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ID 1482 | CHINESE EXPERIENCE IN DELTA CITIES: TO WHAT EXTENT DOES GUANGZHOU CITY`S SPATIAL PLANNING SYSTEM FACILITATE THE INITIATIVES IN RESOLVING FLOOD RISK?

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ABSTRACT: Spatial planning is supposed to denote innovations in resolving flood risk. However, taking spatial action is never an easy task. This study aims to explicate the reasons for this difficulty by illustrating why the urban flood risk mitigation is struggling to be tackled of locally despite the growing flood risk in delta cities. It does so by investigating the recognition of flood risk in the spatial planning system. Specifically, Guangzhou, a city located in the Pearl River Delta and vulnerable to fluvial, pluvial and coastal flooding, is taken as an example in this research. By using the method framing analysis, the paper finds that the road to face the flood risk in Guangzhou is still at an emerging process from informal activities to formal legislation. With a pace changing from a dedicated to an integral issue, there is an appeal for a combination between nature-based options and engineering options. In spit of these progress, there is still a mismatch between this policy intent and real practitioners. Due to the weak sense of identity in flood-proof initiatives among practitioners, the road toward a more resilient city is challenging.

KEYWORDS: Climate change, flood risk, urbanisation, spatial planning, framing analysis, Pearl River Delta, Guangzhou

1 INTRODUCTION

Flood risk, greatly increased by climate change, is remarkably affecting global cities. It poses a considerable threat to the safety and social-economic development by causing considerable losses. Against this background, spatial planning is increasingly recognised as an essential tool and process to mitigate flood risk and raise the cities` ability to face climate change (Gersonius et al. 2008; Roggema 2009, 2014). On one hand, it works through multiple routines by locating suitable types of land use, arranging activities, regulating scales of development and designing physical environment to avoid or decrease the impact of the potential flood (White et al. 2007). By this, many spatial policies, strategies, plans and projects (in this study, they are collectively named as spatial development) are formulated. On the other hand, water sees no boundaries. Flooding is increasingly regarded as a cross-cutting issue which requires the contribution from different professions. Spatial planning, supported by other relevant fields such as water management, is regarded as a decision-making process which provides the opportunities for mutual learning. Thus, the role of spatial planning in enhancing negotiation stands out.

However, incorporating flood risk into spatial planning is still challenging in many delta cities. Even in the pioneer cities, such as Rotterdam in the Netherlands, applying spatial efforts to resolving flood risk is never an easy task. The situation seems worse in new urbanising flood-prone areas equipped with limited experience in dealing with water, for example, Guangzhou city. It is one of the most vulnerable delta cities

around the world, located in the Pearl River Delta (China). In some initial research, it is indicated the local spatial development has not done a good job in mitigating flood risk. This underlying difficulty can be partly attributed by the priority to the economic development in spatial development rather than water issues (Francesch-Huidobro et al. 2016, Meng & Dabrowski 2016).

The other side of this unsuccessful job might closely be related to the weak recognition of flood risk in the spatial planning system. Here, recognition refers to the way how flood is understood, framed and closely linked with spatial planning practice. Weak recognition can happen in the context of the insufficient understanding of the uncertainties and opportunities brought by flooding and climate change among spatial planners, and reflected by the reluctance in changing the traditional planning approaches to face the new natural hazards on account of potential extra efforts and costs (Gersonius et al. 2008; Roggema 2009; Næss et al. 2005).

In order to mark the significance of recognition and clarify its impact on planning practice, we briefly discuss the responses to flood risk in Guangzhou`s case. This article examines whether and how the local spatial planning system acknowledge the flood risk, and, in turn, how this acknowledge facilitates or hinder dealing with the flooding hazard. It contributes to the literature on the explaination why promoting urban flood risk mitigation is so difficult despite the growing flood risk in delta cities and the clarify the interaction between dicourse and practice. The discussion draws on fieldwork conducted in Guangzhou city following the emerging trend toward a more resilient habitat inspired by the Sponge City Programme. This special programme is launched by the central government in 2014 and highly promoted at 30 pioneer cities during the last two years, which aims to deal with the loss from frequent flooding and scarce water resources (Ministry of Housing and Urban-rural Development 2014). Although Guangzhou has not been appointed as one of the pioneer cities, the local authorities have set their minds to catch up this new trend.

Though frame analysis of planning documents, and a series of semi-structure interviews, this article argues that the current spatial planning system is living through a transition from an informal planning process, with flood risk embedded in flagship projects, to a formal planning process, with flooding compulsory considered in normal activities. This article begins by illustrating the pace of urbanisation related to flood risk in Guangzhou`s case, before setting out the methodology and theoretical concepts. Results are explained in the sections spatial policy making and practise before the implications are discussed.

