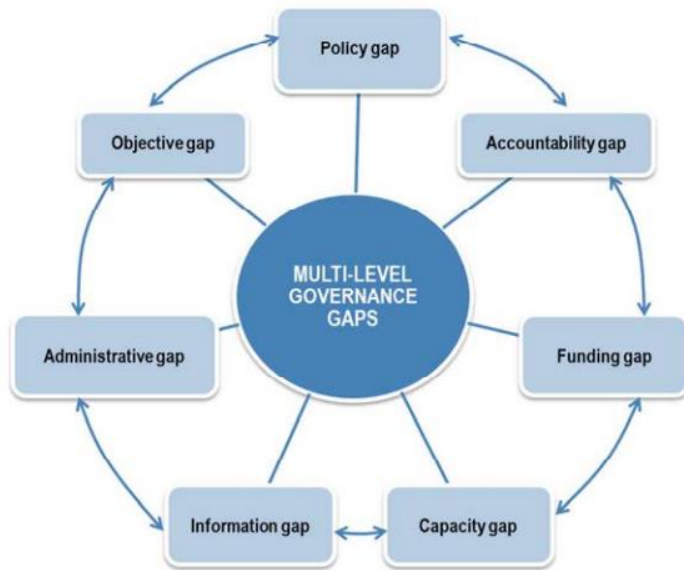
Figure 5: the OECD multi-level governance gaps (OECD, 2016).

fragmentation is a threat to an integral approach (van Rijswick et al, 2014). The OECD (2011) names more limitations to water governance, such as insufficient means of scientific and technical capacity, monitoring, funding, accountability and transparency gaps, and lacklustre long-term planning. Termeer et al (2012) add the dimension of climate change to new limiting conditions in water governance: which government level, which policy and which area of expertise is in charge of handling climate change? Which scale does it belong to? Most limiting conditions are dependent on context and actor, but nonetheless all require a prolonged process of planning to ensure 'good' water governance (Tortajada, 2010). A durable and reliable governance strategy is necessary for this prolonged process in achieving sustainability, according to Koop & van Leeuwen (2017). Biesbroek et al (2013) discuss barriers to climate change adaptation and conclude that they involve factors and conditions that restrict the process, development and implementation of adaptation plans, thus impacting governance processes that affect output and, in a later stage, the outcome. Specifically, Biesbroek et al argue that these limitations range from cognitive and ambition to institutional, determined by the context. Moreover, they emphasize the necessity to define these limitations in governance for comparing studies and leading the search for solutions. Both the findings of Grigg (2008) and Biesbroek et al (2013) are similar to the OECD multi-level governance gaps (figure 5). According to the OECD (2016), diagnosing these seven gaps can overcome obstacles and support a stronger form of IWRM. An administrative gap arises when there is a scale mismatch between administrative boundaries with watersheds not corresponding with administrative regions or functional areas (example: spatial plans only accounting for the municipality while the watershed is a larger area). Objective gaps occur when diverging interests and targets collide and hurt long-term urban water strategies.

Policy gaps happen when there is no co-ordination mechanism and division of responsibilities between departments of authorities, therefore hurting policy coherence. Accountability gaps appear when there is a lack of transparency in the practices of voting districts, often due to asymmetric information availability between levels of government. Funding gaps arise when financial backing of implementing water policy is insufficient, such as when budget is too tight for the growing demands of urban water infrastructure. The capacity gap occurs when implementation of water policy is interfered by a deficiency of scientific, infrastructural and technical capacity of actors. Lastly, the information gap appears when water-related data and knowledge is incomplete to steer adequate decision-making across levels of government (OECD, 2016). Limiting conditions as described in this paragraph lead to more complicated 'wicked' challenges in the water sector, such as flooding. To overcome such limiting conditions, a strong governance capacity is needed to be able to anticipate and tackle these conditions, ideally forming a coherent form of IWRM (Koop & van Leeuwen, 2015; Pahl-Wostl, 2009).

2.7.2. Supporting conditions

How can good governance be achieved? Answering that question will lead to finding supporting conditions (often referred to as 'enablers') that make good governance possible. Since governance includes (in)formal processes that organize policy decisions to realize societal goals, supporting conditions are thus defined by Martin et al (2021) as circumstances, factors and processes that play a positive role in governing and achieving policy decisions by the government authorities in accordance with the market, civil society and stakeholders. Such conditions can emerge during different stages, chronologically: before initiation of nature-based solution projects; during project initiation, planning and design; and during implementation (figure 6, next page). These enablers are categorized through political, legal, financial, socio-cultural, human resources and institutional features. Moreover, supporting conditions need to facilitate the dynamic character of governance due to the ever-changing context of socio-economics and scientific knowledge. Dang et al (2016) name three elements to reach good governance, by assessing *'the rules of the*
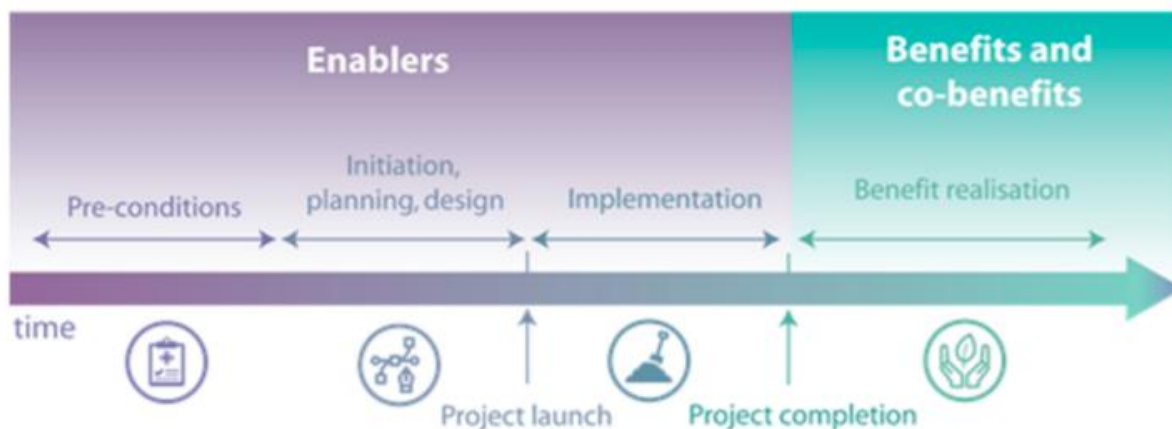
Figure 6: supporting conditions ('enablers') during different stages of NBS projects (Martin et al, 2021).

game' (legislation and procedures), *'facilitating resources'* (the division of power between actors) and *'converging discourses'* (the playing field of various actors, stakeholders and their interests). These three elements further advance governance accomplishments and institutional capacity. Others (Ford & King, 2015) name more elements such as stakeholder participation, science availability, leadership, financing, public approval and institutional context as vital for governance. Grigg (2011) presses for improving the elements of policy, empowerment and control at all government levels to advance water governance. A broader effort was undertaken by van Rijswijck et al (2014), who have written about ten 'building blocks' to identify limiting and supporting conditions within water governance. These building blocks are categorized in three separate dimensions: the first addresses knowledge on principles, values, policy discourse and the water system, such as flood risk. The second advocates the involvement of stakeholders, authorities and regulations. Lastly, the third focuses on conflict prevention. Important to note is how these dimensions are all interconnected and complementary: coherence is a requirement to ensure successful implementation of water policy, van Rijswijck et al (2014) argue.

2.8.   Flood risk management

According to Nillesen (2019), the primary goal of flood risk management is to reduce the likelihood of flooding and to reduce the impact when flooding occurs. To do so, *prevention* and *protection* methods can be developed to minimize loss of life and assets (Simonovic, 2017). Obstacles must be overcome to achieve successful flood risk

management, ranging from finance, social and political obstacles to changing human behaviour (Levy, 2005). Policies can be aimed at overcoming such obstacles. To implement these, problems must be thoroughly analysed beforehand, evaluated and communicated. Combining these efforts will work towards being able to identify risk and come up with corresponding action to minimize them. Since climate change seems to not turn around in the near future, action that is taken should at least partly focus on the *adaptation* part of flooding, i.e., adjusting the human environment and systems in response to anticipated climate effects to minimize flood risk (McBean, 2018). This requires complex interactions between the natural and built environment, thus needing an integrated approach. Flood risk management strategies are often thought to be too short-term, tending towards temporary solutions that are quick to implement (such as levees and dams), all the while disregarding long-term impacts (Simonovic, 2017). Randers (2015) states that this is often a political problem due to short term positions of power in democracies that are obsessed with quick results. Such lines of thought must shift towards sustainable solutions, argues Schanze (2006), by taking into consideration what is best for the environment and future generations. This is a continuous societal process, that needs to find sustainable flood risk management methods to add to policy through governance.

2.9. Governance capacity

What is required to guide vision into policy and practice? This is the question that encompasses governance capacity: whatever resources, skills, instruments, management tools and institutions are necessary to govern in a complex society. These 'capacities' refer to the interdependencies between actors and the wicked nature of problems, as well as the features of networks and organizations (IGI Global, n.d.; van Popering-Verkerk et al, 2020). Within these capacities, researchers emphasize characteristics such as collaboration, agility, flexibility, stability, innovation and networks. Some of these create tension, such as the contradictory traits of flexibility and stability. Another example is tension between collaborative governance and decisiveness (Healey, 1998).

A key aspect of governance capacity is therefore about the means to balance: the capacity to ensure democratic values in the governmental hierarchy (Christensen

et al, 2016), meaning legitimacy and trust are important in this dynamic relationship. Others link governance capacity to the 'infrastructural power' of the government (Fukuyama, 2013), or to the quality of government (Rothstein & Teorell, 2008). Both formal structural and procedural elements of the government are named, as well as informal elements (i.e., how it works in practice). Lodge & Wegrich (2014) distinguish between four types of governance capacity: *'coordination capacity'* as a means of getting various organizations to work together; '*analytical capacity'* as the ability to analyse information, assess and advise; *'regulation capacity'* to keep a style of governance in control; and *delivery capacity* to exercise power and provide public services in practice.

An important component of governance capacity is institutional capacity, says the UNDP (2008): actors are enabled to collaborate and share knowledge through the institutional setting, rules and regulations. Governance capacity, however, is broader and includes the roles of resources and discourses (Engle & Lemos, 2010). It is context dependent, with for example emphasis on integration (Emerson et al, 2012), cooperation (Dang et al, 2016) or on flexibility (Termeer et al, 2015). Koop et al (2017) take the position that governance capacity is about being able to incite change. On some points, however, most researchers seem to agree, such as: governance capacity being about actors identifying and acting upon collective problems (Dang et al, 2016), governance capacity being determined by institutional settings and distribution of resources (Pahl-Wostl, 2009) and the influence of actors' interests on interactions between them (Adger et al, 2009).

Since actors and stakeholders can behave in unpredictable and complex ways, governance capacity does not necessarily lead to effective change automatically. Instead, it is a prerequisite enabler for effective change (Koop et al, 2017). IWRM and water governance in general are hindered in their implementation effectiveness due to governance limitations, categorized in gaps (figure 5) that can be addressed with the twelve OECD principles (figure 4). These principles, however, are aimed at (inter)national water governance levels. Governance capacity, however, can be assessed at a city scale level.

2.9.1. Governance Capacity Framework

Dimensions	Condition	Indicators
Knowing	1 Awareness	1.1 Community knowledge 1.2 Local sense of urgency 1.3 Behavioral internalization
	2 Useful knowledge	2.1 Information availability 2.2 Information transparency 2.3 Knowledge cohesion
	3 Continuous learning	3.1 Smart monitoring 3.2 Evaluation 3.3 Cross-stakeholder learning
Wanting	4 Stakeholder engagement process	4.1 Stakeholder inclusiveness 4.2 Protection of core values 4.3 Progress and variety of options
	5 Management ambition	5.1 Ambitious and realistic management 5.2 Discourse embedding 5.3 Management cohesion
	6 Agents of change	6.1 Entrepreneurial agents 6.2 Collaborative agents 6.3 Visionary agents
Enabling	7 Multi-level network potential	7.1 Room to manoeuver 7.2 Clear division of responsibilities 7.3 Authority
	8 Financial viability	8.1 Affordability 8.2 Consumer willingness-to-pay 8.3 Financial continuation
	9 Implementing capacity	9.1 Policy instruments 9.2 Statutory compliance 9.3 Preparedness

Figure 7: the Governance Capacity Framework dimensions, conditions and indicators (Koop et al, 2017).

To complement principles of water governance at a city level scale, the Governance Capacity Framework (GCF) was developed by Koop et al (2017) (figure 7). They argue that governance capacity conditions are essential in order to enable effective change. The GCF is applicable to five different water governance related challenges: water scarcity, flood risk, wastewater treatment, solid waste treatment and urban heat islands.

In this research, the GCF is applied to the SCP, since the SCP too is a project that is implemented at city level and revolves around water governance related challenges of flood risk. Koop et al (2017) state that water governance capacity is defined by a number of governance conditions that need to be addressed in order to be able to find solutions for water governance challenges in cities. These conditions either impede or enhance the ability to act proactively. The GCF is considered as an empirical-based integrated assessment that facilitates knowledge to address water challenges through pragmatic insights, as well as a frame to exchange knowledge, experiences and practices (Global Water Forum, 2018). Any type of water challenge that involves various institutions required to work together can be addressed with the GCF due to its problem-oriented character. An example is its use as a guiding framework for the Dutch Delta Plan on Spatial Adaptation (Ministerie van Infrastructuur en Milieu & Ministerie van Economische Zaken, 2017). In the case of this research, the water challenge is flood risk and the institutions are all the actors and stakeholders involved in the SCP.

Three dimensions form the core of the GCF: *knowing, wanting* and *enabling.* These key conditions determine the governance capacity to find solutions to urban water

challenges (Koop et al, 2017). Indicators are used to assess these conditions. Operationalization to score these indicators is discussed in §3.2 (page 61) and the full scoring rubric can be found in the Appendix (page 157). On the following pages, the governance capacity dimensions, conditions and indicators will be elaborated.

2.9.1.1. Knowing dimension

Knowing	1 Awareness	1.1 Community knowledge 1.2 Local sense of urgency 1.3 Behavioral internalization
	2 Useful knowledge	2.1 Information availability 2.2 Information transparency 2.3 Knowledge cohesion
	3 Continuous learning	3.1 Smart monitoring 3.2 Evaluation 3.3 Cross-stakeholder learning

'Knowing' refers to the necessity of awareness, understanding and learning capacity of knowledge on current and future risks, as well as the consequences of strategic decisions and policies. Governance conditions (c) and *indicators (i)* associated with this dimension encompass the following.

c1) Awareness: understanding of causes and consequences of water challenges.

- *i1.1)* *Community knowledge:* the extent to which knowledge is distributed and available throughout local stakeholders and the community.
- *i1.2)* *Local sense of urgency:* the degree of urgency among local stakeholders and the community that leads to policy and other forms of action.
- *i1.3)* *Behavioural internalization:* the extent to which people react, anticipate and change behaviour to address the water challenge.

Effective change cannot be realised without awareness, which revolves around understanding of causes and impacts of governance challenges (Raaijmakers et al, 2008). The whole of society, from individuals to organizations and government levels, can experience awareness in a cognitive and emotional manner (Ballard, 2008). Adger et al (2009) state that this constitutes as a prerequisite for learning and action. Community knowledge is seen by Gifford (2011) as the first step in bringing about conscious behaviour. Local sense of urgency can result in action taken or developing new policies (O'Connor et al, 1999). Behavioural internalization is formed because of held values, goals and risk perceptions (Gifford et al, 2011).

c2) Useful knowledge: describes quality of information which actors utilize to engage in decision-making processes.

i2.1) *Information availability:* whether information is available, reliable, verifiable and meets current demands.

i2.2) *Information transparency:* whether information is accessible and understandable for all stakeholders involved, both experts and laymen.

i2.3) *Knowledge cohesion:* the extent to which information is cohesive among stakeholders and ensures integration of both long -and short-term goals.

According to Zins (2007) and Rowley (2007), data in itself is not automatically explanatory: it needs to be interpreted and analysed to become useful knowledge. Subsequently, informed decision-making relies on useful knowledge that is available (van Rijswick et al, 2014). Amundsen et al (2010) add that many cities lack such knowledge on how future risks, such as climate change, will affect them. When it is available, adequate information transparency ensures effective communication and sharing of knowledge between stakeholders. Important here is that information needs to be credible, understandable and accessible to prevents miscommunication, which can lead to knowledge gaps and fragmented policies (Lemos et al, 2012).

c3) Continuous learning: analyses refining, investigation, monitoring and questioning of all matters relevant to the water challenge.

i3.1) *Smart monitoring:* how process, policies and progress are monitored.

i3.2) *Evaluation:* about the quality of evaluation of policy and implementation measures, how they are used and the frequency of their application.

i3.3) *Cross-stakeholder learning:* the degree to which stakeholders have the possibility of interaction with each other to learn and negotiate.

Folke et al (2005) state how adapting to changing circumstances with complex uncertainties requires continuous learning. To be able to learn, smart monitoring as well as evaluation can serve as a way to predict future developments and clarify underlying processes (van Leeuwen, 2007). In the context of public policies, understanding of different perspectives can prevent limited scopes and path dependencies through cross-stakeholder learning (Termeer et al, 2015).

2.9.1.2. Wanting dimension

Wanting	4 Stakeholder engagement process	4.1 Stakeholder inclusiveness 4.2 Protection of core values 4.3 Progress and variety of options
	5 Management ambition	5.1 Ambitious and realistic management 5.2 Discourse embedding 5.3 Management cohesion
	6 Agents of change	6.1 Entrepreneurial agents 6.2 Collaborative agents 6.3 Visionary agents

'Wanting' highlights the need for actors and stakeholders to cooperate and act on their ambitions to apply skills in order to find solutions. Commitment to ambition and the application of capabilities is key in this dimension. Governance <u>conditions (c)</u> and *indicators (i)* associated with this dimension encompass the following.

<u>c4) Stakeholder engagement process:</u> understanding of causes and consequences of water challenges.

- *i4.1) Stakeholder inclusiveness:* about active involvement of stakeholders in the decision-making process and the ability to freely speak to represent their organization.
- *i4.2) Protection of core values:* whether actively involved stakeholders' core values are not compromised in the process.
- *i4.3) Progress and variety of options:* actions and targets are selected from various co-created alternatives, through transparent procedures.

In literature, stakeholder engagement is widely considered as essential in decision-making processes. Pahl-Wostl (2009) note that it may lead to more complete framing of problems, as well as broadly accepted solution to those problems. Ridder et al (2005) state that although active stakeholder engagement is time consuming, it can be balanced out by saving time during implementation. During this engagement, it is key to include all relevant stakeholders and enable them to voice their perspectives in a clear and transparent process (Ford & King, 2015), where their core values are not harmed. This creates a trustworthy environment where stakeholders can work together to create a variety of options to decide upon.

<u>c5) Management ambition:</u> whether policy is feasible, well-embedded and whether long -and short-term goals are cohesive across sectors.

  i5.1) *Ambitious and realistic management:* whether challenges are identified and strategies to solve these are comprehensive, and wheter flexible intermittent targets are present, with the inclusion of uncertainty in policy strategies.

  i5.2) *Discourse embedding:* how climate adaptation policy matches with leading values, principles and discourses of the local context.

  i5.3) *Management cohesion:* whether policy is relevant for the water challenge and coherent concerning geographic and administrative boundaries as well as technical and financial possibilities, with alignment across government levels.

An important aspect of management ambition is the extent to which sustainability ambitions are included in policies. Truly ambitious goals within these policies need to be long-term, sufficiently resourced and flexible (Brown & Farrelly, 2009). Alignment of values, principles and discourses can be achieved through discourse embedding and is considered a necessity in order to be successful (van Rijswick et al, 2014), since the dominant discourse determines the direction and effectiveness of ambitious policies. The water challenge that is being analysed needs to be embedded in this dominant discourse. However, that is not enough to create integrated policies: strong management cohesion is needed to prevent fragmentation and define clear roles and responsibilities across sectors (Head & Alford, 2015).

<u>c6) Agents of change:</u> the people involved that 'make or break' the process of created climate adaptation policy and their willingness to support and take risks to incite change.

  i6.1) *Entrepreneurial agents:* these agents have access to resources and seek opportunities to influence decision-making processes.

  i6.2) *Collaborative agents:* these agents connect, engage with and build trust with businesses and government levels to collaborate in order to address the water challenge.

i6.3) *Visionary agents:* these agents can push forward for supported long-term and integrative strategies in the actor network.

Key to the concept of agents of change is the intrinsic motivation of people. It is not limited to just the ones in leading positions, various types of agents of change can be distinguished (Brouwer & Biermann, 2011). Entrepreneurial, collaborative and visionary agents all fit different roles in the process of creating climate adaptation policies. Their roles vary in importance dependent on the local context, but can generally incite change by utilizing their networks and resources (Ford & King, 2015; Gupta et al, 2010).

2.9.1.3.   Enabling dimension

Enabling	7 Multi-level network potential	7.1 Room to manoeuver 7.2 Clear division of responsibilities 7.3 Authority
	8 Financial viability	8.1 Affordability 8.2 Consumer willingness-to-pay 8.3 Financial continuation
	9 Implementing capacity	9.1 Policy instruments 9.2 Statutory compliance 9.3 Preparedness

'Enabling' emphasizes the network, resources and instruments that actors have at their disposal that enable them to implement the policies that correspond with their ambitions to tackle water challenges. Governance <u>conditions (c)</u> and *indicators (i)* associated with this dimension encompass the following.

<u>c7) Multi-level network potential:</u> regarding the utilization and effectivity of networks consisting of actors from all government levels, sectors and stakeholders.

i7.1) *Room to manoeuver:* whether actors have the freedom and opportunity to develop and suggest various approaches and alternatives to policy strategies.

i7.2) *Clear division of responsibilities:* the extent to which responsibilities are clearly formulated and allocated.

i7.3) *Authority:* revolves around the presence of legitimacy in forms of power involved to address the water challenge.

Water governance challenges deal with various perspectives and interests, which need networks that create flexibility in order to adapt to dynamic circumstances (Pahl-Wostl, 2009). This includes the possibility of exploring different alternative pathways and ideas from autonomous actors to tackle problems (Gupta et al, 2010). Clearly formulating responsibilities adds the valuable notion of accountability (Mees et al, 2014). Legitimacy of authority, embedded into regulations, is needed to ensure authorities do not act without the proper competence to address the water challenge (van Rijswick et al, 2014).

c8) Financial viability: addresses whether financial resources are sufficient to ensure good water governance.

    i8.1)   *Affordability:* focuses on whether addressing the water challenge is available and affordable for all stakeholders, including the poor.

    i8.2)   *Consumer willingness-to-pay:* relates to how expenditure to address the water challenge is perceived and trusted by all relevant stakeholders.

    i8.3)   *Financial continuation:* concerns securing financial arrangements to ensure long-term policy implementation.

The OECD (2015) emphasizes that water-related challenges require the assurance of long-term financial backing. This prevents insufficient budgets leading to a series of short-term strategies (Ford & King, 2015), which are often less cost-effective than a single long-term strategy (Koop & van Leeuwen, 2016). When addressing financial viability, it must be kept in mind that who is affected, who benefits and who pays are key within the network of government levels, actors, stakeholders and civil society (UNECE, 2009). The poor and marginalized may not be forgotten during such an assessment (UNDP, 2011), as well as perceived trust in authorities by the ones affected by policy when willingness to pay is essential to financial continuation of policy (Raaijmakers et al, 2008). To prevent uncoordinated and misused investments, financial continuation is necessary to solve long-term challenges (Adger et al, 2005).

<u>c9) Implementing capacity:</u> analyses effectiveness of policy instruments to address the water challenge, as well as compliance to any present regulation.

- *i9.1)* *Policy instruments:* how policy instruments are used to spark desired effects and prevent undesired effects.
- *i9.2)* *Statutory compliance:* whether legislation on climate adaptation is well-coordinated, formulated and transparent with stakeholders respecting these agreements.
- *i9.3)* *Preparedness:* encompasses the degree to which a city is prepared to deal with uncertain changes and events with clear policies and action plans.

Ekstrom et al (2011) state that implementation of policy is a crucial aspect in which policy instruments can be used to stimulate desired behaviour. These instruments need to be regularly monitored and evaluated to check their effectiveness. Moreover, Runhaar et al (2016) note that to contribute to legitimacy and accountability of authorities, statutory compliance needs to be respected by all involved. Implementing capacity can benefit from adequate preparedness, as action plans allow for quick implementation (Gupta et al, 2010).

2.10. Climate adaptation leadership

One of the earlier definitions in literature of general leadership is by Stogdill (1950; in Hartley & Benington, 2011). He argues that leadership is the act of influencing activities of an organization to reach certain goals. Others, such as Bass & Bass (2008) and Bellows (1959; in Becker & Kretsch, 2019), emphasize a coordinated dimension: to reach desirable goals, people can be stimulated by leaders to work together. Pilkiené et al (2018) distinguish between four types of leadership in which various actors take leading roles:

1) Distributed leadership, which is in contrast to traditional vertical leadership due to its focus on the group process in which leading roles are distributed by multiple members;

2) Collaborative leadership, which closely resembles distributed leadership but is considered more inclusive, with the leading roles being performed by the actors that are most capable and best informed (DeWitt, 2016);

3) Horizontal leadership, which is executed by a team member that is nominated

and governed by a 'vertical leader', such as a project manager;

4) *Balanced leadership*, which combines horizontal and vertical leadership in a flexible manner, being able to transition dynamically between these two types when necessary. Pilkiené et al (2018) emphasize the need to cooperate between these two leadership types.

Other researchers, such as Budd & Sancino (2016), categorize leadership by geographical entities. They argue in favour of a city-based leadership approach and are critical about traditional multi-layered governmental leadership with formal institution-based traits. They argue that the role of leadership in urban governance is increasingly important to achieve greater resilience in matters such as the economy and climate.

In this research, the general definition of leadership by Uhl-Bien et al (2007) will be used: *"Leadership is defined as emergent change behaviours under conditions of interaction, interdependence, asymmetrical information, complex network dynamics, and tension"*. The most important aspect of this definition is leadership is carried out by various actors through actions and interactions. Becker & Kretsch (2019) highlight the need for strong guidance in these interactions, due to the discrepancies between 'who pays?' and 'who benefits?' in the variety of stakeholders. Therefore, the absence of leadership can be seen as a governance limitation and must be avoided (Moser & Ekstrom, 2010).

Regarding leadership in climate adaptation, there is no exact shared definition in literature: it is considered context dependent (Becker & Kretsch, 2019). Egri & Herrmann (2000) add that mobilizing organizations with a vision is the core task of leaders and specify for leadership in climate adaptation that societies can only bring substantial change through empowerment brought by such leaders. As stated in §1.3, Meijerink & Stiller (2013) argue that leadership has received relatively little attention in literature about climate adaptation. To contribute to this gap, they have distinguished four leadership concepts within the field of climate adaptation:

1) *policy leadership* focuses on policy entrepreneurs and ideational leaders and is considered top-down in its core. These policy entrepreneurs are actors who foster policy changes and seek out coalitions to reach policy goals (Mintrom, 1997). Ideational leaders specialize in resources and are often politicians. Policy leadership thus resembles political leadership, although policy leadership is relatively more

action oriented according to Eyestone (1971; in Baker, 1973);

2) *connectivity leadership* sees traditional hierarchical leadership as ineffective in modern organizations and prefers multi-level governance with strong partnerships of stakeholders, emphasizing a collaborative style of governance (Chrislip, 2002). Compared to policy leadership, connectivity leadership has a more bottom-up character;

3) *sustainability leadership* is comparable to connectivity leadership in that it focuses on collaborative interaction, but aims at the relationship between social and natural systems to address adaptive challenges. Ferdig (2007) states that successful sustainability leaders enable others to create opportunities and share their own beliefs in how to tackle a problem. With this style of leadership, both a bottom-up and top-down structure is possible, dependent on the context in which either formal positional leaders are in charge or key individuals such as consultants;

4) *complexity leadership theory (CLT)* revolves around adaptability, creativity and flexibility of an organization to deal with dynamic circumstances. The relationship between formal administrative leaders and adaptive leaders can be performed in both bottom-up and top-down structures (Meijerink & Stiller, 2013). The actors in CLT are dependent on which leadership functions are utilized.

The OECD (2013) wrote a report that synthesizes essential points that were raised among leaders in climate adaptation from fourteen cities around the world. These include:

1) *political commitment* from local to national levels of government, so that long term stability and success of programmes is ensured;

2) *understanding of risks and vulnerabilities* through sharing data and information, in order to anticipate future conditions and remain flexible when projections don't turn out as predicted;

3) *stakeholder engagement*, which need to be shaped by the local context and negotiations;

4) *sustained financial resources*, with special attention to aligning budgets and timelines between national and local levels of government.

Furthermore, the OECD report highlights the need for policy-makers to facilitate processes of testing, learning and adjusting plans when new information is available.

The final key remark by the OECD is about the importance of local government departments, such as cities: execution of nationwide plans is often most noticeably carried out at this local level and therefore the success rate goes up or down depending how local governments handle implementation. Communication and coordination, both vertical and horizontal, is of utmost importance to prevent misaligned intentions and ambitions. An example by Meijerink & Stiller (2013): a water management agency that wants to create a retention area near a river to be able to take in peak discharges may be dependent on ministries that are responsible for spatial planning or agriculture, on municipal land use plans or on private land owners. Therefore, negotiations and clear communication is necessary in multi-level governance networks before decisions are made. Such networks are complex due to the often-large number of parties involved and the unpredictability of their interactions. Part of these uncertainties arise due to uncertain circumstances that no one has direct control over – such as the impact of climate change (Osberghaus et al, 2010).

Plans will need to be adapted to dynamic circumstances, which requires flexibility from all participating parties. To make this happen, leadership can enhance adaptive capacity, according to various researchers (Gupta et al, 2010; Olson et al, 2006). Meijerink & Stiller (2013) emphasize that such leadership goes beyond the standard notion of a single charismatic leader that rallies others around his ideas. Instead, leadership needs to be versatile and handled by multiple individuals. This is in line with Complexity Leadership Theory (CLT), a leadership paradigm that aims at multiple branches of an organization or network and their dynamic interactions that lead to adaptive outcomes (Uhl-Bien et al, 2007). This theory argues that modern organizations need to be able to adapt to environmental changes in order to survive, making adaptive capacity a key element to success. Moreover, CLT highlights the role of organizational members who do not hold a formal leadership position, such as consultants, experts and researchers who have the ability to incite change.

The OECD (2016) adds how understanding risks and vulnerabilities is integral to adaptation planning, which matches with the statements on the importance of informal expert positions within organizations. However, the OECD does note how 'traditional' strong leadership from city policy-makers and elected officials, such as the mayor, is equally important to advance urban adaptation plans: leadership by

elected officials can contribute significantly to departmental action that empowers staff members to take action in establishing a workspace aimed at innovative and sustainable solutions.

In China, the planning system has been transformed, subsequently bringing change to its style of leadership. The drivers behind this change were the political transition from a centrally planned system to a market system, including governance reforms (Zhao, 2015). Civil society, a larger middle class and increasingly autonomous local governments have gained a larger role. However, Zhao (2015) notes that these changes are induced and allowed top-down: leadership from above still holds the strings, thus largely maintaining traditional hierarchical structures. Two mechanisms now coexist in China: a socialist planning structure built around maintaining control and a decentralised planning structure to speed up growth processes. In these processes, Chinese institutions are redirected and guided to new functions by leaders from above.

According to Heilmann & Melton (2013), one of the more remarkable traits of the current Chinese planning system are the discrepancies between China's 'Five-Year Plans' and state leadership, who are not completely synchronized. This is due to the fact that Chinese leaders remain bound to the previous Five-Year Plan for three years when a new Five-Year Plan starts. Policy goals that are set by any predecessors must be followed in that time period, which may create 'plan lock-in' and 'path dependency', meaning processes that bring about a particular outcome (Sydow et al, 2008) and in which a continuous state of explicit features occur (Vergne & Durand, 2010). In these cases, there is no or little room for other options (Hetz & Bruns, 2014). Other relatively new institutional limitations for governance capacity in China include fragmented leadership, insufficient citizen participation and increasing social inequity (Zhao, 2015).

2.10.1. Leadership Functions Framework (LFF)

Based on the four leadership concepts (policy, connectivity, sustainability and CLT - leadership) as discussed in §2.8, Meijerink & Stiller (2013) have created a comprehensive leadership functions framework to analyse how leadership is carried out in climate adaptation. The framework can be applied in an empirical manner to case studies (Meijerink & Stiller, 2013), in this case the SCP. It consists of five distinct functions that can be typically found in climate adaptation networks: the *political-administrative, adaptive, enabling, dissemination* and *connective* functions (figure 8).
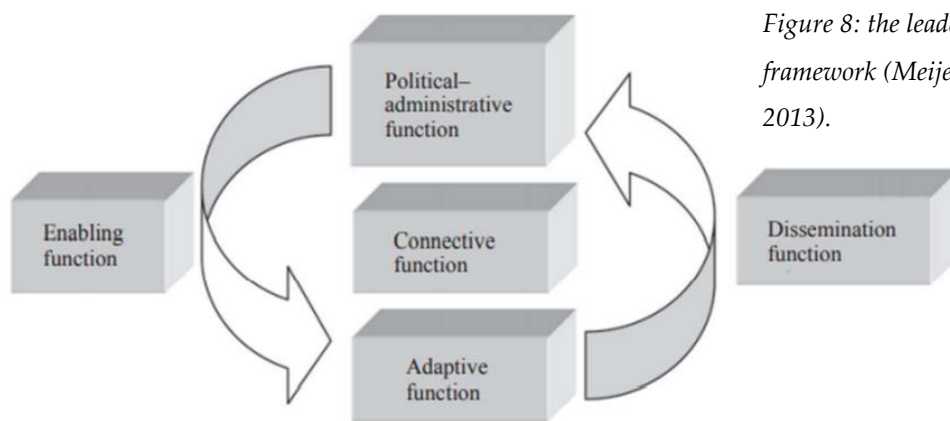
Figure 8: the leadership functions framework (Meijerink & Stiller, 2013).

1) The political-administrative function can be fulfilled by positional leaders only, such as politicians, public managers, provincial delegates or heads of a department. These positions give them formal decision-making power in creating adaptation policies and management of resources to accomplish such policies;

2) The adaptive function refers to developing of new ideas and approaches, including governance innovations, new ways of collaboration and new planning strategies to adapt to climate change. The high level of uncertainty that is associated with this function leaves room for experimentation that may create adaptive capacity to adapt to dynamic circumstances. This function is focused on the process, not so much on which actors or persons are involved. During the adaptation process, adaptive capacity needs to focus on specific problems and change the leadership strategy to overcome them;

3) The enabling function aims to creating conditions that enable the emergence of innovations and new knowledge within a network. In figure 8, this is visualized

with the arrow from political-administrative to adaptive, since policy -and decision-makers often decide to what extent space for innovation is allowed to exist. Within this function, innovation can be supported by, for example, encouraging collaboration between actors or creating a feel of urgency on a certain matter;

4) The dissemination function focuses on spreading new and innovative ideas that have been generated by the adaptive function into the networks of positional leaders that have power to implement such ideas. In figure 8, the linked arrow from adaptive to political-administrative visualizes this. In essence, it is the opposite of the enabling function. Policy entrepreneurs can play a significant role in this by seeking out opportunities and collaborations that foster the implementation of ideas (Mintrom & Leutjens, 2017);

5) The connective leadership function is the central element in figure 8, since this function revolves around creating connections between all sectors and levels of government and between public and private parties. The goal is to bring actors and stakeholders together to reach a commonly shared goal. Due to the fragmented nature of climate adaptation issues, which include different interests and resources, the connective leadership function is considered especially difficult but equally important. Representative boundary spanning leaders appear in this function, who have the ability to connect their organization with its environment by linking people and processes across boundaries (Edelenbos & van Meerkerk, 2015).

Based on case study findings in the Netherlands, Germany and England, Meijerink et al (2014) integrated the connective -and enabling functions in their final revised version of the LFF, because actors in those case studies who contributed to the connective function, contributed to the enabling function as well. In this research, however, the original LFF will be used as described in the previous paragraph. The reason for this is the very different context in which climate adaptation and spatial planning take place in China compared to European countries: it cannot be assumed that Chinese actors behave in a similar manner.

2.11. Conceptual model

Following the findings found in literature, a conceptual model has been created to incorporate these findings into this research (figure 9). The conceptual model can be summarized as follows: the Sponge City Programme (SCP), a government initiative designed to combat water issues in Chinese cities that are the result of urbanization and climate change, requires adequate governance capacity to enable effective change, which may help with the programme's longevity. The Governance Capacity Framework (GCF) will identify limiting and supporting governance conditions of the SCP, showing which areas need improvement and which can be further utilized to strengthen the programme. Since literature emphasizes the importance of leadership in governance, findings found in the GCF will be addressed by types of leadership from the Leadership Functions Framework (LFF) to analyse how these elements of governance capacity can benefit from leadership. An advice will be given on which leadership function to utilize per governance capacity condition and which actor(s) is/are most suitable to do so.
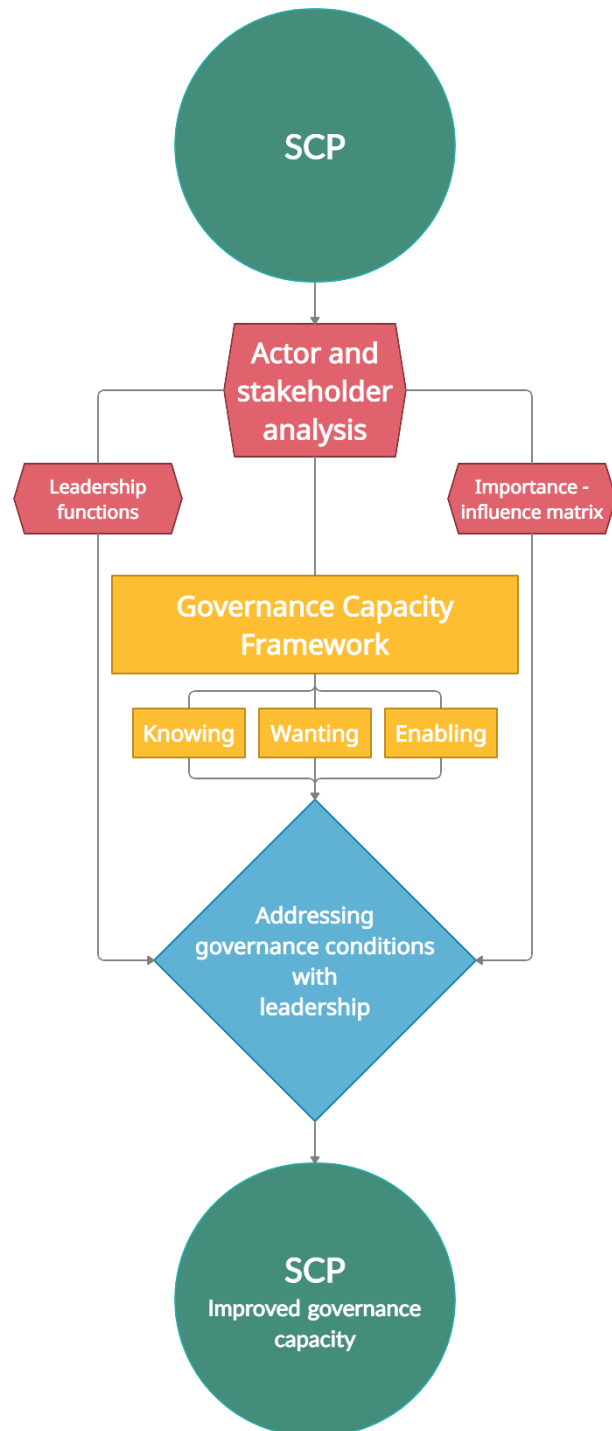
Figure 9: conceptual model of this research.