2 URBAN DEVELOPMENT AND FLOOD RISK

Guangzhou, the largest city in Pearl River Delta, is located on the Pearl River. It is one of the best examples of rapid urbanisation process in this delta while increasing number of inhabitants exposed to flooding. As the capital of the Guangdong province, it is close to Hong Kong with 120 km distance at the north-west and 145 km apart to the north of Macau. The old ancient town of Guangzhou was near Baiyun Mountain on the east bank of the Pearl River. It has a diverse topography, ranging from urban centre area with Pear River passing through and flowing into a south floodplain area, to a mainly agricultural and rural area with natural canals and streams in the north and east. The elevation of the prefecture generally increases from south-west to northeast, with mountains forming the backbone of the city and the ocean comprising the front.

Due to the convenient condition for transportation and maritime trade, it developed into the most important port city in southern China, with the exchange of economy and culture. This city sees an explosive economic growth from 365 billion in 1978 to approximately 7400 billion in 2016, after the launch of the reform and open policy. Correspondingly, the population in this period climbs from 3 million to 14 million. Now it becomes the third heavily settled city in mainland China, with a population of 13,501,100, behind Beijing (2nd) and Shanghai (1st).

The increasing population and economic development result in the dramatic transformation of the urban landscape. During the period from1980`s to 2010`s, economic rise led to rapid urbanisation and high-density development, which brought about too much paving in the built area and insufficient capacity of water discharging system (Li et al. 2015). This scenario contributes to the increasingly severe pluvial flooding after 2010`s. One of the local authorities showed his concerns in the early time (interview 1),

"The location of waterlogging are mainly distributed in the city centre and the number of those is increasing every year. The sad is it is never easy to handle it in a decent way. This situation has been made worse recently, considering frequent rains and thunderstorms caused by the climate change".

The latest Sponge City Plan launched in 2017 reconfirms this trend (Figure 1-left), in which the city centre area is regarded as the most vulnerable area threatened by pluvial flooding. As Li (2015) put out in his research, the data of the events of pluvial flooding in the city centre from 1980 to 2012 indicates the density of waterlogging is closely correlated with the percentage of the impervious area. The distribution of these pots stretched by the pace of urban sprawl.

Moreover, Guangzhou is facing a new dilemma as well: the threat of coastal flooding. In a series of literature launched recently (Hanson et al. 2011, Hallegatte et al. 2013), Guangzhou is recognised as one of the most vulnerable cities considering the loss from populations and assets exposed to coastal flooding. According to the latest Sponge City Plan, the southern part of Guangzhou is the worst-hit area (Figure 1-right). Two driving forces could intensify the potential loss from coastal flooding. On one hand, the fluctuation of 30cm higher of mean sea-level in the PRD was speculated between 1990 and 2030 with a 5cm increase annually due to climate change, which brings an external pressure to this area (Chinese Academy of Science, 2002). On the other hand, the unstoppable trend of urbanisation and industrialisation might increase the exposure of people and property to potential coastal flooding. Nansha District, a district in southern Guangzhou, was officially acknowledged as a State-approved Special Economic Zone in 2012, competing and cooperating with Shenzhen and Zhuhai. In the near future, the development based on transportation and maritime trade will definitely bring a new trend of urbanisation and land reclaim. Given the uncertainties of climate change and potential urbanisation on coastal areas, the flooding risk stands out.

In contrast to increasing pluvial and coastal flooding, the fluvial flooding is not so dazzling of light in 2000`s (Carmona et al. 2014). Although Guangzhou is also historically threatened by the fluvial flooding, the continuous construction of water infrastructures like dykes, dams and reservoirs from the 1950s` to 1980`s has built the basic safeguard for Guangzhou city. "The related construction pays more attention to the reinforcement of existing engineering infrastructure". By this, in the research of Guangzhou, we paid our attention to pluvial and coastal flooding.

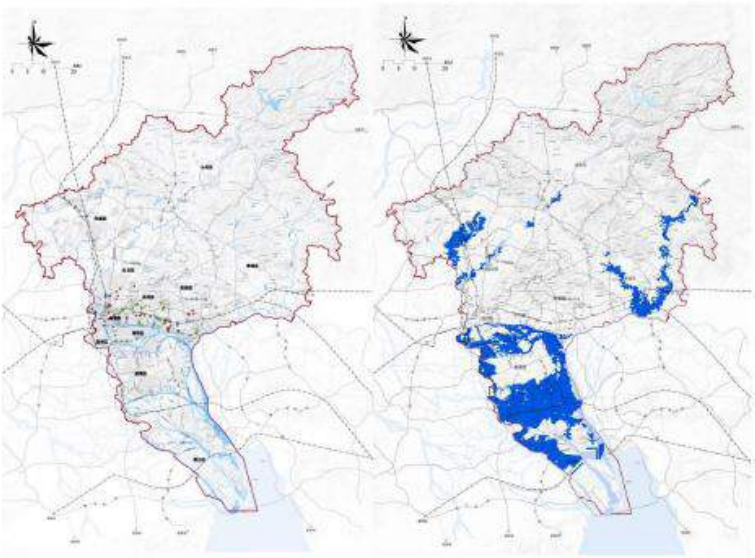

Figure 1 – The spots of frequent waterlogging (left), the vulnerable areas threatened by coastal flooding (right)

3 METHODOLOGY

3.1 FRAMING ANALYSIS

In examining the recognition of flood risk in planning, it is important to address the agreement and disagreement between the claiming of policy discourse such as rules, principles, criterions, and the reflections of policy discourse, such as the activities and choices conducted by institutions and agents. Such controversy can be examined by framing analysis, which is generally used to analyse “the mismatch between administrations` implementation of legislated policies and policy intent” (Hulst & Yanow 2016 P.92). As proposed by Rein and Schon (1994, 1996), though “frame critical analysis” and “frame-reflective analysis”, the two perspectives of framing analysis, this method helps to explain, such as the sense-making of problems, the evolution of understanding, the gaining of legitimacy and the value reflection of policy designers and practitioners.

Hulst and Yanow (2016) underlines three identities in conducting framing analysis,

1. the substance of policy issue
2. the policy process
3. policy-relevant actors` identities and relationship

Here, we take use of this outlines of exploration and apply it in the discussion of the agenda setting of flood risk in the spatial planning system. First, the fitting planning policies and plan documents are selected, and the content in relation to flood risk and planning will be sought. Following this, they are analysed to clue the changes of beliefs and standpoints of policy makers and planning practitioners in flood-proof routines. In order to recheck the statement of policy discourse, in reality, we add another discussion to the original framework: the reflection of policy intent.

Based on this, the discussion of this paper are sketched out along four axes:

1. How is flood risk defined in spatial planning documents and brought to the public in policy arena?
2. What routines are set in resolving flood risk in spatial regulations, plans?
3. What are the identities of spatial planners in representing the flood-proof intent in policy?
4. What is the reflection of policy intent in practice?

3.2 POLICY SELECTION AND DATA COLLECTION SOURCES

In order to reflect the new trend towards a resilient city, stimulated by the latest political innovation “Sponge city Programme”, and the transitions in spatial planning during this new trend, this research examine the official documents from 1990`s to present. Two reasons contribute to the time point we selected: the increasing flood risk caused by climate change and urban development. On one hand, it is the time, in 1990, when the climate change started to step into the political arena and had an influence on policy and plan making (Meng & Dabrowski 2016). The recognition of the impact of climate change on urban development was emerging, which sets the premise of this discussion. For the sake of Guangzhou, there is a remarkable increase of waterlogging pots from 2000 to 2012 due to the frequent storms (Li et al. 2015). Thus, flooding hazard caused by climate change is becoming a key factor that affecting residential property and urban development. On the other hand, it is generally recognised 2000 means a lot to China, which opened the door to the period of accelerating urbanisation. This new trend was highly praised in 10th 5 Year Plan (National Social and Economic Development Plan), regardless of the size of cities (Li 2010). During this period, a mass of people immigrated into large cities, for instance, Guangzhou, on account of the advantages in resources, location and employ opportunities (Chen 2013). By this, Guangzhou sees a rapid urbanisation and lots of problems following up.

Here, we choose Guangzhou Master Plan 2000-2010 (MP1), Guangzhou Master Plan 2010-2020 (MP2) and Guangzhou Sponge City Plan (SCP) in the following analysis, which provide the spinal column of the local spatial planning system and play an influential role in ensuring whether flood risk is seriously concerned and in what ways it is handled. Although this policy selection does not cover the full range of flood- related plans and policies, it provides an overview of current local resilient routines in the spatial planning system.

To enrich the insights from framing analysis, 30 experts and professor are invited in a series of semi-structure interviews. Interviewees at the provincial and municipal level were selected to present the principal institutions and reflect on the key viewpoints in the documents review. The interviewees cover administrators in the spatial planning system, administrators of water management system, experts in research institutions and private planning companies and representatives in real estate companies. Three questions concerning recognition and awareness are asked:

- Do you think your profession can contribute to a flood-proof city?
- What obstacles might hinder your contribution?

The survey helps to show the extent of recognition of flood risk among the relevant actors in spatial policy and planning practise. It increases understanding the extent of the correspondence and opposition between the agenda setting in legislation and the following interpretation

4 THEORETICAL CONCEPTS

Four concepts are identified as primary factors in this analysis from the theory of framing analysis derived from Schon and Rein (1994). They are problem-setting, routines for resolving problems and identities of actors in reflecting the policy discourse.