Research methods

In this chapter, an explanation will be given on how this research is carried out. The research strategy for each subquestion is elaborated regarding data collection and used frameworks, summarized in table 2 below. Moreover: the research area will be shown and interviews, operationalization, range and validity will be discussed. Lastly, an explanation is given on collection of own data through surveys and interviews: why these instruments were chosen, which people were selected and why they were selected, as well as the response rate among them. An overview of these can be found in table x and x at the end of the chapter. In appendix x, interview transcriptions and the full survey result can be found.

First, a reminder of the main- and subquestions:

MQ. **To what extent is governance capacity of the Sponge City Programme capable of managing flood risk and how can leadership make a difference?**

SQ1. What is the institutional context and leadership structure of the Sponge City programme?

SQ2. How does the Sponge City Programme's governance capacity perform?

SQ3. To what extent can leadership play a role in improving the Sponge City Programme's governance capacity conditions?

Below, an overview of the used frameworks and methods of data collection (table 2).

	SQ1	SQ2	SQ3
Aim	Overview of SCP's institutional and structural context; actor-stakeholder analysis with leadership functions	Assess capacity of SCP governance through various indicators	Address governance capacity conditions with leadership functions
Framework	Importance-influence matrix + Leadership Functions Framework	Governance Capacity Framework	Governance Capacity Framework + Leadership Functions Framework
Info & data	Planning and policy documents, literature, news articles, interviews	Surveys, interviews, planning and policy documents, literature	Literature, planning and policy documents, interviews

Table 2: objectives, used frameworks and gathering of information and data per subquestion.

3.1. Institutional context and leadership structure of the SCP (SQ1)

Answering this first part will serve as a contextual basis for the rest of the research. Before an assessment of the SCP's governance capacity can be made, a thorough understanding of the institutional context of the SCP is necessary: only then is it possible to identify which actors need to be analysed to address governance conditions. The roles and position of actors and stakeholders will be discussed, mapped and visualized to create an overview of their importance and influence. For the latter, the *'importance-influence matrix'* (IIM) (DFID, 2003) is used. *Influence* is defined as the power a stakeholder has to facilitate or block the goals of a policy and *importance* is defined as the extent to which the interests of stakeholders are prioritized (DFID, 2003). The scores on their importance and influence combined assigns the stakeholders with a classification: *key player* (high importance, high influence), *context setter* (low importance, high influence), *subject* (high importance, low influence) or *crowd* (low importance, low influence). Actors and stakeholders will include relevant

government institutions from national to local, development banks, developers, companies directly involved with SCP projects and civil society. The actors and stakeholders that hold any form of leader position is examined with the LFF (figure 10).
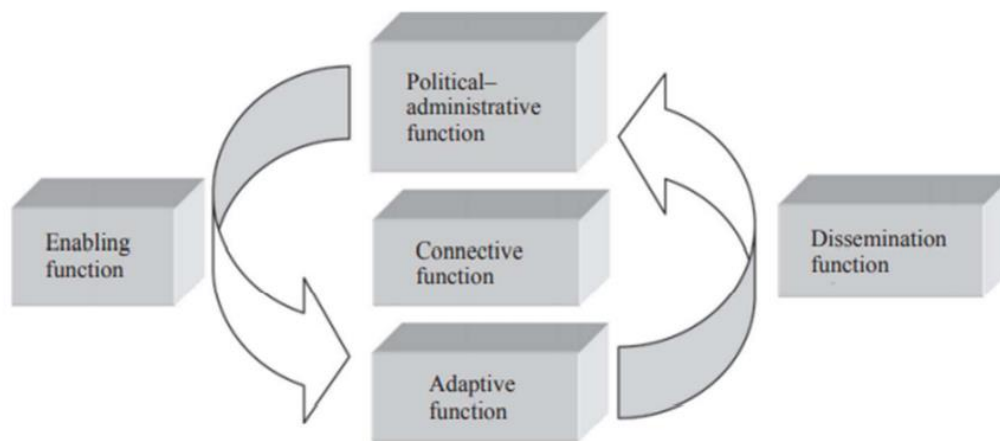
Figure 10: the leadership functions framework (Meijerink & Stiller, 2013).

To figure out which roles they fill within the governance process of the SCP, their activities will be assigned to one of the following leadership functions: *political-administrative, connective, enabling, adaptive* and *dissemination* (see §2.10.1. for a detailed explanation of these functions). Together with the findings of both the actor-stakeholder analysis and the GCF outcome, this will serve as a means to answer SQ3.

Policy and planning documents combined with literature are the primary sources of data for this subquestion, since the roles of actors and stakeholders are often explicitly described in these, making their interrelationships clear. It is noteworthy how almost all Chinese government websites specifically show leadership structure and clear descriptions of responsibilities (e.g.: MWR, n.d.; MOF, n.d.; MOHURD, n.d.). Moreover, most relevant official policies revolving around the SCP are accessible on these websites, providing a convenient starting point for an actor analysis. Other data such news articles will be utilized as well in which their roles are described. Lastly, in interviews, respondents are asked about activities they think certain actors and stakeholders carry out in the governance process of the SCP. This way, the contents of official online published documents can be verified.

3.2. Governance Capacity Framework (SQ2)

To find supporting and limiting governance conditions present in the SCP, the Governance Capacity Framework (GCF) will be applied (figure 11, next page). This empirical-based framework has been developed by Koop et al (2017) as a means to provide an integrated understanding of the most essential governance conditions that determine the governance capacity which is needed to continually solve dynamic governance challenges of water and climate change in urban areas (for more information, see §2.9.1.). It is designed to be transparent and easy to understand, with the end-users such as decision-makers, stakeholders and citizens in mind. That way, the GCF facilitates constructive discussions, collaboration and sharing of knowledge. The GCF integrates transformation processes and literature on governance and provides a diagnostic method to use for complex challenges that involve multi-organizational networks that need to collaborate in order to find solutions (Koop et al, 2017). The SCP falls within that description. An extra advantage of using the GCF is that is has been used before and proven to be useful in conducting research into governance capacity of various programmes and urban water challenges. For example, see GCF studies conducted in Colombia (Aguilar et al, 2021), Vietnam (Dang et al, 2015) and the United States (Feingold et al, 2017).

Dimensions	Condition	Indicators
Knowing	**1 Awareness**	1.1 Community knowledge 1.2 Local sense of urgency 1.3 Behavioral internalization
	2 Useful knowledge	2.1 Information availability 2.2 Information transparency 2.3 Knowledge cohesion
	3 Continuous learning	3.1 Smart monitoring 3.2 Evaluation 3.3 Cross-stakeholder learning
Wanting	**4 Stakeholder engagement process**	4.1 Stakeholder inclusiveness 4.2 Protection of core values 4.3 Progress and variety of options
	5 Management ambition	5.1 Ambitious and realistic management 5.2 Discourse embedding 5.3 Management cohesion
	6 Agents of change	6.1 Entrepreneurial agents 6.2 Collaborative agents 6.3 Visionary agents
Enabling	**7 Multi-level network potential**	7.1 Room to manoeuver 7.2 Clear division of responsibilities 7.3 Authority
	8 Financial viability	8.1 Affordability 8.2 Consumer willingness-to-pay 8.3 Financial continuation
	9 Implementing capacity	9.1 Policy instruments 9.2 Statutory compliance 9.3 Preparedness

Figure 11: the Governance Capacity Framework dimensions, conditions and indicators (Koop et al, 2017).

The GCF consists of three dimensions: *knowing, wanting* and *enabling.* Each of the three dimensions analyses three separate governance conditions, which in turn are assessed by three indicators each.

3.2.1. Operationalization: scoring method and data collection

Indicators can be used to translate concepts to perceivable measurements (Verschuren & Doorewaard, 2010). These indicators are used as sensitising concepts, meaning they will be seen as general guidelines that are interpreted more specifically during empirical research (Bryman et al, 2008). Indicators will be scored with a five step Likert scale ranging from -- (very limiting) to ++ (very supporting) to determine an average score for its corresponding governance condition in a consistent manner (table 3). This

Indicator score	Numerical value
++	4
+	3
+/-	2
-	1
--	0

Table 3: indicator scores and corresponding values.

scaling system provides urban water governance initiatives a clear indication of where they are and what steps are necessary to improve governance capacity (Koop et al, 2017).

Findings and results from policy documents, literature, surveys and interviews are what define a score. Predefined questions for each indicator can be found on the next three pages for the knowing (blue), wanting (beige) and enabling (green) dimensions. These have been edited to fit the Sponge City Programme context. A Likert score rubric assessment functions as a scoring guide to help assess each indicator and can be found in the Appendix on page 157.

Knowing dimension

Condition 1: Awareness

Indicator	Predefined question
1.1 Community knowledge	*To what extent is knowledge regarding flood risk present throughout the community in SCP pilot cities?*
1.2 Local sense of urgency	*To what extent do actors have a sense of urgency, resulting in awareness and SCP policies that address flood risk?*
1.3 Behavioural internalization	*To what extent do local communities try to change their behaviour in order to contribute to solutions regarding flood risk?*

Condition 2: Useful knowledge

Indicator	Predefined question
2.1 Information availability	*To what extent is SCP information on flood risk available and reliable, which can support well-informed decision-making?*
2.2 Information transparency	*To what extent is SCP information on the flood challenge accessible and understandable for experts and non-experts, including decision-makers?*
2.3 Knowledge cohesion	*To what extent is information on the SCP cohesive, including integration of short- and long-term goals between various policies and stakeholders in order to deal with the flooding challenge?*

Condition 3: Continuous learning

Indicator	Predefined question
3.1 Smart monitoring	*To what extent is the monitoring of process, progress, and policies in the SCP able to improve the level of learning about the flooding challenge?*
3.2 Evaluation	*To what extent are SCP policies and projects continuously assessed and improved, based on quality evaluation methods?*
3.3 Cross-stakeholder learning	*To what extent do stakeholders involved in the SCP have the opportunity to interact with other stakeholders and choose to learn from each other?*

Wanting dimension

Condition 4: Stakeholder engagement process

Indicator	Predefined question
4.1 Stakeholder inclusiveness	*To what extent are stakeholders involved in the decision-making process of the SCP?*
4.2 Protection of core values	*To what extent are SCP stakeholders committed to the process and actively involved?*
4.3 Progress and variety of options	*To what extent are SCP procedures clear and realistic and are a variety of alternatives co-created?*

Condition 5: Management ambition

Indicator	Predefined question
5.1 Ambitious-realistic management	*To what extent are the SCP's goals ambitious and yet realistic?*
5.2 Discourse embedding	*To what extent is SCP policy interwoven in local historical, cultural, and political context?*
5.3 Management cohesion	*To what extent is SCP policy coherent regarding 1) geographic and administrative boundaries, and 2) alignment across sectors, government levels, and technical and financial possibilities?*

Condition 6: Agents of change

Indicator	Predefined question
6.1 Entrepreneurial agents	*To what extent are entrepreneurial agents of change enabled to gain access to resources and have influence on decision-making?*
6.2 Collaborative agents	*To what extent are actors enabled to engage, collaborate and connect businesses, government & sectors in order to address flood risk?*
6.3 Visionary agents	*To what extent are actors in the SCP network able to facilitate long-term and integrated strategies which are supported by interim targets?*

Enabling dimension

Condition 7: Multi-level network potential

Indicator	Predefined question
7.1 Room to manoeuvre	*To what extent do actors in the SCP have the opportunity to develop a variety of alternative approaches that can address existing or emerging flood risk challenges?*
7.2 Clear division of responsibilities	*To what extent are responsibilities in SCP policies and regulations clearly formulated and allocated, in order to effectively address flood risk challenges?*
7.3 Authority	*To what extent are legitimate forms of power and authority present in the SCP?*

Condition 8: Financial viability

Indicator	Predefined question
8.1 Affordability	*To what extent are flood risk related SCP policies and climate adaptation measures available and affordable for all citizens?*
8.2 Consumer willingness to pay	*How is expenditure related to flood risk perceived by all relevant stakeholders (i.e., is there trust that the money is well-spent)?*
8.3 Financial continuation	*To what extent do financial arrangements secure long-term, robust policy implementation, continuation, and risk reduction?*

Condition 9: Implementing capacity

Indicator	Predefined question
9.1 Policy instruments	*To what extent are SCP policy instruments effectively used?*
9.2 Statutory compliance	*To what extent is SCP legislation and compliance well-coordinated, clear and transparent, and do stakeholders respect agreements and objectives?*
9.3 Preparedness	*To what extent does the SCP account for uncertain changes and events?*

3.2.2. Processing and visualization of scoring results

First, indicator scores will be derived from the predefined questions that are listed on the previous pages. An assessment guide will be used (Appendix, page 157) to create Likert indicator scores that range from -- 'very limiting' or ++ 'very supporting' (table 3) will be shown in a 'spider web' diagram made with Microsoft Excel, by entering numbers ranging from 0 (--) to 4 (++). In figure 12, an example of this can be seen.
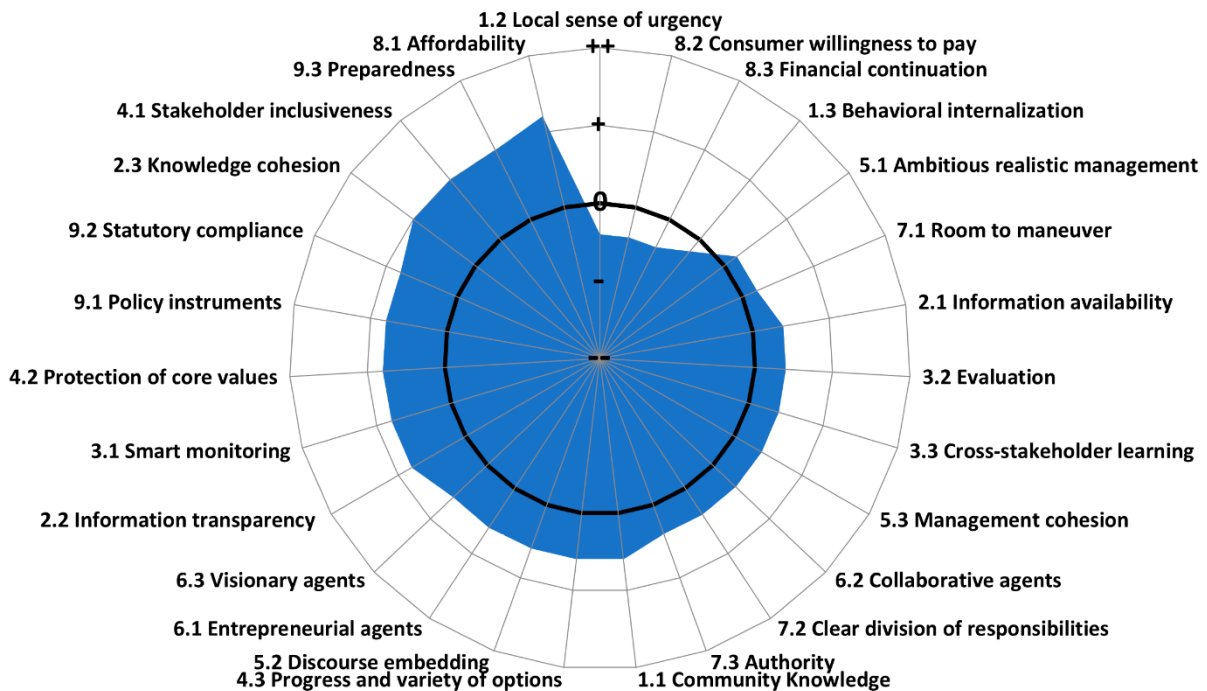
Figure 12: An example of GCF results: water governance capacity of Seoul, South Korea (Kim et al, 2018).

For each indicator, scores will be elaborated as to why it scored a certain number of points, thus making clear which governance conditions have room for improvement and which areas already perform strongly. Scores will be based on literature, policy documents, open-ended interviews and a survey in which respondents can pick answers on the aforementioned predefined questions, ranging from -- to ++ (Appendix, page 157). Combining these various sources leads to a single score per indicator.

Since all conditions include three indicators *(i)*, an average score out of these indicators will emerge for each condition. For example: the average of the 8. Financial viability condition is scored as follows, based on the predefined questions and rubric assessment:

i8.1 Affordability (+)	=	2
i8.2. Consumer willingness to pay (-)	=	2
i8.3 Financial continuation (++)	=	3
Total	=	7

In this example, the three indicators lead to an average score of 7/3 = 2,33 ≈ a score of **+/-** for the 8. Financial viability governance condition. These outcomes will subsequently be displayed in a bar chart to show all average scores for each condition.

3.3. Addressing governance capacity with leadership (SQ3)

In the third and final subquestion, findings from the previous subquestions come together: in SQ1, actors and stakeholders that were identified in the analysis have been linked to leadership functions that hold influential power in governance of the SCP. In SQ2, governance capacity is assessed to find supporting and limiting governance conditions. Addressing to improve governance conditions with the identified leadership functions will form the final results chapter of this research: indicators that score **+/-** or lower will be analysed through the lens of leadership functions, while indicators that score **+** or higher will not, as the former should be prioritized before already well-performing indicators.

3.4.   Research area
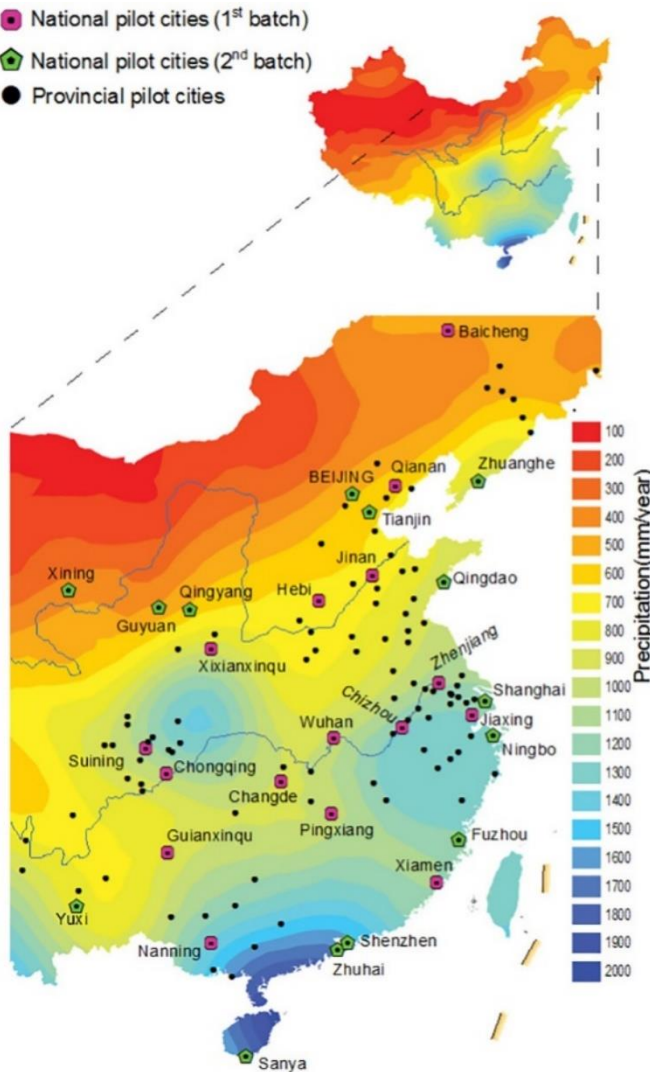
Figure 13: SCP pilot cities. Most are located around the Yellow River in the north and the Yangtze River in the south. (Ma, 2020; edited by author).

This research focuses on the SCP in general, therefore the research area can be considered as all urban areas within China that have implemented SCP policies (figure 13). Pilot cities from the first batch started implementing sponge city projects in 2015 while the second batch started in 2016 by approval of China's Ministry of Housing and Urban-Rural Development, (MOHURD) the Ministry of Water Resources (MWR) and the Ministry of Finance (MOF), meaning that at the time of writing this research, these cities have experienced at least five years of sponge city urban water governance, ranging from the designing phase until the post-construction phase. Many of these cities lie in floodplains, most noticeably the floodplains of the southern Yangtze River, which the World Resources Institute (WRI) considers as high risk due to being prone to riverine and pluvial flooding. The Yangtze River basin endures summer monsoon seasons, where natural floods occur in its floodplain (World Resources Institute, 2013), strengthened by increased precipitation from climate change. Other SCP cities are located along the rainy southern coastline, with monsoon seasons and heavily built-up areas: most of China's population lives along the coast, which has led to high density grey infrastructure with little room for water. Next to pluvial flooding, these coastal cities are threatened by coastal flooding as well, but the SCP is not focused on this type of flooding.

3.5. Range of research

This research will cover a comprehensive overview of the governance approach that has been utilized to implement the SCP, in order to find potential improvement points that can contribute to the programme's governance capacity. Without the possibility to travel to the research area due to the covid pandemic, gathering information first-hand can prove to be more difficult. However, interviews and surveys will be conducted from a distance to bolster gathering of information.

Moreover, since most of this research looks into governance of the SCP as a whole, findings can be generalized: though keep in mind that what may apply in general may not account for every pilot city involved in the SCP (e.g., regarding research into funding issues, some wealthier SCP pilot cities may not experience funding problems at all, while others struggle to fund even a handful of projects). Lastly, it should be noted that the SCP is still relatively young at five years old. Its long-term effects and influence are not yet known and many existing literature findings is based on predictions and/or short-term impacts. Lastly, in order to restrict the theme of this research, only governance-related topics will be taken into account.

3.6. Reliability and validity

For all three subquestions, three types of sources are used to find results: primary sources (public policies, regulations, etc), secondary sources (academic literature and news) and own data (surveys, interviews). Each finding from a type of source can be compared and validated by the other types. The frameworks that have been used provide consistency. Surveys are standardized and ensure validity of results.

Due to the nature of the GCF in which experts give their personal insights and experiences, and scoring is partly based on interpretation by the researcher, a single 'truth' cannot be found. However, the average scores that are found for the several governance conditions will give an indication of SCP governance capacity performance. Linking these with leadership functions will give a general idea on which actors can 'take the wheel' to solve specific governance capacity issues and how they can do so. Applying these methods on a case-study can provide more detailed insights, but this research can be considered as a first step to apply the GCF and LFF to a broader Chinese context.

3.7. Interviews and surveys

To find both in-depth data and generalisable data through qualitative and quantitative methods, interviews and surveys were conducted for this research. In the appendix, interview transcriptions as well as survey responses can be found.

Interviews have been conducted in a structured and semi-structured manner, as that best represents the GCF framework: structured on the one hand, because the predetermined formalized list of GCF questions were discussed with the participants, and semi-structured on the other hand because of open-ended questions that allow the possibility for follow-up questions based on their answers, as well as a discussion on the topic. That way, the interviews were done both strictly corresponding to the GCF framework while at the same time allowing flexibility. To operationalize answers given by interviewees, scores from -- to ++ were assigned per topic based on interpretation.

At the same time, surveys were conducted to analyse data from a larger group. Instead of the possibility of open-ended answers as in interviews, answering possibilities in the survey were closed-ended through multiple choice options that directly corresponded with the GCF scoring method ranging from -- to ++. Scores were gathered in Excel and averages were calculated by operationalizing scores to numbers ranging from 0 to 4 in a Likert scale type manner, allowing quantitative treatment of data. Questions were standardized based on the GCF and self-administered, which has the benefit of easier distribution to a larger number of potential respondents and can that way be conducted anonymously.

Interview participants and survey respondents were selected based on their expertise (table A and table B). The most approachable candidates for both interviews and surveys were found to be researchers and professors at various universities. Compared to other professions, the response rate among researchers was relatively high. In total, over 150 potential candidates were

#	Name	Profession / expertise	Institute / company	Experience with SCP
1	Liping Dai	Researcher and professor on water governance	Utrecht University	Worked together with municipal Water Affairs Bureau to organise SCP workshops and a symposium
2	Lei Li	Specialist in sustainable flood risk management	Chinese National Research Council / Nottingham-Ningbo University	Aids in development of SCP pilot in Ningbo city
3	Shiyang Chen	Urban planner; consultant for Sponge City planning	China Academy of Urban Planning and Design (falls under MOHURD)	Worked with Deltares on SCP implementation in Nanjing; currently working on SCP in Suqian

Table A: interview participants.

#	Profession / expertise	Institute / organization / company	#	Profession / expertise	Institute / organization / company
1	Urban planner and landscape architect	Turenscape	20	Professor in Information Systems	University of Nottingham-Ningbo
2	Consultant	International Water Association	21	Director / Distinguished visiting professor	Water Management International / University of Glasgow
3	Civil engineer at Baotou SCP	Arup	22	Adjunct researcher of Water Policy	Lee Kuan Yew School of Public Policy
4	Urban development specialist	Asian Development Bank	23	Professor in International Business and Strategy	Nottingham University Business School China
5	Professor of Environmental Sciences	University of Nottingham-Ningbo	24	Professor of Water Resources Planning and Management	Institute of Geographic Sciences and Natural Resources Research
6	Professor of Flood Resilience	IHE Delft Institute of Water Education	25	Expert in water and climate risk assessment	China Water Risk
7	Professor of flood management	University of Nottingham	26	Representative	China Development Bank
8	Professor of Environment & Energy Engineering	Beijing University of Civil Engineering and Architecture (BUCEA)	27	Professor of Urbanism	TU Delft
9	Researcher	Research Institute of Sponge City Development (BUCEA)	28	Hydrologist	National Institute of Water and Atmospheric Research
10	Researcher in Urban Flood Resilience / project coordinator	University of Nottingham	29	Water Quality Modeller	UK Centre for Ecology & Hydrology
11	Researcher of Economics and Management	Nanjing Forestry University	30	Researcher	Guizhou Water & Power Design Institute
12	Researcher of Ecological Civilization Construction and Forestry Development	Nanjing Forestry University	31	Researcher at Key Laboratory of Water Cycle and Related Land Surface Processes	Institute of Geographic Sciences and Natural Resources Research
13	Postdoctoral researcher	Utrecht University Centre for Water, Oceans and Sustainability Law	32	Professor of Civil and Environmental Engineering	Auburn University
14	Professor of Civil Engineering	Southeast University Nanjing	33	Research scientist	Institute of Urban Environment Ningbo
15	Researcher of Integrated Water Systems and Governance	IHE Delft Institute of Water Education	34	Professor	University of Colorado
16	Postdoctoral researcher of Urbanism	South China University of Technology	35	Director of Water Management China (consulted Wuhan municipality for SCP)	Arcadis
17	Lecturer and postdoctoral researcher of Landscape Architecture & Spatial Planning	Wageningen University	36	Stormwater management consultant (SCP Chongqing)	Suez
18	Professor of Land Use and Transport Planning	Aalto University			
19	Adjunct professor in Environmental Sustainability	University of Hong Kong			

Table B: survey respondents.

approached by e-mail and were asked if they were available for either an interview or could participate anonymously in the survey. Most had the Chinese nationality and were occasionally able to provide examples to answers. They were selected based on their current expertise, such as experience and knowledge regarding the Sponge City Programme, Chinese water governance, flood risk management, Chinese urban planning, land use, and environmental engineering. Besides researchers and professors at universities and research institutes, candidates had professional backgrounds at consultancy firms, development banks, landscape architecture bureaus, engineering bureaus and NGOs. As can be expected, more candidates were willing to do an anonymous survey instead of an interview. Still, it was possible to conduct three interviews (table A) next to a total amount of 36 survey responses (table B). Due to the nature of the GCF framework questions, which can be regarded as being able to evoke rather critical answers to government policies, it is assumed many Chinese candidates were less keen to participate in interviews but would rather help anonymously in the survey. Providing an anonymous option was therefore a deliberate choice to maximize response numbers, although the response rate was nonetheless lower than expected. Utilizing mixed methods provided necessary data.

Results

Analysis, assessment and synthesis

Photo: Lianhuashan Park, Shenzhen city (LZF).

Analysis

What is the institutional context and leadership structure of the SCP?

In this chapter, the institutional background and leadership structure of the SCP are examined. This includes the following: actors and stakeholders (categorized within 'public sector, 'private sector' or 'civil society') will be analysed, mapped and placed in a 'importance-influence matrix' (DFID, 2003) to describe their positions, interests and interactions. As a reminder: *importance* is defined as the extent to which interests are being prioritized, while *influence* is defined by the power to facilitate or block policy goals (DFID, 2003). Moreover, leadership functions of actors are described and elaborated (*political-administrative*, *connective*, *adaptive*, *enabling* and *dissemination*), while bearing in mind the effects of the cadre evaluation system and the extent to which (local) authorities have discretionary power.

4.1. Actor analysis

Governmental institutions that are most involved with governing the SCP are the State Council (SC), the Ministry of Housing and Urban-Rural Development (MOHURD), the Ministry of Water Resources (MWR), the ministry of Finance (MOF), the National Development and Reform Commission (NDRC) and two banks: the state-owned Chinese Development Bank (CDB) and the internationally oriented Asian Development Bank (ADB). The latter is run by several countries, which is why it is placed in the public sector category. Among the bank's member countries is China, which is also the largest borrower country of the ADB. The ADB contributes significantly to the SCP financially and therefore steers the direction of the programme to some extent, which is why it will be considered as an actor. Next, their scores regarding importance and influence with their corresponding classification based on the matrix (DFID, 2003) will be given and explained, as well as their leadership function based on the LFF (Meijerink & Stiller, 2013).

4.1.1. State Council (SC)

Matrix classification: key player (high importance, high influence)
Leadership functions: political-administrative

The SC is the official name of the central Chinese government, under leadership of president Xi Jinping, who was the first to publicly mention the idea of sponge cities. As has previously been described in this research, the central government has initiated the SCP and is the central overseer to the programme. The SC political party (China is a one-party state), the CCP, is the head of several ministries that are involved in the SCP and thus formally in charge of all related SCP policies (Lashford, 2019). Pilot cities have been selected by the SC in 2015 and 2016. According to Chen & Chen (2020), the main consideration during this time was the public welfare nature of the project. The top-down structure of Chinese governance of the SCP means that the SC holds the largest *influence* to facilitate or impede the objectives of the SCP out of all stakeholders. Their *importance* is unmatched, too: the SC's needs and interest are top priority.

Dai (2017) states that political steering is very clear for SCP policies: by means of law, binding engineering standards, mandatory responsibility statements and other compliance mechanisms, the SC assures itself of control. Requirements for SCP planning is directly published or otherwise approved by the SC before construction or implementation is possible. Short, medium and long-term development targets for the SCP have been initiated by the SC since the start of the programme (Qi et al, 2020): the short term (2015-2018) focused on promoting, demonstrating and establishing small-scale SCP construction projects; the medium-term (2018-2020) aimed to establish and legislate SCP performance to expand SCP infrastructure to at least 20% of municipal pilot city areas by the end of 2020; and lastly, the long-term (2020-2030) is currently targeting implementation of SCP projects into general planning strategies and urban master development plans with the final goal of 80% of pilot city municipal areas having SCP infrastructure.

All these targets set by the SC are leading for all other government authorities, who must always act upon them when governing the SCP. This is most noticeable for the MOHURD, who translate these targets into technical guidelines. As head of all other government actors and leading authority on formal decision-making and funding, the SC fills the *political-administrative* leadership function. Other functions are outsourced to departments, both horizontally and vertically.

4.1.2. Ministry of Housing and Urban-Rural Development (MOHURD)

Matrix classification: key player (high importance, high influence)
Leadership functions: political-administrative, enabling

Together with the MOF and MWR, the MOHURD has announced development of the SCP and these three ministries together are in charge of selecting pilot cities, based on assessing their applications that provincial governments have forwarded (Kumar, 2021). They are most involved out of all Chinese ministries in SCP implementation (Li et al, 2016). The MOHURD is in charge of operation and delivery of SCP practices and carries the responsibility for all SCP construction in the total of 30 Chinese pilot cities (Qi et al, 2020). Other objectives within the SCP include forming targets for urban flood control (e.g., the SCP's target of making 80% of Chinese urban areas absorbent), creating standards on construction that correspond with SCP construction requirements, and supervising SCP implementation and construction by municipalities on 6 aspects: water ecology; water environment; water security; institutional capacity building; execution effectiveness (I&W, 2016). This is all included in one of the main frameworks of the SCP, the *Technical Guidelines for Sponge City Construction'* (MOHURD, n.d.), which is published by the MOHURD. It describes the relationship between nature-based solutions and the SCP in detail. Moreover, this document contains the SCP's design objectives, procedures and construction details, divided by urban area characteristics (e.g., buildings, parks, roads). Lastly, this document describes how to operate, evaluate and maintain SCP facilities. It works as a binding toolkit from the planning stage to construction and maintenance (Dai et al, 2017), effectively making the MOHURD in charge of a large part of the SCP implementation process.

The MOHURD is thus considered a *key player* with both high *influence* and *importance*, as they hold the power to facilitate or block support of policy and their interests are of the highest priority. By creating the framework of the SCP and guiding lower levels of government with the *Technical Guidelines*, the MOHURD most noticeably fills the *political-administrative* leadership function due to the formal decision-making power they hold. The MOHURD has the power to accept or turn down self-assessments by municipalities (after being evaluated by the province) and can thus be seen as a positional leader. Moreover, they fulfil the *enabling* leadership function, due to how

the MOHURD's position between the State Council and the municipality is utilized: policy targets are translated into guidelines before passing them on to the municipality. This creates conditions for implementation of the programme, while they hold the power to determine how much space for innovation is allowed on a lower level with the technical guidelines they provide.

4.1.3. Ministry of Water Resources (MWR)

Matrix classification: subject (high importance, low influence)
Leadership functions: connective, enabling, adaptive

Together with the MOHURD and MOF, the MWR has announced development of the SCP and these three ministries together are in charge of selecting pilot cities, based on assessing their applications that provincial governments have forwarded (Kumar, 2021). They are most involved out of all Chinese ministries in SCP implementation (Li et al, 2016). The MWR is responsible for drainage, handling stormwater and urban surface water management, which includes all forms of urban flooding. Moreover, the MWR monitors urban water quality, vegetation, green spaces and their maintenance within SCP projects (Qi et al, 2020) and handles the functioning, supervision and guidance on water conservancy aspects of the SCP (I&W, 2016). The MWR puts forward key water conservancy measures and technical support such as technical standards on water level, flow capacity and water quality.

Their responsibility on standards and measures indicates a high amount of *importance*, but since they have little power to facilitate or block SCP policy goals, their *influence* is significantly lower (especially compared to the other involved ministries): a largely supervisory role is observable within the more 'technical' aspects of the SCP. The MWR also establishes connections between water facilities and city drainage networks, indicating their *connective* leadership function. Moreover, the MWR handles spatial control and ecosystem protection of rivers, lakes and bodies of water in cities: in the SCP, this translates most noticeably into the ecosystems of SCP wetland projects (Turenscape, n.d.). Nowadays, the MWR aims to give rivers more space and to use more ecological friendly flood protection measures along river banks. With use of their own engineering facilities and emergency response, the MWR aids municipalities with flood prevention and drainage systems. Workshops are organized

with Chinese cities regularly by the MWR to introduce and share knowledge around SCP projects, thus creating conditions for the emergence of new knowledge within the network, a characteristic of the *enabling* function.

4.1.4. Ministry of Finance (MOF)

Matrix classification: key player (high importance, high influence)
Leadership functions: political-administrative, connective

Together with the MOHURD and MWR, the MOF has announced development of the SCP and these three ministries together are in charge of selecting pilot cities, based on assessing their applications that provincial governments have forwarded (Kumar, 2021). They are most involved out of all Chinese ministries in SCP implementation (Li et al, 2016). Allocation of funding for SCP pilot cities is one of its key tasks, with amounts varying based on administrative levels (e.g., a provincial capital receives more than a regular city). The MOF is responsible for funding of SCP development, but government funding is not sufficient (Dai et al, 2017). Thus, seeking out possibilities for PPP (public private partnerships) is another main task of the MOF (Qi et al, 2020; Ministry of Infrastructure and Water Management, 2016). For that reason, the MOF published the *'Government Procurement Management Method of Public-Private Partnerships Program'* document which aims to attract more private investors and to formalize the SC's involvement in PPP (Li et al, 2016). These PPP agreements aim for provision of assets or services, as well as allocating risks between both public and private partners and creating efficiency incentives for service providers. For that to work, the MOF links payments to explicit performance criteria. PPP arrangements found by the MOF for the SCP can take the form of five categories: services contracts, leases, management contracts, concessions and design/build-operate-transfers (Li et al, 2016). Allocation of funding is a typical function of *political-administrative* leadership, while searching for PPP agreements are part of the *connective* function, since new collaborations between sectors are being sought out to seek solutions (in this case, to close the funding gap). Since the end of 2015, the MOF has provided more than 70 PPP documents (Tortajada et al, 2020), indicating the willingness of the Chinese government to promote PPPs. This willingness makes sense, since

aforementioned risk can be transferred partly to the private sector at a fixed price. It can also accelerate project implementation and reduce project costs (Lu et al, 2019).

Despite these advantages, PPP funding for the SCP is still in a developing stage. The MOF aims to fund the SCP with PPP with two thirds of the total funds needed: ideally, the government needs to finance only a third (Sina, 2016), meaning the MOF still has enough work to do in order to acquire more PPP collaborations. Since the MOF allocates funding, their *influence* is high, as funding is essential to realizing policy goals. Their *importance* is classified as high as well: the MOF determines the conditions for PPP agreements.