4.1 PROBLEM-SETTING

First, problem-setting, which denotes a sense-making process, is selected. Through this process, the specific uncertain or ambiguous problems are selected, analysed and converted into explicit questions (Schon 2008). Such sense-making work then set the basis for the formulation of rules subsequently and impact on the further implementation. Specifically, the concern of problems setting in this study is derived from the premise that we should not only pay the attention to the external implication from climate change in delta cities. Flood risk is also interwoven with internal pressure from the physical development such as urbanisation, land-use patterns and technical treatment (Meyer 2014). Such “binding together” pattern, if any, not only provide a perspective to view what the troublesome is and what should be fixed but also holds dissimilar patches together in a scrutable and cogent way to motivate and steer actions (Weick 1995; Rein & Schn 1996).

In many delta cities, high-density urban sprawl and uncontrolled development in the flood-prone area may cause the difficult in water discharge and increases the odds of people’s exposure to flood hazards, such as Guangzhou in Pearl River Delta and Argentina in the Parana Delta (Bosselmann, Peter 2014; Zagare 2014). In another context, flood risk is correlated to the construction of large dams upstream. The case in Mekong Delta and Nile Delta manifest the concerns that such technical treatment may lead to the lack of sediment disposal and land subsidence (Cornelia & Kantoush. 2014; Marcel et al. 2014). The clarification of this interwoven in policy analysis between flood risk and other elements, thus, contribute to a better understanding of in what ways is flood risk framed and how they shape and impact on the future ambitions and options in spatial development. Consequently, a fundamental reconsideration of the problem setting of flood risk is highly emphasised in this study.

4.2 ROUTINES FOR RESOLVING PROBLEMS

Policy discourse could be regarded as a storytelling process, which naming the problems, defining the features, explaining them to the public what has happened, what is going on, and what should be done at present and in the future (Hulst & Yanow 2016). Through this process, policy discourse bridges the problem setting and real problem solving, and enable a leap from what it is to what needs be done. Here, we pay our attention to the session what needs be done, namely, the routines for resolving problems, through four aspects, goals, philosophy, principles for action and available options.

Since it is easy to understand the meaning of goals, principles for action and available options, we concentrating on the clarification of philosophy. As Wittgenstein (1921; P.25) mentioned, “Philosophy aims at the logical clarification of thoughts”. Similar point of view is also elaborated in Nigel Taylor`s study that it

refers to the “activity which is concerned with the clarification, and critical examination, of the basic assumptions underlying our ideas and beliefs (and thus, too, theories) and our actions and intentions (and thus, too, practices)”(1980, P.160). In terms of planning, Taylor argues that philosophical inquiry covers two main aspects: the ethical judgments (e.g. the economic development is promoted even though it might spoil the natural circumstances, or give priorities to the public transportation not the private), and the knowledge of problem (e.g. the causes of traffic jam) (Taylor 1980). In this paper, we build our views of philosophy by emphasising the former one and connecting it with the value judgement. It is, in this way, used to reflect the value orientation of policy, strategy and plans (e.g. a programme is encouraged which brings about long-term economic profits and adds to the living quality in spite of large sum of investment in a short-term). By this, it reflects the collective consciousness, overall tendency or dominating ideology from the decision makers, in most case derived from the government authorities with citizen`s reflection embedded in.

The belief underlying this discussion is that different goals, principles, philosophy and available options could have different impacts on, for instance, the following detailed plan and design process. For the Dutch case in Rotterdam, economic values derived from flood-proof initiatives are remarkable in a series of official documents, for instance, Rotterdam Adaptation Strategy (Rotterdam Climate Initiative 2013). Correspondingly, the cost and benefit analysis is promoted in the following plan and design process, which as a tool consolidates a proposal by comparing the cost of new construction and the loss caused by flooding hazards otherwise. On the contrary, in the Chinese case “Sponge City Programme” in Guangzhou (which will be further explored in paragraph 4 - analysis), the economic benefits is overestimated, which leads to a lack of expenditure comparison and a risk that the programme will not be sustainable. Thus, the role of routines for resolving problems stands out.

4.3 IDENTITIES OF ACTORS IN THE POLICY DISCOURSE

The discussion of identity derives from the concern that planning practice might work as policy discourse claims because of the thoughts of identities of the potential actors. They might detach themselves from the affairs because of the weak sense of responsibility or conflicts out of different political positions (Forester 1999, Forester 2012). Policy discourse contributes to framing this identity through constructing a common ground, appealing mutual recognition, clarifying their power and building relationship between parties within their beliefs (Schon & Rein 1994, Forester 1999, Forester 2012).

4.4 REFLECTION OF POLICY INTENT IN PRACTICE

Although policy might portray a promising future, in reality, the actors will reframe the discourse according to their own understandings and interests, and apply the revised discourse in practice. It means there might be a mismatch between the intent and practise. Here, the discussion focuses on clarifying the real thoughts of actors in spatial policy making and planning practise.