4.1.5. National Development and Reform Commission (NDRC)

Matrix classification: key player (high importance, high influence)
Leadership function: political-administrative

Similar to the three ministries elaborated in the last three paragraphs, the NDRC is a constituent department of the State Council (SC). The NDRC has administrative and planning control over Chinese economic matters and is sometimes nicknamed the 'mini–State Council' (Woodall, 2013). They formulate, develop and implement long-term strategies while leading a unified planning mechanism (NDRC, n.d.). Other tasks include evaluating risk assessments and proposing suitable measures to combat them. According to their website (NDRC, n.d.), focus has shifted primarily on macro matters and coordination of major strategic planning: the NDRC states to have cut activities on a micro level to stimulate market players by minimizing their own role. Top-down instructions from the SC are passed on by the NDRC, while proposals that are submitted to the NDRC are reviewed by requirements of the SC and then possibly approved. The NDRC oversees and facilitates or blocks allocated funds for sponge city construction (I&W, 2016). Their *influence* is therefore classified as high. Assessments are made by degree of adherence to the *'Sponge City Construction Guidance'*, published by the SC. The NDRC is thus responsible for approval of SCP project implementations (Qi et al, 2020). The NDRC doesn't have any interests of its own regarding the SCP, but since they directly represent the SC's interests when they review proposals, they are nonetheless highly *important.* Since the NDRC's activities are rather restricted and function more or less as a representative of the SC in the SCP process reviewing

proposals, their leadership function is limited to *political-administrative* activities. Besides that, they are not involved in any decision-making of the SCP process regarding how and when it must be implemented.

4.1.6. Provinces (PROV)

Matrix classification: context-setter (low importance, high influence)
Leadership function: connective

Due to the nature of the SCP, which is created at the highest government level and implemented on a local city municipality level, provinces only have a small and mainly supervisory role for the SCP. However, besides advisory activities, Chinese provinces do have a role in the central government's SCP evaluation system mechanism to ensure implementation of the SCP at the local level (Dai et al, 2017). For the SCP, this system contains six categories that each have their own compulsory standards and criteria to adhere to: water ecology, water environment, water resources, water security, institutional capacity and execution effectiveness. These are evaluated in three steps: a pilot city submits a self-assessment of the requirements of all three categories to a provincial government authority, which subsequently reviews the assessment and creates a report that is then sent to the MOHURD if the review is positive. Their power of approving assessments indicates high *influence.*

As provinces act as a connecting government authority between the municipality and national government, they fill a *connective* leadership position. Provincial leadership will be held accountable if a municipal self-assessment should not have been approved and sent to the MOHURD. Worst case scenario in this is that the city loses its sponge city title and provincial government officials may be demoted or not promoted. These rules are standard in CCP regulations and therefore also present in the process of the SCP. This accountability system ensures implementation of the SCP at the local level through the provincial level by the national government. Thus, the province plays not only an advisory role towards municipalities, but an evaluative role according to the standards given from above as well, with corresponding accountability responsibilities. In some instances, provinces may add modifications to the SCP in order to better fit their needs. An example of this (Galderisi, 2018) is

Guangdong province, which requested to alter certain SCP standards before construction started. It was approved by national government thanks to the province's adherence to the *Technical Guidelines for Sponge City Construction'* (MOHURD, n.d.). Such modifications are thus limited by national government regulations, but possible nonetheless. Due to their infrequency and limitations, *importance* of provinces is considered low: their interests are not weighted heavily.

4.1.7. Municipalities (MUN)

Matrix classification: subject (high importance, low influence)
Leadership functions: connective, enabling, dissemination

Even though the SCP consists of top-down processes with policies and decisions coming from national government authorities, municipalities have an active role to play. After all, it is at their city level that SCP projects are eventually implemented. For municipalities, the most important is the aforementioned *Technical Guidelines for Sponge City Construction'*, provided by the MOHURD (Qi et al, 2020).

As long as municipalities abide by these guidelines, they have discretionary power to some degree: a relatively large amount of freedom in deciding how SCP projects can accommodate their specific context, thus having a high amount of *importance* surrounding the implementation process and outcome of SCP projects. For example: in the city of Jinhua, the municipality was free to hire companies and approve their designs for sponge city projects (figure 2 on page 15: Yanweizhou Wetland Park by Turenscape). Another example is that municipalities can explore ways of PPP, which is exemplary of the *adaptive* function (see 4.1.4.) that fit to their local context. However, the level of *influence* SCP municipalities have is considerably lower than their level of *importance*, as they are 'chosen' by higher government powers and must simply abide to facilitate SCP projects. But it must be noted that municipalities are almost always willing to partake in the SCP, as it can lead to a higher city status, more money and better environmental conditions.

The *connective* function is observable as well due to municipalities aiming to bring the public and private sector together. Some municipalities do not necessarily need to aim for high percentages of PPP funding, dependent on whether infrastructures and facilities are mostly managed by the municipality or not (Li et al,

2016). In many cases, anti-flooding engineering infrastructure is not profitable for the private sector, meaning actively seeking out PPPs can be futile. A larger PPP success rate is typically found in SCP projects that include housing and recreation. An extra incentive for municipalities was created by the MOF and MOHURD: bonuses of 10% of initial central government funding is awarded to municipalities that raise a certain percentage of PPP funding (MOF, 2014; MOHURD, 2014).

Municipalities typically have their own departments that deal with the SCP, such as *'Land Resources Committees* and *Urban Planning Committees'* and *'Water Affairs Bureaus'* who are responsible for making local policy out of higher-level government plans and providing blueprints for construction based on the MOHURD's technical guidelines. However, Meng (2019) states that in practice, spatial planners for Chinese municipalities are mostly negotiating and regulating between different departments to find consensus and collaboration. Other municipal departments include *Finance Bureaus* (searches for funding support such as PPPs on order of the MOF), *Water Affairs Bureaus* (in control of ensuring the MWR's standards are being upheld, as well as providing planning, design and evaluation parameters) and *Housing Construction Committees* (inspection of SCP project constructions). Through the *Application Guidelines* provided by the MOHURD, municipalities are given instructions on how to research their topography, hydrological characteristics, rainfall, flooding traits and water resources. In general, Chinese municipalities are highly interested in application for becoming a SCP pilot city (Dai et al, 2017). First and foremost, because of the improvements to their cities with regard to flooding resilience and sustainable water management (Chen & Chen, 2020), but also due to the economic benefits and prestige the title 'sponge city' can bring nationwide.

Moreover, in a one-party state such as China, actively responding to a request from higher levels of government is important for state officials. It is noteworthy, however, that finances surrounding the SCP can be a 'double-edged sword' for municipalities: as mentioned, funding by the central government is not sufficient for full SCP implementation, which poses great challenges for municipalities to acquire additional funding (such as through PPPs). Research (Tortajada et al, 2020) indicates that PPP requirements from the MOF are often difficult to achieve for municipalities due to (among other reasons) policy conflicts between policies from the MOF, MOHURD and MWR (Yu, 2016).   A   final

activity that many SCP municipalities arrange are discussion platforms to enhance cooperation and collaboration between departments. An example of this is the Wuhan municipality, which established a 'Headquarters of Pilot Projects for Sponge City constructions' (Wuhan Municipality, 2016). During the sessions of these platforms, matters such as relevant policies and essential decisions of the SCP are discussed. This plays an important part in effective SCP implementation on the municipal level, since municipal ideas are spread out through its various departments. Next to these discussion platforms, municipalities organise workshops together with the MWR. Both the discussion platforms and workshops show the *dissemination* function in action, as this function is about spreading of new and innovative ideas.

4.1.8. China Development Bank (CDB)

Matrix classification: context-setter (low importance, high influence)
Leadership function: none

The CDB is under direct jurisdiction of the SC and is one of three *policy banks* (Chinese banks that are in charge of funding state projects) in China. The CDB in particular is often referred to as the main engine that powers development policies from the central government (Forsythe, 2011). Being one of the main government funding drivers behind the SCP, the CDB gathers funds from various sectors, among which commercial banks to provide min- and long-term loans, bonds and insurances for SCP projects (Qi et al. 2020). Their interests are not prioritized in SCP planning, indicating low *importance*, but their *influence* is considered high due to their power of providing funding in name of the SC. The CDB is active in seeking out aforementioned PPP opportunities (Liu, 2016). The 10% SCP bonus funding that is awarded to successful municipalities in PPP agreements is paid out by the CDB (Cai, 2017). Although under direct jurisdiction of the SC, the CDB itself does not hold a leadership position within the SCP.

4.1.9. Asian Development Bank (ADB)

Matrix classification: subject (high importance, low influence)

Leadership function: none

The ADB is one of the main loan providers for funding into the SCP. In their report *"Key considerations for mobilising financing for Sponge Cities"* (ADB, 2021), both past loans and future loans are elaborated. A given example is their involvement for the SCP in Wuhan, where the ADB provided $100 million in loans (of $252 million total investment) to reduce flood risk in the Huanggang area, along the Yangtze River. The ADB is not involved in all SCP projects, but when it is, it covers significant amounts and is thus an important player. Over the next three years from 2021 onwards, another loan of $200 million is provided by the ADB, designated for "climate- and disaster-resilient urban water infrastructure" projects of the SCP. It must be noted that these loans come with conditions and requirements, formulated by the ADB. For example, technical requirements are formulated in the loan agreement as part of eligibility criteria. These requirements indicate a high level of *importance,* but since the ADB is not involved in any other way of the implementation process of the SCP, their *influence* is low: the funding helps, but is not essential to ensure the SCP's longevity. State funding makes a larger impact, as does PPP in potential when utilized. Lastly, the ADB does not hold a leadership position as defined by Meijerink et al (2014). Leadership positions in the SCP are solely present for Chinese-only government authorities. The ADB consists of multiple country member-shareholders (including China), but its president is always Japanese and the United States are the largest shareholder.

4.2. Stakeholder analysis

Regarding relevant stakeholders in the SCP, a distinction can be made between the private sector and civil society. In the private sector, companies that are hired to design and construct sponge city projects (named 'executive companies'), private land and real estate developers and private investors will be discussed. Executive companies due to their significance for the outcome of SCP plans, developers because of their development of the land on which SCP infrastructure is placed as well as their financial possibilities, and private investors for their involvement in PPP agreements.

Regarding civil society, one group is most relevant for governance of the SCP: residents, since they inhabit areas where sponge city infrastructure is built. Below, their scores regarding importance and influence with their corresponding classification based on the matrix (DFID, 2003) will be explained. Leadership functions will not be analysed as they are not present, since they are not part of the Chinese government.

4.2.1. Executive companies (EXCOM)

Matrix classification: subject (high importance, low influence)

Companies that work as contractors or focus on designing or advising the construction of sponge city infrastructure shape the outcome of sponge city planning and therefore play an important role in the SCP. Examples include: *Arcadis*, a Dutch engineering and management consulting company, whom provided technical, program management and policy related advisory to the Wuhan municipality during the pilot city's trajectory (Arcadis, n.d.); *Arup*, a British advisory company on design, planning and engineering, whom have helped Chinese local government authorities in creating a sponge city master plan in Baotou city, to develop over 15 square kilometres of its urban area (Pattinson, 2016); *Suez*, a French water management company, whom have developed an urban drainage stormwater management system in the city of Chongqing for a SCP project; and the aforementioned *Turenscape*, a Chinese landscape architecture company that has designed several wetland parks in cities such as Jinhua (figure 2 on page 21). All these companies are chosen by municipalities: higher levels of government allow municipalities to employ companies for the practicalities of sponge city infrastructure. The way sponge city projects are shaped by such companies shows their relatively *high* importance, as they work within their own interests when designing or advising municipalities. Their viewpoints and expertise are taken seriously enough for Chinese government authorities to entrust them with sponge city projects. However, such companies do not hold any power over SCP policy and are therefore not *influential.*

4.2.2. Developers (DEV)

Matrix classification: crowd (low importance, low influence)

Developers are potentially key stakeholders for the SCP: they are essential in making PPP agreements work and must be incentivized to be willing to incorporate SCP infrastructure into their developments (Qi et al, 2020). The SCP's targets of covering at least 20% of urban areas in pilot cities with sponge infrastructure cannot be realised without the help of developers, co-production needs support from both the public and private sector in order to achieve results. One way to incentivize developers to invest more in land that is scheduled for SCP projects, is to reduce taxation (Gao et al, 2017), as there is little interest coming from developers in most projects, unless liveability increases, for example, housing prices. Developers' interests are not prioritized and they do not hold any power to facilitate or block SCP policies, and therefore score low on both *importance* and *influence.* It must be kept in mind, however, that their *importance* could grow drastically when PPP is utilized to a larger degree.

4.2.3. Private investors (INV)

Matrix classification: crowd (low importance, low influence)

Private investments into sponge infrastructure are an underdeveloped way of funding for the SCP. This has several reasons. First, SCP infrastructure usually results in a low investment return for investors, making it undesirable for them (Qi et al, 2021). Second, according to Tortajada et al (2020), there is distrust between local governments and private investors: local governments are often not willing to transfer financial gains from potentially promising projects (partially) to private investors. Officials are reported to often be suspicious of private firms, resulting in them keeping the already few interested private investors out. This appears to be contradictory to government authorities seeking out PPP agreements to fund the SCP, but since China accepts 'social capital' instead of 'private capital' as well in such agreements, state-run firms are often preferred (Bloomberg News, 2017). Dai (2017) adds that another possible reason which leads to the reluctancy of private investors to invest is their exclusion of the decision-making process. For many of them, it is unclear how they can gain profitable returns on their investment. The Economist (2016) has shown statistics that private investments have only grown by 2.1% in 2016 compared to 2015, which is why Dai (2017) calls it one of the main obstacles to upscale the SCP to a nationwide policy. At the current stage, the 'private' component of PPP funding is thus mostly state-run

(Lockett, 2017) until investing into SCP projects becomes more appealing for private investors, similarly to how private developers need to be attracted more. Investors' *importance* and *influence* is therefore low as well, until the SCP evolves into a programme that includes PPP.

4.2.4. Residents (RES)

Matrix classification: crowd (low importance, low influence)

Residents are the first and foremost to be affected by sponge infrastructure. Ideally, construction of SCP projects can provide better living conditions for residents. When cooperation between all stakeholders is realised, including residents, a "win-win" situation might be possible (Tang et al, 2018), since support and engagement of residents is key to the SCP's success in terms of increasing liveability of environments (Qi et al, 2021). However, according to Dai (2017), civil society is merely the recipient in sponge city planning due to the top-down approach. Qi et al (2020) state that resident participation is practically non-existent, even though it is recognized that it could enhance the capacity to improve project outcomes. Being on the receiving end without having their interests heard and without holding any power to shape SCP policies, residents score low on both *importance* and *influence.* Peng & Reilly (2021) add that residents are not considered enough in the implementation process of sponge city projects and that a mechanism should be introduced that permanently involves them in all steps of SCP governance, from the design phase to implementation. Although effective citizen participation demands time, commitment and effort from all other stakeholders, it can identify this group's interests and raise environmental awareness too. Liu et al (2016) argue that this awareness is currently 'shallow': most residents have only heard about the SCP on TV and from websites. Only the relatively small group of experts and other well-educated people are aware of the SCP's details. Surveys from researchers (Qi et al, 2021) have shown that the common perception is that the SCP can improve the urban environment and improve outdoor recreational facilities. Perhaps more importantly, residents believe that sponge infrastructure can raise their housing prices, the surveys showed. It is argued that governmental authorities should survey the public as well to evaluate their thoughts and needs.

4.3.   Overview, matrix, LFF and interaction map

This paragraph contains an overview of SCP actors and stakeholders (table 4). They are visualized on the next page in an importance-influence matrix (figure 14), added into the Leadership Functions Framework (figure 15) and mapped (figure 16).

	Actor	Importance	Influence	Matrix classification	Leadership function(s)
Public sector	**SC**	High	High	Key player	Political-administrative
	MOH URD	High	High	Key player	Political-administrative, Enabling
	MWR	High	Low	Subject	Connective, Enabling, Adaptive
	MOF	High	High	Key player	Political-administrative, Connective
	NDRC	High	High	Key player	Political-administrative
	PROV	Low	High	Context-setter	Connective
	MUN	High	Low	Subject	Connective, Enabling, Dissemination
	CDB	Low	High	Context-setter	None
	ADB	High	Low	Subject	None

	Stakeholder	Importance	Influence	Matrix classification
Private sector	**EXCOM**	High	Low	Subject
	DEV	Low	Low	Crowd
	INV	Low	Low	Crowd
Civ. Soc	**RES**	Low	Low	Crowd

Table 4: overview of SCP actors and stakeholders with their corresponding importance, influence and leadership position (the latter only accounting for actors).
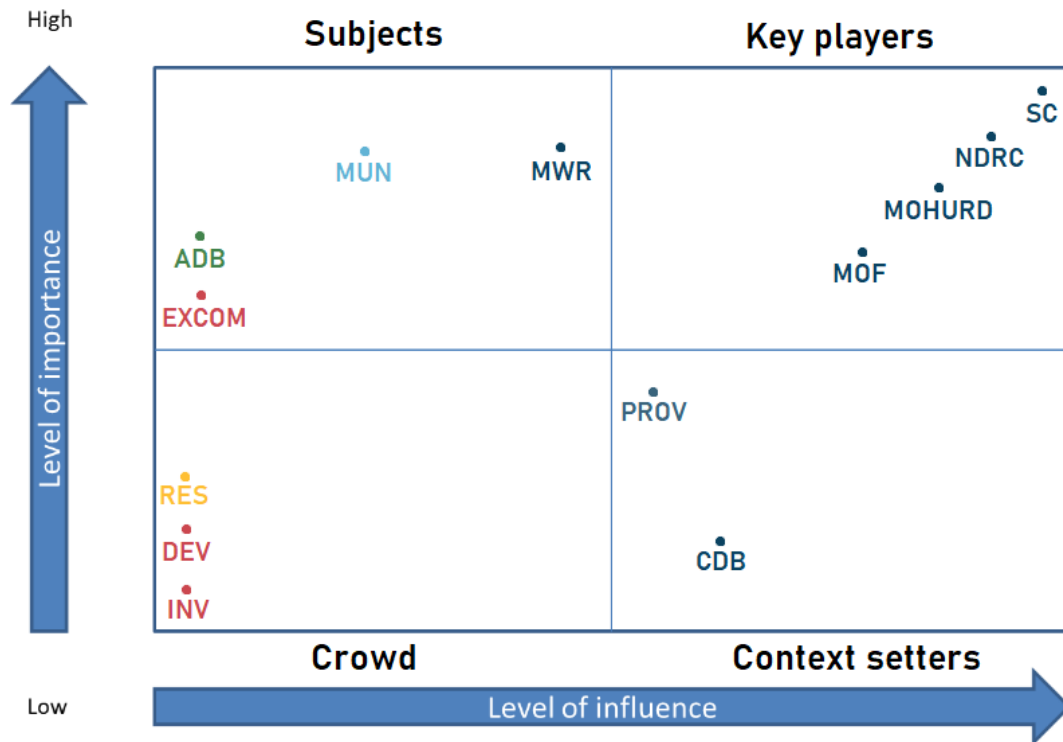
Figure 14: importance-influence matrix of actors and stakeholders.
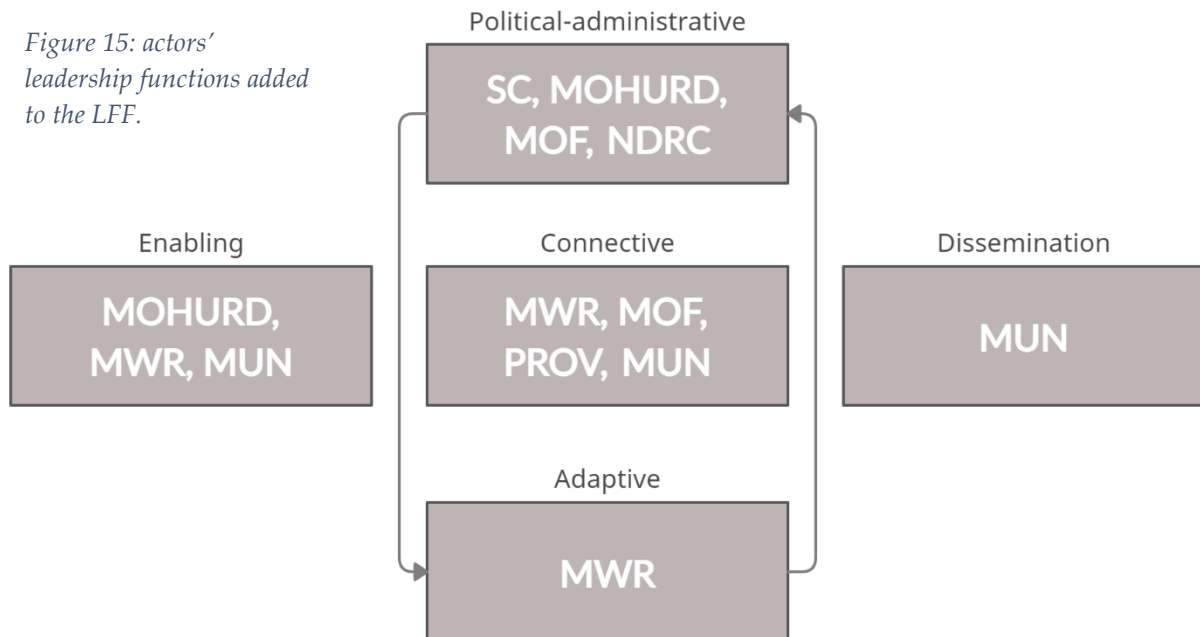
Figure 15: actors' leadership functions added to the LFF.

Figure 16: actor & stakeholder map with the interactions outlined between them.
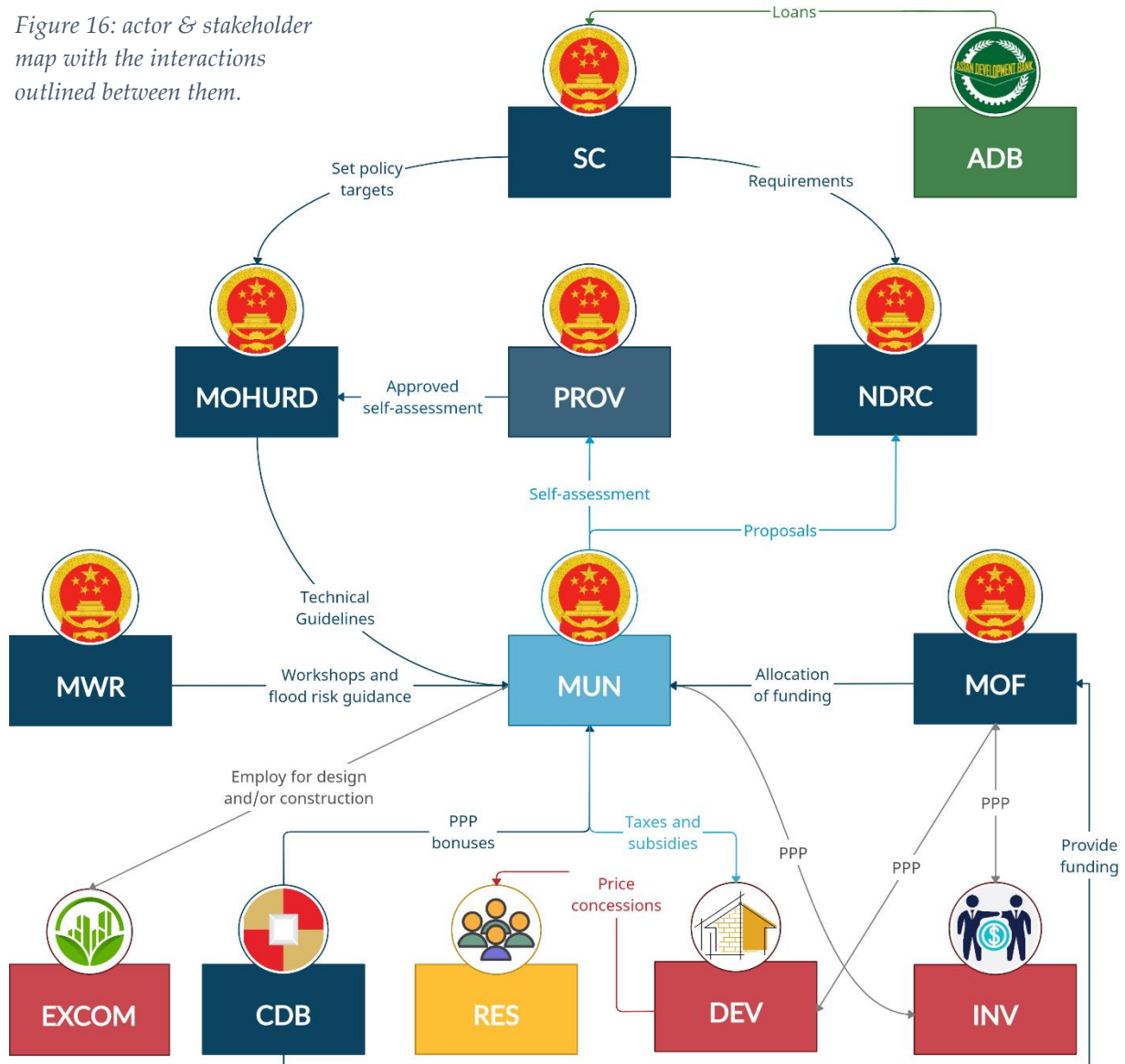
4.4. Conclusion

A few conclusions can be drawn on the institutional background and leadership structure of the SCP. The first thing that stands out is how national government authorities are clearly in absolute control of the whole programme. This is reflected in both the *importance-influence* matrix and the leadership functions of the SCP: only national government authorities are considered *key players* and hold *political-administrative* functions. The national government, through its ministries and departments, pulls the strings and decides the structure that all other actors and stakeholders must work within. There is little room to work 'outside the box', set aside for some discretionary power of provinces and municipalities to fit the SCP to local

context, as long as they abide by guidelines that are decided on a higher government level. Still, municipalities are at the centre of it all. Even though they must abide by top-down decision-making, they hold the most leadership functions: most noticeably in areas where they function as the link between higher levels of government and stakeholders in the private sector.

Stakeholders outside of government authorities have practically zero influence on SCP policies and their importance is low as well: only companies that are hired to advise or design sponge city projects have interests that are upheld by some degree (but still lower compared to government authorities). Moreover, PPP agreements are often described as important in potential but largely underused, showing little involvement of developers and private investors so far. For financial continuation of the SCP, these PPP options should be further developed, which can lead to increased participation from non-governmental groups.

Assessment

How does the SCP's governance capacity perform? (SQ2)

In this chapter, the results of the Governance Capacity Framework (GCF) will be elaborated. The GCF has been applied to the SCP to provide insight into limiting and supporting governance conditions for addressing the flood risk challenge. These conditions are nine in total, with three indicators each that are assessed with scores ranging from -- to ++ (0 to 4 in numerical values to make calculating of averages possible) based on policy reviews, literature findings, a survey and interviews that were conducted with experts. The scores are assessed with the GCF assessment guide (Appendix, page 157). Each condition will receive an average rating out of the three indicators, which are visualized in the conclusion at the end of the chapter. The three interviewees are referred to as 'participants' in the upcoming sections and are abbreviated to P1, P2 and P3.

5.1.   Knowing dimension

This dimension refers to the necessity of awareness as well as understanding and learning about risk and impacts of policies. The three associated conditions are *Awareness, Useful knowledge* and *Continuous learning*.

5.1.1. Awareness

	Surveys	Policy / literature	Interviews	Avg.	Final avg.
1.1. Community knowledge	1,84 (+/-)	2 (+/-)	3 (+)	2,28 (+/-)	2,20 (+/-)
1.2. Local sense of urgency	2,63 (+)	3 (+)	3 (+)	2,88 (+)	
1.3. Behavioural internalization	2,29 (+/-)	1 (-)	1 (-)	1,43 (-)	

Table 5: indicator scores for the Awareness condition (scores range from -- to ++; from 0 to 4 in numerical values).

According to historical records, China has a long history of flooding (Jiang et al, 2005). Somewhat similarly to the Netherlands, this has embedded 'the fight against water'

into the cultural context, especially in southern China where most rain falls and where most SCP pilot cities are based. Of course, since China is a huge country with different climate zones, it varies per region to what extent its citizens are knowledgeable about flooding. There is no single conclusion on community knowledge in all SCP pilot cities, but findings from different cases can be generalized to some extent. For example, Ge et al (2021) found a statistically significant connection between exposure to flood risk and flood risk perception, as well as a higher willingness to take protective measures when people have experienced flooding. In the survey, the *Community knowledge* indicator has scored an average of 1,84 and the most chosen answer was *"The community has a basic understanding of flood risk, but impacts and frequencies are often underestimated."* (41.9% of answers). This basic understanding mostly corresponds to findings in literature and what interviewees have stated, although findings from literature and interviews describe a relatively larger percentage of local communities having knowledge on flood risk.

P1 mentioned that for the city of Wuhan, most local communities are knowledgeable and aware on flood risks, since they experience floods every year. This is the case for most pilot cities, as they are located in areas that experiences monsoon rains in summer. P2 emphasizes that community knowledge is dependent on flooding frequency and gives an example of Ningbo, a city that experiences typhoons. Through a survey study, she found that over 60% of Ningbo locals are knowledgeable to some extent on flood risk and over 50% know that there is a link between climate change, flood risk and the need for sponge city construction. However, P3 stated that people tend to have the wrong expectations of the sponge city programme: for example, some expect the program to solve all flooding, which the programme on its own is not capable of. P1 adds that cities don't expect all citizens to know causes and impacts of flood risk. Knowledge about flooding is thus related to its frequency in an area. When frequency is on a monsoon-area level, awareness seems to run through most of the community. In southern Chinese SCP pilot cities, where more rain falls and especially cities that lie along the Yangtze River, community knowledge on flooding will generally be higher than SCP pilot cities in the northern half, where the programme is more focused on drought.

Wang et al (2018) researched to what extent local communities in Jingdezhen experience flood risk and which factors influence this experience. Key findings include: more than half of respondents have a perception of flood risk (ranging from medium to high levels) and know about flooding issues. Local communities in the city centre, which is the most flood-prone area, experience a higher flood risk perception compared to other districts. This is consistent with both Ge et al's (2021) findings and what P1 and P2 have mentioned. Moreover, factors such as gender, age, work sector, income and education level statistically influence locals' flooding knowledge and risk perception significantly, but can vary case by case (Wang et al, 2018; Wang et al, 2017).

To acquire more generalized findings, Wang et al (2017) conducted broader research to study public perceptions of sponge cities across China. They conclude that most respondents (about 62%) know about both urban flooding and sponge cities, with various degrees of flood risk perceptions across regions. It must be noted, however, that knowledge on urban flooding was found to be mostly 'shallow': respondents that were knowledgeable on urban flooding often knew less about the connection between flooding and sponge city infrastructure. More than 75% percent of their respondents blame faulty drainage systems as a main flooding cause (figure 17, next page). This is most likely due to extensive critical media attention to drainage systems, causing this issue to come first in people's thoughts when thinking about flooding. Extreme weather was named second most often and less than half of respondents named matters such as impermeable pavements and infrastructure as causes for urban flooding. Thus, from the perspective of the SCP, there is a need to promote knowledge on improving permeability and sustainable infrastructure as a means of tackling urban floods. Still, besides improving drainage, respondents named a few other flood-mitigating options that are included in the SCP: increasing city vegetation, usage of rivers and lakes, adoption of permeable material and instalment of green roofs (figure 18, next page), hinting at public support for such SCP measures.

Compared to *Community Knowledge,* the *Local sense of urgency* indicator has scored noticeably higher with an average of 2,63. This strengthens the idea of government actors creating policy while citizens are merely the recipient. The most chosen answer for this indicator was *"Flooding is increasingly taken seriously, but considerable efforts often only receive temporary support."* (43.8% of answers). A sense of urgency to address flood
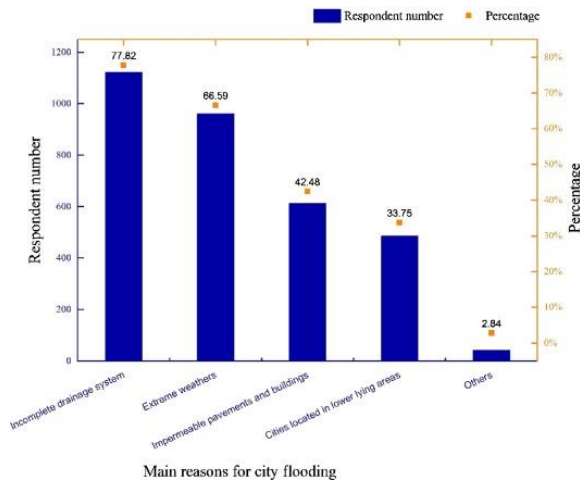
Figure 17: respondents' perception of urban flooding causes (Wang et al, 2017).
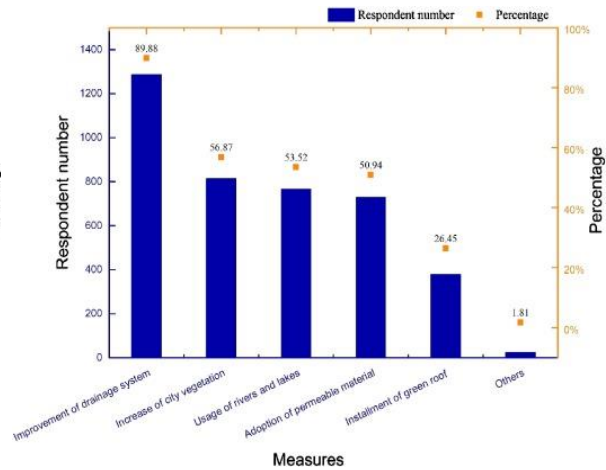
Figure 18: respondents' perception of which measures must be utilized to tackle urban flooding (Wang et al, 2017).

risk has noticeably come from top-down structures, as is often the case in a contemporary Chinese context. The SCP follows this structure, but is nonetheless revolutionary in its ideas, going against the former approach of fighting water with grey infrastructure only and developing new approaches for land-use planning, incorporating climate change, ecological and social wellbeing, as well as integrated water resources management (Chan et al, 2018). With the SCP, the Chinese government has shown encouraging commitment to being open for exploration of new ideas and willingness to learn from concepts such as low impact development and nature-based solutions overseas. A sense of urgency and awareness to address flood risk has thus definitely become a part of Chinese national government discourse.

As is explained in the chapter 4 actor analysis (page 73), local actors go along with what course of action the national level is taking. Their sense of urgency corresponds with higher government levels. The national government is in charge of governing the SCP by authority, through provision and through funding (Dai, 2017). However, one type of governing the SCP at a local level that shows municipalities taking flood risk seriously, is governing by example (Bulkeley & Broto, 2013). This is enabled by the discretionary power that municipalities have (to some extent, since adherence to national guidelines must always be assured). In practice, this translates into adapting the SCP to the local context: many SCP pilot cities have tried to lead the way by constructing SCP infrastructure that were subsequently showcased as examples, among which were showcases of green roofs in Guangzhou and a rainwater collection

system in Shanghai. These can then help other municipalities explore their potential for similar sustainable development projects (Dai, 2017). P2 says that in recent years, increased priority for SCP-like flood mitigation projects has risen in the agenda of municipalities, with SCP policies being updated more often. P3 mentions that in the early stages of the SCP, flood risk was not high on the agenda yet (it was focused more on improving the

Figure 19: preferred roles of Chinese citizens in urban flood prevention (Wang et al, 2021).

environment), but the sense of urgency to address flood risk increased in later stages of the programme. Lastly, according to P2, social media is being used more and more to create awareness, knowledge and urgency of flood risk mitigation through platforms such as Weibo and WeChat. This is one way to reach Chinese citizens, but since they tend to assign flood mitigation as a government responsibility (P1, P2 and P3), a change in their own behaviour to address flood risk is relatively low.

In the survey, the *Behavioural internalization* indicator has scored an average of 2,29 and the most chosen answers were *"Action is being taken to address flood risk but it is not fully integrated into practices and policies yet."* and *"Although there is a growing awareness, it results only in small steps of change regarding practices and policies."* (both accounted for 35,5% of answers each). According to Wang et al (2021), public behaviour can have a large influence on sponge city implementation in practice. For example, for green roofs construction, efforts from the public are necessary. In their research, they found that the public are mostly supportive of active flooding prevention, although only 18% wanted to participate in projects. Others were willing to supervise projects (13%), but a few did not want anything to do with flood prevention (5%), see figure 19. Direct involvement requires investment of time, money and effort, which hinders public participation although it can be beneficial to them in the long run (Rasmussen, 1992; Wang et al, 2016). Increasing public participation to address flood risk by change of behaviour can thus be beneficial for the SCP as a means of increasing effectiveness and awareness.

5.1.2. Useful knowledge

	Surveys	Policy / literature	Interviews	Avg.	Final avg.
2.1. **Information availability**	1,9 (+/-)	2 (+/-)	2 (+/-)	1,97 (+/-)	1,79 (+/-)
2.2. **Information transparency**	2,25 (+/-)	2 (+/-)	2 (+/-)	2,08 (+/-)	
2.3. **Knowledge cohesion**	1,94 (+/-)	1 (-)	1 (-)	1,31 (-)	

Table 6: indicator scores for the Awareness condition (scores range from -- to ++; from 0 to 4 in numerical values).

Information availability, transparency and cohesion are closely related and correspond to some extent. Kumar et al (2021) state that there is both an abundance and a lack of information: clear data regarding design, construction and implementation of sponge city facilities are available and accessible, but there is not enough information accessible on sponge city long-term performance, especially when it comes to maintenance, operations and longevity costs (mentioned as well by Li et al, 2017). In the survey, the *Information availability* indicator has scored an average of 1,9 out of 4 and the most chosen answers were *"Limited information is available. Not all information is of sufficient quality."* and *"Some factual information can be found, but information on causes and impacts of long-term processes are lacking."* (both accounted for 31% of answers each).

Kumar et al (2021) therefore emphasize the need for tools that can track performance data. P2 mentions a lack of professional performance data on governmental websites as well, ranging from biophysical to social-economic data, which makes it hard for experts to do assessments and evaluations of the SCP's impact on the environment and society. Performance tracking tools are beneficial for actors and stakeholders alike: policy makers can enhance their decision-making; communities can be better informed about developments in their area; and the private sector can better estimate the risk and potential of investment, increasing the feasibility of PPP agreements. As of now, there are no online databases that display information on any PPPs that are up for bidding (Dai et al, 2017). Lack of data is as one of the SCP's main barriers in order to attract private investors, according to Li et al (2017), who also highlight the need for development of information availability regarding life cycle costs and specific
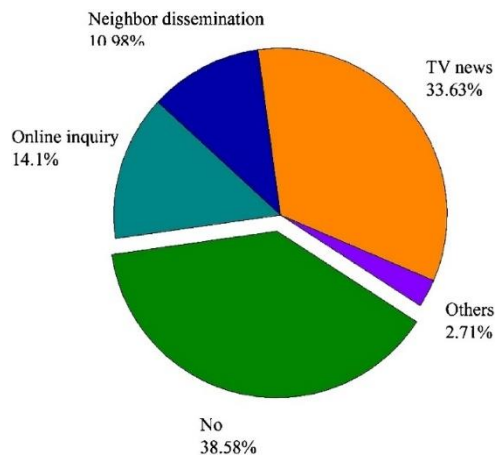
Figure 20: main ways of learning about sponge cities for the public (Wang et al, 2017).

soil -and climate types: without that information, local communities have many uncertainties when implementing SCP projects during the development process.

When it comes to the public, the SCP is relatively new. Wang et al (2017) state that for the future dissemination of information, it is crucial to know how the public learns about sponge cities. In figure 20, it can be seen that almost 39% of respondents in research by Wang et al (2017) have indicated not to have heard of the SCP. Of the ones that did, the majority learned so through news on TV (about 34%) with a second place for online media channels (about 14%). Dissemination of information to the public must therefore be geared towards both offline and online mediums.

According to P3, information on flood risk is still limited although currently increasing, as the focus of the SCP has first and foremost been centred around the environment and ecology before ensuring a bigger role for flood risk. Still, available information is easy to understand for experts, says P3, but citizens hardly concern themselves with this type of information as they generally don't care for targets and effectiveness numbers. In the survey, the *Information transparency* indicator has scored an average of 2,25 out of 4 and the most chosen answer was *"Information is accessible and mostly understandable, but needs a time-consuming search through databases."* (37.5% of answers). This is similar to what P1, P2 and P3 have stated on this matter. Concerning cohesion of information, sponge cities endure a few problems. According to Zevenbergen et al (2018), information about indirect damage of flooding (e.g., urban transport or property value) is hard to find in Chinese sponge cities compared to localized direct damage impacts (e.g., buildings and infrastructure). This is due to the trans-boundary character of indirect damages which makes assessing information more difficult (Zevenbergen et al, 2018).

Furthermore, P1 states that SCP information indicators can be complex and non-cohesive when they are assessed across governmental sectors with their own (sometimes conflicting) interests. P1 illustrates this with an example: when conflicting

targets are set by different authorities, choices must be made based on priority that is derived from independent indicators. This makes it difficult to integrate information on SCP projects into one system. The survey outcome corresponds to P1's comments in this regard: the *Knowledge cohesion* indicator has scored an average of 1,94 and the most chosen answer was *"Data collection within sectors is consistent but knowledge on the flooding challenge is still fragmented between sectors."* (37.5%% of answers). P3 agrees and states that SCP information about flood risk planning is often separated and not integrated yet, and adds that different authorities treat information differently based on what they think is important. Besides cohesiveness of information within and across government sectors, Kumar (2021) and Li et al (2017) also mention how essential it is for the general public to be able to access understandable and cohesive information. They therefore recommend more incorporation of NBS practices into education and media to boost understanding of the SCP and encourage active participation. Moreover, Li et al (2017) emphasize the need for sharing of information to prevent obstacles in research and innovations, which is only possible when information is accessible, understandable and cohesive.

5.1.3. Continuous learning

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
3.1. Smart monitoring	1,75 (+/-)	1 (-)	2 (+/-)	1,58 (+/-)	2,06 (+/-)
3.2. Evaluation	1,57 (+/-)	3 (+)	3 (+)	2,52 (+)	
3.3. Cross-stakeholder learning	2,21 (+/-)	2 (+/-)	2 (+/-)	2,07 (+/-)	

Table 7: indicator scores for the Continuous learning condition (scores range from -- to ++; from 0 to 4 in numerical values).

Due to the aforementioned lack of long-term performance data, monitoring of the SCP is resorted to the use of computer modelling-based predictions to keep track of costs for operation and maintenance (Li et al, 2017). It is argued that this is not sufficient to understand long-term performance of sponge cities. Instead, gradual learning and feedback-loop mechanisms are required to tackle urban flooding issues through the SCP (Chan et al, 2018). In the survey, the *Smart monitoring* indicator has scored an

average of 1,75 and the most chosen answer was *"Monitoring occurs now and then but does not provide useful information on developments, processes or alarming situations."* (50% of answers). To enhance decision-making, Ma et al (2020) recommend the use of the Ecosystem Services Framework (ESF) as a monitoring tool for the SCP. Jiang et al (2017) argue that in order to facilitate the development of the right indicators to evaluate performance, comprehensive monitoring is a must and currently lacking. When made publicly available, the data of such monitoring systems can enable stakeholders in the SCP to share more accurate information with each other, increasing the potential of cross-stakeholder learning as well.

Somewhat in contrast to the above findings, P1 argues that monitoring systems in the SCP are accurate and information reliability is generally high thanks to these systems, such as in the departments of modelling and field project technologies data and monitoring of stormwater management practices. Still, P1 names an exception: maintenance monitoring is not in place for sponge cities, as it is not regulated by law. When a city has limited time and personnel, monitoring of maintenance will therefore be of low priority in comparison to regulated area targets, which P1 considers a flaw. Since there are no maintenance monitoring regulations in the SCP, it is not addressed in the evaluation system either. This part is reflected in the survey outcome: the *Evaluation* indicator has scored an average of 1,57 and the most chosen answer was *"Evaluations are being made on conventional (technical) criteria, leading to mostly small and short-term changes."* (46,4% of answers). Both P2 and P3 mention such convential technical evaluations: P2 mentions monitoring and evaluation of water runoff indicators as well as elimination of polluted water bodies, while P3 adds that the same happens for storage capacity.

All interviewees mention the importance of the top-down evaluation system that is present in the SCP, as it is the guiding mechanism that ultimately determines what is decided in the planning process. Assessments of SCP constructions and policy effectiveness are done by municipal governments and subsequently evaluated by higher governments, who determine scores and rankings to sponge cities based on these evaluations. According to P2, performing well can help sponge cities gain more funding for the next stage in the programme. P3 adds that boosting a cities' image is another main incentive to rank as high as possible and names an example: the city of

Pingxiang, which scored a first-place ranking for three years and was used as a good example by the national government.

Oates et al (2020) describes the inadequate sharing of data as a main barrier to effective coordination and learning in the SCP planning process, limiting the programme's longevity chances. P1 first and foremost notes that citizens don't play a significant role in it, but developers and architects do play a passive role, as they mostly engage in learning processes that are set up by government authorities such as organized congresses and workshops. An example of this is the Sponge City Development Committee, which is a panel of stakeholders and experts (MOHURD, 2015). This panel should be better utilized to facilitate sharing of (scientific) research, according to Oates et al (2020). Wang et al (2021) explored SCP learning processes and found that stakeholders' willingness to participate was mostly based on potential mutual benefits and the degree of conflict or consensus between different stakeholders. Qi et al (2020) describe stakeholders' reluctance to make trade-offs due to their competing priorities as an emerging challenge for the SCP. In the survey, the *Cross-stakeholder learning* indicator has scored an average of 2,21 and the most chosen answer was *"Stakeholder interaction occurs in small coalitions based on common interests. Those outside such coalitions are often being excluded."* (32,1% of answers). For example, P3 describes how different stakeholders are consulted by developers when they need to get permits to build a sponge city project, and even citizens can be involved when a project involves their private property. Some sponge cities try to stimulate interdisciplinary learning and cooperation, such as Pingxiang: there, representatives from water, park -and flooding departments were invited together with developers, planners, designers and architects to co-learn, co-operate and co-evaluate in order to better manage the SCP. P3 argues that this is one of the reasons that led to the success of SCP implementation in Pingxiang, but it is not yet a general standard in the SCP across the country.

5.2.   Wanting dimension

This dimension refers to the need for cooperation between actors and stakeholders, acting upon ambitions and applying assets to enable finding solutions. The three associated conditions are *Stakeholder engagement process, Management ambition* and *Agents of change.*

5.2.1. Stakeholder engagement process

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
4.1. Stakeholder inclusiveness	1,52 (+/-)	1 (-)	2 (+/-)	1,51 (+/-)	
4.2. Protection of core values	1,39 (-)	2 (+/-)	1 (-)	1,46 (-)	1,46 (-)
4.3. Progress and variety of options	1,27 (-)	2 (+/-)	1 (-)	1,42 (-)	

Table 8: indicator scores for the Stakeholder engagement process condition (scores range from -- to ++; from 0 to 4 in numerical values).

As has been described in chapter 4, the extent to which stakeholders can actively participate in the SCP planning process is minimal, due to the Chinese top-down governance mechanism that is also present in the SCP: at its core, the programme is completely led by governmental actors. However, some stakeholder categories are passively included and are potentially essential to the SCP's longevity. According to P1, the main reason why citizens are excluded from the process is due to a lack of time: targets must be achieved and they must be achieved quickly. Involving citizens would delay that.

P1 and P3 do mention the (passive) involvement of developers and architects as participants in workshops by the government. Furthermore, P3 describes the emergence of unofficial, self-organized meetings by planners and designers in which various stakeholders can submit their designs and ideas, but notes how these are still relatively limited. In the survey, the *Stakeholder inclusiveness* indicator has scored an average of 1,52. The most chosen answers were *"Stakeholders are mostly consulted or informed, not frequently engaged. Decisions are largely made before involving stakeholders."* and *"Not all relevant stakeholders are informed and only sometimes consulted. Engagement opportunities are unclear."* (both accounted for 29,4% of answers each). The limited and passive roles mentioned by P1 and P3 are thus reflected in the survey. Kumar et al (2021) describe a low stakeholder participation in the SCP and name a method of addressing this: inclusion of the general public can be boosted by incorporating NBS-based education into media and schools. As is often the case in China, public participation that does take place is during the implementation phase rather than the

decision-making phase (Chen, 2016), but new upcoming opportunities are noticeable: an increasing need for public rights has led to residents pushing for transparent inclusion with an equal seat at the table. An example of how their participation is made more attractive is given by Wang (2015): residents and households in SCP cities are promised rewards by the government when they contribute to improved drainage.

However, P1 states that in order to be able to truly protect the rights and interests of a stakeholder group, there should be at least time and effort to discuss with them what their needs exactly are. This time and effort are lacking, although P3 does mention that citizens can actually make objections to plans and designs. However, according to P3, the government doesn't encourage them to do so as the fear is that the spectrum of their needs is too broad to take into account. That is why governments first propose a design and then see if there are any objections, instead of taking citizens' needs into account beforehand. In the survey, the *Protection of core values* indicator has scored an average of 1,39 and the most chosen answer was *"Most stakeholders are engaged, but the level of engagement is low (for example, only informative). Their influence on the end-result is low."* (33,3% of answers), which certainly holds true for the general public based on what is found in literature and interviews. P3 notes that it also depends on the type of sponge city project: stakeholder involvement and extent to which their needs are taken into account will be lower in large public area projects, but higher in neighbourhood-scale projects that affect residents' everyday life.

Regarding varieties of options put forward by stakeholders, the indicator has scored an average of 1,27 and the most chosen answer was *"Informative procedures are present with low flexibility. Stakeholder engagement is low, possibly leading to unilateral decision-making."* (46,7% of answers). This corresponds with aforementioned findings in which SCP stakeholders are consulted, but not involved in the decision-making process. Generally, this leads to fewer varieties of options, but during the SCP's implementation phase, stakeholders such as architects and designers do exchange ideas. Congresses, workshops and committees are all organized to go through options, indicating at least that a variety is co-created or considered. Whether these are then generally looked at as serious alternatives by governmental actors remains unsure and is best looked at case-by-case. P1 mentions that in the case of Wuhan, options were often already decided when Arcadis was involved and describes their role in

developing as limited. Meng et al (2019) describes how stakeholder participation, whether they are consulted, their values protected or included in developing alternatives, is currently hindered by a lack of organisational and economical support. If not addressed, this could further weaken much-needed diversity of stakeholders in not just the SCP, but Chinese flood risk management in general.

5.2.2. Management ambition

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
5.1. Ambitious and realistic management	2,1 (+/-)	1 (-)	2 (+/-)	1,7 (+/-)	1,86 (+/-)
5.2. Discourse embedding	1,75 (+/-)	3 (+)	3 (+)	2,58 (+)	
5.3. Management cohesion	1,93 (+/-)	1 (-)	1 (-)	1,31 (-)	

Table 9: indicator scores for the Management ambition condition (scores range from -- to ++; from 0 to 4 in numerical values).

As mentioned, the SC has decided goals for the SCP that include having sponge cities transform over 80% of their urban areas into sponge areas. This is definitely ambitious, but is it realistic? According to Zevenbergen et al (2018), such targets are too ambitious to be realistic: the time needed for integrative and holistic planning, design and implementation requires more time than traditional sectoral approaches. In particular, transformation of existing grey infrastructure is heavily time-consuming. In the survey, this indicator has scored an average of 2,1 and the most chosen answer was *"There is a long-term vision that incorporates uncertainty, but it is not supported by short-term goals."* (36,7% of answers). The long-term vision for 2030 is clear, but that means the programme needs to survive for 15 years (since 2015) with adequate short -to long-term targets. A key challenge herein, according to Zevenbergen et al (2018), is how the SCP can be aligned with other infrastructure and urban renovation projects, as well as making sure the programme is financially viable in the meantime. For that, investors need to be attracted as soon as possible. At the same time, such processes cannot be completed overnight. However, although figuratively speaking, it seems that some sponge cities have tried doing so. For example, Dai et al (2017) describe that the first batch of pilot cities were given only 3 months to design their sponge infrastructure,

with project teams working around the clock to meet tight deadlines. This has possibly led to lowered effectiveness (Kumar et al, 2021), which is troublesome for such ambitious goals.

Still, P1 states that no matter how high SCP targets are, cities will almost always achieve them. This makes it seem the programme is not overly ambitious. However, P1 emphasizes that this is because of the top-down evaluation mechanism in which municipalities are evaluated by higher level government authorities: municipalities simply must achieve SCP goals. On that regard, P3 states that while the 80% of urban areas converted into sponge areas by 2030 target seems daunting, it is based on a VCR (Volume Control Ratio) indicator, which is based on 20-30mm of storage capacity. According to P3, this is not a lot, which makes achieving that target easier for cities. But if you look into the details of projects, says P1, there are many problems due to time -and personnel limits: the consequence of this is a tunnel vision focus on achieving regulated targets and a lack of maintenance, which in turn hinders long-term effectiveness. These issues thus indicate that the programme is not so realistic when it comes down to expected time management for cities.

One of the challenges of a nationwide programme such as SCP is to incorporate it into the local context. P1 describes the SCP as mostly standardised, as is often the case with Chinese planning: many developments follow the same approach since Chinese cities are built with similar ideas and values in mind. However, P1 states that political factors can influence development: some tier 1 cities (Chinese cities are hierarchically ranked based on economic, cultural and political factors, although not officially) such as Shenzhen and Shanghai have more discretionary power to alter implementation of the SCP. In the survey, the *Discourse embedding* indicator has scored an average of 1,75 and the most chosen answer was *"Current policy fits the local context, but decision-making often results in compromised small short-term policies."* (39,3% of answers). P3 explains another local political factor: competitiveness between cities. In China, cities try to become 'urban champions'. Before, this was based on economic indicators, but in the last few years this has shifted to ecological and environmental indicators. Local leaders have a political drive to make their sponge city better than others.

As for local cultural and historical context, the most noticeable feature of the SCP is that it intends to "revive ancient wisdom" (see Kongjian Yu's quote in the introduction,

page 20) and restore the water culture that China has had since thousands of years. According to P2, incorporating local historical heritage into SCP planning is also used for the sake of promotion and branding of the city, especially so with ancient water town characteristics. Tang et al (2018) describe how the SCP tries to align its policies with historical 'blue-green' principles in cities that have a distinct water culture, such as Ningbo in the province of Zhejiang. For example, similar approaches to ancient times are used, when water was diverted from upstream catchments with the use of (semi)natural channel networks. A big difference compared to then, however, is how the SCP is regulated top-down while in ancient China, small scale landowners took control of water -and flood risk management (Tang et al, 2018). P3 mentions that water culture even has its own section in sponge city planning policies for cities along the Yangtze River and the Great Canal. This results in, for example, the construction of specialized waterfronts projects there that include Chinese water culture and local history to make the area more liveable and enjoyable for residents.

Concerning management coherence, P1 explains some of the difficulties experienced in the SCP. Hierarchy, both within and outside of sectors, make it hard to organize meetings that leaders will attend to discuss conflicting interests. P1 described their line of thought as "I won't go to you if you don't come to me", which led to consultants visiting sectors multiple times separately and discussing the same things independently instead of on a single occasion with all leaders at the same table. This leads to projects often being developed in an individual manner with interests of one sector taken care of, says P1, while emphasizing that it would be cheaper as well to plan it in an integrated way from the beginning. Similarly, Xu et al (2018) advocate for sponge cities to be planned and designed before building new urban areas: incorporating sponge infrastructure into existing urban areas can work as a bottleneck. Griffiths et al (2020) agree that integrating drainage management from the start is crucial, more so as transformation of existing structures above ground and their drainage networks will be impacted faster by pressures from spatial developments such as urbanization.

P3 adds that SCP management also needs to be further integrated within spatial scales as well and describes three boundaries: the catchment level, the city level and the neighbourhood level. According to Oates et al (2020), development of the SCP and its

impacts has not been monitored on the basin level yet, resulting in many seperate projects instead of a holistic approach that is streamlined into regional planning. They emphasize the need for an integrated watershed scale of approach for the programme's water management. Moreover, Kumar et al (2021) and Li et al (2017) point out that the NBS that are being used in sponge cities are too similar across topographical conditions, including very different weather patterns. An example is given: the sponge cities Baicheng and Shenzhen are both required to have green roofs and permeable pavements due to the MOHURD's technical guidelines, although Baicheng is located in an arid region and Shenzhen is located in a tropical region. Ma et al (2020) argue that "design deficits" are to blame for the solidified choice of NBS infrastructures across China despite sponge cities being located in varying geographical conditions. To visualize this, Ma et al (2020) provided some examples of similar sponge city infrastructure across China's different climate zones (figure 21).
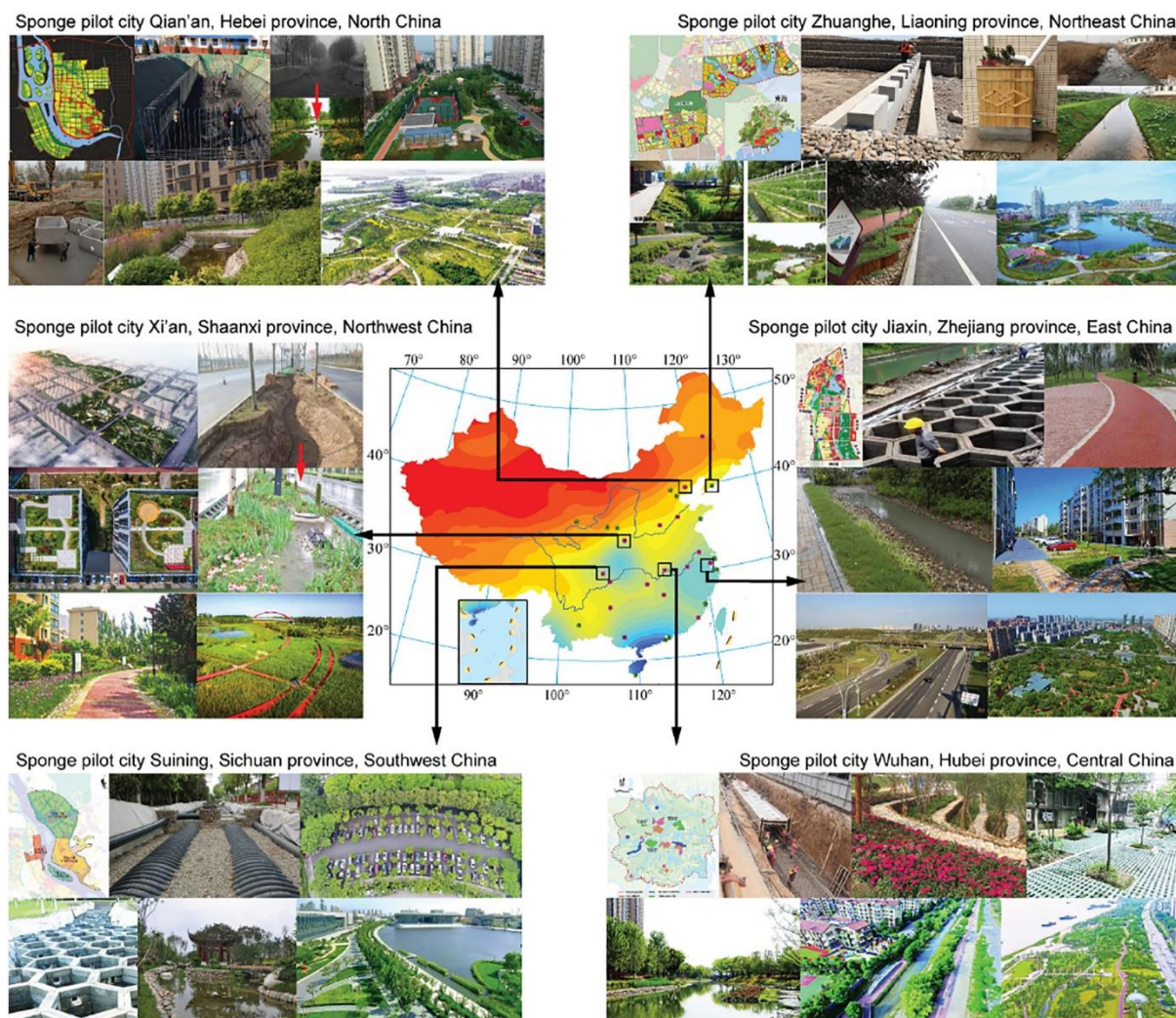
Figure 21: similar SCP projects in pilot cities across the country (Ma et al, 2020).

In the survey, the *Management cohesion* indicator has scored an average of 1,93 and the most chosen answer was *"Policy is characterised by fragmentation and imbalance between sectors, with possible imbalanced use of resources between sectors."* (37,9% of answers). P3 similarly states that SCP planning falls under different sectoral authorities who treat information differently, leading to short-term and long-term targets not always working together.

Jiang et al (2017) note that local governments, with their own administrative boundaries, experience trouble when dealing with overlapping water administration functions, which poses a risk of limited interaction and coordination between these governments. Moreover, with different national ministries, provincial authorities and municipalities involved in the SCP as explained in the actor analysis, it is important that guidelines and legislations are coherently managed throughout all government levels to avoid discrepancies. Li et al (2017) suggest that linking communities within regional watershed scales to water sources would be beneficial for the SCP planning system, instead of focusing on fragmented benefits. Moreover, they suggest altering the guidelines provided by ministries to allow for a larger extent of local adaptability in terms of climate, weather patters and other geographical factors. Lastly, Oates et al (2020) argue that currently, tasks within the SCP are fragmented between municipalities and are treated as 'handovers': for example, SCP projects may be designed by a subdivision and subsequently transferred elsewhere for construction. Meanwhile, there is no single authority supervising the project from beginning to end.

5.2.3. Agents of change

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
6.1. Entrepreneurial agents	1,18 (-)	1 (-)	1 (-)	1,06 (-)	
6.2. Collaborative agents	1,59 (+/-)	2 (+/-)	2 (+/-)	1,86 (+/-)	1,89 (+/-)
6.3. Visionary agents	2,29 (+/-)	3 (+/-)	3 (+)	2,76 (+)	

Table 10: indicator scores for the Awareness condition (scores range from -- to ++; from 0 to 4 in numerical values).

As has been mentioned in the actor -and stakeholder analyses, the SCP allows for little

significant influence of companies, investors, architectural bureaus or other businesses. The private sector itself is reluctant as well, as business opportunities are often not clear in SCP policy (Zevenbergen et al, 2018). Implementation of the SCP is considered a public responsibility, not a private matter, and this is reflected when delving into the extent that entrepreneurial agents have influence on decision-making, which is virtually zero. In the survey, this indicator has scored an average of 1,18 and the most chosen answer was *"Agents of change struggle to find windows of opportunity to act upon perceived flood risks."* (42,9% of answers). Caution for entrepreneurial agents to engage in the SCP is observable from all relevant sides and is corresponding with preceding governance capacity indicators such as information availability and transparency. Consultancy companies fulfil a passive advisory role to governmental authorities, land developers may engage in sponge city land development but are severely restricted in their options and access to information, and government authorities show scepticism towards the intentions of potential investors. P1 states that some entrepreneurial agents with large amounts of money to invest are sometimes invited by the government to participate in the SCP, but generally all decision-making takes place on a government level without influence of the private sector. There are no networks of entrepreneurial agents that influence the planning process, says P1. According to P3, land developers do receive financial stimulations from cities if they include sponge measures. Though it must be noted that control is still entirely in the hands of the city authorities as they can 'force' developers to include sponge measures by only giving out permits if they do so.

Chinese government authorities, from the national level to the municipal level, have the opportunity to engage and collaborate with businesses, other government levels and sectors. On paper, it is encouraged. For example, P3 remarks that the guidelines state that it is important to involve different disciplines, but it's hardly utilized in practice. P3 gives an example of municipal bureaus: the housing bureau, transport bureau and water bureaus don't want other bureaus to be an obstacle for their own plans. The same goes for PPPs: while cities are encouraged to fund SCP projects partially through PPPs, engagement remains low in practice. In the survey, this indicator has scored an average of 1,59. The survey reflects the findings on private sector engagements: for the *Collaborative agents* indicator, the most chosen answer was *"Agents of change are enabled to enhance conventional collaboration with traditional coalitions,*

but with limited space for new collaborations." (44,8% of answers). Conventional coalitions between government actors in a traditional top-down mechanism, although not always effective due to integration issues across sectors, are being utilized (as explored in the actor analysis, page 73) while new collaborations with the private sector remain limited. Municipal bureaus show little effort to collaborate with stakeholders from different disciplines, according to P3. Instead, collaborations are self-organized between planners and designers. This, however, does not lead them to being a part of the decision-making process unless a governmental authority allows it.

One area in which the SCP performs better regarding agents of change, is when it comes to visionary agents. In the survey, this indicator has scored an average of 2,29. and the most chosen answer was *"There is a clear long-term and sustainable vision, but a discrepancy between that and short-term goals."* (53,6% of answers). Actors are certainly able to facilitate long-term strategies, although integration is not optimal, as mentioned. P3 states that visionary agents are motivated to fulfil short-term targets (due to, among other things, evaluation pressure) and will prioritize these, while the long-term is written down in sponge city plans and supported by the planning system. Zevenbergen et al (2018) warn Chinese sponge cities against 'leapfrogging' towards their ideal sponge city: technological innovations require governance innovations that take substantial time, which SCP actors must keep in mind when visioning an SCP future for a city.

5.3. Enabling dimension

Enabling refers to the toolkit that actors have at their disposal in order to develop a variety of approaches and whether this is clearly regulated by legitimate authorities. The associated indicators are *Room to manoeuvre, Clear division of responsibilities* and *Authority.*

5.3.1. Multi-level network potential

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
7.1. **Room to manoeuvre**	1,45 (-)	2 (+/-)	2 (+/-)	1,82 (+/-)	
7.2. **Clear division of responsibilities**	1,9 (+/-)	4 (++)	3 (+)	2,97 (+)	2,67 (+)
7.3. **Authority**	2,66 (+)	4 (++)	3 (+)	3,22 (+)	

Table 11: indicator scores for the Multi-level network potential condition (scores range from -- to ++; from 0 to 4 in numerical values).

To alleviate urban flooding, combining methods is essential. That is why it is important for actors to have room to manoeuvre in developing alternative approaches. Within the SCP, a variety of alternative approaches can be found to combat flooding. The ones most used across all pilot cities can be seen in figure 22.
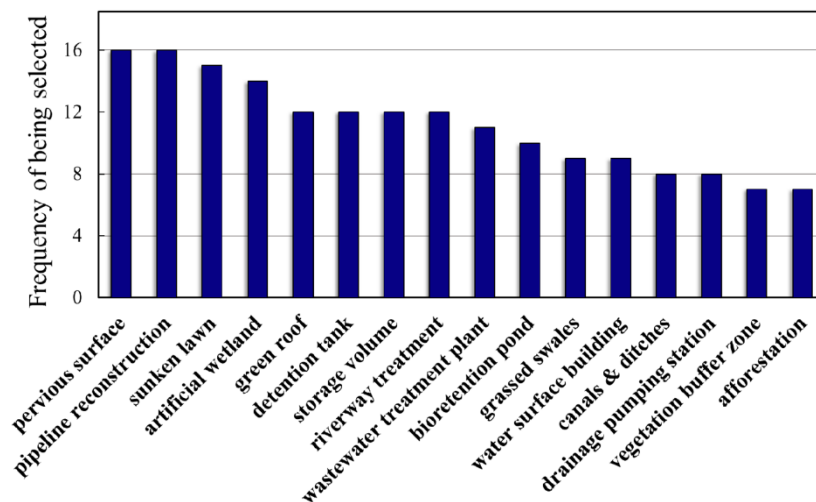
Figure 22: most commonly used sponge measures in SCP pilot cities (Xiang et al, 2019).

Among the most effective to reduce total water runoff are pervious pavements, green roofs, bio-retention basins and rain gardens (Wang et al, 2018). 'Green' sponge infrastructure is not enough to deal with flooding, however. According to P1, it is crucial to combine grey and green infrastructure, such as improving aged pipes before applying green infrastructure on top. Municipalities have the freedom and discretionary power to find such combinations, says P1. But as mentioned before, targets and deadlines are strict, which requires prioritizing those first before alternatives can be considered. Moreover, as can be seen in figure 21, some standardised SCP measures are implemented throughout the country regardless of climate zone, indicating that some local government authorities have little room to develop alternatives. Room to manoeuvre is there on paper, but seems relatively limited in practice. Meng et al (2019) found that for

example in Guangzhou, a neglect of NBS alternatives was the result of an insufficient transfer of power and resources to spatial planning institutions, resulting falling back on traditional engineering solutions. In the survey, the *Room to manoeuvre* indicator has scored an average of 1,45 and the most chosen answer was *"Only a few actors receive some degree of freedom, and there are limited opportunities to develop alternatives and unconventional partnerships."* (41,4% of answers). P3 adds that in the early stages of the SCP (the first round), the extent of discretionary power for local governments were not widely formulated into written law and regulations. However, since the second round, such matters are more frequently added, including to the regulations of the SCP planning process. Aside for the SCP, local governments in China combat urban flooding through its executive branch 'Flood Control Office', which focuses on mostly engineering-style alleviation of flooding (Rubinato et al, 2019). Other programmes have targeted flood risk as well in China. A few examples are: the Flood Defence and Rainwater Discharge Plan (FDRD), the Canals and Waterways Renovation Program (CWR) and Rainwater Discharge System Comprehensive Plan (RDS). Meng et al (2019) states that these programmes have been used by local governments as key reference policies to formulate local sponge city plans.

The responsibilities that actors have in the SCP are in most cases clearly formulated and allocated, although often in wide, overarching terms instead of specifics (for example, the MWR website states it is responsible for drainage). In the survey, the *Clear division of responsibilities* indicator has scored an average of 1,9 and the most chosen answer was *"Actors within the network recognize the need to explore cooperation to bring together expertise and divide roles and responsibilities clearly."* (40% of answers). According to Meng et al (2019), the SCP has changed conventional policymaking procedures with more responsibilities allocated to the spatial planning sector. Before, almost all water-related issues fell under the wings of the water management sector only (although this remains so for lakes and rivers) and were weakly defined in the planning system.

Meng (2021) further emphasizes how Chinese planning institutions have gained a more legitimate and clearly declared role in flood governance: this is beneficial, as vague descriptions can leave a grey area for potential participants and weak enforcement. In several sponge cities, the SCP has been embedded into their master

plan (somewhat comparable to the Dutch 'Bestemmingsplan', although not binding). P1 argues that responsibilities are clearly written in regulations and policies, with details as to who needs to do what. However, sectoral responsibilities are not always clearly written down, says P1. Furthermore, P1 adds that different sectors need to sit down with each other more often in the SCP to discuss responsibilities in order to prevent problems later on. P2 agrees, stating that different departments and bureaus exist with their own clearly formulated responsibilities and managing of urban developments, but overlap (e.g., in catchments that cover multiple districts) requires more co-operation.

Responsibilities over sponge measures are given to legitimate forms of power: from top-down requirements coming from the MOHURD (technical guidelines) and the MWR (urban water management duties), to implementation of specific sponge measures at the local level. In the survey, the *Authority* indicator has scored an average of 2,66 and the most chosen answer was *"Legitimate authorities are recognized publicly. They are assigned to coordinate long-term integrated policy and implementation."* (34,4% of answers). Typically, the most relevant responsibilities in sponge cities for the SCP are allocated to authorities as in table 12 on the next page (as found in Chen, 2021; Dai, 2017).

Municipal authorities	Main responsibilities	Sponge measures
Water Affairs Bureau	Waterlogging; emergency response	Water storage and retention ponds; wetlands; rainwater harvesting
Construction Commission	Review construction plans and permits	/
Development and Reform Commission	Research investment channels; coordination with other departments	/
Planning Bureau	Integrate SCP requirements into planning; coordination	/
Finance Bureau	Funding; budgets; sanctions and incentives	/
Environmental Protection Bureau	Water quality monitoring	Co-ordination and supervision of wetlands and retention ponds
Housing and Urban-Rural Development Bureau	Public areas and residential districts	Green roofs and facades; urban agriculture; rain tanks
Transport Bureau	Co-ordination and supervision	Permeable pavements; adjusting roads

Table 12: authorities that carry out SCP projects on a city level.

5.3.2. Financial viability

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
8.1. Affordability	2,55 (+)	2 (+/-)	3 (+)	2,52 (+)	
8.2. Consumer willingness to pay	1,93 (+/-)	3 (+)	3 (+)	2,64 (+)	2,08 (+/-)
8.3. Financial continuation	1,25 (-)	1 (-)	1 (-)	1,08 (-)	

Table 13: indicator scores for the Financial viability condition (scores range from -- to ++; from 0 to 4 in numerical values).

In terms of *Affordability* (for all), it seems apparent that it is the government's intention to ensure everyone benefits from sponge city projects. Aside for environmental and flood alleviation purposes, P3 states that especially in the first round of the SCP, the central government wanted to make projects enjoyable for the public by incorporating it well into the landscape and allow people to make use of its publicly available facilities. This boosted the image of the programme. P1 agrees that sponge city projects are affordable for all in the sense that they are either incorporated into residents' housing areas or located in places that are almost always free to access, such as parks, waterfronts and rain gardens. Furthermore, P1 argues that as long as sponge city projects aren't built for image building only, they are very welcomed by communities.

Not only do green spaces allow recreation, but housing values increase when they are in or near sponge infrastructure. P1 also states that there are requirements to build sponge infrastructure in various types of neighbourhoods, both new and old, and rich or poor, so that different populations can benefit. In the survey, the *Affordability* indicator has scored an average of 2,55 and the most chosen answer was *"Sponge infrastructure for everyone is pursued."* (38,7% of answers). Since almost all SCP funding is currently still coming from the government, a large part of it is through taxpayers' money, making the cost relevant to
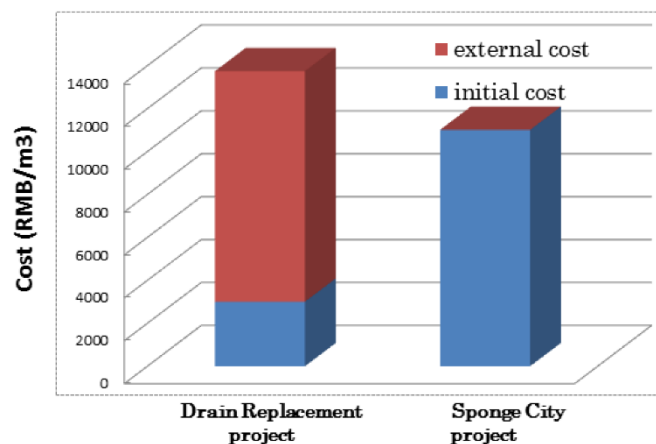
Figure 23: difference in initial and external costs between a general drain replacement project and a sponge city project (Fan & Matsumoto, 2020).

everyone. On this, Fan & Matsumoto (2020) state that although implementation of sponge measures is costly in the initial phase, it will become more profitable and financially advantageous thanks to carbon emission reductions. In figure 23, a visualization of their findings shows that although initial costs (e.g., from construction fees) in the SCP are higher, SCP projects have virtually zero external costs (e.g., from carbon emissions) in comparison to a regular drain replacement project.

The question is whether people find that money for the SCP is well-spent, which leads to the next indicator: *Consumer willingness to pay*. P2 researched satisfaction with the SCP, and found that people feel that the programme is worthwhile when money is spent to benefit the general public. However, when money is spent for sponge measures in private estates and residential buildings from which they do not benefit themselves, they don't agree as much, says P2. In the survey, the *Willingness to pay* indicator has scored an average of 1,93 and the most chosen answer was *"There is support for the allocation of resources for conventional tasks. Most stakeholders are unwilling to financially support beyond the usual."* (39,3% of answers). Wang et al (2017) have researched willingness to pay for the SCP and found that residents believed that the main financial source for sponge measures should be coming from government funding and PPPs (figure 24), and willingness to pay for government-issued credit securities for sponge city construction was found to be 55% of average yearly excess in financial assets.