5 SPATIAL PLANS BEFORE THE LAUNCH OF SPONGE CITY PLAN

5.1 PROBLEM SETTING

Both of MP1 (Guangzhou Government 2005) and MP2 (Guangzhou Government 2016) SCP include the discussion of flood risk but the ways of problem definition are different. It indicates flooding risk (too much water) is turning from a detached issue to a connector associated with other urban problems, such as water pollution, water quality, etc.

In MP1 (Guangzhou Government 2005), flooding is concerned under the subtitle flooding prevention and rainfall discharging, a section of the chapter public safety and disaster prevention. Beneath this framework, flooding is recognised as a natural hazard caused by frequent storm and overflows of river and coastal flooding. There is no discussion of the impact of climate and weak description of urban development on flooding. In addition, dealing with flooding is regarded as a detached issue with the construction of engineering infrastructure emphasised.

Although flooding is also framed in the similar framework in MP2 (Guangzhou Government 2016), it sees a slight change. There seems to be a shift in the attitude which tries to clarify the relationship between flooding and urban development. Apart from the description of natural impacts, in this plan, flooding is attributed to the problems brought by the rapid urbanisation, such as the insufficient discharging capacity of drainage and sewer system, the disappearance of waterways and canals system, the decrease of buffer zones for flood discharge and retention due to urban expansion. Correspondingly, traditional flooding mitigation projects are criticised as:

> *"a series of detached actions, which heavily rely on the engineering facilitates while neglecting their connections with urban development…Flood mitigation projects in the future with the chief objective of safety should be an intriguer which bring profits to a clean water environment and an ecological circumstance for working and living (P.445)."*

5.2 WHAT ROUTINES ARE FORMULATED IN RESOLVING FLOOD RISK?

GOALS OF FLOOD-PROOF INITIATIVES

In MP1(Guangzhou Government 2005), water safety is regarded as the primary goal that should be achieved. This goal is explicated in two aspects. On one hand, to protect the city from fluvial and coastal flooding" is highly emphasised through the reinforcement of the existing engineering infrastructure such as dykes, levees, pump station, etc. Beneath this elaboration, the frequency of fluvial flooding in city centre should be "lower than 1 in 100 years in short-term and lower than 1 in 300 years in long-term" (Guangzhou Government 2005, P 47). On the other hand, improvement of the discharging infrastructure and reinforcement of the existing retention infrastructure means a lot in raising the capacity to deal with excessive water though. Based on those infrastructures, "the frequency of pluvial flooding is supposed to be lower than 1 in 10 years in short-term and 1 in 20 years in long-term…", and "excessive rainfalls should be discharged within 24 hours" (Guangzhou Government 2005, P 48).

Even though the significance of water safety is still re-emphasized in MP2 (Guangzhou Government 2016), the close connection between flood-proof projects with urban development starts to impact on the policy formulation and enriches the goals setting. Apart from the modification of river flood defence standards and water discharging standards, this plan claims that implementing flood mitigation projects could be combined with the measures "improving the quality of water… enhancing the ecological environment… and shaping the culture identity" (Guangzhou Government 2016, P445). Thus, the goals of flood-proof statement start to explore the extensive possibility.

PHILOSOPHY

The philosophy in dealing with flood risk is broadened through the evolutionary development of spatial planning making as time goes by. It is obviously that the concern of safety penetrates in both of two documents. As described in MP1 (Guangzhou Government 2005) and MP2 (Guangzhou Government 2016), the safety is cognizant as their first priority. However, the content of philosophy in MP2 (Guangzhou Government 2016) sees a subtle variation that there is a gradual transition from narrowed focus on water safety to a diverse orientation which adds the value to safety, ecology, environment and cultural identity. The reason why such transition is regarded as a subtle variation is that description of the available options to support this transition is insufficient in spite of these new value judgement in the policy statement. Thus, the extension of philosophy in MP2 seems more like a reframing the irritating flooding risk in a more comprehensive perspective than a radical switch.

PRINCIPLES FOR ACTIONS

The prime principle for Guangzhou`s actions shared by MP1(Guangzhou Government 2005) and MP2 (Guangzhou Government 2016) can be generalised as taking action according to local settings. It can be reflected by two main aspects: the distinctive geographic features of different areas and the status of existing infrastructure. Correspondingly, different options are proposed in terms of potential flooding resources along with the reinforcement the existing infrastructure.

In addition, MP2 (Guangzhou Government 2016) shows a new tendency of joint performance. As mentioned in the philosophy part, this plans calls on an integral choice which combines the flood-proof initiatives with other activities contributing to improving the water quality, living environment and cultural identity (Guangzhou Government 2016, P.445).