Moreover, respondents in their research showed wide support of sponge city construction (96%), while only 4% opposed it. Occupation, income and educational background were found to be main influential factors based on their willingness to pay and general support of the programme. As can be seen in figure 24, only 4% of respondents thought that sponge measures should be directly funded from citizens' wallets (Wang et al, 2017). The results show how essential government funding and PPPs are for continuation of the programme.
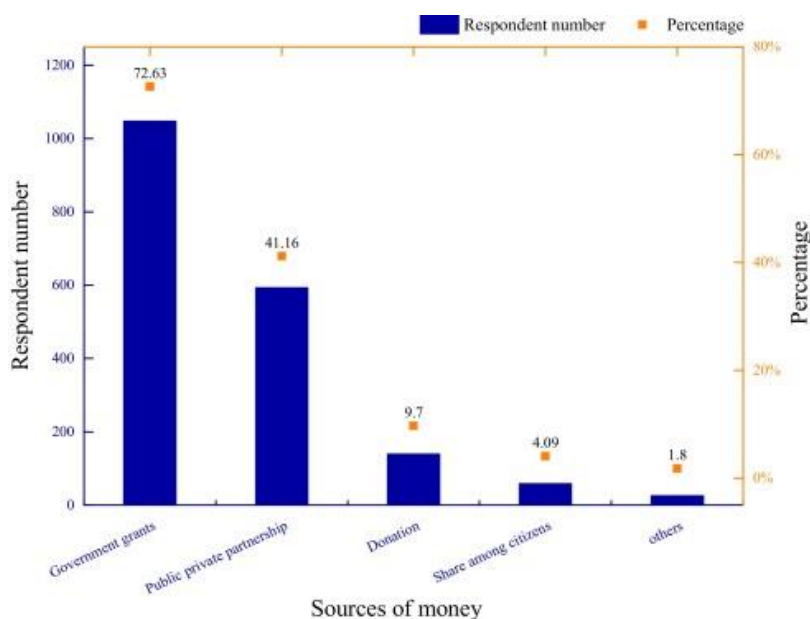
Figure 24: the main sources of financial support for sponge cities as preferred by citizens (Wang et al, 2017).

Financial continuation is perhaps the SCP's most important point of concern. In the survey, this indicator has scored an average of 1,25 and the most chosen answer was *"There are insufficient financial resources. Financing is irregular and*

117

unpredictable leading to poor policy continuation." (37,5% of answers). P1 emphasizes that public funding is far from enough to sustain the programme, and as can be seen in figure 24, other options besides PPP do not seem viable. The PPP scheme is not mature enough though, says P1: the legal framework has not developed yet as it should be to support such a financing scheme. This is remarkable, since the Chinese government intends to have PPPs cover a large portion of funding (Wang et al, 2017; Jia et al, 2017; Xiang et al, 2019). P1 furthermore points out that only a handful of successful PPP agreements have been utilized in the SCP so far, mostly because it is too risky for developers and investors due to long return periods with no short-term financial gains and an unpredictable character. Even the companies that currently might be willing to invest are not really private, says P1: many are at least partially state-owned. Griffiths et al (2020) add that private investors are wary of investing due to lack of performance tracking and PPP databases, which was also discussed during the *Smart monitoring* indicator (page 98). Wang et al (2017) agrees that currently, the PPP business model is not clear, and advocates for more public participation that can lead to providing of crucial information that investors need. These include understanding public perceptions towards the SCP and willingness to pay. Moreover, P1 highlights the need for setting aside money for maintenance of sponge infrastructure, otherwise it will cause problems on the long term. As government officials don't want to burn their hands on maintenance costs due to maintenance not being included in evaluation, it should be added as an expense in order to be normalized.

P2 describes that national public funding will steadily decrease in the coming years, so there is significant time pressure on government actors to make PPPs work: when a stronger PPP foundation has been placed, especially municipalities need to find their own way to support projects as soon as possible. Li et al (2020) describe government funding as beneficial in the kick-starting phase only, but a bottleneck for the programme's expansion. Li et al (2017) argue in favour of integration of national agencies that can share costs from accessible national reserves in order to aid implementation of sponge measures at local levels.

One way to attract the private sector, according to P2, is to give them more influential power over projects. On the other end, P2 advises government authorities to increase trust in the private sector, making them able to perform leadership tasks as well.

Currently, the private sector cannot shape the future of their potential investments, which contributes to their worries of risk and uncertainties. Jia et al (2017) highlight the necessity of being able to quantify and appraise (financial) benefits of sponge city projects, since not being able to estimate tangible returns on investments reliably is a major current issue.

5.3.3. Implementing capacity

	Surveys	Policy / literature	Interviews	Indicator avg.	Condition avg.
9.1. **Policy instruments**	2,61 (+)	3 (+)	2 (+/-)	2,54 (+)	
9.2. **Statutory compliance**	2,67 (+)	3 (+)	3 (+)	2,89 (+)	2,51 (+)
9.3. **Preparedness**	2,26 (+/-)	2 (+/-)	2 (+/-)	2,09 (+/-)	

Table 14: indicator scores for the Implementing capacity condition (scores range from -- to ++; from 0 to 4 in numerical values).

Effectiveness of SCP *Policy instruments* is high regarding environmental impact and alleviating mild floods, but less so in extreme flooding with longer return periods. Especially for the latter, the SCP needs help from engineering methods to combine for greater effectiveness, says P2. This is being done, but recent flooding of SCP pilot cities prove that most sponge cities are not flood-proof yet. However, current developments in SCP policies are a push in the right direction which cannot be rushed to avoid long-term issues. P2 emphasizes that in these SCP policy documents, exact amounts of water that needs to be handled is regulated, and the necessity of combining green and grey methods is emphasized. Currently, authorities are working out the percentages of targets for combining methods, says P2. In the survey, the *Policy instruments* indicator has scored an average of 2,61 and the most chosen answer was *"Policy instruments serve as an incentive to internalize sustainable behaviour, but not (yet) always optimized with maximum efficiency."* (35,7% of answers). This efficiency is expected to grow when both green and grey infrastructure become more intertwined in SCP policy.

As for *Statutory compliance*, the conclusion can be drawn that SCP legislation and regulation are being well complied to, thanks to the aforementioned strong top-down

enforcement methods such as strict deadlines and targets, as well as evaluations of lower government authorities by higher government authorities. P1 calls implementation of policy efficient due to these systems and reiterates that regulated targets must simply be complied with to prevent negative consequences after evaluation. In the survey, the *Statutory compliance* indicator has scored an average of 2,67 and the most chosen answer was *"New ambitious policies, agreements and legislations are being explored. Most stakeholders are willing to comply."* (36,7% of answers). P3 adds that in some pilot cities such as Suqian, SCP guidelines have been added into the legislation system which makes actors and stakeholders respect them. Compliance would be lower and objections more frequent otherwise, says P3. One thing that speaks against full compliance to SCP guidelines, according to P3, is that cities can lose innovation in their projects. An example is given: when guidelines are strict on ecological matters, innovation in flood risk management can suffer, and vice versa.

Concerning *Preparedness* to account for uncertain changes and events, P1 states that it can vary from one sponge city project to the next, but generally designers take it into account as much as possible. However, it is impossible to take into account all unexpected changes and events with sponge city projects, says P2. Changes in the environment happen quickly in China's fast urbanizing cities. And for extreme flooding events, currently the only way to be prepared is to make use of effective monitoring systems that can predict and send out warnings before emergencies hit, says P2. As recent as the summer of 2021, the sponge city of Zhengzhou experienced severe flooding, with lives and assets lost. Experts state that the storm that flooded Zhengzhou was more than any city could have handled (Baragona, 2021). Such severe floods were always considered rare events, but they are occurring more often due to climate change: the line between uncertain and unexpected to certain and expected is shifting, which is arguably something the SCP should account for in its vision of handling severe floods with decreasing return periods.

Furthermore, P3 adds that misconceptions about scattered indicators have made it more difficult to account for uncertainties. There is too little flexibility, says P3, and highlights the need for flooding resilience becoming a more embedded part of sponge city planning next to ecological purposes. In the survey, the *Preparedness* indicator has scored an average of 2,26 and the most chosen answer was *"Based on past events, there*

are clear action plans and policies addressing the flooding challenge, but risk is often underestimated." (38,7% of answers). This holds true for most flooding challenges, but preparedness for the more extreme ones remains an Achilles heel. Climate change is changing the significance of 'past events': relying on those can more easily lead to underestimation of risk.

5.4. Conclusion

Applying the GCF to the SCP has provided a performance assessment of the programme's governance capacity to address flood risk. In total, 9 governance conditions (figure 25) with 3 indicators each (table 15) have been assessed by answering predefined questions with information and data coming from literature, policy documents, a survey and interviews.
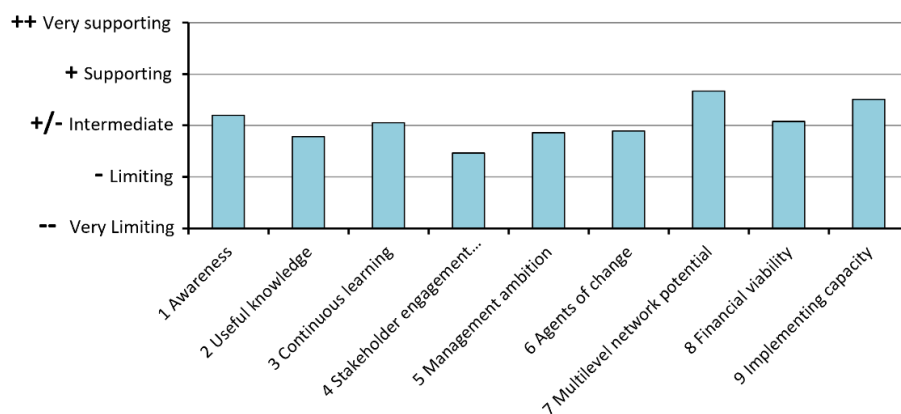
Figure 25: final GCF scores per condition in the SCP.

1.1 Community knowledge	2,28
1.2 Local sense of urgency	2,88
1.3 Behavioral internalization	1,43
2.1 Information availability	1,97
2.2 Information transparency	2,08
2.3 Knowledge cohesion	1,31
3.1 Smart monitoring	1,58
3.2 Evaluation	2,52
3.3 Cross-stakeholder learning	2,07
4.1 Stakeholder inclusiveness	1,51
4.2 Protection of core values	1,46
4.3 Progress and variety of options	1,42
5.1 Ambitious and realistic management	1,7
5.2 Discourse embedding	2,58
5.3 Management cohesion	1,31
6.1 Entrepreneurial agents	1,06
6.2 Collaborative agents	1,86
6.3 Visionary agents	2,76
7.1 Room to maneuver	1,82
7.2 Clear division of responsibilities	2,97
7.3 Authority	3,22
8.1 Affordability	2,52
8.2 Consumer willingness to pay	2,64
8.3 Financial continuation	1,08
9.1 Policy instruments	2,54
9.2 Statutory compliance	2,89
9.3 Preparedness	2,09

Table 15: indicator names and scores in numerical values.
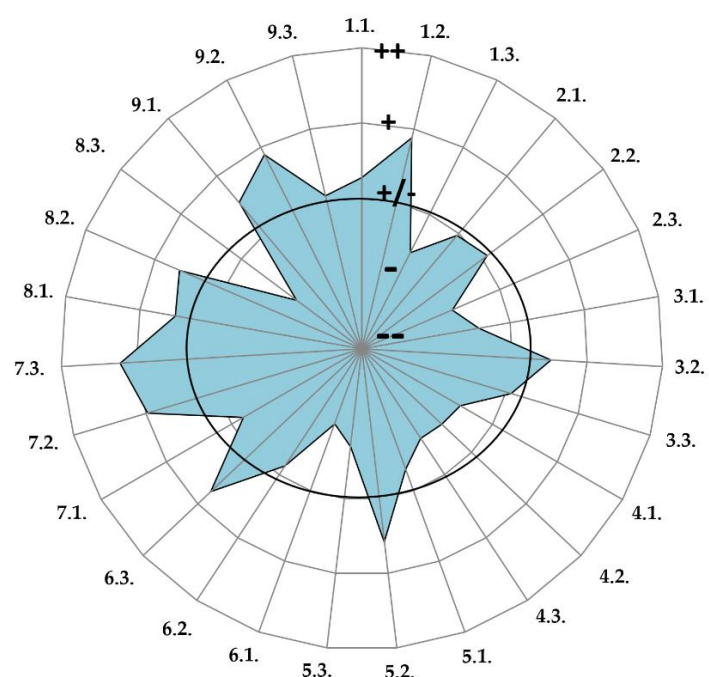
Figure 26: spider web diagram showing all indicator scores on a scale from -- to ++. The further towards the edge of the diagram, the higher the score.

121

'Multi-level network potential' and 'Implementing capacity' have scored highest, while 'Stakeholder participation' and 'Useful knowledge' have scored lowest. In figure 26, a 'spider web' diagram can be seen for a clear overview of the SCP's highest- and lowest scoring elements. Refer to table 15 for each indicator name and numerical score value.

As was somewhat expected based on the literature review, matters such as stakeholder participation and long-term financial securement have received scores on the lower end that should be addressed first according to the GCF. Other indicators that need attention have found to be integration of in information and inter-sectoral management to prevent conflicting interests. On the other end, the SCP scored high regarding matters such as authority, clear allocation of responsibilities, statutory compliance to laws and regulations, and accounting for local historical and cultural context when designing SCP projects.

Synthesis

To what extent can leadership functions play a role in improving the
Sponge City Programme's governance capacity conditions? (SQ3)

In Chapter 4 (Analysis), the leadership functions, the amount of influence and importance, and the interactions between the most important Chinese governmental actors in the SCP have been determined. With that, it is possible to address governance indicators that have been scored in chapter 5 (Assessment). For indicators scoring **+/-** or lower, it will be elaborated which type of leadership is the right one to utilize their leadership tasks, and thus which actors have the ability to make beneficial changes. Therefore, a synthesis of results from previous chapters will lead to an advice in this chapter. At the start of each condition, a short summary will be given for each indicator score based on the previous chapter. As a reminder, the tied leadership functions to actors can be seen in figure 27 and the most prominent interactions between actors in figure 28.

Figure 27: Leadership Functions Framework with tied Chinese governmental actors involved in the SCP.

Figure 28: actor & stakeholder map with the interactions outlined between them.
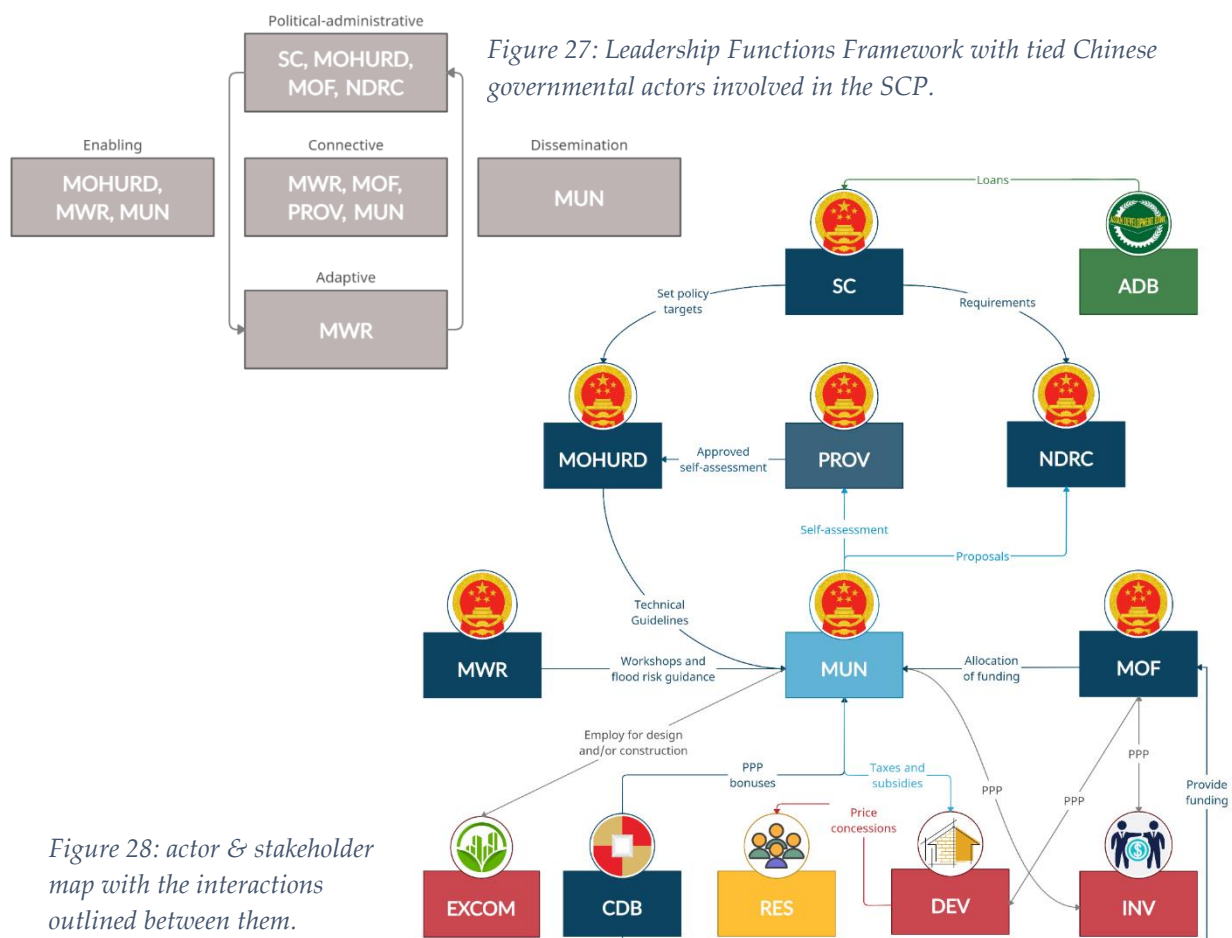
6.1. Leadership to raise awareness

The *Awareness* condition can be summarized as follows: community knowledge regarding flood risk and the SCP is present although on a basic level, scoring an average of **+/-**. An increased sense of urgency is passed top-down from governmental actors, scoring a **+.** Public participation to address flood risk through own behaviour is low due to the discourse that citizens are merely the recipient of flood risk policies, scoring a **-**. See below for what leadership functions can be utilized to address the indicators scoring **+/-** or lower.

GCF indicators (avg. score)	Leadership function(s)	Actor(s)
Community knowledge (+/-)	Political-administrative, Connective	SC, MWR, MUN
Behaviroural internalization (-)	Political-administrative, Adaptive	MWR

Table 16: Awareness indicators linked to actors and their leadership functions.

Increasing *Community knowledge* on the SCP and flood risk in China can best be done at national government level (where it is created) and municipal government level (where it is implemented). According to Meijerink et al (2014), deciding on and communicating the realization of a shared vision on climate adaptation is a political-administrative leadership task, executed by positional leaders and politicians. The State Council (SC), which holds the political-administrative function, has always been the first to set the stage. Through events such as environmental-themed congresses, the SC has already spread information and knowledge about the SCP, but this doesn't mean it will reach regular citizens. Top-down communication is the first step for widespread knowledge in China: the SC can utilize communication instruments to promote policies to the public, such as popularization of science and the encouragement of public participation (Guo & Wei, 2019). The latter would help boost the *Behavioural internalization* indicator as well. Popularization of science that is relevant in the SCP (nature-based solutions, flood risk management, engineering, etc) can take place in various forms, such as through education. Another is to make use of Chinese social media (ICCO, 2017), with platforms like Weibo and WeChat.

The MWR and municipalities are currently responsible for the organization of workshops that share knowledge about SCP projects, thus utilizing their connective leadership function, by bringing people together towards a collaborative strategy

(Meijerink et al, 2014). These workshops could be made more accessible to the general public, through for example a live video stream that people can follow, or the possibility of sending in ideas that can be discussed by actors present in the workshops: interaction leading to more widespread knowledge throughout the community. Municipalities in particular have the influential power to induce behavioural change of their residents by getting into contact with relevant neighbourhoods that experience flooding or are to be constructed into a sponge city project. Through public hearings and surveys, for example. According to Guo & Wei (2019), open discussion helps people realize their value as citizens and encourages them to influence policies, which in turn strengthens public acceptance. As discussed, most Chinese citizens in sponge cities currently prefer a passive supportive role in urban flood prevention (Wang et al, 2018). Since a more active behavioural role can be beneficial to the SCP, public enthusiasm can be increased by allowing them to take part in the programme instead of being just the recipient. This can only be decided at the top, by the SC. Subsequently, municipalities can implement that strategy down to the neighbourhood level, thus making use of their connective leadership function.

6.2. Leadership to expand useful knowledge

Availability and transparency of information in the SCP both score **+/-** as some parts are available and accessible (e.g., technical data) while others aren't (e.g., long-term and maintenance). Cohesion of SCP information is the lowest scoring indicator, due to fragmentation between sectors and targets: **-**. Next, leadership functions to address these indicators will be elaborated.

GCF indicators (avg. score)	Leadership function(s)	Actor(s)
Information availability (+/-)	Connective, Enabling	MWR, MOF, MUN
Information transparency (+/-)	Connective, Enabling	MWR, MOF, MUN
Knowledge cohesion (-)	Political-administrative, Connective, Enabling	SC, MOHURD, MWR, MOF

Table 17: Useful knowledge indicators linked to actors and their leadership functions.

The first leadership function that is able to improve both information availability and transparency, is the connective function: among other things, its tasks include

building trust and legitimacy (Meijerink et al, 2014). More available, accessible and reliable information can help with legal compliance, accountability and transparency (Logan, 2010), thus building trust and legitimacy. In the SCP, the actors that can increase information availability and transparency are most noticeably two out of the three most important ministries involved in the SCP (the MWR and MOF), and municipalities. The MOHURD already does well regarding information availability and transparency, by mainly providing technical data through its aforementioned *Technical Guidelines for Sponge City Construction* policy document.

The MWR, however, can play a significant role to improve the lack of maintenance and long-term performance data, since the MWR is responsible for water administration, drainage, urban surface water management and handling of stormwater. The MWR has several departments, including a Department of Supervision, a Department of Water Project Operation Management and a Department of Flood and Drought Disaster Prevention (MWR, n.d.). The MWR can utilize its enabling leadership function to create the conditions for the emergence of new knowledge in the network, and utilize its connective function to bring different actors together (Meijerink & Stiller, 2013): in this case, having its departments fill the maintenance and long-term performance data gap. These departments can subsequently enable water bureaus at a municipal level to acquire and publicize data for each sponge city. Workshops that are being organized between the MWR and municipalities might opt for a more transparent and accessible strategy; sharing knowledge to a wider audience. To improve cohesion across governmental sectors with their own SCP information indicators, an overarching authority must effectuate this: the SC can instruct the MOHURD, MWR and MOF make it possible integrate information into a comprehensive system, thereby preventing conflicting targets and priorities. Aligning the MOHURD's *Technical Guidelines*, the MWR's water management data and the MOF's sharing of information to attract PPP investors will result in a stronger cohesion of knowledge. The MOF in particular can bridge an important data gap by setting up an online database for PPPs that are up for bidding.

6.3. Leadership to facilitate continuous learning

Within this governance condition, smart monitoring (**+/-**) is the indicator that should receive the most attention from SCP leadership, as it relies on inaccurate prediction systems that do not facilitate gaining knowledge about long-term performance on matters such as maintenance. Although evaluation is often focused on short-term targets while lacking long-term performance evaluations, evaluation mechanisms are present throughout the SCP and effectively used by government authorities as a means to assess constructions and policy: **+**. Lastly, opportunities for stakeholders to gather and share knowledge with each other are present in some SCP cities by attending committees and workshops, but regular citizens are still left out: **+/-**. Below, the indicators scoring **+/-** or lower will be looked at through the lens of leadership functions.

GCF indicators (avg. score)	Leadership function(s)	Actor(s)
Smart monitoring (+/-)	Adaptive, Connective, Enabling	MWR, MUN
Cross-stakeholder learning (+/-)	Connective	MWR, MUN

Table 18: Continuous learning indicators linked to actors and their leadership functions.

The MWR, which has its own engineering facilities, carries the responsibility of urban surface water management and is thus responsible for maintenance. Since the SCP is implemented on a city scale, while the actual projects are often even on a neighbourhood scale, cooperation between the MWR and municipalities is essential to facilitate monitoring of maintenance. As the MWR can establish connections between water facilities and city drainage, thereby utilizing their connective leadership function, a steady basis is already present to do so. Municipalities must make use of their adaptive leadership function to allow the emergence of the new practice of keeping track of long-term performance. Furthermore, municipalities should apply their enabling leadership function to increase the priority that maintenance monitoring is given, as one of the tasks of this function is to create a sense of urgency (Meijerink et al, 2014). Both the MWR and municipalities can facilitate a larger extent of cross-stakeholder learning by utilizing their connective leadership functions: the MWR can allow for more sharing of data and knowledge from its workshops and congresses to a wider audience, while municipalities have the ability to include local stakeholders such as citizens into the learning process.

6.4. Leadership to enhance stakeholder engagement

The *Stakeholder engagement process* governance condition is the lowest scoring condition for the SCP in the GCF. On itself, stakeholder inclusiveness does not score particularly low **(+/-)** since there is room for passive participation for a restricted group of stakeholders such as non-governmental experts. However, upon further inspection, exclusion of the general public in most instances combined with little room for active participation of other stakeholders, leads to lower scores of core values protection **(-)** and variety of options **(-)**. Leadership to improve the stakeholder engagement process will be discussed on the next page.

GCF indicators (avg. score)	Leadership function(s)	Actor(s)
Stakeholder inclusiveness (+/-)	Political-administrative, Enabling, Connective	SC, MUN
Protection of core values (-)	Adaptive, Dissemination	MWR, MUN
Progress and variety of options (-)	Enabling, Dissemination	MWR, MUN

Table 19: Stakeholder engagement process indicators linked to actors and their leadership functions.

To increase stakeholder inclusiveness, Xu (2016) recommends to form consensus and support through promotion and education in the short-term, a legislative framework and revision of relevant laws for the medium-term, and full participation in all phases (implementation, construction and monitoring) in the long-term. First, a change must be made top-down to allow for a larger extent of stakeholder inclusion, particularly of the general public. This is where the SC can utilize its political-administrative leadership function to provide the foundation for civil engagement (Carmin et al, 2013; Lee & Koski, 2012), thus making the decision to work towards a (more broadly) shared vision on a climate adaptation plan, which is one of its leadership tasks (Meijerink et al, 2014). Next, the MWR and MUN can invite public representatives from sponge cities into -already existing- workshops, committees and congresses, thereby making use of their adaptive and dissemination leadership functions respectively. According to Randall & Coakley (2007), the adaptive leadership function can mean searching for active civil commitment in search of seeking new solutions. Through the adaptive function, the development and emergence of new ideas can grow by increasing stakeholder inclusion. By taking the ideas of this 'new' stakeholder group seriously, protecting their core values is a logical result. Municipalities play a key role here: first,

by performing an enabling leadership task such as fostering interaction (Meijerink et al, 2014) through giving its residents a seat at the table. Second, by using another enabling leadership task: "allow for and stimulate a variety of adaptation strategies and options" (Meijerink et al, 2014), a larger variety of alternatives may be co-created by stakeholders and actors alike. Third and final, the municipality can use their dissemination leadership function to insert newly developed ideas into the network of leaders. For example: ideas that are put forward by newly-included stakeholders (adaptive function) during workshops and committees can be forwarded to higher governmental authorities such as the MOHURD, MWR and MOF to take into consideration when they decide on sponge city policies.

6.5. Leadership to balance management ambition

The SCP was found to be highly ambitious, but arguably much less so realistic, depending from which perspective: high targets can lead to time and personnel shortages, while moving aside non-evaluated aspects such as maintenance. These double-edged findings leave the *Ambitious and realistic management* indicator with a score of **+/-**. The *Discourse embedding* indicator achieves a higher score (**+**), as the SCP generally takes local historical, cultural and political context into account with, for example, ancient water town culture and encouraging competition between cities. However, *Management cohesion* is one of the SCP's weaker points, due to a poor integration between sectors and administrative boundaries: **-**. Next, the indicators scoring **+/-** or lower will be looked at through the lens of leadership functions.

GCF indicator(s)	Leadership function(s)	Actor(s)
Ambitious and realistic management (+/-)	Political-administrative, Enabling	SC, MOHURD, MWR
Management cohesion (-)	Political-administrative, Connective	SC, MUN

Table 20: Management ambition indicators linked to actors and their leadership functions.

Increasing realism of SCP (time) management is relatively simple: the overambitious area target for sponge cities is decided by the SC, which has the power to adjust it through their political-administrative leadership function. The MOHURD must act accordingly, by adjusting the technical guidelines to lower area target percentages. To do so, their enabling function can create more flexibility for cities through its task of

allowing for a wider variety of adaptation strategies. A larger extent on flexibility with less-strict targets subsequently allows for much-needed attention to maintenance. This is not a part of evaluation yet, but the MWR (as the overarching responsible authority on maintenance) can add it to the evaluation mechanic to ensure a sense of urgency is created around the matter, thus making use of an enabling leadership task (Meijerink et al, 2014). Increasing maintenance importance would make SCP ambitions more realistic in the long-term, instead of practically forcing municipalities to work towards short-term currently evaluated targets only.

Improving management cohesion comes down to full integration of the SCP regarding relevant sectors, while ensuring discretionary power to local authorities to adapt the programme to fit the local context (and therefore: not necessarily increasing coherence through geographical-administrative boundaries). Currently, as the programme is in the pilot phase, it does not have its own ministerial department. This would be beneficial to the SCP, as an overarching department can mitigate the current situation of sectors not working together due to conflicting interests. Moreover, cohesion is achieved by connecting. Therefore, the connective leadership function is most apparent to improve this indicator. Bringing actors together to collaborate is a key leadership task of this function, which is best executed by the MWR, the MOF or municipalities, depending on which part. Using the connective function to make SCP policy more coherent regarding alignment across sectors can most easily be achieved by municipalities: on a project-scale level, cities can invite all relevant stakeholders to the table as equals, negating hierarchy disparities and talking through conflicts of interests. Of course, this would slow the SCP process down, but if targets are adjusted to a more realistic standard as discussed in the previous paragraph, this should not be an issue. As Zevenbergen et al (2018) state, upscaling towards a resilient city is a time-consuming process if done correctly. Municipalities would need more discretionary power to make the above possible, which is up to the national government. Lastly, it has been discussed how municipal bureaus chase their own goals which hinders SCP policy effectiveness. An overarching municipal sponge city bureau, with constituents from other municipal bureaus, can work on collaborative sponge city strategies, thereby fulfilling a connective leadership task as well. An important effort herein for municipal bureaus is to allow the SCP to co-exist or co-develop together with other programmes, such as in the field of housing.

6.6.   Leadership to empower agents of change

Entrepreneurial agents are allowed virtually zero influence within SCP planning, although land developers are included within the reigns of governmental control: **-**. Actors are enabled to engage collaborative agents, although mostly within conventional and traditional coalitions: **+/-**. As actors in the SCP are enabled to create long-term visions and strategies supported by intermediate targets, a higher score is given: **+**. Leadership functions that can further empower entrepreneurial -and collaborative agents of change will be specified next.

GCF indicator(s)	Leadership function(s)	Actor(s)
Entrepreneurial agents (-)	Political-administrative, Connective	MOF, MUN
Collaborative agents (+/-)	Connective	MUN

Table 21: Agents of change indicators linked to actors and their leadership functions.

Entrepreneurial agents are first and foremost crucial in making PPP arrangements work in the SCP, which currently cover nowhere near the government's ideal of two thirds of SCP funding. The MOF is responsible for the technicalities of PPPs and finding means to formally attract investors, while municipalities hold the responsibility of seeking out such arrangements with developers and investors. However, this has proved to not be very attractive to developers who have little influence on decision-making and to investors due to uncertainties, making investing too risky. It is up to the MOF to make PPPs more attractive by utilizing leadership tasks. For example, the political-administrative task to generate and allocate necessary resources for climate adaptation (Meijerink et al, 2014). In the SCP, this would translate to guaranteeing certain financial benefits when investors decide to invest, making it less risky. To attract more financial backing from developers, trust must first be repaired, since there has been a distrust from government authorities towards developers. Building trust is one of the connective leadership function's tasks and is best assigned to municipalities, as both most SCP projects and most developers work on a relatively small scale in urban areas.

Furthermore, Zevenbergen et al (2018) call for strategy that links SCP investments to other sectors, that way expanding the 'fishing pond' to find more developers and investors that are willing to partake in the SCP. Enabling actors to engage in

collaborations between businesses, government levels and sectors requires municipalities to align its municipal bureaus going forward, thereby using their connective leadership tasks of bringing people together and agreeing on a collaborative strategy.

6.7. Leadership to raise multi-level network potential

Room to manoeuvre was found to be somewhat limited for local actors, although improving. Discretionary power and flexibility are currently only there in the SCP within a predefined structure that higher authorities allow for, but local actors can opt to develop alternative approaches to address flood risk: **+/-**. *Clear division of responsibilities* and *Authority* are the two highest scoring indicators of the SCP in the GCF though, thanks to clearly written allocation of roles to actors and legitimate forms of power enabling SCP policies. Both score a **+**. The indicators scoring **+/-** or lower will be analysed by leadership functions below.

GCF indicator(s)	Leadership function(s)	Actor(s)
Room to manoeuvre (+/-)	Enabling, Adaptive, Dissemination	MOHURD, NDRC, MUN

Table 22: Multi-level network potential indicators linked to actors and their leadership functions.

In the top-down SCP planning mechanism, allowing local actors more room to manoeuvre needs to be decided on a higher government level. The most important matter for cities is to be able to adapt the programme to their geographic context, such as climate zone and associated weather patterns. Secondly, cities need more breathing room regarding targets and evaluations, making it easier to develop and perhaps experiment with a variety of approaches. Since the MOHURD sets the stage for which (standardised) sponge measures must be implemented and how targets must be achieved, their enabling leadership function can utilize its leadership task of allowing municipalities more optional adaptation strategies (Meijerink et al, 2014), leading to larger flexibility and space for innovation. The NDRC can make use of the same leadership task, as this authority is in charge of reviewing municipalities' SCP project proposals. To develop new ideas and practices within the SCP, municipalities need to be able to apply the adaptive leadership function, which they currently do not hold in the programme. National government authorities can give local authorities this form

of discretionary power, however. If done so, municipalities can subsequently take advantage of their dissemination leadership function, by inserting newly developed (alternative) ideas into the network of actors. If these three leadership tasks are made use of, room to manoeuvre for local actors will thus increase.

6.8. Leadership to ensure financial viability

Financial viability is a double-edged sword in the SCP. On the one hand, the programme is built around truly Chinese ideals, being 'for the people'. Sponge projects generally benefit virtually all residents of a city, either through accessible public facilities or increase of housing values. *Affordability* and *Consumer willingness to pay* therefore both score a **+**. On the other hand, *Financial continuation* of the programme is in danger due to insufficient means of private funding, scoring a **-**.

GCF indicator(s)	Leadership function(s)	Actor(s)
Financial continuation (+/-)	Political-administrative, Connective	MOF, MUN

Table 23: Financial viability indicators linked to actors and their leadership functions.

A clearer, more maturely developed PPP business model is essential. To achieve that, the following can be done based on the findings in literature, interviews and surveys:

1) Create accessible-to-all PPP online databases consisting of all necessary information that can attract investors;
2) Reward cities and the private sector more generously for successful PPPs;
3) Allow the private sector more influential power on SCP projects;
4) Add maintenance expenses into funding budget;
5) Decentralize administrative authority to cities to allow them to build a tailored funding approach with local investors.

Key actors in this are the MOF and municipalities. The MOF is the highest authoritative power and leading decision-maker regarding PPPs, which can add an overarching national PPP database with general information about financial constructs, thereby using their connective leadership function. Associated leadership tasks in this are building trust and legitimacy (through information availability and transparency) and bringing actors and stakeholders closer together in PPP

mechanisms. Meanwhile, cities can do the same for locally-aimed PPP databases with information on their city, such as feasibility reports, clearance statuses and land acquisition information. This way, local investors can be better informed and attracted to PPPs (Kumar et al, 2021).

Currently, the MOF dishes out 10% funding bonuses to cities who arrange PPPs and maintenance is not included in funding. By raising the percentage and including funding, the MOF utilizes its political-administrative leadership task of allocating resources (Meijerink et al, 2014). Raising the bonus percentage would be more expensive at first, but provide a much-needed kickstart incentive for cities to attract the private sector which can pay itself out in the long run (Jia et al, 2017), while adding maintenance funding will prevent effectiveness issues later on as well.

To make investing less risky for the private sector, their influence on projects can be increased and certain financial benefits ensured. Both of these require use of the MOF's political-administrative function by managing resources and providing a foundation for engagement, as well as the connective function task of stimulating working together. Since there is currently distrust between government authorities and the private sector, it must be made sure beforehand that their interests allow for working towards the same goals. Lastly, as the SCP is implemented on a city level, local government authorities need to be enabled to construct their own tailored PPP agreements. This requires decentralization of decision-making on PPPs from the MOF to municipalities. Allowing this enables municipalities to more effectively make use of their connective leadership function by finding investors who are willing to co-fund locally.

6.9.   Leadership to secure sufficient implementing capacity

SCP policies are found to be effective in what they are trying to achieve, which is a combination of ecological improvements and alleviating mild flooding, with current developments pushing towards further integration of green and grey methods in SCP policy: a + for *Policy instruments*. Compliance to SCP policies and regulations is well enforced, thanks to clear formulations in legislation and evaluations: **+**. However, *Preparedness* needs some work as the SCP in its current form cannot handle increasing

occurrences of severe flooding, but it is being worked on by combining grey and green methods: **+/-**.

GCF indicator(s)	Leadership function(s)	Actor(s)
Preparedness (+/-)	Adaptive, Enabling	MWR, MUN

Table 24: Implementing capacity indicators linked to actors and their leadership functions.

To further strengthen preparedness in the SCP, the ability to handle stronger floods than what is currently the case is key, so that severe floods do not push sponge cities over their limits as easily. Because the MWR is the main responsible authority for handling urban flooding (Kumar et al, 2021), it is the most prominent actor to exercise its leadership function tasks and push for expecting of shorter return-periods of floods in the coming years in SCP policy. Storage capacity targets must be raised to account for more water (currently at 20-30mm, on which P3 stated that it's not much), even though that makes achieving SCP targets harder for municipalities (but as discussed, these can be given more time to balance things out). By adjusting storage capacity targets, the MWR would apply its adaptive leadership function by adapting to changing contextual circumstances (Meijerink & Stiller, 2013). It is important to note, however, that this too must be tailored to the local level: sponge cities that are located in the southern (sub)tropical climate zones are more vulnerable than in the drier, northern parts of China and must receive extra consideration. Municipalities thus have an important role as well, and can use the enabling leadership function task of creating a sense of urgency (Meijerink et al, 2014) to increase flooding resilience among actors such as its municipal bureaus, and stakeholders, such as designers.