AVAILABLE OPTIONS

Divided by the sources of flood risk, In MP1(Guangzhou Government 2005) the options can be into alternatives to deal with the fluvial and coastal flooding, and alternatives for pluvial flooding. The former concentrates on engineering construction. Under its influence, reinforcing flood defence infrastructure, such as embanks, dykes, pumps, water lock; and raising the elevation of ground are emphasised (Guangzhou Government 2005, P.47). The latter focuses on a conservative way by ameliorating of existing water discharging infrastructure and protecting the open canals, waterways and artificial lakes from the negative impacts of excessive urbanisation. Activities such as improving the discharging system; preserving and dredging the canals and waterways; suppressing the erosion to existing waterways out of urbanisation, canals; and preserving the artificial lakes are encouraged (Guangzhou Government 2005, P.48).

The diversity of available options seems to be loosened in MP2 (Guangzhou Government 2016). Options focus their attention on the reinforcement of the dykes, flood walls, pumping facilities, reservoirs, canals and discharging system (Guangzhou Government 2016, P.442-447). Engineering construction appears to be the dominant approaches to face the flood risk.

In spite of those available options, there is a lack of description of areas without any canals and lakes in their site. In fact, lots of areas are located in those positions, where the available options are building underground discharging system and drainaging the water out of the city as soon as possible. It actually brings a hidden trouble to the city because of the fixed drainaging capacity of the discharging system. The point is normally it is difficult to change the designed permenant drainaging volume. However, due to the increasing frequent rainfalls and storms caused by climate change, the drainaging capacity will finally see its boundary. In that case, the lowland in the city will be submerged. Thus, a more flexible system which can bear the excessive water is needed.

In addition, for the sake of potential fluvial and coastal flooding, suggested options mainly rely on the “barriers”, underpinned by engineering approaches. To face the potential increasing risk caused by climate change, the only solution is to raise the height of dykes, flood walls and building more pumping facilitates. Engineering construction is necessary, but the narrow focus on it may lead to troubles. In flood-prone areas, natives will be used to the engineering protection (Solomon 2007)In the case that engineering construction is ill-prepared to resist the floods when water excesses the capacity of protecting the system, people would encounter a great loss, with little knowledge to handle the unexpected inundation. Thus, some extra protective options are needed.

5.3 IDENTITY ASSIGNED BY POLICY FRAMING

MP1 (Guangzhou Government 2005) and MP2 (Guangzhou Government 2016) share a weak recognition of identity assignment in policy discourse. It seems policy statements in these two files is more likely a technical tool which pays more attention to the problem setting and routines for action, while the discussion about who should be involved and shoulder the responsibility to handle the flood risk is neglected. However, it is still to be emphasised that, in MP2 when flood proof issues are talked about, there is a hint which claims that “water administration institutions will play a significant role in enhancing the water safety, water purification and waterfront environment ” (Guangzhou Government 2016, P 445). Thus, the identities of the relevant actor are vague and uncertain.

5.4 REFLECTION IN PRACTICE

In this session, 30 experts and professor are invited to the interviews, which achieved 25 positive response. They come from the Municipal Urban Planning Department, Water Affair Bureau, Pearl River

Delta Commission, provincial spatial planning and design institute, municipal spatial planning and design institute, research institute, civil engineering institute (working on drainage and sewer system and water supply system), private spatial and landscape planning company and real estate company. Their majors cover spatial planning, sewer discharging, ecology, landscape designer and planning, greening, water resources, sewer discharging water resources, flood defence, administration and management and housing.

Among those are 11 spatial planners, including 6 spatial planners who work on land-use and economic development, 4 spatial planners who work on landscape and ecology (2), and sewer system (2), 1 spatial planning administrator who work on drainage and sewer system.

The investigation established the willingness of participation in the routines towards a resilient city in terms of their past experience. We followed a guideline with two main questions:

- Do you think your profession can contribute to a flood-proof city? The attitudes from different institutions are categorised with five intervals from first priority, strong interest, neutral position, weak interest and no interest.
- What obstacles might hinder your contribution?

RESULT 1:

The results of those interviews show that 7 respondents, nearly 1/3, show strong interested in keeping eyes on flood risk, with 2 spatial planners working on landscape and ecology (1), and sewer system (1) are included.

Nearly half of respondents, 11 out of 25, respondents hold a neutral position in considering flood risk in planning practice. Here, neutral altitude refers to the situation that the respondents are aware of the increasing flood risk in the context of climate change but not reluctant to change their planning tools or measures to face this new challenge. Among them, 4 spatial planners working on land use and economic development, 1 spatial planners working on landscape, 1 spatial planner working on the sewer system and 1 spatial planning administrator working on sewer system are included, showing the neutral position.

3 respondents show weak interested in taking flood risk in their practice related to spatial plans or projects, including 2 spatial planners who work on land use and economic development.

2 respondents, who work on flood defence in the Pear River Delta Commission, put flood risk at their first priority and 2 respondents, who work in the real estate, show no interest in flood-proof initiatives.

Due to the small sample of the interviewees, the result cannot totally reflect the overview of attitudes at local circumstances. However, it still hints some phenomenon indirectly. It seems that not so many interviewees are willing to put flood risk in them agenda. According to the investigation, 16 respondents, nearly 2/3 of the whole sample, hold a neutrual, weak or even indifference attitude to the new challenges brought by flood risk. In contrast, 9 respondents, around 1/3 of the interviewee shows a strong interest in flood-proof initiatives or take it seriously.

A similar situation happens among spatial planners. 9 responses show a neutral or weak attitude while only 2 spatial planners show a strong interest.

RESULT 2:

The investigation about the obstacles help our to understand the underlying reasons of such neglect of flood risk in spatial related plans and practise.

According to interviewees, most people attribute their timid attitude to the potential sanitation problems brought by flood- proof initiatives, not the tradition in their fields, no agreement on available options, weak cooperation between different institutions, lack of experts in this new problems and lack of politicial support.

For spatial planners, the main reasons concentrate on the potential sanitation problems brought by flood-proof initiatives, not the tradition in spatial planning practice, lack of experts in this new problems and lack of polititical support.

6 A NEW ERA: THE LAUNCH OF SPONGE CITY PLAN

6.1 PROBLEM-SETTING

The definition of flood risk becomes richer in SCP (Guangzhou Government 2017). On one hand, the role of climate change starts to step into the arena and realised by the actors who are involved in the process of plan making. “Due to the climate change, there will be an increase in the events of rainstorm and thunderstorms. By this, the occurrence of waterlogging will be much higher than ever before (Guangzhou Government 2017, P.43). In addition, flood risk is regarded as a hub, closely linked with water pollution, poor ecological environment and weak culture identity. Dealing with flood risk is, thus, packaged in a systematic project, integral with other public issues. By this, decreasing flood risk is regarded an opportunity to resolve the other public problems out of rapid urbanisation.

6.2 WHAT ROUTINES ARE FORMULATED IN RESOLVING FLOOD RISK?

GOALS OF FLOOD-PROOF INITIATIVES

The goals of SCP (Guangzhou Government 2017) are expressed through five main aspects: raising the safety to flood; improving water ecology; purifying water environment; enhancing the usage of water resources and rebuilding the connection between water and citizens. Compared with the suggestions proposed in MP2 (Guangzhou Government 2016) that multi-objectives activities considering the flood risk, quality of water, ecological environment and culture identity are preferred, this time such policy statement is demonstrated clearly in a visionary language and used as a framework to charge the whole file.

PHILOSOPHY

includes clearly value judgement on bringing the benefits to water safety, ecology, environment and cultural identity. Though these clues, it helps to build a more safe, attractive, liveable and resilient city.

PRINCIPLES FOR ACTION

The changes of principles for action highlights the necessity of institutional cooperation and integrated measures in dealing with flood risk. In SCP (Guangzhou Government 2017), it advocates horizontal interactions between the profession of spatial planning, transportation planning, water institution, which provides the legislative foundation for future cooperation in a formal way. Consequently, it may lead to an easy-going circumstance for mutual learning and information exchange in the process of policy and plan making.

Although it is officially claimed that an integral system binding nature-based infrastructure with engineering infrastructure is significant, a greater emphasis on nature-based infrastructure can be perceived. By this, components of nature, such as wetlands, lakes, waterways even the farmland are recognised as a crucial element in water retention and detention. It gets the upper hand uncomplicated in terms of the traditional notion that natural elements are more acting as an ecological habitat for biodiversity. “It is meaningful for the rapid urban sprawl process in Guangzhou.” As an interviewee previously put out,

> *“To get out of the trouble of pluvial flooding is never easy. Because you cannot expect the rainwater discharging system can totally handle it, especially now the frequency and amount of rain can easily surplus our control due to extreme storms surge. However, we can still ameliorate it by relying on the green and blue network in this city. They take*

effect by storing the excessive water, slowing down the speed of run-off in transit, and extending the time of flowing into the rainwater discharging system."

AVAILABLE OPTIONS

In SCP (Guangzhou Government 2017), it calls for new remedies to deal with a series of water problems with flood risk included. In contrast to the conventional methods, new remedies are explicated through as follows:

- Raising of the water safety by the reinforcement of flood defence infrastructure, e.g. dikes, and levees; the construction of pumping; the upgrade of discharging system; the partition of the water basin; the adjustment of ground elevation; the construction of underground drainage tunnel; the building of water retention and detention areas, e.g. wetlands, parks, and green and blue corridors.
- Purifying the polluted water by the improvement of wastewater chain, e.g. the set of sewer treatment plant; the construction of overflows pollution control system; the purification of the contaminated canals and rivers; and the building of eco-purification system, e.g. wetland system
- Improving the ecology environment by softening the channels and canals and the utilisation of green open space in water retention and detention;
- Enhancing the optimisation of the use of water by the diversion of water resources; the improvement of water supplement system; the reuse of treated sewage; and the recycle of rainfalls.
- Reconstructing the connection between water and citizens by facilitating the access to waterfront area; arranging waterfront recreation; and build the image of water-related heritages.