6.10. Conclusion

Different types of leadership functions have been found to be adequate to address various indicators scoring **+/-** or lower. A few things stand out. First, it is important for almost all governance capacity indicators to improve coordination across all government levels and sectors. Second, although municipalities are not at the top of leading decision-making (national government authorities are), they are at the centre of most interactions between both actors and stakeholders. It's reflected in how often it was found to be that municipalities' connective leadership function was useful to

improve governance capacity indicators such as expanding knowledge and awareness to its citizens. This is not surprising, as the SCP is, as mentioned, implemented at the local level. Third, the enabling leadership function was found to be one of the most important functions, since it can be used to tackle governance capacity elements that require more participation and flexibility by stimulating the emergence of option variations and alternatives. Fourth, as was the case with Meijerink et al's (2014) case-studies in Europe, Chinese governmental actors in the SCP that fulfilled the enabling role often fulfilled the connective role as well. This was not always the case though: the MOHURD for example was found to hold the enabling function but not a connective one. Lastly, it is noteworthy that the top-down mechanisms in the SCP were reflected in the importance of the political-administrative task of leading decision-making on the top authoritative levels, and that the adaptive leadership function was found to often be subsequently necessary in order to set changes in motion after being enabled to do so.

Outcome

Conclusion, discussion, reflection and recommendations

Photo: satellite image of the Pearl River Delta urban area, home to over 22 million people across several cities, including Shenzhen (a Sponge City Programme pilot city since 2016) and Guangzhou (currently in development towards a sponge city). Credit: PlanetObserver.

Conclusion

To what extent is governance capacity of the Sponge City Programme capable of managing flood risk and how can leadership make a difference?

Answer to main question

Certain aspects of governance capacity in the Sponge City Programme (SCP) have proven to be effective for flood risk management, while others can best be described as bottlenecks for the future of the programme. In general, capacity conditions that are about powerful, decisive and assertive governance do well in the SCP. However, generally the opposite applies to capacity conditions that are about loosening the reins of strong governmental control.

Currently, the SCP is quite effective at alleviating mild floods with its use of green infrastructure. However, the programme in itself is not capable of stopping severe floods. For that, integration with grey infrastructure and other programmes and policies is necessary. The Chinese government will decide whether alleviating floods should become a stronger priority in the programme. If that decision is made, several governance capacity indicators are in need of improvement based on the Governance Capacity Framework (GCF). The most important ones include: increasing storage targets and adjusting both deadlines and rather unrealistic area targets accordingly to a more 'quality over quantity' approach; securing financial continuation by developing private-public partnerships; increase sharing and transparency of information to increase public participation; allowing stakeholders and agents of change a more influential part of the decision-making process; and making sure SCP management is coherent across sectors and government levels.

Plenty of opportunities can be found to improve governance capacity through use of leadership functions, based on applying the Leadership Functions Framework (LFF). Some leadership functions can be utilized through the top-down planning mechanism that the SCP operates within, such as making changes through decision-making in the political-administrative function. However, there are two reasons that advocate for a more decentralized approach: municipalities are key in the SCP and can use more discretionary power to be able to make wider use of leadership functions; and

stakeholders need a seat at the decision-making table to attract private investment funding.

Ultimately, the SCP is a solid programme that is firmly controlled by Chinese government actors, especially at a national level. This can be used to its advantage, as the mechanism allows for potent decisiveness in adapting to change. For some governance capacity conditions, however, it is wise to allow other parties a larger amount of influence to reach the programme's full potential of alleviating flood risk.

New insights

Both the GCF and the LFF research frameworks are written from a western perspective of governance ideals and have not been applied to a Chinese water governance programme before. These new insights can be compared to applications of these frameworks in European or American contexts. Moreover, as stated in the introduction, some criticism on the SCP concerns financial matters and inclusiveness. The GCF made examining those criticisms possible and found some expected results which corresponded with previous literature, but surprising results were found as well: for example, how SCP projects are fitted into local cultural heritage such as ancient water town characteristics. Furthermore, the SCP itself received little attention from a planning perspective so far (compared to engineering and ecological perspectives), which this research has aimed to contribute to. The context of the Chinese urban governance system has led to very different results compared to case-studies undertaken in western countries with either the GCF or LFF, such as a stronger governmental dominance in the case of China. While watching through the lens of leadership functions, occasionally it became clear how the programme can benefit from high-ranking actors to actually cut back on their leadership power, or to decentralize it. As decentralization is already a main element in for example Dutch spatial planning, GCF or LFF research undertaken in the Netherlands evidently leads to different outcomes compared to China. This does not mean that either planning approach is 'best'. Governance values and priorities are different and this is reflected in policies. Frameworks such as the GCF and LFF have thus proven to be valuable in pointing out differences in various governance mechanisms.

Discussion

Reflection and interpretation

A pattern that can be identified in this research is that governance capacity of the SCP performs strongly on elements in which a strong government control thrives, but needs work by actors making use of leadership functions to address elements that are currently insufficient to achieve flood alleviation goals in the long-term, often involving a lack of stakeholder participation. A relationship can be observed between holding onto full influential power to ensure decisiveness on the one side, and on the other allowing decentralization and participation into decision-making to ensure financial continuation. Results are mostly corresponding with findings in literature in that regard, but the question is whether the SCP would actually benefit from steering towards a more western style of governance that is based on western frameworks such as the GCF would suggest. After all, China's 21st century (urban) development story has been a rapid and successful one while making use of similar planning mechanisms as applied in the SCP. In China, appreciation of certain governance factors differs from western ideas. For example, decisiveness in China is often placed above stakeholder participation, as participation can lead to slowing down implementation. The culture is generally different from the west, which is reflected in their way of practicing governance: the benefit of the many outweigh the benefit of the few who might be opposed to plans.

Regarding validity of results, the GCF is a comprehensive and consistent method in which information from literature, policy documents, a survey and interviews have been used to form scores, which has contributed to thoroughness and validity. Scores ranging from -- to ++ are useful to combine data results, but restrictive in other aspects: for example, dependent on context, some indicators may be more important than others, which the framework does not show. In times of crisis, indicators such as a sense of urgency might be more valuable compared to other indicators, requiring adding differently weighted variables. Moreover, indicator scores are independent but show overlap and are interrelated to some extent, which can give a skewed view. For example: the indicators for *Ambitious and realistic management* and *Statutory*

compliance: it is easier to comply with ambitious targets set within strict time limits than to comply with easy-to-achieve targets within longer time frames.

Researching which leadership functions are most effective to address certain governance capacity indicators is somewhat open to interpretation, but leadership tasks are clearly defined by the creators of that framework, allowing to connect the GCF and LFF. Nonetheless, combining the two frameworks created uncertainties in the beginning of this research, as information and data might have been hard to come by since Chinese governmental information is not always publicly available or accessible. Fortunately, Chinese acquaintances were there to help out with this issue.

Limitations and recommendations

Some obstacles were encountered while conducting this research. The pandemic prohibited any form of travel, eliminating former plans of conducting case-study field work in a research internship environment. The choice was therefore made to research governance of the SCP as a whole, and while the programme is similarly applied across the country, a case-study could have provided more detailed governance capacity results per city. Now, it was necessary to generalize some findings, which worked well for creating a broad overview of the SCP's governance capacity. A recommendation for further research would therefore be to apply the GCF on a single sponge city. Another limitation was the fact that on occurrence, answers given by for example interview participants did not perfectly fit into the predefined questions or indicators. In those cases, a more flexible approach would have been beneficial. In further research, perhaps the GCF can be more tailored to the research context, while trying to provide the same consistency. It should be noted though, that knowledge will always be inseparable from values, current scientific discourses, and disciplinary approaches. Lastly, as discussed, both the GCF and LFF are constructed from a western perspective on governance. This provided new insights about a Chinese context, but it would be thought-provoking as well to create similar frameworks from a Chinese perspective that can be applied to western governance programs. In the end, such new experimental styles of research have the possibility of expanding scientific knowledge and mutual understanding. And since the GCF holds citizen participation in high regard, citizens can be surveyed or interviewed in further research.

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Appendices

GCF scoring guide, interview transcriptions and survey response data

Photo: Nanhu Wetland Park, Chengdu city (Kvasnetsky).

GCF scoring guide

About the understanding of causes, impact, scale and urgency of flood risk.

Indicator 1.1: Community knowledge

Likert score table with predefined question and indicative answers for this indicator:

To what extent is knowledge regarding flood risk present throughout the community in SCP pilot cities?	
++	Nearly all members of the community are aware of and understand the actual risks, impacts and uncertainties of flooding.
+	The community is mostly knowledgeable and recognize the many existing uncertainties of flood risk.
+/-	The community has a basic understanding of flood risk, but impacts and frequencies are often underestimated.
-	Only a small part of the community recognizes flood risk.
--	The community is unaware of flood risk.

Indicator 1.2: Local sense of urgency

Likert score table with predefined question and indicative answers for this indicator:

To what extent do actors have a sense of urgency, resulting in awareness and SCP policies that address flood risk?	
++	Flooding is taken seriously: continuous action is being taken and there are investments in innovative solutions.
+	Flooding is increasingly taken seriously, but considerable efforts often only receive temporary support.
+/-	There is some awareness around flood risk. Small adaptation efforts are being made, but not on the long-term.
-	A small group expresses concern about flood risk, but adaptation efforts are not on the agenda.
--	There is no sense of urgency and there is resistance against flood adaptation measures.

Indicator 1.3: Behavioural internalization

Likert score table with predefined question and indicative answers for this indicator:

	To what extent do local communities try to change their behaviour in order to contribute to solutions regarding flood risk?
++	Communities are encouraged to participate and minimizing flood risk is integrated into practices and policies at the local level.
+	Action is being taken to address flood risk but it is not fully integrated into practices and policies yet.
+/-	Although there is a growing awareness, it results only in small steps of change regarding practices and policies.
-	Flood risk is recognized but there is no support to take action.
--	Most are unaware of flood risk and do not concern themselves with any action taken.

Condition 2: Useful knowledge

Describes quality of information which actors utilize to engage in decision-making processes.

Indicator 2.1: Information availability

Likert score table with predefined question and indicative answers for this indicator:

	To what extent is SCP information on flood risk available and reliable, which can support well-informed decision-making?
++	Comprehensive and adequate information can easily be found online and in policies regarding the flooding challenge.
+	There is a strong effort to provide comprehensive information, but it is not complete.
+/-	Some factual information can be found, but information on causes and impacts of long-term processes are lacking.
-	Limited information is available. Not all information is of sufficient quality.
--	There is either no information available or it is of poor quality.

Indicator 2.2: Information transparency

Likert score table with predefined question and indicative answers for this indicator:

To what extent is SCP information on the flood challenge accessible and understandable for experts and non-experts, including decision-makers?	
++	Information is understandable for everyone, easily accessible and can be openly shared.
+	Information is accessible and mostly understandable, but needs a time-consuming search through databases.
+/-	There are protocols to access information, but it is not readily available. Information is not easy to understand for non-experts.
-	Information is sometimes shared between stakeholders, but inaccessible for most people and difficult to understand for non-experts.
--	Information is mostly unavailable and difficult to understand in general.

Indicator 2.3: Knowledge cohesion

Likert score table with predefined question and indicative answers for this indicator:

To what extent is information on the SCP cohesive, including integration of short- and long-term goals between various policies and stakeholders in order to deal with the flooding challenge?	
++	Stakeholders are engaged in long-term and integrated strategies. Information consisting of co-created knowledge can be found.
+	Sectors cooperate in a multidisciplinary way, resulting in complete information. However, knowledge about implementation is limited.
+/-	Data collection within sectors is consistent but knowledge on the flooding challenge is still fragmented between sectors.
-	Information is sector-specific and is inconsistent both within and between sectors.
--	A lack of data strongly limits the cohesion between sectors. Found information can be contradictory at times.

Condition 3: Continuous learning

Refers to analysing, refining, investigation, monitoring and questioning of all matters relevant to the flooding challenge.

Indicator 3.1: Smart monitoring

Likert score table with predefined question and indicative answers for this indicator:

To what extent is the monitoring of process, progress, and policies in the SCP able to improve the level of learning about the flood challenge?
++	A monitoring system is in place and provides useful information to identify and change future developments.
+	A monitoring system is in place and provides useful information on recognizing underlying processes.
+/-	A monitoring system is in place and provides useful information on recognizing alarming situations.
-	Monitoring occurs now and then but does not provide useful information on developments, processes or alarming situations.
--	There is no monitoring or monitoring is very irregular.

Indicator 3.2: Evaluation

Likert score table with predefined question and indicative answers for this indicator:

To what extent are SCP policies continuously assessed and improved, based on quality evaluation methods?
++	Frequent and high-quality evaluation procedures are in place and current governance principles are always being questioned.
+	There is continuous evaluation and improvement of policy measures.
+/-	Evaluations are being made on conventional (technical) criteria, leading to mostly small and short-term changes.
-	Evaluation is limited regarding both frequency and quality and performed in a not-systematic manner.
--	There is no evaluation or it is not being documented.

Indicator 3.3: Cross-stakeholder learning

Likert score table with predefined question and indicative answers for this indicator:

	To what extent do stakeholders involved in the SCP have the opportunity to interact with other stakeholders and choose to learn from each other?
++	Programs/workshops to support cross-stakeholder learning and interaction are in place to find adequate solution.
+	Stakeholder interaction is considered valuable, but is not being put to practice as much.
+/-	Stakeholders are open to interaction but not much learning is going on.
-	Stakeholder interaction occurs in small coalitions based on common interests. Those outside such coalitions are often being excluded.
--	There is no contact between stakeholders. No information is shared outside of organisation/sector.

Condition 4: Stakeholder engagement process

About participation of all relevant parties and their influence on decision-making.

Indicator 4.1: Stakeholder inclusiveness

Likert score table with predefined question and indicative answers for this indicator:

	To what extent are stakeholders involved in the decision-making process of the SCP?
++	All relevant stakeholders are actively involved. The decision-making process and engagement opportunities for stakeholders are clear.
+	A number of stakeholders are actively involved but is unclear who should be involved in each stage of the process.
+/-	Stakeholders are mostly consulted or informed, not frequently engaged. Decisions are largely made before involving stakeholders.
-	Not all relevant stakeholders are informed and only sometimes consulted. Engagement opportunities are unclear.
--	No stakeholders are included, or their engagement is discouraged.

Indicator 4.2: Protection of core values

Likert score table with predefined question and indicative answers for this indicator:

	To what extent are SCP stakeholders committed to the process and actively involved?
++	Stakeholders have a large committed influence on the end-result. Participation opportunities and exit procedures are clear.
+	Stakeholders are actively involved, but they may be missing in contractual agreements when they do not wish to commit.
+/-	Stakeholders are involved for only short periods and have a limited influence. There are no clear exits in the engagement process.
-	Most stakeholders are engaged, but the level of engagement is low (for example, only informative). Their influence on the end-result is low.
--	Stakeholders are barely engaged or informed, thus their core values are not being protected.

Indicator 4.3: Progress and variety of options

Likert score table with predefined question and indicative answers for this indicator:

	To what extent are SCP procedures clear and realistic and are a variety of alternatives co-created?
++	For all stakeholders, the participation procedures are clear and deadlines are realistic. All alternatives are explored before making a decision.
+	Stakeholders can discuss alternatives, but procedures and deadlines are unclear. Decisions are made relatively early in the process.
+/-	There is a clear procedure for (short-term) stakeholder involvement, but insufficient opportunities to consider alternative options.
-	Informative procedures are present with low flexibility. Stakeholder engagement is low, possibly leading to unilateral decision-making.
--	There is a lack of clear procedures which hinders stakeholder engagement. Unilateral decision-making limits progress of decision-making.

Condition 5: Management ambition

Whether policy is feasible, well-embedded and whether long -and short-term goals are cohesive across sectors.

Indicator 5.1: Ambitious and realistic management

Likert score table with predefined question and indicative answers for this indicator:

To what extent are the SCP's goals ambitious and yet realistic?	
++	Policy is based on adequate assessment tools and objectives are ambitious. Goals, from short- to long-term, are clear and flexible.
+	There is a long-term vision that incorporates uncertainty, but it is not supported by short-term goals.
+/-	Goals are mostly focused the current situation where contextual conditions are assumed and long-term risk scenarios are lacking.
-	Goals are 'quick fixes' mainly, without a long-term vision that includes sustainability, risks and uncertainties.
--	Goals only consider current flooding challenges, are short-sighted and lack sustainability objectives. Policy is typically reactive.

Indicator 5.2: Discourse embedding

Likert score table with predefined question and indicative answers for this indicator:

To what extent is SCP policy interwoven in local historical, cultural, normative and political context?	
++	Local context is used to accelerate policy implementation. Innovations are divided into acceptable phases and enable sustainable practices.
+	There is local consensus on the need for creating adaptive measures, but there is little experience in addressing flood risk on the long term.
+/-	Current policy fits the local context, but decision-making often results in compromised small short-term policies.
-	Local actors are unwilling to execute policy as it conflicts with their norms and values. Local interests are barely considered in policies.
--	Local cultural, historical and political context is largely ignored, possibly leading to difficult policy implementation.

Indicator 5.3: Management cohesion

Likert score table with predefined question and indicative answers for this indicator:

	To what extent is SCP policy coherent regarding 1) geographic and administrative boundaries, and 2) alignment across sectors, government levels, and technical and financial possibilities?
++	Policies are coherent and comprehensive within and between sectors. There is an overarching vision resulting in smooth cooperation.
+	There is cross-boundary coordination between policy fields to address flood risk. Policies are cohesive, but multi-sectoral actions are lacking.
+/-	Policy is fragmented and based on sector's specific scope and opportunities for co-benefits are hardly explored.
-	Policy is characterised by fragmentation and imbalance between sectors, with possible imbalanced use of resources between sectors.
--	Policies between and within sectors are strongly fragmented and conflicting with contradicting goals.

Condition 6: Agents of change

The people involved that 'make or break' the process of created climate adaptation policy and their willingness to support and take risks to incite change.

Indicator 6.1: Entrepreneurial agents

Likert score table with predefined question and indicative answers for this indicator:

	To what extent are entrepreneurial agents of change enabled to gain access to resources and have influence on decision-making?
++	There is a long-term support for entrepreneurship, which creates benefits and new insights.
+	There is a form of provisional experimental entrepreneurship in small-scale pilots to address the flooding challenge's complexity.
+/-	Entrepreneurial agents are able to seize low-risk opportunities but mostly ignore opportunities for innovative approaches.
-	Agents of change struggle to find windows of opportunity to act upon perceived flood risks.
--	Insufficient room for entrepreneurship leads to ineffective governance and lack of opportunity for entrepreneurial agents to enable improvements.

Indicator 6.2: Collaborative agents

Likert score table with predefined question and indicative answers for this indicator:

To what extent are actors enabled to engage, collaborate and connect businesses, government & sectors in order to address flood risk?	
++	Agents of change enhance wide-spread collaboration and are possibly administered to coordinate this through authority.
+	Agents of change can push for collaboration between new stakeholders.
+/-	Agents of change are enabled to enhance conventional collaboration with traditional coalitions, but with limited space for new collaborations.
-	There is insufficient opportunity for agents of change to go beyond conventional collaboration.
--	Collaboration is absent or discouraged due to a strong hierarchical structure.

Indicator 6.3: Visionary agents

Likert score table with predefined question and indicative answers for this indicator:

To what extent are actors in the SCP network able to facilitate long-term and integrated strategies which are supported by interim targets?	
++	Agents of change actively and successfully promote sustainable and long-term visions with fitting short-term goals included.
+	There is a clear long-term and sustainable vision, but a discrepancy between that and short-term goals.
+/-	Agents of change are limited to promoting 'business as usual' and do not promote long-term integrative thinking.
-	The (often short-term) vision to address the flooding challenge considers only a limited group of actors.
--	There is a lack of visionary agents that promote long-term sustainable visions regarding the flooding challenge.

Refers to influential power allocated to all levels of government and the network in which they cooperate.

Indicator 7.1: Room to manoeuvre

Likert score table with predefined question and indicative answers for this indicator:

To what extent do actors in the SCP have the opportunity to develop a variety of alternative approaches that can address existing or emerging flood risk challenges?	
++	Actors are given the freedom to develop new and diverse approaches and partnerships, resulting in continuous improvements and exploration.
+	It is recognized that a high degree of freedom is needed in the form of experiments and looking for unconventional collaborations.
+/-	There is limited room to deviate from predefined tasks.
-	Only a few actors receive some degree of freedom, and there are limited opportunities to develop alternatives and unconventional partnerships.
--	The actions of stakeholders are strictly controlled. Freedom to form new partnerships is strongly limited as actor network composition is fixed.

Indicator 7.2: Clear division of responsibilities

Likert score table with predefined question and indicative answers for this indicator:

To what extent are responsibilities in SCP policies and regulations clearly formulated and allocated, in order to effectively address flood risk challenges?	
++	The roles and responsibilities are clearly divided amongst actors. Cooperation between them is dynamic and effective.
+	Actors within the network recognize the need to explore cooperation to bring together expertise and divide roles and responsibilities clearly.
+/-	Responsibilities are divided over a limited set of conventional actors, with little opportunity for new unconventional cooperation.
-	Authorities are fragmentized or they lack interest. Miscommunication and lack of trust are causes that block effective water governance.
--	There is an unclear division of responsibilities and a over-hierarchical structure. Trust and expectations between actors are low.

Indicator 7.3: Authority

Likert score table with predefined question and indicative answers for this indicator:

	To what extent are legitimate forms of power and authority present in the SCP that enable long-term, integrated and sustainable solutions for flood risk challenges?
++	Long-term, integrated approaches are well embedded in policy. Authorities receive much support both politically and by society.
+	Legitimate authorities are recognized publicly. They are assigned to coordinate long-term integrated policy and implementation.
+/-	The flooding challenge is addressed as long as the status quo is not questioned. New policy mainly needs to fit into an existing structure.
-	Actor engagement is limited due to poor embedding of sustainability principles in current policy mechanisms, interests, and budget allocation.
--	Addressing the flooding challenge is regularly overruled with contradicting interests and thus it is hardly included in policy and regulation.

Condition 8: Financial viability

Concerning reliable financial possibilities to ensure longevity and affordability for all.

Indicator 8.1: Affordability

Likert score table with predefined question and indicative answers for this indicator:

	To what extent are flood risk related SCP policies and climate adaptation measures available and affordable for all citizens?
++	Policies ensure solidarity: sponge projects benefit everyone, including public infrastructure and private property protection.
+	Sponge infrastructure for everyone is pursued. It is increasingly addressed that the poor are disproportionately affected by the flooding challenge.
+/-	Basic sponge projects are affordable for most, but poor people struggle to afford adaptation measures that protect them against flooding.
-	A share of the population struggles to pay for basic adaptation. There is hardly any social safety net regarding climate adaptation measures.
--	Basic sponge infrastructure is not affordable substantial part of the population.

Indicator 8.2: Consumer willingness to pay

Likert score table with predefined question and indicative answers for this indicator:

	How is expenditure related to flood risk perceived by all relevant stakeholders (i.e., is there trust that the money is well-spent)?
++	There is a wide support to allocate substantial financial resources. Expenditure for public benefits is perceived as important too.
+	Due to growing worries about the flooding challenge, there are windows of opportunity that allow significant funding.
+/-	There is support for the allocation of resources for conventional tasks. Most actors are unwilling to financially support beyond the usual.
-	Willingness to pay is insufficient. The importance is perceived differently by each stakeholder and their cost estimates are too low.
--	There is little trust in how resources are allocated. Financial decisions are based on prestige projects that benefit small groups.

Indicator 8.3: Financial continuation

Likert score table with predefined question and indicative answers for this indicator:

	To what extent do financial arrangements secure long-term, robust policy implementation, continuation, and risk reduction?
++	There is secured continuous financial support for long-term policy. Both economic and noneconomic benefits are considered.
+	Financial resources are made available for single projects, but long-term resource allocation or institutionalized financial continuation is lacking.
+/-	The allocation of financial resources is based on past trends, without regard for future flooding challenges and unforeseen situations.
-	Potential resources are difficult to access, are distributed rather randomly and lack continuity.
--	There are insufficient financial resources. Financing is irregular and unpredictable leading to poor policy continuation.

Relates to effectiveness and flexibility of policy, including whether they are being respected.

Indicator 9.1: Policy instruments

Likert score table with predefined question and indicative answers for this indicator:

To what extent are SCP policy instruments effectively used in order to stimulate desired behaviour?	
++	Policy instruments are effective in achieving sustainable behaviour. Continuous evaluation ensures flexibility and adaptive capacity.
+	Policy instruments serve as an incentive to internalize sustainable behaviour, but not (yet) always optimized with maximum efficiency.
+/-	Policy fields often have similar goals, but instruments are not coherent and may even contradict. Overall instrumental effectiveness is low.
-	Instruments are being used without knowing their impacts, leading to imbalanced development and inefficiencies that are hardly addressed.
--	Policy instruments may enhance unwanted or even damaging behaviour that opposes sustainability principles.

Indicator 9.2: Statutory compliance

Likert score table with predefined question and indicative answers for this indicator:

To what extent is SCP legislation and compliance well-coordinated, clear and transparent, and do stakeholders respect agreements and objectives?	
++	Legislation is being complied with. Short -and long-term goals are well integrated. Local authorities and stakeholders respect agreements.
+	New ambitious policies, agreements and legislations are being explored in a "learning-by-doing" fashion. Most stakeholders are willing to comply.
+/-	Legal regulations regarding the flooding challenge are fragmented. However, well-defined fragmentized policies are being complied with.
-	Legislation is incomplete meaning that certain gaps can be misused. There is little trust in local authorities due to inconsistent enforcement.
--	Legislation is unclear or incomplete, leading to poor legal compliance by most actors. Legitimacy is low: actors operate independently.

Indicator 9.3: Preparedness

Likert score table with predefined question and indicative answers for this indicator:

	To what extent does the SCP account for uncertain changes and events?
++	Long-term plans and policies are flexible and bundle different risks, impacts and worst-case scenarios.
+	A wide range of threats is considered in action plans and policies, but measures are scattered and non-cohesive.
+/-	Based on past events, there are clear action plans and policies addressing the flooding challenge, but risk is often underestimated.
-	Action plans are present, but actual probabilities and impacts of risks are not well understood and incorporated into actions or policies.
--	There are hardly any action plans or policies for dealing with (future) calamities, uncertainties and existing risks, leading to high vulnerability.

GCF SCP interview transcriptions

A. Liping Dai (Utrecht University)

Winson
Before we start, could you please briefly explain your job and profession?

Dai
Well, I'm assistant professor in Utrecht University. My background is law. I'm working in law in water governance, water law and policy. My focus was in China. So I know about sponge city. And now I also compare the Chinese cities and Dutch cities under the scheme of water governance.

Winson
Great, great. Thank you. Actually, maybe I'd like to start as well with a question about your work in China. Because I read that you worked with Wuhan municipality and with the Water Affairs Bureau to organize workshops, right?

Dai
Yes, a short period. Not long, but I did.

Winson
I was wondering, how did you experience working with Wuhan municipality?

Dai
Well it's quite challenging because.. Yeah, knowledge transfer is not always easy. And also some sensitivity in between, because I'm also I was also working for Utrecht as abroad University. So there is some sensitivity. And I don't know if they were totally open to me. But yeah, I did get some information.

Winson
Okay. Why do you think there's some sensitivity?

Dai
Well, in China do interview is more challenging than here. Especially when you have a broad background. It's some political reason.

Winson
Political reasons. Okay. Yeah. Okay, because are they reluctant to give out information to organizations from outside of China?

Dai
Yeah, it's not per se. Because no one.. Yeah, no one wants to take the risk. Yeah, so that it's more safe. Just nothing of risk.

Winson
I see. I think I've read that somewhere as well. Thank you. So, the first topic is awareness. And it's about community knowledge, sense of urgency. And behavior.

Dai

Yes. If you or I share the screen about the questionnaire. We can go through that.

Winson

Sure. Yeah. Sure, I can share it. I have it open here right now. Just a second. I've got two monitors open. So I need to see how to share just one.

Dai   like me give you an answer about the scale give you like
four or five? Or just give the?

Winson

No, it's not necessary to give a scale, because I will get those from the survey.

Dai

It's also hard to to give the scale, actually.

Winson

Yeah, it is. I can imagine. Do you see the document now on your screen?

Dai

Yeah, I see now.

Winson

So if you could just answer it in whatever you think is the right answer to his question. And then I will use my research as a means to quote and elaborate on the topics and not so much as a skill how we do that with the surveys.

Dai

Yeah, for your first question would... extend this knowledge throughout the community. So when I talk about the local, most times I yeah, I think all the time, I will refer to the city of Wuhan. If I mentioned other cities, I will specify that. So throughout the community, I think about what do you mean about knowledge?

Winson

So, how general citizens that live in in city areas like Wuhan are in sponge to the area's or experience any type of flooding. Are they aware of flood risk and do they know about the sponge city for example?

Dai

Okay, Yeah, in the past, they experienced urban flooding every year. They know the flooding. Yeah, more or less would come every year every summer. But I don't think they know clear why the... how the flood treated, for example because lack of [...] capacity or because of the city planning or something like that. But they're aware of the risk there.

Winson

So they're so they're aware of the risk, but they don't always know what it triggers?

Dai

I think is universal. Also in that cities we don't expect to every citizen knows why. Exactly.

Winson

Okay. And so the second question is about the actors. So the municipal government, for example, the water Affairs Bureau, to what extent do they, create policies to address flood risk?

Dai

Well, the China is a centralized country, normally the central government policies and the local government implemented, yes. So they don't have very much room to create their own policies to deal with the flooding, but they do...ehm... yep, but there are some policies for example, also from top down from the central government, like changing the aged pipes or repair the roads or about the planning. So, this is a very general... this is a before the sponge city policies, sponge city policy is also initiated by the central government, the local government, employment, implements the policy, and they have some room to change it according to their own situation. This is what do they have done, and they are doing.

Winson

Yes, I see. Okay. So the first one behavioral internalization. So this is about local communities trying to change their behavior in order to address flood risk. Do you see that in local communities?

Dai

Is more about citizens, right? Well, not really, according to my knowledge is that people assume that this kind of things are public responsibility, so the government should, should do this should improve the living environment, not a citizen is themselves. So then, yeah, there must be some changes, but not so obvious.

Winson

Yeah. Okay. So they think the central government or the local government has responsibility?

Dai

Yeah, this is a public responsibility.

Winson

I see. Okay, second topic. Useful knowledge. So this is about all kinds of relevant information around sponge city program. So what I would like to know is a part I already know because I found quite a lot of sponge city policies online on the websites of, of the ministries. So for the average Chinese citizen, you think flood risk information and information, on the sponge city program is reliable?

Dai

Well, for the flash flood risk of what actually happened about a flood is reliable because it already happened. And you had the monitoring system, you could see how it happened and what happened. So well, even though it can support the decision making, I'm not quite sure because the sponge city is very complex, you need a lot of knowledge, not only on the flood itself, but also some other things. And you know, the sponge city program is a pilot program, and it requires... I am sure that you have read the indicators about three years to achieve a very high target. This is a little bit... Yeah... Impossible. So during my field research, I also talked with the architectures and also some projects managers. Yeah, they, they actually didn't have enough time to prepare it. So what they got, I mean, what they collected as information, I think is not enough to support the decision making, but due to the time pressure, they have to make a decision. So to answer your question, I think. I don't think it can.

Winson

Okay. And I think I think target was something like 80% of cities have to be [sponge city area]. And it's too high, you think the percentage?

Dai

Is too high is too high. If you compare the Dutch cities, the Dutch cities will not reach the specific, the same target, but some similar things will take years or decades.

Winson

Yeah exactly. Do you think that, let's say, a city like Wuhan doesn't reach the target. Let's say they get to 50% instead of 80%, or something. Do you think the central government will see it as failed? Or do you think they will see it as successful?

Dai

Well, this is the really political thing. So in China, you not only have the sponge city targets, you have many other targets that are applied to the same system, the evaluation, so as local government, if you don't reach the goal, perhaps the central government won't say: okay, you have failed to do so. But you have a peer pressure. And you also have the pressure of the risk that you won't receive the central financial support for the next few years. And you also lose some opportunities to... I mean, this is a sponge city... program is a new thing. You definitely want to be in the frontier, then it will get you where many opportunities to develop yourself as a city. But if you don't you.. if you fail from that, and you lose, definitely you lose many financial support and opportunities, and also the image of your, of your city.

Winson

I see yeah, that's that's a lot of pressure. Okay. So, let's see about. So we have information availability and transparency. So most information is available. Right? And do you think that information is cohesive? So when you find information about sponge city, is it across sectors? Does it include all relevant sectors?

Dai

Yes, it across sectors, but it's not so cohesive. Like what I said, and there are many targets within the government, and they all require strict deadlines. So within the short time, you need to do a lot of things. And yeah, some of them might conflict with each other. It happens very often. So in this case, then you need to set a priority, or you need to choose.

Winson
Choose between..?

Dai

Between what is more urgent, sponge city or some other targets are picked, for example, if the deadline is next month, or next year.

Winson

I see. Yeah, that makes sense.

Dai

Also, because all not all, most of the projects are developed in a very short period, that it's difficult to integrate in a whole system. Winson

yeah, yeah. I can imagine if there's time pressure, it's hard to integrate across sectors

Dai

Yeah. The program indeed, across different sectors, but there's a leader sector. So different sectors have their own interests. So that also plays a role.

Winson

Yes, I see. So yeah, I think we'll get that back to those interests later. When they conflict. Yeah. The next topic is continuous learning. By the way, if there's any topic you feel you can't answer, then that's no problem. We can just skip them. If there's any, then just tell me, it's fine. So this is about monitoring. So during the process of the sponge city program, to what extent is the program being monitored to improve?

Dai

You know, what is this really bad at this point? Because the government includes other cities, they hurry up for achieving the target. But the monitoring is not in place. For example, the sponge cities, like the public parks, also the the public laws, you need maintenance for the next few decades, for sure. And this kind of things are not in place. As far as I know. Wuhan didn't have monetary and maintenance policy into... Yeah, into recently. So they have started a sponsorship program in 2016.

Winson

I think '15, yeah.

Dai

But the follow up policies like maintenance policies wasn't in place. Because, also because this maintenance is not included in the evaluation system, and is not included in the target system. So required to build like 80%, but you are not obligated to maintain them, let's say, it's a big flaw.

Winson

Okay, so there is some evaluation, but it's not addressed.

Dai

The central government evaluates the local government based on different indicators. But if you check the indicators, the maintenance after the program is not included in the evaluation. So in this way, if you have limited time, you have limited personnel... you definitely choose to reach the target first, but maintenance, you can do something for maintenance later.

Winson

Okay, and so about learning: do the stakeholders have the opportunity to meet with each other, to interact with each other and to learn with each other to improve the sponge cityprogram?

Dai

This is also very different from most western cities, and stakeholders. I'm sure you already read a lot of about that. So the main stakeholders of sponge cities is the central government, local government, and also some architects, project managers, some land developers. And so yeah, the communities, the citizens, but citizens don't play a role in this program. And the program is leaded by the government. And developers and architects: they passively receive the tasks from from the government, so they don't play an active role. But they, like for example, they join the project or they develop the projects and must follow the introduction of the government.

Winson

Yes, I see. Yeah. Okay. Thank you. Doing very good. I think this is very helpful. Let's go on to topic four. So this is more about the stakeholders. You already answered some of this actually, in what you just said. So stakeholders, to what extent are they involved? It is said, citizens are not involved at all. But mostly they're governments and some land developers, right? Okay. And then the second question is about the core values. So this is a bit of a abstract question, but it pretty much means: the stakeholders that are actively involved in a specific program, or actually, you can also count the citizens because even if they got involved in the program, they are on the receiving end, right? [- Yeah]. Do you think their failures are protected, their interests are protected?

Dai

Well, if you want to, yeah, protect, protect their rights and interests, or you, you should at least have time to discuss with them. Right. But in the case of Wuhan, again, because the limits are tight, they don't really have time to involve the general public to discuss: okay, this is what you want, or this is what you don't want. But all the things were designed at the governmental level. And the government's assign the tasks to the developers.

Winson

The developers are their interests and values.. do they have serious weight?

Dai

Well, this, I'm not quite sure. I only know that the developers get the tasks, then they design things, then they submitted back to the government to be evaluated. So I'm not quite sure if they have a serious say.

Winson

Yeah. Okay. And then about the process of this punch the program: before, before a decision is made, do you think all variety of options, alternative options are being looked at before they make a decision?

Dai

What do you mean about that? Can you do sponge city or don't do sponge city?

Winson

No, I mean, more like, before they make any type of decision within the sponge city program progress? Let's say they decide to do some area, they will rebuild an area before they choose how to rebuild it, do they, look at all the other options, or they choose one and then that's it.

Dai

Oh, this? I am not sure. I don't know.

Winson

Okay, then we will skip this. Let's go to management ambition. So you already answered this first one, actually, a bit, because you said the percentage is too high. Right from [- Yeah it's too ambitous]. So it's not realistic enough, you would say?

Dai

Well, if you see now is already.. Yeah, a few years after the program initiated? If you see the public report, and you see all the cities have achieved that targets. It seems the targets is not so ambitious. And it's realistic. But if you look into every small projects there, yeah, they have problems.

Winson

I see. Yeah, I read that somewhere else. Chris Zevenbergen from Delft. He also pointed out that the target percentages are just too high.

Dai

Yeah, let's say, yeah. If you understand the Chinese political system, we understand what I mean. So let's say if the target is even higher, 90%, I would say this targets would also be achieved. Because somehow the local governments have to achieve it. As, like we said, it's not about... Yeah, not only about the central government's evaluation, but some other factors. So more or less, they have to do it, if you say 100%, I would say they have also achieved. But if you look at the project itself, whether, yeah, it's really realistic, that's questionable.

Winson

I see. I think I understand it with the evaluation system. So they have to [- yeah, they have to achieve it]. Okay, so do you think this sponge city program takes into account.. let's say, for Wuhan, for example, the local historical and cultural context?

Dai

Well, I ever read some article says the Chinese cities look similar. Looks like a very, like very much like each other, because they develop, they are developed by the same approach. So if you look at the sponge city project, the individual projects, they're more

178

or less similar, like the public parks and the rain gardens. I'm not sure they really take into account about the historical cultural factors, but definitely political factors.

Winson

Yes, yeah, yes, that should explain. Okay. And then, so the sponge city program is, is mostly on a city level skill, right? [-Yeah]. But does it also take into account geographic and boundaries of rivers, for example. And then across sectors and all, let's say the whole area, which is involved into the process that is it also taking into account during a process?

Dai

Well, they try to do so but it is difficult. For example, when we were there, we need to have workshop with the water sector and the Environment Protection sector. But this these two sectors, they have different interests. Yeah, they also don't really meet each other to discuss the conflicts very often there to say in Chinese, say, the people who manages water they want to go to the bank. I mean, the water bank, the river bank, yeah. And the people who manage the bank, they want to go to go to the water. So they basically they.. So when we were there, we need to have workshop, but the, you know, the political leaders... The boss from both sectors, they're really in a high position. I mean, in China, the hierarchy is really different from here. So they are like: I don't want to go to you if you don't come to me.

Winson

Oh, okay. I see.

Dai

So it was very difficult that we planned to go as consultant. So we needed to go to the two sectors separately. Talk about the same thing two times.

Winson

Okay.

Dai

So that by the end of that they didn't sit together, only we... Yeah, went there. And he ended there two times. So this is the example to show, you know, how they work together. In terms of the sponge projects, you know, this project is not the big projects, but many individual projects. Yeah. So the innovative projects, they also, they're also developed in the individual way. So sometimes when they are collected together, by the end, there are conflicts between different projects, so then you need to solve it, then the cost would be higher, then when you plan it in a integrated way from the beginning. So this is the problem.

Winson

I see. Is that do you think that's typical for Chinese planning problems? Or more for sponge city specifically?

Dai

I think it's, it's, yeah, it's a general watermanagement problems.

Winson

General water management. Okay. Yeah. They mean for Chinese water management [-Yeah]. Okay. I see. All right, thanks. Let's go to topic six: agents of change. So this agents of change can be anyone that has the power to influence the sponge city process. Could be governments or could be developers, entrepreners with money, let's say anyone. Today, you think they have access to resources and have an influence on decision making of the sponge city progress?

Dai

I think if you bring money in then perhaps it's possible. But if not then.. yeah, it's difficult. Well, they have a think tank like the University Research Institute. But I don't know how to what extent the institute can influence the decision making.

Winson

Okay. And do you think so, about the actors, are they able to work together and connect, let's say a business together with the government? So they can together work on this sponge city process?

Dai

Definitely they can, but it's a question that to what extent they can because say the government is still higher.. in higher position. It is not a flat society. So yeah, it's working within a hierarchy system. It requires a lot of I don't know how to say it. It's not easy.

Winson

Yeah. I think Wuhan... they work together with our Arcadis, right?

Dai

Yeah. Arcadis. Yeah, I went there with Arcadis. So Arcadis... [...]?

Winson

Consultancy?

Dai

Yeah, yeah, let's see, but not a big role. So the process is the, the... Okay, the government has idea of the sponge city then need to find someone to design. Then they found some architecture. I think Arcadis is the consultancy for the architecture. It's not really to the government. And somehow they go back to the government pattern, they play a really limited role. I attended a congress of sponge city in Wuhan, it's organized by the University of Wuhan University. It is a think tank, I mentioned that Arcadis was not invited in and they wanted to attend to the conference, but they need to pay some ridiculous high cost entry fee. So they didn't. So you'll see. It's not so it's not really a network connected to each other. So they're separately, they do different things.

Winson

Why do you think they would charge such a high fee to Arcadis?

Dai

Well, yeah, you organize conference, you have costs. And for the famous speakers, you might need to pay them. Actually, you pay them very high. Yeah. So you need money.

Winson

And so they wanted to add Arcadis would pay?

Dai

Yes, very high.

Winson

Okay. Is that only for businesses? I mean, let's say they would invite a government organization from the Netherlands for example, maybe Foreign Affairs, would they also have to pay that amount or just for businesses?

Dai

Well, if they invite, so if you are the main speakers, perhaps you don't need to pay but most of time if they don't invite you and you want to participate you need pay the entry fee. Also for for us the conference, if you go some somewhere for conference, you need to pay the registration fee, but not very high. It's a symbolic, is just for the cost of the conference. But yeah, the ask is too high for Arcadis.

Winson

Okay, so let's go to topic seven: multi-level network potential. Actually, this, what I found out about this framework is this, this question is actually the same as the variety of options, well it's very similar. So this is about alternative approaches. And you already answered that question. So let's go to the second one.

Dai

Well maybe I have something more to say about alternatives. I think yes. Sponge city to solve the flooding problems sponge city is not the only solution. And because, like in Wuhan, sponge cities, most times are triggered by the aged pipes. If you just change the pipes that it's already a lot of approval. Improved.

Winson

Is changing the pipes part of the sponge city program or..?

Dai

I'm not quite sure. But there is another parallel program is called a, I've got an M just to change the pipes is not in, in sponge city, but I'm not sure if sponge city also has such part like the gray infrastructure, because there's more during and resilient, but I'm sure there are some great projects. And I'm not sure whether the this pipe things I included.

Winson

Do you know, the Chinese name for the pipe program or..?

Dai

Xiaoxue Guangdong. Do you speak Chinese?

Winson

Just a little. I have Chinese classes every week.

Dai

That is great. I'm sure. There will know it if you say that, the pipes.

Winson

Okay, I'll look it up. Okay. Then about responsibilities. So the policies of the sponge city program, are responsibilities very clearly stated into into these policies?

Dai

What do you mean, whose responsibility?

Winson

Does the spoinge city program state whose responsibility it is to address certain problems or to implement the system.?

Dai

As most of times the government the government's the local government. So as we said before the public. Yeah, or assume that this is the governmental responsibility.

Winson

Are these responsibilities also written down into the policies?

Dai

Yeah, in the Basic Law, like a water law is written that the government has the responsibility to, to manage the flood or something like that. I cannot remember clearly. Yeah, but if you ask about the responsibility allocation within the sponge city program, yes. It's written. Yeah, who needs to do what. But it's not always so clear. See, what is like, every, not every, most of the policies in China is always written. The sectoral responsibilities, or impact is very difficult, because you really need them to sit together to discuss if you cannot sit together then.

Winson

So, yes, yeah, that's hard. You explained that. Okay, but, so it is written down, though the allocation of responsibility in city policy?

Dai

I think, as far as I know, it's written down, but not about every detail. Yeah, it's written down. Okay, you should do this, but very general.

Winson

Okay. So not very specific, more like a general idea of what you have to do. Yeah, yeah. Yes. Okay. All right. So about authority: So the sponge city program is being implemented and enforced by legitimate forms of power. So I think I can get this answer ready, because it's a very central government. [-Yeah]. Yeah. So yeah, the central government is in charge. Right. [-Yeah]. Okay, the last two topics. Financial viability. So this is about the cost of sponge city program. I've read in a few papers that the cost is quite high, but some, but the cities get subsidies as well. I think one of the main points that I've read was that subsidies by the government is not always enough for a city and they need private public partnerships. Is that true?

Dai

Yeah, it's far from enough, they need private investment. But in current situation is like what I have written in my paper, it's very difficult to because the whole scheme public private partnership, it's not.. Yeah, it's not mature enough. So if you see the statistics, the PPP projects was like this. So only in that year 2016 I think very, very many. Then in 2018? There were only two public private partnership projects sponge projects in the whole country.

Winson

In the whole country? [-Yeah]. Really? Okay. So it peaks for a little bit, and then yeah, dropped. [-Yeah]. And why do you think that is?

Dai

It's the main reason behind is that the legal framework to regulate the partnership is not mature enough. You know, the sponge city, the projects are also special, you cannot get the return in a very short time. So it's really risky for the developers, because you cannot predict what you can get in in 20 years. In addition to that, now, the private is actually not really private: is state owned companies?

Winson

Oh, yeah.

Dai

Yeah. So yeah, the lack of money, let's say, is because of these reasons.

Winson

I see. And I'm not sure about sponge city program, if citizens pay through taxes for this program, directly as well? Because the first question is about is it affordable for all citizens?

Dai

Yeah, I think I can answer in this way. Because, for example, the green parks and the rain gardens, the citizens need to pay the tickets, the entry tickets when they go in. So I think it's affordable. And it's also welcomed by the communities. Because it cannot be very high, the fee, the entry fee, and also, if you have such green places in your neighborhood, and then your houses also get more value. Yeah, I think that they're very welcomed by the citizens.

Winson

And so as I was also just wondering, these sponge city small scale projects, are they mostly being built in areas that are already let's say, quite rich parts of the city or also in poorer parts of the city?

Dai

As far as I remember, there's requirements for building for choosing the places, it seems every city needs to choose, oone develeoped districts, nad also wone older neighborhood? OTo apply different strategies?

Winson

Yeah. Okay. I see. Do you think that, that citizens and stakeholders, everybody involved within the sponge city program, to what extent do they think that money is being well spent that it is being efficiently spent?

Dai

I mean, I don't know.

Winson

It's hard to speak for all stakeholders, of course, but, um, but maybe, do you personally think that money is being well spent?

Dai

I'm not sure. I, I think there must be some alternatives. So like, what I said, you don't really need to build sponge city projects for your, your image. So yeah. Yeah, they can be some other ways to do things to have the effects.

Winson

And the last one about financial viability is so about, because of course, this is a pilot program. And do you think that financial continuation financial arrangements are good enough to ensure long-term..?

Dai

No. This would be the biggest problem to extend the the program. So the first is financial support. So like what I said they want to get enough subsidies or financial support from the government, but they cannot also cannot get a private investment in because the PPP, legal framework and also the maintenance. So it's not.. yeah, it's not only about extending the project to the nationwide also about the existing project, how are they going to sustain it is also problematic.

Winson

Because it's too expensive, the maintenance or..?

Dai

First it is too expensive, they don't have the sustainable money to do it. And second, like what we said, it wasn't in, you know, for some government officials that do this is not because it needs not because they want to do this. And because they need to be, they have to be evaluated. If they don't do this, they might.. yeah, get some consequences. So, so they do this, but maintenance is not their responsibility.

183

Winson

Whose responsibility is maintenance then?

Dai

Well, at least as government as initiator, you should have the maintenance policy in place, but as a leader, you don't have this in place. And of course, the developers are the owners of the project that won't invest very much in this.

Winson

Yeah, okay. I see. Okay, well, that's clear. So do you think if they don't get their financial arrangements in order that the program will stop?

Dai

I think so. Yeah. They have to otherwise they dont. have the money.

Winson

Do you think that would be a shame if that happens?

Dai

Yeah and it already happened very often in China, you start money prints from big the register disappeared a few years. Okay. I hope not. But yeah. Because the sponge city you cannot take it as a separate independent program is now is more is related or integrated into the event policy. So maybe in the long run, it can continue in a different way. For example. Yes, now is a special program. So in the long run, it will become it might become more common. It's a common program is just the the design.. how to say that. It's become a value of the government of the new developed cities. It might go in this way. Yeah, if going in this way, it might be succesful.

Winson

It might be national policy upscaled, someday maybe?. We'll see. Yeah, I hope so too. Okay, the last topic is about implementing capacity. So, do you think the policy instruments from the sponge city program are they being effectively used to stimulate their targets?

Dai

Yeah, the evaluation system is the most important factor to stimulate the implementation, and also the top down system. So the deadlines are strict deadlines.

Winson

Implementation is quite effective, you would say?

Dai

Yeah, maybe more efficient, but I am not sure is effective.

Winson

Okay, why
not?

Dai

You achieve the target and you do it very fast and efficient. But yeah, whether it is effective for managing flooding is a question.

Winson

Yeah, yeah. I've also read that sponge city program mostly accounts for small floods right? Not like really the huge like last summer in Zhengzhou. It was really bad. And I think the sponge city program doesn't stop those kinds of floods or only smaller ones is that right?

Dai

Well, first of the sponge city, actually, yeah, it sounds big, but actually its very small. If you press it in the city is only in small, different size. So it won't be very effective for the entire city. And I'm not sure if it's only for the small [...] or not. But yeah, according to the policies consider should have many functions like, deal with the drought. And also the heat, and also something else, but it has many functions.

Winson

And then the second one is about to what extent are laws and regulations.. Are they coordinated well? Are they clear and transparent? And do stakeholders respect those agreements and objectives of the laws and regulation?

Dai

Well, we somehow have discussed it, I think, in terms of the objectives, the different need to respect, otherwise they have consequence, but the transparency and coordination? Yeah, that's something you cannot measure.

Winson
Sorry, what was that?

Dai

I mean, you don't have indicators for coordination. I also don't have indicators for transparency. So it's, it's difficult to say yes or no.

Winson

Okay. It's a it's a difficult question. Oh, yeah. So the last one is about does the sponge city program take into account uncertain changes and events. So say flooding, for example.

Dai

Yeah. Flooding, like a climate change. Yeah, I think so. But for this question you need to ask architects, they might know more. How would they design the project? What kind of on uncertainties they take into account?

Winson
Okay. Thank you. That's all. That's all the questions.

Dai
Yeah, okay. I hope you got some new information from me.

B. Lei Li (Nottingham–Ningbo University)

Note: the connection during this interview was unstable and resulted in loss of audio during some parts. The transcription does not reflect the full conversation.

Winson

Okay, so my research is about the sponge city program, of course. And I'm trying to find water management or water governance conditions that can improve. So, for example, financial situations stakeholder participation, but it's it's a bit of a Western look at it. And of course, the Chinese context is quite different to the Western one, right? Your urban planning system is different than ours. So I thought it was interesting to use a Western water governance framework on a Chinese context, see what the outcome is. So what's your background?

Li

So you're more like social science?

Winson

Yeah. Spatial Planning background. The master is called spatial planning. And then it's a subdivision, which is called Cities water and climate change. So it's more aimed towards sustainability and climate adaptation.

Li

Okay. So your chosen topic by yourself rather than given?

Winson

Yeah, I chose it myself. Because I was interested in China. I want to write about China. I was actually I was supposed to have a research internship in Suzhou at a university. But, of course, coronavirus, and then I couldn't go anywhere.

Li

Quite difficult to enter China now.

Winson

Yeah, it's very difficult. Who knows next year or the year after? I can be patient. So what's your background?

Li

I started. I started these geographical ties in Ningbo University of Nottingham for my undergraduate study. And study one year master in Imperial College London, going on and policy and specialize in water management. Yeah, my master project of Masters is also blue green infrastructure. I also also compare urban drainage data in UK and sponge cities in both so compare their governance and their aim and their future measurements. Yeah. And after graduating from my master's, I chose to study PhD, about the public participation in the sponge city project.

Winson

That's interesting as well. Do you want to keep working in the UK or in China?

Li

I actually haven't really decided where I'm going.. to China or other European cities.

Winson

Yeah, okay. Well, many options. If you want, I can share my screen and then we have to, then you can see the questions while we go through it. And if that helps, maybe.

Li

I also take some notes, too.

Winson

Oh, really? That's great. Do you want me to share the screen for the for the questions or do you have them already there?

Li

You can share the screen.

Winson

Just so you can look at them if you like All right. So are there any topics that you think we should not be going through? Because they're not your kinds of topics?

Li

Let me Oh, I think I know a little bit. I was like each question but can't answer really like deep details.

Winson

Okay, let's start with the first one. Awareness. And as I understand, you would like to hear my perspective on it as well. Right. From the Dutch perspective. Sounds good. So the first one is about community knowledge. And the question is, to what extent is knowledge regarding flood risk present throughout the community in sponge cities? So this means the general public, the residents, people who live there?

Li

I think, currently very little information available for public knowledge regarding the flood risk, [...] and so the people find the result as a consequence of the flooding, depending on the lifestyle. […] And they also find the majority of the people, they will take action to protect themselves to against flooding. And, like 66% of people, they took the protective measures like recovery actions, like after flooding. We ourselves have done a study in Ningbo. So we also interviewed some panelists about how do they understand the cause and consequences of the urban flood. For example, ask them why urban flooding is occurring anymore and we gave them some options. Like the intensive rainstorm, the storm surge or climate change or combine issues and we found over 60% of people they understand the problem. So now the flood the causes are more understood, frequently […] typhoons from the Pacific during the August and October. And so they have intensive rainstorm during that period. So people do understand and experience that urban flood info. And also ask them to do things that sponge city project can address climate change, and, like over half of people, they think there is a link between climate change and the sponge city construction.

Winson

I see. That's not a bad percentage for Ningbo, over 60%.

Li

Also quite depends on where do you live and age and your education that demographic factors and weather like your city climate zone is also influenced.

Winson

In the Netherlands, it's been on the news constantly the last years, and we actually had some really bad floods last summer, worst in many years. Because of rain and riverine flooding. Normally, it's with us, it's always been about flooding from the sea, right? Because we used to, or we still are below sea level and the dikes act as protection. So it's normally it's always been about flooding dangers from the sea. But we've been talking more and more on flooding from rivers and rain in cities, and how rain can't drain away in our cities. And many areas in our country are still not prepared for such kinds of floods. But they've been working on both. And it's a big thing in our political agenda. Because our country has a history of fighting with water. And recently, we started to think about how do we not fight it but live with it and give the river some space. So we've had new regulations for rivers that you can't build anymore right next to a river the river needs to have some space to allow flooding. And the general public is I'd say quite well known on that subject. But maybe mostly the higher educated people maybe the lower educated people they might not know too much about it.

Li

Yeah, yeah. Yeah. And these like concepts helps sponge cities originate you from like, living with the water or making space for the water.

Winson
Yeah it's called 'ruimte voor de rivier', it's called in Dutch. It's that one right? Yeah, we've been doing that since the 90s or 2000s or something.

Li
So you also have, like a lot of blue green infrastructure to mitigate for […].

Winson
Well, the second one local sence of urgency are kind of the same. But that's more about, let's say, the municipality or governmental actors. Do you think, say the politicians and people from the government, whether it's the municipality or the province or the national government, do you think do you think they have a high sense of urgency in China for flood risk? Or do you think it's low on the agenda?

Li
I think in recent years, they put that to increase that priority, because when I map the policies about this policy, I find is not only mentioned it not only mentioned in the flood, flood risk area, but also in like as a document like the rural planning the emergency term and the greenery damaging. So, it means the city get more and more attention in recent years, and they still keep updating that document or the standard and the comment they also took some make like how to get more attention for the vulnerable group like the old people when they have difficulty to seek help or the assessed media source. So, when when that type in involving that type is going to come in they will sends a warning messages to your phone and they will have the people who live in in the flood prone area to have their people to move in advance and also provide some using some smart technologies to monitor and to monitor the typhoon pathway and yeah to keep people in mind to keep away from that dangerous area. Yeah, many policy documents in last year, they mentioned to enhance resiliency and sponge city like for example, I saw the you know, this year is the 14th five year plan for the National Economic and Social to maintain long term goals for 2035. So, in the long term goals say they mentioned we will enhance urban flood control and drainage capacity and build our safety and resilient cities and we will improve urban governance and stress risk prevention and control in our governance. So is it kind of the document in the long term goal, they will highlight the importance of the flood risk and resilience.

Winson
This is the second the national five year plan?

Li
Every five years they have a new plan.

Winson
Okay. Okay. And they mentioned it explicitly? [-Yeah].

Winson
The third question you already answered when we were dealing with the first question, right.

Li
I think for the flood risk, not only, I mean, includes prevention measures, adaptive measures and recovery, right. So in the data they have like different behaviors or the arrangement by the government. So for the prevention, they will using combined gray and gray and green infrastructure together, not only this specific facilities, but it also has some retrofit some pipes or drainage system to prevent and is our current sponge city protection level. And for the adaptation, which means like, like the pre disaster education or effective communication and social learning to allow the people to actively engage in this activity to reduce flood risk and to increase your awareness to like to more depth to these disasters. And they also use advanced Internet technologies.

Winson

One of the other people I spoke during the interview, she said that a lot of local communities, they think it's the responsibility of the government, and they don't really try to reduce flood risk or change their behavior themselves. They just think it's a responsibility of the government. So they should do it. Do you think that's true?

Li

It means, like, positively to, like change the behavior rather than placing to the government? I mean, yeah, like government has done something. Like, they will like do interviews, to ask our communities, like how often these areas is flooded, and do you suffer anything? And how can we improve, but I've placed very difficult to, for those all community to really change or to re construct, like new facilities, so that people who live in that old community areas, they still suffering the flood, like every two or three years. So I think the government had done some […] that lacked effect, too. So yeah.

Winson

I think I think your local news, things people do themselves is, let's say you have a garden, for example. And it's full of brick and stone, you see people changing it out to grass. People trying to make their roofs permeable for rain. But that's pretty much it. I think. I think most people here think as well, that they that the government is responsible for flood risk prevention. Yeah. Okay, let's go on to topic two. So topic two is all about information. And maybe we can try to answer these first two together, because this may be easier. So the first one is about information availability, can everyone access sponge to the program information? And now, the question is, is the information understandable for people that are also non experts just for normal people? What would you say?

Li

So for the first question, you mean, for the whole public rather than the experts?

Winson

Yes. So this information. Can everyone find information about such day policies on the internet, for example?

Li

Yeah, I think for the public, if you want most like new projects about one city, or the information about the construction fund is through the news or like social media, like WeChat, or Weibo. They will relate such kind of posts about sponge city and also the policy update. And you can also access a website with manuals for local government websites and different institutions. But I don't think many people they have entries that we really like. I mean for the experts, if you want to do some assessment or evaluation, you're not only needs policy and this, like, basic information, but you also need a performance data, like biophysical or like social economic data. So we will need to think about how to combine the data together. That will be more difficult and more difficult for public to access.

Winson

Yeah, of course, I understand. It's easier for experts to access then the public? [-Yeah]. Okay. And do you think information on the sponge the program is integrated with short and long term goals? Do you think it's all included in the in the information about the sponge of the program?

Li

Yeah, because as a national level, they do have the short and medium or long term goals, like for every two or three years, they have different aims and objectives. And written down, but the general just general description like is our long term goals like overs, 60 percentage will be retrofitted to the sponge city area and observed over 80 percentage. And if the policy was the technical standard, they will have like more specific requirements and description for these goals.

Winson

This is a bit jumping ahead because this will be later in the questions as well. But you mentioned the long term goal of was like 80%. Another interviewee said that percentage is too high, that it's really hard for municipalities to achieve that goal. What do you think?

Li

Yeah I think many people and also the news, they said is quite ambitious.

Winson

Let's see if I can answer this question for for the Netherlands. As far as I know, most that our government does with city planning, you can find on the municipal municipality website. They are published on our government websites. It's always kind of a big thing here to have everything accessible. All the information needs to be findable. So all our flood risk policies they are I think most of them are available and transparent.

Li

Yeah in China, currently, the data says the availability and quality, a specialism like the basic data of the underground tabs exist, but monitoring or supervision, they don't have like the unified basic database. So it is quite difficult for the public to see this, like this basic data, maybe the experts they have and some people if we want to use that, like the academic area, if we want to use that data, maybe we need to pay to this institution to buy this data. Yeah. And he also said, like, because apparently the sponge city is just small to medium scale, like in the site specific scale, rather than regional catchment area. So we still need evidence to prove that efficiency, effectiveness. And also about the financial, if we're talking about the financial sources or the funding, because currently most state on the project, although they have the PPP, public and private, now not willing to invest and also, it is a long term to return this interest. And also, yeah, kind of the barriers for the future.

Winson

I've heard about that as well. We will get back to that financial bit. Okay. Let's see.

Li

Yeah, I think the smart monitoring, I think he has a […], they have the sponge city technical […], released in 2018. So they do have the flex specific requirements and indicators to to monitor, like the rate of the control rate of the total annual run off and eliminate black and smelly water bodies.

Winson

I think I've seen that. Yes. On one of the government websites, they keep track of it, right?

Li

Yeah. They have indicators that are necessary to evaluate and some indicators selected to evaluate and in some cities, they have to do a self evaluation and they also have to pass experts like evaluation. They rank them.

Winson

Does anything happen if you rank really low as a city?

Li

Yeah, if they didn't achieve the standard objective. But if you do, that gives us funding in a next stage for the next.. like, planning stage. I know they have kind of this mechanism.

Winson

Ok, yeah. I see. So, about stakeholder inclusiveness. And actually question 3.3 as well, that's stakeholders having the opportunity to interact with each other. So do you think the role of stakeholders are in this of the program, do you think they are included? Or do you think they are outside of the program?

Li

There are several departments involved like the urban and housing department. They are the main body for the sponge city construction, and they draft him also for the sponge city. And they also need to cooperate with Ministry of Finance and the Ministry of Water Resources. And then the local the problem when the local governments they need to follow their guidelines in the requirement. And the office director is selected from the newborn construction and housing committee. And then they have the office Deputy Director. They also from the Housing, Construction, the Housing Committee and the financial Bureau and the Water Resources bureau. So mainly these three, Bureau answer they have different members from different bureaus, like, for example, Ningbo has some district government so they select each of them. And they also include municipal support department, propaganda departments, and the Development and Reform Commission and land resources Bureau, the planning bureau, the

urban measurement, Bureau, and Environmental Protection Bureau, and might invite other units. I think main body is having and the construction Housing Committee. Yes, he has a main body. So they, they need to take the leader to how to cooperate with.

Winson

Okay. Well, if you look at our country, hold on. So one of the things that we're known for, it's called in Dutch it's called polderen. You're constantly negotiating things with a lot of committees as well. Until you get a.. What's the English word? You get an agreement that most agree to. It's a mixture. Right. And it's, it can take a long time. It has some advantages, because then eventually you have support of most stakeholder groups. Support for the policy that you're about to implement. But a disadvantage is because you're negotiating sometimes for years before the policy is implemented, and I think that's one of the probably one of the bigger differences with Chinese urban planning, because in China, things can go pretty fast. Right? There's a plan, there's a policy, and then it gets implemented quite fast. [-Yeah]. Oh, well, municipalities have a lot of power compared to the national government, because municipalities, they can make their own spatial development plans, called bestemmingsplan. And that that plan is the binding one, it's more bottom up instead of top down compared to China. Which, I guess, is nice for municipalities. But of course, let's say you have a river area catchment area, and there's multiple municipalities along the river then they need to have same similar plans or you will get conflicts right. So, yeah, this also has advantages and disadvantages, I think.

Li

The bottom up so this local authorities or governments.. they also collect opinion forms, local communities and.. Like, how does that work? Like they have some workshop or?

Winson

Yeah, they hold meetings, workshops and so on. Sometimes I get mails from my municipality in my mailbox about something when it is about to be decided. And you can give your opinion on it, a link to a website and give your opinion here or you can join the meeting. Of course, the last one and a half years all the meetings have been online but before the covid pandemic, a lot of the meetings were actually at a town hall and you could just attend that one either online or physically there. Yeah, but I think I think not many people do that and then it's only it's only you know, a small group of people do that. And most most people they they just see the invite and they just throw it away in the trash can to be honest.

Li

It means are different stages of the project as they they always invite people to attend right? In the design or maintainance so yeah, like construction phase.

Winson

They ask people's opinions sometimes before instructions are made before because it's kind of problematic here if plans are implemented and big groups are not supportive of it and it can get delayed for a long time it can get delayed for years. So they try to avoid that.

Li

Yeah okay

Winson

I would say let's go to.., yeah. So this is about management ambition.The other interviewee said it's too high percentage for most cities. And so municipalities are really feeling pressure to achieve those targets in China, and if they don't achieve them, then they might lose their sponge city status. And lose their image.

Li

Ok yes, but I'm not sure. Maybe like in the next question about this include the local historical culture. I think they do. In some document, they mentioned water culture, and pulling the foundation of cities like has water Asian town characteristics they have some historical sites in the old communities. So they do that how to take this advantage to create like the city for the sake of branding and to promote it. So they consider some how to use local historical heritage.

Winson

Okay, this one, we already get this cost, I think about the boundaries. Let's see. If there's any one for you that stands out then. Go ahead. Because we don't have to discuss them all just which ones you think that you would like to discuss?

Li

We can talk a about finance and policy.

Winson

Yeah, okay. So the one I'm most curious about is the third one financial continuation. Because I've read that it has a problem of funding because the private investors and private partnerships, they haven't really grown yet. Do you think that's true? Do you think funding of sponge city projects needs to develop further for the long term?

Li

I think, yeah. Because in previous years, most of the funding forms, government funding from the national and municipal government. And yeah, they do try to, like encourage the private, and in the next few years, there will be no direct funding from the government. So they need to find their own way to support their projects. they haven't been really used at all in the experiment of sponge city projects, because there are some risks and uncertainties. And so the stakeholder and these private matters, they may not willing to.. in this kind of mechanism. And I think we also talk about the, if the private investors, they take the lead of the project, the other departments like the planning bureaus, water resource Bureau, they may don't have the answer that power to like, honestly, is to control the projects. So by the private event times, they may not care about about the environment, or the planning, they may more want to get the money back. So this is the problem if we took, like, invite too many private investors into the projects. Yeah, they have different concerns, interests. Can conflict with the government.

Winson

Yeah. I understand. So basically, do they think this is going to be a big problem for the next five or ten years?

Li

Yeah, I think it can be. It takes lots of money to reach full scale capacity. The public, if we the public have the taxpayers.. they can say the effectiveness about […] policy and they may be willing to pause sponge city project.

Winson

Do you think the public trust that money is well spent, that money is being put to good use for sponge city projects? Do you think they agree with the money being used for projects?

Li

Yeah, I.. about this I interviewed some people in Ningbo.I think they are quite satisfied about the sponge city design and the construction like the whole riverfront parks using some sponge city facilities, because people can have a space to like do some leisure activities or nighttime and it's not only about the flood risk. So they are quite happy about kind of money for this park design interaction. But if they using that money for the privates, residential building community, then the other people who live far from there, they may not be happy about a public project. Benefit to most citizens they maybe happy.. but for the people who live in the rural area, the vulnerable people, they don't have access to this kind and may not be happy. It's also their taxes.

Winson

I see. Yeah, that makes sense. Yeah. Okay. Let's see. So maybe topics seven.. because what I'm wondering, what I've read and what I the things that I know about Chinese spatial planning what I think I know is that probably these two they score quite high which is clear division of responsibilities and authority. Would you agree that in this program, it's very clearly regulated and formulated exactly which government levels let's say the Ministry of Housing provinces and instead is what their roles are and do you think they have authority power in a legitimate form?

Li

Yeah, like different departments they can draft just their document for them like in planning bureau, they can design sponge city planning principles and the water Bureau, they can design the drainage system and planning and the financial bureaus they can design the the measurement about the special fund for sponge city construction, so, when I map the policy document about the sponge city using a case, they now kind of the rule or power they own but in reality not really depends on the city. And sometimes sponge city responsibility may cover or overlaps. So that exact case maybe responsibility need to be clarified. But yeah, sometimes it is hard, like also, they have different governance. But the catchments may be covered by both districts. They need to cooperate together. Yeah.

Winson

Ok, thanks. Let's see if there's any other topics we can discuss. Let's take a look at the last one, I was wondering. So this question is to what extent does the sponge city program account for certain changes and events? So let's say things that you don't expect to happen, like, really extreme floods or any anything that you can't expect. Do you think the sponge city program keeps that in mind when implemented?

Li

I think yeah, yeah. They do mention about like, what kind of the rainfall levels they can handle. And they highlight the importance. So how to combine a sponge data with other traditional hard engineering together, not only rely on the sponge city. It's difficult for sponge city to handle this extreme flooding. But the thing is, they didn't really clearly decide how to combine sponge city ways as a percentage of the infrastructure. Policies should be combined together.

Winson

I see, because the specific program doesn't account for huge floods, only smaller ones or less amount of water?

Li

Max 30 year returns flood. Yeah.

Winson

Is that what went wrong in Zhengzhou? There some pretty big floods last summer. That's a sponge city as well.

Li

Yeah is too much for the sponge city to handle. And another problem is they didn't do the early warning, or emergency, then these cannot respond very quick. They need the management, manage the stormwater with different intelligence and using as a, like a monitoring system. I want to see some the policy together.

Winson

Yeah, so they have to be used together, grey and green infrastructure, got it. Okay. Let's see if there's any others that we can discuss. Yeah, so maybe this one: room to maneuver? Do you think before they make a decision about sponge city projects, do you think the national governments for example, or municipalities that they put all the other options.. so varieties or alternatives.. do they put them all on the table before they make a decision? Or do you think they just take the sponge city plan? And stick with it?

Li

You mean alternative plans? [-Yes]. Yeah. I mean, before the sponge city was implemented, in the design phase.

Winson

I mean, even now, when the sponge city is already proposed, do you think that for let's say one of the areas in Ningbo, one of the areas is very prone to flooding, before they make any sponge city project.. Do you think they have any other ideas that they might implement? Or they just go for the sponge city program?

Li

I'm not very sure about the decision making process. Not sure how they compare like, which one is the best? How can I plan like which area to do the sponge city and like how many percentage of the built up area should be the sponge city.

C. Shiyang Chen (MOHURD – CAUPD)

Winson
Could you state your current job or where you're working and your background of the sponge city program?

Chen
Yeah, I'm currently working at China Academy of urban planning and design. I will type it in the chatbox. And have been working at the water system planning department. So I'm now participating in sponge city consulting. So I will stay here, I will serve the government for next three years. So they will ask us questions about the design, if the designs are okay, with the sponge concepts or other constructions problems.

Winson
So you're employed by the government?

Chen
Yeah, we are and we have contracts with the local governments.

Winson
Okay. All right. Thanks. If you like I can share my screen and put the questions on the screen.

Chen
It will be easier. Yeah. Okay.

Winson
Okay, do you see them? Yeah. Okay, so let's go on to the first topic, which is awareness. The first one community knowledge, to what extent is knowledge regarding flood risk present throughout the community, in SCP pilot cities? So what I mean by this question is normal people, residents, people who live in areas where sponge City projects are being implemented? Do you think they have knowledge on flood risk in general?

Chen
Yeah, I think I think most of the people know about the flood risk, especially about severe flood risk flood events. So they are quite some critical events through past years. And I think they are quite aware of that risk.

Winson
Yes. Yeah. I saw that. Last summer. It was a lot of floods in Zhengzhou, right. [-Yeah].

Chen
And that also affects the sponge city program. So that's the second round of comprehensive sponge city program this year. But the terms of events sort of ring the bell on the role of the sponge city, because the sponge city cannot solve all flooding issues. But people expect that with sponge city, you can solve that. So there's misleading on risk concepts.

Winson
Do Chinese people think that this sponge city can solve that?

Chen

194

Yeah, yeah. So I think I think there are some news, people think the government's spend a lot of money on the sponge city investments. But when there's a flood, there's a really extreme rainfall… sponge city measures cannot work.

Winson

So the second one, local sense of urgency. This is about, for example, government actors: do you think they try to create awareness among people, for flooding for measures like the sponge city project?

Chen

There are two stages. So the first round is started at in the year of 2015. And just ended last year, and this is the second round. And the governments.. And I think the central government doesn't want the people to think sponge city, you have the flooding protection functions. So it's only about the environment and the ecology functions, not about the flood risk, because sponge city measures only have the small thickness of storage capacity. So like 20 to 30 millimeters storage. So they are not mostly aimed at the flood risk.

Winson

Another interviewer told me that one of the things she noticed was that the government also informed people about sponge city program on social media like WeChat, and Weibo. Do they do that in all sponge city pilot cities? Do they spread that through social media accounts for something to create some awareness?

Chen

I haven't read some data on that. I think it's quite, you can, to some extent, see the will to raise some awareness or sponge city program to the people.

Winson

Okay. And do you This is about the third question. Do you think that people in sponge cities try to change their own behaviour to reduce flood risk? For example not cluttering.. drainage, for example.

Chen

You mean, the local community? Which level?

Winson

I mean, more just residents. And let's say average people, and do you think they they change their behavior to reduce flood risk for themselves or for their neighborhood?

Chen

No, no, very limited. [-Limited?]. Yeah. Because you know, the residential neighbourhoods are quite different from the European or the Dutch way. That's way. So a lot of high rise buildings. Yeah. Usually, yeah. Usually above six levels. And people don't care about the rainfall on the building. And the drainage system of the local communities are in charge of the municipality. So I don't think people are aware of their behaviour change, no.

Winson

I see. Okay, thank you. Let's go on to the next one. So it's opportunities for knowledge. And this is all about information, about availability, transparency, and integration of information. So the first one: to what extent is SCP information flows available and reliable. So this accounts as well for just normal people, normal residents, can they find information on the sponge city program and is it reliable information?

Chen

On the flood risk is very limited. I don't think they are.

Winson

Okay, it's hard to find for for most people would you say?

Chen

Because in Sponge city program scope, the flood risk is not the central part. So the central part is the environment and ecology. In the first round of sponge city program, in this new round, I think it's, it's getting improved. But the results will... Yeah, we don't see the results now. Okay, so it's in the progress. So I think currently very difficult.

Winson

And the information that is available, do you think it's easy to understand for people? Or is it only easy to understand for experts?

Chen

I think is easy to understand for experts, but for the citizens.. I think they don't care about targets. They don't I don't think they understand the targets, but we can see the effects on the streets in the neighborhoods. But for the media side, I don't think we understand the concepts quite well. That's for my impression.

Winson

Yeah. Okay. And do you think that in the information is given about sponge city program where it is written down.. It both integrates long term targets and short term targets?

Chen

So in the sponge city program planning, there are some references to the flood risk planning. So they are separate plans. So sponge cities under the construction Bureau of the housing Bureau, the housing and construction Bureau and the flood flooding protection plans made by the.. Yeah, most of the time, the water authorities. And there are some linkage between the sponge city and the flood protection plans. In terms of the short and long term goals that for the sponge city per se, still very limited. Evolving the flood protection, I think, yeah.

Winson

Okay. I say that it's a, it's a bit of a different planning system in China compared to ours. It's I'm trying to work it I try to map everything. It's interesting to try to make sense of it. Let's see. So third topic is continuous learning. And then the first one: Do you notice any monitoring of the sponge city program, constant monitoring, which they use to improve the program?

Chen

Yeah, yeah. I think there's an annual assessment of the sponge city construction for the policies. So they monitor, the sponge measures to see the effects. And they will submit their assessments to the central government. So there is a monitoring mechanism.

Winson

Is it the municipality, the city level that sends the assessment?

Chen

Yeah, this level sends to the ministry level.

Winson

Okay. Okay. And..

Chen

But, you mentioned the flood challenge. So that's still the same story that the flood is not the largest topic in the first round of sponge city program.

Winson

Okay. Yeah. I'll write that down. So only in later stages.. First stage is more about the environment, right? [-Yeah, yeah]. Yeah. Okay. And so when they send up an assessment to a ministry level, does the ministry level then make an evaluation and give them permission or they deny it, or how does that work?

Chen

So, yeah, in terms of the pilot city, I think I mentioned the national pilot cities. So there are 30 national pilot cities in the first round, and these, these submit the assessment to the ministry, and the ministry will look at the reports and score them. So there's a ranking system for the pilot cities.

Winson

Ok, rankings.. and what happens if you rank high or low? Do you get rewarded? Or are there some bad consequences as well?

Chen

I think it's it's more about the the propaganda. I don't know, the natural words for that reason and more about the reputation, I think. There's no real punishment for that as far as I know.

Winson

Okay, so if you score high then it is that's good for your city, I guess.

Chen

Yeah, yeah. Yeah. So yeah. Last week, I went to a pilot city in Jiangxi province, it's called Pingxiang City. And these did three year plan city programs and scored first place for each year. So they are quite proud of the sponge city the project. That's why we go there and see some projects.

Winson

Okay, so that actually covers the second question as well. It's about evaluation. And then the last one, cross stakeholder learning. So do you notice any stakeholders within the sponge city program that work together to learn from each other? Maybe in for example, working groups?

Chen

Yeah. But that's very up to the city level, I mean, different city have different mechanism to stimulate.. the interdisciplinary cooperation. For example, in Pingxiang city, we try to pool the staff from different disciplines, for example, they found a person from the water department, and another one in the Park Department and the other one in the flood department to try to organize office the sponge office to manage the sponge city program. So in this way, different people from different disciplines can co-design. Okay, and co-evaluate the decisions. Yes. So that's for the actors, but you also said, stakeholders?

Winson

Yeah. Yeah, of course, it depends on what you see as a stakeholder actor, but so stakeholders I, I'm also wondering about, let's say, citizens, or private investors, or other groups that are maybe getting involved as well.

Chen

Yeah, so there's one participatory design process in the project. So okay, developers have to get the permit to continue their projects. So in this process, they have to consult different stakeholders try to collect documents from the citizens if the project involves their properties. And in this type of projects, the citizens also are involved. And the developers and different departments of the government, and also the planners, designers, from the water from the landscape from architecture. So, so that depends on the project.

Winson

Okay. That's mostly in the early stages? Or in all stages, perhaps?

Chen

That's, yeah. How you define the early and late..?

Winson

Let's say before, before any projects are starting to be constructed as an early stage.

Chen

I think it's after the, the design process, so.. So there will be a meeting, evolve in different stakeholders up to the designers.. submit their designs, but it's not officially organized for the early stages, so it's more like a self-organized, so initiated by the planners and designers, and for the official process: I think it's kind of in the middle stage. So the earliest stage involvement is very, I think it's very limited in sponge city projects. [-Okay].

Winson

All right. Let's go on to more about stakeholder engagement. Maybe we can focus it more so towards the decision-making process. So are stakeholders involved in decision making?

Chen

It's not officially written in the rule in the law. It's like, the citizens can object but they can... But the government doesn't encourage them to put up their needs. Because otherwise, we will have very spectrum, very wide spectrum of their needs. So the government's try to first propose the design and see if there is any objects or alternatives.

Winson

Okay. So the second question is, then if they are committed to the process, but you're saying it's, it's quite limited. So.. they're not that actively involved in the beginning stages? But during the design process, they are they can object right? [-Yeah].

Chen

And also, it's up to the type of the project, if it's a new project, and they then will be very limited. I mean, citizens involved. So the governance wants to build a park or a stadium or a road. I think the citizens will be... Yeah, they want to be consulted at the earliest stage, but maybe, at some certain points, this type of projects I'm not sure about, but for the neighbourhood projects, that will affect the citizens daily life, and they will be invited to the decision making process.

Winson

Okay. Many, many sponge city projects or on a neighborhood level, right? Small scale? With many combined creating a city with many projects?

Chen

Yeah. Yeah. Yeah. The types of sponge city measures are quite various from the roads to the neighbourhood, public space. Parks. Yeah. And the pavements. So, yeah, wide selections. And it's also up to the city. So, if the city has impervious or very low permeable soil, so some measures will be less preferred.

Winson

I forgot to ask just now: what was the reason that Pingxiang score so high every year?

Chen

According to them, they said they have very, very organized system to manage sponge city projects. So for the.. I think it's from the governance governance side they organized a well functioning sponge office to govern each individual or each engineering package. And their sponge measures or small projects are not individual separated, and they are systematically organized to be well functioning for the ecological purposes and to also have flood risk prevention function to some extent.

Winson

The last part about this topic, so that's about the alternatives, to what extent are sponge city programs used being realistic and are a variety of alternatives laid on the table, for example, before a decision is made on a single project, so is that maybe in the design phase that they look at alternatives?

Chen

Yeah, I think it's, it's required to have alternatives. Okay. Planning and Design. So to make to make the cost-benefit analysis to make.. yeah. To evaluate different [...] to weigh between the cost and effect.

Winson
Sorry, was the last part to weigh between?

Chen
Yeah. Between the cost of investments and the effectiveness.

Winson
Oh, yeah. Yeah, that's right. Okay. Topic number five already. And it's about managing ambition. So to what extent are those sponge city program's goals ambitious, yet realistic? The reason I asked this one is, I saw that the target is for 2030. For sponge cities to have about I think, was 80% of the surface being sponge projects. Is that realistic to achieve for cities?

Chen
That's for the first round. This goal, I think it's also raised up in the first round in the guidance in the guidelines of the sponge city construction, I think you maybe read about that. But that's a trial version of guidelines. And in this round, I heard from the ministry that the VCRA, I'm not sure if you heard about that indicator? So the volume control ratio. And that is the core indicator for the first round. And they use this indicator to evaluate sponge city effectiveness. So like you said, 2030, about 80% of city area, and that is based on this required indicator. And that indicator is for the ecological purposes. So, for example, it's like 20 and 30 millimeter storage capacity. So I think it's a it's not, it's not thick storage. [-I see]. Yeah, I think cities can reach this goal, if the second round or third round, stick to these guidelines. But I heard there will be a change in the ecosystem. In the coming future.

Winson
Is it now the second round? That the sponge city program is in?

Chen
Yeah, second round.

Winson
So until when is that round?

Chen
Three years, from now to 2024.

Winson
Okay. And then the last round is until 2030?

Chen
There's no news for the third round, but we're not sure about the next one.

Chen
And about your question, management goals ambitious yet realistic? For example, Pingxiang is in the, in the first batch of the first round policies. So there are two batches in the first round. The one the first the first batch is about, I think 60 cities and Pingxiang is one of them. And they did three year policy programs, and now they are not policy anymore. So we're not sure if they can stick to the original goals they made in past years. So in 2030 that I think there is uncertainty if the city still want to make sponge city programs continuously and stick to the original goals. So that's a uncertain political factor.

Winson
But they still.. do they still make new sponge city projects there?

Chen

They said they will still insert the sponge concepts in the in the project. But yeah it's this year is in the transition between the first round and second round. So, some questions we are not familiar with, yet to see.

Winson

Okay, let's go to the second one. So, this is about if the sponge city program is adapted to local context and mostly wondering about the historical and cultural context Do you think that when a sponge city project is designed that the local context of a city or municipality or maybe even a neighbourhood is taken into account?

Chen

Yeah, I can first answer for local historical, the cultural part. So there are some water cities along Yangtze river like Nanjing, like Shanghai is also part of that. So they have the water culture section in the sponge city plans. For example they make some waterfront projects. So to innovate their waterfronts to make it more liveable, walkable for the citizens for them to enjoy the landscape. The water culture and the history is included. And also Beijing and cities along the Canal, the Great Canal that connects the south and north of China, and cities near this canal also try to innovate their water culture, like Suqian, which is also in the lower part of the the great canal. And it wants realize the local historical and cultural context.

Winson

Okay, so they.. they do take into account for example, the water culture in these cities?

Chen

Yeah. Okay. And what do you mean by normative?

Winson

So what a city does in general, what their normal type of planning is the normal type of how they shape the environment.

Chen

Reminds me of Wuhan. Also by the river and which has thousands of lakes and ponds. But during the urbanization, lots of ponds were filled, to make buildings. And I think also by this sponge city program they tried to make systematic storage capacity. For the flooding. I think the Wuhan sponge city projects was made by Arcadis. Yeah. They also make.. they take the role in his planning. And about political concept. I think it's a, it's a new, new political sort of, I don't know how to say that. It's, there's a, there's a book called China's Urban Champion, or something related to that. So how Chinese cities compete with each other. So I think in the previous few years, just by GDP, the economic indicators, and this year is it shifted to ecology, ecological, environmentally. Yeah. So there is a political drive of political motivation for the leaders of local governance to make their sponge city better than others, competitively. More reputation on that. So I think that's the political context.

Winson

That sounds beneficial, such competitiveness. [-Yeah]. And then the third one. So, sponge city policies. I've read that most of them are quite small scale, and then a lot of them in the city, many small scale project, but are there also big ones that are going across boundaries? From let's say, multiple municipalities or across sectors?

Chen

No, I don't think there is any transparent boundary project.

Winson

Yeah, I was just wondering about if that if this question is then relevant, because if there's no specific project that goes across boundaries, then I might have to scratch that question, actually.

Chen

You can say trans-districts or trans political or administrative boundary?

Winson

I'm trying to to see if these policies when they are spread out through multiple boundaries, such as, let's say, districts or municipalities? And then if they are taken together for that area? So is it coherent for those areas? Or does it change for each area, for example?

Chen

In this second round of sponge city program, we have multiple levels. So they have the catchment level, we have the city level, the neighbourhood level. And for the catchment level, I think they don't mean by trans-administrative boundary is still within one city. As far as I know, from switching. For example, you want to improve the ecology of a big lake, then it is within its administrative boundary.

Winson

Was wondering if there was maybe a sponge city project that goes across multiple cities that share the same catchment area or something like that, you know?

Chen

That would be sponge region. And not a sponge city, maybe.

Winson

Haha, yeah. But some sponge cities, or just cities in general, they're grown next to each other, right. Like the Pearl River Delta, which has Shenzhen as a sponge city but shares geographic boundaries with Guangzhou, Zhongshan, Dongguan...

Chen

Yeah. Oh, yeah. Yeah, maybe that's.. yeah, that's quite interesting. If you find out, please let me know.

Winson

Yeah, okay. So the sixth one is about agents of change. This is more about being able to make changes. And then the first one is about access to resources. And for, for example, you can think about investors or developers, do they have access to resources to have influence on a sponge city project? Maybe through subsidies for developers, for example?

Chen

Yeah, they have. That's also up to the city. So, some cities have the financial stimulations for the developers, if they have sort of measures, you can have some financial benefits. And I think it's also required by most of the pilot cities to have the sponge city concepts in their development, because the indicators were incorporated in the planning assessment. If they don't have the sponge city concepts in their development, the governance won't send the issue, the permit to them, so they cannot develop the land. And in this way, the developers were... Yeah, so it's a top down mechanism to make them buy sponge city concepts.

Winson

I see. Ok, the second one. So if think you already mentioned, workshops, and meetings being held. So to what extent are actors enable to engage, collaborate and connect?

So let's say across sectors, businesses, governments, residents, are they able.. Are they enabled by actors such as the municipality or maybe ministries to work together?

Chen

What's the difference between this one and the previous one? Yeah. Stakeholder involvement?

Winson

This is more about the actors instead of stakeholders. Are actors organizing these things? Or does it have to be organized by someone else than the government, for example? Or is the government organizing the collaboration between these sectors?

Chen

That's a difficult question. Because the sponge city, in most of the cities, they were governed by the housing bureaus. So housing bureaus they don't want other bureaus to be an obstacle. So maybe the greenery park people said, your runoff flow in my plants, and that won't be good for our plants. And maybe for the transport bureaus, they say, your construction, yeah, blocks my streets. And I think in the practice, housing bureaus try to make the project's within its power, I think.

Winson

And the housing Bureau is a municipal government authority, right?

Chen

It's an authority under the local governments. Yeah, it's an administrative authority. So, from my observation, there's no strong incentive for the housing bureaus to invite other bureaus in cooperation. Although the guidelines said it's better to involve different disciplines, but I think this part is not well implemented in practice. But this process was.. yeah. So most of the time, it was the planners and designers who tried to, to organize such meeting, corporate meeting.

Winson

Okay, that's clear. Then, yeah, the last one. It's just about long term targets and short term targets. And do you think it's.. so for actors, are they able to work towards long term targets? And short term targets as well?

Chen

Yeah, they have short term, like five years to 10 years. What do you mean by the access able to facilitate?

Winson

Yeah. So for example, a municipality when they are going to implement sponge city projects. Can they do that while keeping both an eye on long term and short term targets? I mean, the targets that are defined by national governments, for example, Ministry of Housing.

Chen

Mm hmm. I think it's quite hard to answer this question. Okay. Yeah, I'm not sure if they are able to facilitate it, but I think they have the motivation to fulfill the short term at least and for the long term is in the sponge city plan. So I think it is supported by such planning planning system. So if the long term targets is in the sponge city plan, or in the spatial plan, in the future, it will be supported by local actors, I think.

Winson

I Okay. You said the last three topics, where?

Chen

Are we gonna try to go through that? [-Yeah].

Winson

So that's okay. If you if you can say which one you want to discuss, and which one that you say, you don't know, that's fine.

Chen

The financial thing I'm not familiar with. So that was my, my experience, maybe at Suqian. I know some of this random sponge city program. I don't know about other cities. I can take Suqian, for example.

Winson

Ok, yeah, can you tell me about the financial situation of the sponge city programme in Suqian?

Chen

Yeah, for this round, but not for the first round. So I think the questions above, I answered most about the first round. Yes, it's only the early stage of the second round now. For the financial, I know their investments, compensation, subsidies, like, also, apart from the local investments and small part from the central governments: central governments want to use money to to let the local governments be more motivated.

Winson

Do you know, for search end or for Pingxiang maybe, if they use the private-public funding?

Chen

Yeah, they have some projects, but I don't know how much.

Winson

Okay. Maybe we can try these two questions about authority and responsibility. Do you think in general with sponge city policies that responsibilities are clearly stated in the policy: who's responsible for what and do you think it is stated by legitimate forms of power? So, authority of governments, for example.

Chen

in the first round of sponge city is not widely formulated in the in the law system, but in this round, at least, for Suqian they already get started in formulating the responsibility distribution in laws, so they try to make clear which authority is responsible for each part of projects. Also in the assessment in the planning process.

Winson

Okay, then.. Okay, so... Yeah. And maybe there's one that you might give an idea of: it's about discussion on willingness to pay. Do you think that most Chinese people would say that money that is being spent on the sponge cities.. do they agree with that money being spent? What do you think?

Chen

It's still very engineering concepts in the first stage. And in this stage, I think central governments wants to, to make the projects more like people will enjoy this, these outcomes of sponge city programs, so only about permeable pavements or rain gardens, but also to make people enjoy some incorporation into the landscape. Yeah. And make people use of the facilities, not only in the in a rainy day, but also in daily life. So yeah, I think so it's a big leap, in this round.

Winson

So probably a lot of people will be happy if, of course, if a nice Wetland Park to hang out is being built, for example. [-Yeah]. Okay, thanks. So the last one is about effectiveness. Do you think the sponge city policies are effective?

Chen

There's one point I want to mention is I also mentioned before, is the indicator system. And also, other areas like the permeable pavement ratio. They try to incorporate these indicators into the planning process, permit issue process. So the developers would like to.. they require the developers to have those indicators met in the plan. So in this way, the sponge requirements were implemented locally.

Winson

Okay, maybe the last part that we can discuss is about statutory compliance. This is more about laws and regulation. And do you think that stakeholders are respectful of agreements and objectives and have laws and regulations that go with the sponge city program?

Chen

If the sponge legislation was for example, in Suqian they started to make sponge city program in the legislation system, and then the other authorities or stakeholders will respect it, but if it's not in the legislation, there will be a big objection in the planning I think.

Winson

Okay. And if we change it to actors or let's say.. because the Ministry of Housing day they give out guidelines, right? [-Yeah]. Do municipalities go with these guidelines perfectly or do they sidetrack from it as well?

Chen

One of the challenges, or one of the gaps in the first round is that the cities will comply too much with the guidelines and then they lose innovation in their projects. So they be tried to pursue the indicator requirements, you know, the indicator requirements is for ecological purposes. And it's a very low standard, and they won't change their behaviour to pursue, for example, the flood risk management. So that I think that limits their innovation. And the first round, there are some misconceptions: the guidelines, we want to sort of cascading indicator at the city level to a small piece of land. So they try to dismantle the indicators to very little land, then the projects cannot meet the standard. So they are very dismantle.. scattered sponges and not in a systematic way. So that is one of the two limits in the first round.

Winson

Okay. And in the second round, they took care of that, or?

Chen

Yeah, in second round the the indicator VCRA is used as a focus. And the central government's wants to stimulate the local innovation. So we can do self assessment, you can have an own indicator system.

Winson

Okay. So there's more.. there's now some more, let's say, bottom up power, compared to the first round?

Chen

Right. Yeah, true. True.

Winson

Then, the final question, that's about uncertain changes on events. So do you think this sponge city program? Do they take that into account for things that you can't expect? And they might happen? So is programming flexible?

Chen

I mean, during for the climate change, or population migration things..?

Winson

Do you think they it's a flexible program when it comes to flood risk? Or is it with a bit of a tunnel vision that doesn't account for the unexpected?

Chen

It's not so flexible for the flood risk. And for future, I think the resilience will be a part of the sponge city. So there will be more flexibility in the plan. For example in Suqian, we have the concept to remain some spaces for the future changes.

GCF SCP survey answer statistics

Community knowledge:

To what extent is knowledge regarding flood risk present throughout the community in SCP pilot cities?

31 out of 36 answered

The community has a basic understanding of flood risk, but impacts and frequencies are often underestimated. (0) — 13 resp. 41.9%

Only a small part of the community recognizes flood risk. (-) — 9 resp. 29%

The community is mostly knowledgeable and recognize the many existing uncertainties of flood risk. (+) — 6 resp. 19.4%

The community is unaware of flood risk. (--) — 2 resp. 6.5%
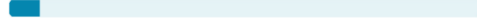
Nearly all members of the community are aware of and understand the actual risks, impacts and uncertainties of flooding. (++) — 1 resp. 3.2%

Other — 0 resp. 0%

Local sense of urgency:

To what extent do actors have a sense of urgency, resulting in awareness and SCP policies that address flood risk?

32 out of 36 answered

Flooding is increasingly taken seriously, but considerable efforts often only receive temporary support. (+) — 14 resp. 43.8%

There is some awareness around flood risk. Small adaptation efforts are being made, but not on the long-term. (0) — 10 resp. 31.2%
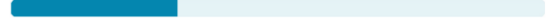
Flooding is taken seriously: continuous action is being taken and there are investments in innovative solutions. (++) — 5 resp. 15.6%

A small group expresses concern about flood risk, but adaptation efforts are not on the agenda. (-) — 2 resp. 6.2%

There is no sense of urgency and there is resistance against flood adaptation measures. (--) — 1 resp. 3.1%

Other — 0 resp. 0%

Behavioural internalization:

To what extent do local communities try to change their behaviour in order to contribute to solutions regarding flood risk?

31 out of 36 answered

Action is being taken to address flood risk but it is not fully integrated into practices and policies yet. (+) — 11 resp. 35.5%

Although there is a growing awareness, it results only in small steps of change regarding practices and policies. (0) — 11 resp. 35.5%

Flood risk is recognized but there is no support to take action. (-) — 4 resp. 12.9%

Communities are encouraged to participate and minimizing flood risk is integrated into practices and policies at the local level. (++) — 3 resp. 9.7%

Most are unaware of flood risk and do not concern themselves with any action taken. (--) — 2 resp. 6.5%

Other — 0 resp. 0%

Information availability:

To what extent is SCP information on flood risk available and reliable, which can support well-informed decision-making?

29 out of 36 answered

Limited information is available. Not all information is of sufficient quality. (-) — 9 resp. 31%

Some factual information can be found, but information on causes and impacts of long-term processes are lacking. (0) — 9 resp. 31%

There is a strong effort to provide comprehensive information, but it is not complete. (+) — 8 resp. 27.6%

There is either no information available or it is of poor quality. (--) — 2 resp. 6.9%
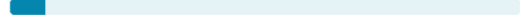
Comprehensive and adequate information can easily be found online and in policies regarding the flooding challenge. (++) — 1 resp. 3.4%

Other — 0 resp. 0%
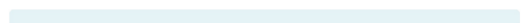
205

Information transparency:

To what extent is SCP information on the flood challenge accessible and understandable for experts and non-experts, including decision-makers?

32 out of 36 answered

Information is accessible and mostly understandable, but needs a time-consuming search through databases. (+) — 12 resp. 37.5%

Information is sometimes shared between stakeholders, but inaccessible for most people and difficult to understand for non-experts. (-) — 10 resp. 31.2%

There are protocols to access information, but it is not readily available. Information is not easy to understand for non-experts. (0) — 7 resp. 21.9%

Information is understandable for everyone, easily accessible and can be openly shared. (++) — 3 resp. 9.4%

Information is mostly unavailable and difficult to understand in general. (--) — 0 resp. 0%

Other — 0 resp. 0%

Knowledge cohesion:

To what extent is information on the SCP cohesive, including integration of short- and long-term goals between various policies and stakeholders in order to deal with the flooding challenge?

32 out of 36 answered

Data collection within sectors is consistent but knowledge on the flooding challenge is still fragmented between sectors. (0) — 12 resp. 37.5%

Information is sector-specific and is inconsistent both within and between sectors. (-) — 9 resp. 28.1%

Sectors cooperate in a multidisciplinary way, resulting in complete information. However, knowledge about implementation is limited. (+) — 7 resp. 21.9%

A lack of data strongly limits the cohesion between sectors. Found information can be contradictory at times. (--) — 2 resp. 6.2%

Stakeholders are engaged in long-term and integrated strategies. Information consisting of co-created knowledge can be found. (++) — 2 resp. 6.2%

Other — 0 resp. 0%

Smart monitoring:

To what extent is the monitoring of process, progress, and policies in the SCP able to improve the level of learning about the flood challenge?

28 out of 36 answered

Monitoring occurs now and then but does not provide useful information on developments, processes or alarming situations. (-) — 14 resp. 50%

A monitoring system is in place and provides useful information on recognizing alarming situations. (0) — 6 resp. 21.4%

A monitoring system is in place and provides useful information on recognizing underlying processes. (+) — 5 resp. 17.9%

A monitoring system is in place and provides useful information to identify and change future developments. (++) — 2 resp. 7.1%

There is no monitoring or monitoring is very irregular. (--) — 1 resp. 3.6%

Other — 0 resp. 0%

Evaluation:

To what extent are SCP policies continuously assessed and improved, based on quality evaluation methods?

28 out of 36 answered
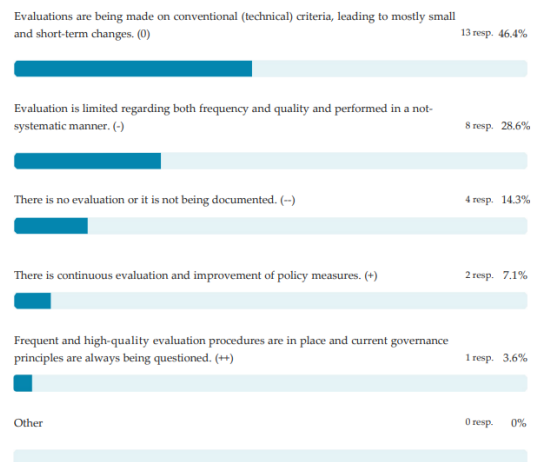
Evaluations are being made on conventional (technical) criteria, leading to mostly small and short-term changes. (0) — 13 resp. 46.4%

Evaluation is limited regarding both frequency and quality and performed in a not-systematic manner. (-) — 8 resp. 28.6%

There is no evaluation or it is not being documented. (--) — 4 resp. 14.3%

There is continuous evaluation and improvement of policy measures. (+) — 2 resp. 7.1%

Frequent and high-quality evaluation procedures are in place and current governance principles are always being questioned. (++) — 1 resp. 3.6%

Other — 0 resp. 0%

To what extent do stakeholders involved in the SCP have the opportunity to interact with other stakeholders and choose to learn from each other?

28 out of 36 answered

Stakeholder interaction occurs in small coalitions based on common interests. Those outside such coalitions are often being excluded. (-) — 9 resp. 32.1%

Stakeholder interaction is considered valuable, but is not being put to practice as much. (+) — 7 resp. 25%

Programs/workshops to support cross-stakeholder learning and interaction are in place to find adequate solution. (++) — 6 resp. 21.4%

Stakeholders are open to interaction but not much learning is going on. (0) — 4 resp. 14.3%

There is no contact between stakeholders. No information is shared outside of organisation/sector. (--) — 2 resp. 7.1%

Other — 0 resp. 0%

To what extent are stakeholders involved in the decision-making process of the SCP?

34 out of 36 answered

Stakeholders are mostly consulted or informed, not frequently engaged. Decisions are largely made before involving stakeholders. (0) — 10 resp. 29.4%

Not all relevant stakeholders are informed and only sometimes consulted. Engagement opportunities are unclear. (-) — 10 resp. 29.4%

A number of stakeholders are actively involved but it is unclear who should be involved in each stage of the process. (+) — 7 resp. 20.6%

No stakeholders are included, or their engagement is discouraged. (--) — 6 resp. 17.6%

All relevant stakeholders are actively involved. The decision-making process and engagement opportunities for stakeholders are clear. (++) — 1 resp. 2.9%

Other — 0 resp. 0%

To what extent are SCP stakeholders committed to the process and actively involved?

33 out of 36 answered

Most stakeholders are engaged, but the level of engagement is low (for example, only informative). Their influence on the end-result is low. (-) — 11 resp. 33.3%

Stakeholders are involved for only short periods and have a limited influence. There are no clear exits in the engagement process. (0) — 11 resp. 33.3%

Stakeholders are barely engaged or informed, thus their core values are not being protected. (--) — 7 resp. 21.2%

Stakeholders are actively involved, but they may be missing in contractual agreements when they do not wish to commit. (+) — 3 resp. 9.1%

Stakeholders have a large committed influence on the end-result. Participation opportunities and exit procedures are clear. (++) — 0 resp. 0%

Other — 1 resp. 3%

To what extent are SCP procedures clear and realistic and are a variety of alternatives co-created?

30 out of 36 answered

Informative procedures are present with low flexibility. Stakeholder engagement is low, possibly leading to unilateral decision-making. (-) — 14 resp. 46.7%

There is a clear procedure for (short-term) stakeholder involvement, but insufficient opportunities to consider alternative options. (0) — 7 resp. 23.3%

There is a lack of clear procedures which hinders stakeholder engagement. Unilateral decision-making limits progress of decision-making. (--) — 6 resp. 20%

Stakeholders can discuss alternatives, but procedures and deadlines are unclear. Decisions are made relatively early in the process. (+) — 2 resp. 6.7%

For all stakeholders, the participation procedures are clear and deadlines are realistic. All alternatives are explored before making a decision. (++) — 1 resp. 3.3%

Other — 0 resp. 0%

To what extent are the SCP's goals ambitious and yet realistic?

30 out of 36 answered

There is a long-term vision that incorporates uncertainty, but it is not supported by short-term goals. (+) — 11 resp. 36.7%

Goals are mostly focused the current situation where contextual conditions are assumed and long-term risk scenarios are lacking. (0) — 10 resp. 33.3%

Goals are 'quick fixes' mainly, without a long-term vision that includes sustainability, risks and uncertainties. (-) — 6 resp. 20%

Goals only consider current flooding challenges, are short-sighted and lack sustainability objectives. Policy is typically reactive. (--) — 3 resp. 10%

Policy is based on adequate assessment tools and objectives are ambitious. Goals, from short- to long-term, are clear and flexible. (++) — 0 resp. 0%

Other — 0 resp. 0%

To what extent is SCP policy interwoven in local historical, cultural, normative and political context?

28 out of 36 answered

Current policy fits the local context, but decision-making often results in compromised small short-term policies. (0) — 11 resp. 39.3%

Local actors are unwilling to execute policy as it conflicts with their norms and values. Local interests are barely considered in policies. (-) — 7 resp. 25%

Local cultural, historical and political context is largely ignored, possibly leading to difficult policy implementation. (--) — 5 resp. 17.9%

There is local consensus on the need for creating adaptive measures, but there is little experience in addressing flood risk on the long term. (+) — 4 resp. 14.3%

Other — 1 resp. 3.6%

Local context is used to accelerate policy implementation. Innovations are divided into acceptable phases and enable sustainable practices (++) — 0 resp. 0%

To what extent is SCP policy coherent regarding 1) geographic and administrative boundaries, and 2) alignment across sectors, government levels, and technical and financial possibilities?

29 out of 36 answered

Policy is characterized by fragmentation and imbalance between sectors, with possible imbalanced use of resources between sectors. (-) — 11 resp. 37.9%

Policy is fragmented and based on sector's specific scope and opportunities for co-benefits are hardly explored. (0) — 8 resp. 27.6%

There is cross-boundary coordination between policy fields to address flood risk. Policies are cohesive, but multi-sectoral actions are lacking. (+) — 7 resp. 24.1%

Policies are coherent and comprehensive within and between sectors. There is an overarching vision resulting in smooth cooperation. (++) — 2 resp. 6.9%

Policies between and within sectors are strongly fragmented and conflicting with contradicting goals. (--) — 1 resp. 3.4%

Other — 1 resp. 3.4%

To what extent are entrepreneurial agents of change enabled to gain access to resources and have influence on decision-making?

28 out of 36 answered

Agents of change struggle to find windows of opportunity to act upon perceived flood risks. (-) — 12 resp. 42.9%

Insufficient room for entrepreneurship leads to ineffective governance and lack of opportunity for entrepreneurial agents to enable improvements. (--) — 9 resp. 32.1%

Entrepreneurial agents are able to seize low-risk opportunities but mostly ignore opportunities for innovative approaches. (0) — 4 resp. 14.3%

There is a form of provisional experimental entrepreneurship in small-scale pilots to address the flooding challenge's complexity. (+) — 3 resp. 10.7%

There is a long-term support for entrepreneurship, which creates benefits and new insights. (++) — 0 resp. 0%

Other — 0 resp. 0%

Collaborative agents:

To what extent are actors enabled to engage, collaborate and connect businesses, government & sectors in order to address flood risk?

29 out of 36 answered

Agents of change are enabled to enhance conventional collaboration with traditional coalitions, but with limited space for new collaborations. (0)
13 resp. 44.8%

There is insufficient opportunity for agents of change to go beyond conventional collaboration. (-)
10 resp. 34.5%

Collaboration is absent or discouraged due to a strong hierarchical structure. (--)
5 resp. 17.2%

Agents of change can push for collaboration between new stakeholders. (+)
2 resp. 6.9%

Agents of change enhance wide-spread collaboration and are possibly administered to coordinate this through authority. (++)
0 resp. 0%

Other
0 resp. 0%

Visionary agents:

To what extent are actors in the SCP network able to facilitate long-term and integrated strategies which are supported by interim targets?

28 out of 36 answered

There is a clear long-term and sustainable vision, but a discrepancy between that and short-term goals. (+)
15 resp. 53.6%

Agents of change are limited to promoting 'business as usual' and do not promote long-term integrative thinking. (0)
6 resp. 21.4%

The (often short-term) vision to address the flooding challenge considers only a limited group of actors. (-)
3 resp. 10.7%

There is a lack of visionary agents that promote long-term sustainable visions regarding the flooding challenge. (--)
3 resp. 10.7%

Agents of change actively and successfully promote sustainable and long-term visions with fitting short-term goals included. (++)
1 resp. 3.6%

Other
0 resp. 0%

Room to manoeuvre:

To what extent do actors in the SCP have the opportunity to develop a variety of alternative approaches that can address existing or emerging flood risk challenges?

29 out of 36 answered

Only a few actors receive some degree of freedom, and there are limited opportunities to develop alternatives and unconventional partnerships. (-)
12 resp. 41.4%

There is limited room to deviate from predefined tasks. (0)
10 resp. 34.5%

The actions of stakeholders are strictly controlled. Freedom to form new partnerships is strongly limited as actor network composition is fixed. (--)
3 resp. 10.3%

It is recognized that a high degree of freedom is needed in the form of experiments and looking for unconventional collaborations. (+)
2 resp. 6.9%

Actors are given the freedom to develop new and diverse approaches and partnerships, resulting in continuous improvements and exploration. (++)
1 resp. 3.4%

Other
1 resp. 3.4%

Clear division of responsibilities:

To what extent are responsibilities in SCP policies and regulations clearly formulated and allocated, in order to effectively address flood risk challenges?

30 out of 36 answered

Actors within the network recognize the need to explore cooperation to bring together expertise and divide roles and responsibilities clearly. (+)
12 resp. 40%

There is an unclear division of responsibilities and an over-hierarchical structure. Trust and expectations between actors are low. (--)
7 resp. 23.3%

Authorities are fragmentized or they lack interest. Miscommunication and lack of trust are causes that block effective water governance. (-)
5 resp. 16.7%

Responsibilities are divided over a limited set of conventional actors, with little opportunity for new unconventional cooperation. (0)
4 resp. 13.3%

The roles and responsibilities are clearly divided amongst actors. Cooperation between them is dynamic and effective. (++)
2 resp. 6.7%

Other
0 resp. 0%

Authority:

To what extent are legitimate forms of power and authority present in the SCP that enable long-term, integrated and sustainable solutions for flood risk challenges?

32 out of 36 answered

Legitimate authorities are recognized publicly. They are assigned to coordinate long-term integrated policy and implementation. (+)

11 resp. 34.4%

The flooding challenge is addressed as long as the status quo is not questioned. New policy mainly needs to fit into an existing structure. (0)

9 resp. 28.1%

Long-term, integrated approaches are well embedded in policy. Authorities receive much support both politically and by society. (++)

8 resp. 25%

Actor engagement is limited due to poor embedding of sustainability principles in current policy mechanisms, interests, and budget allocation. (-)

2 resp. 6.2%

Addressing the flooding challenge is regularly overruled with contradicting interests and thus it is hardly included in policy and regulation. (--)

2 resp. 6.2%

Other

0 resp. 0%

Affordability:

To what extent are flood risk related SCP policies and climate adaptation measures available and affordable for all citizens?

31 out of 36 answered

Sponge infrastructure for everyone is pursued. (+)

12 resp. 38.7%

Policies ensure solidarity: sponge projects benefit everyone, including public infrastructure and private property protection. (++)

7 resp. 22.6%

A share of the population struggles to pay for basic adaptation. There is hardly any social safety net regarding climate adaptation measures. (-)

5 resp. 16.1%

Basic sponge projects are affordable for most, but poor people struggle to afford adaptation measures that protect them against flooding. (0)

5 resp. 16.1%

Basic sponge infrastructure is not affordable for a substantial part of the population. (--)

1 resp. 3.2%

Other

1 resp. 3.2%

Willingness to pay:

How is expenditure related to flood risk perceived by all relevant stakeholders (i.e., is there trust that the money is well-spent)?

28 out of 36 answered

There is support for the allocation of resources for conventional tasks. Most stakeholders are unwilling to financially support beyond the usual. (0)

11 resp. 39.3%

Willingness to pay is insufficient. The importance is perceived differently by each stakeholder and their cost estimates are too low. (-)

10 resp. 35.7%

Due to growing worries about the flooding challenge, there are windows of opportunity that allow significant funding. (+)

6 resp. 21.4%

There is little trust in how resources are allocated. Financial decisions are based on prestige projects that benefit small groups. (--)

2 resp. 7.1%

There is a wide support to allocate substantial financial resources. Expenditure for public benefits are perceived as important too. (++)

1 resp. 3.6%

Other

0 resp. 0%

Financial continuation:

To what extent do financial arrangements secure long-term, robust policy implementation, continuation, and risk reduction?

32 out of 36 answered

There are insufficient financial resources. Financing is irregular and unpredictable leading to poor policy continuation. (--)

12 resp. 37.5%

Potential resources are difficult to access and lack continuity. (-)

11 resp. 34.4%

Financial resources are made available for single projects, but long-term resource allocation or institutionalized financial continuation is lacking. (+)

6 resp. 18.8%

The allocation of financial resources is based on past trends, without regard for future flooding challenges and unforeseen situations. (0)

3 resp. 9.4%

There is secured continuous financial support for long-term policy. Both economic and noneconomic benefits are considered. (++)

0 resp. 0%

Other

0 resp. 0%

210

To what extent are SCP policy instruments effectively used in order to stimulate desired behaviour?

28 out of 36 answered

Policy instruments serve as an incentive to internalize sustainable behavior, but not (yet) always optimized with maximum efficiency. (+)

10 resp. 35.7%

Policy fields often have similar goals, but instruments are not coherent and may even contradict. Overall instrumental effectiveness is low. (0)

8 resp. 28.6%

Policy instruments are effective in achieving sustainable behaviour. Continuous evaluation ensures flexibility and adaptive capacity. (++)

6 resp. 21.4%

Instruments are being used without knowing their impacts, leading to imbalanced development and inefficiencies that are hardly addressed. (-)

3 resp. 10.7%

Policy instruments may enhance unwanted or even damaging behavior that opposes sustainability principles. (--)

1 resp. 3.6%

Other

0 resp. 0%

To what extent is SCP legislation and compliance well-coordinated clear and transparent, and do stakeholders respect agreements and objectives?

30 out of 36 answered

New ambitious policies, agreements and legislations are being explored. Most stakeholders are willing to comply. (+)

11 resp. 36.7%

Legal regulations regarding the flooding challenge are fragmented. However, well-defined fragmentized policies are being complied with. (0)

10 resp. 33.3%

Legislation is being complied with. Short -and long-term goals are well integrated. Local authorities and stakeholders respect agreements. (++)

6 resp. 20%

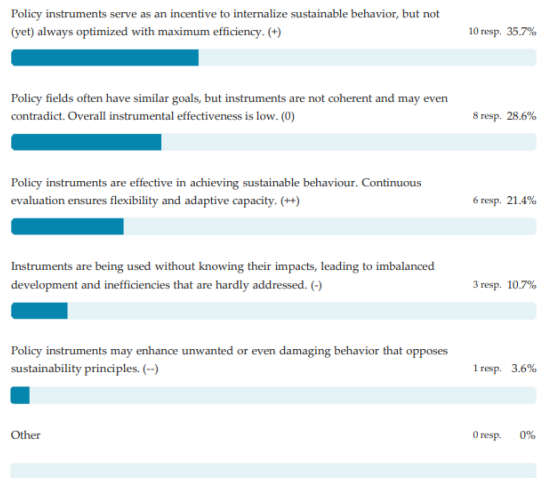Legislation is incomplete meaning that certain gaps can be misused. There is little trust in local authorities due to inconsistent enforcement. (-)

3 resp. 10%

Legislation is unclear or incomplete, leading to poor legal compliance by most actors. Legitimacy is low: actors operate independently. (--)

0 resp. 0%

Other

0 resp. 0%

To what extent does the SCP account for uncertain changes and events?

31 out of 36 answered

Based on past events, there are clear action plans and policies addressing the flooding challenge, but risk is often underestimated. (0)

12 resp. 38.7%

A wide range of threats is considered in action plans and policies, but measures are scattered and non-cohesive. (+)

9 resp. 29%

Action plans are present, but actual probabilities and impacts of risks are not well understood and incorporated into actions or policies. (-)

7 resp. 22.6%

Long-term plans and policies are flexible and bundle different risks, impacts and worst-case scenarios. (++)

3 resp. 9.7%

There are hardly any action plans or policies for dealing with (future) calamities, uncertainties and existing risks, leading to high vulnerability. (--)

0 resp. 0%

Other

0 resp. 0%