Although the options are categorised into five axes, in real practice, a project might take two or more options. For instance, the softened canals might act as a part of green blue corridors which help to drainage the excessive water and reduce the pressure of underground discharging system out of pluvial flooding and provide an attractive place for recreation. It is obvious that different flood-proof options are related, overlapped, and interacted. Here, engineering based and nature-based options are regarded essential components constitute a comprehensive system.

6.3 IDENTITY ASSIGNMENT BY POLICY FRAMING

The SCP (Guangzhou Government 2017) takes a huge step in clarifying the identities of different actors. This file calls on collaborative efforts from different departments in raising the ability of the city to deal with flood risk, as well as building an attractive, ecological and livable water environment. The roles of key administrator are identified, for instance, the local Development & Reform Commission, Water Affairs Bureau, Housing and Construction Committee, and so on.

In this file, the role of Guangzhou Land Resources and Urban Planning Committee is defined as "the main actor who is responsible for the improvement of sponge city plan, as well as relevant plan and policy, for instance, master plan, detailed plan and greening plan; a coordinator who negotiates the interests from different administrations; a regular who sets the zoning index to guarantee the realization of the notions in sponge city programme; and manager who inspects the final implementation of sponge city projects (Guangzhou Government 2017, P 120) ." By this, spatial planning formally steps into the arena in dealing with flood risk. Although it could be criticised that most descriptions are related to the administrators, those statements are still promising to bring new changes for future spatial planning industry and attract other relevant actors involved in the spatial planning process, such as research institutions and private companies.

6.4 REFLECTION IN PRACTICE

Since the official document of SCP (Guangzhou Government 2017) is such a new plan which has just been launched in 2017, there is no practice operated in the full sense of this special plan. However, we still succeed in interviewing the policy makers of SCP. In this session, 5 experts involved in the plan making

are invited to the interviews, which achieved 3 positive response. It established the willingness of participation in the routines towards a resilient city in terms of their past experience. We followed a guideline with two main questions: Is there any problems arise in the plan making process? And what obstacles might weaken the willingness of relevant actors in participating in the sponge city projects in the coming future?

A spatial planner with the background of ecology and landscape architecture shared her experience on the dilemmas arising in the plan making process and showed the concerns of her role in the future projects:

> *"The arguments, I mean so many disagreements arose in the planning making process. But the problems concentrated on the seesaw game between nature-based infrastructure and engineering-based infrastructure. On one hand, the experts in the field of water management criticised the unrealistic expectation on the application of natured-based options in the city centre, which is the most vulnerable area while with insufficient space for green space. On the other hand, the experts in the field of landscape planning, with rich experience in low impact development (LID) and green infrastructure (GI), stroke back their opponents using the same cases in city centre by emphasizing the inadequate capacity to drainage rainfalls in the context of climate change even if there existed discharging system... Such conflicts are obvious especially in the initial stage of plan making when the green infrastructure is appointed with a relatively high preference."*
>
> *"For me, a representative of spatial planners is a little embarrassed. We didn`t have so much experience in practice concerning technics in water management and LID, which makes us difficulty in voicing our thoughts. Although we are regarded a leader in this planning process, in most cases, we act more likely as a negotiator. This lack of specific knowledge might hinder my future involvement."*

Another spatial planner who majors in water discharging system shared a similar idea on the disagreements between different professions and reframed current dilemmas into two necessities for future work: to raise the awareness of knowledge and to build the platform for mutual understanding and information sharing. In his opinion, resolving flood risk is an issue needed the support from numerous professions. However, the weak awareness of their own contribution and the way of cooperation among potential actors may hinder the collaborative activities in the future.

> *"It is not a main focus in the traditional spatial planning system. Without sufficient preparation, I mean the knowledge, spatial planners will be reluctant to consider it in following plans and practise. Even the Sponge city plan will be finally launched in the future, it makes no difference because people don`t know how to apply the notions in Sponge City Plan in the real projects. A similar situation might also occur among other potential actors and hinders their involvement in spatial activities.*
>
> *Currently, it is more significant to build a platform to promote the information sharing and enhance mutual understanding, rather than narrow our eyes on some flagship projects. They are the fundamental ways to solve the unawareness of knowledge."*

An administrator from Water Affairs Bureau proposed another interesting idea on the willingness of participation. In her opinion, the emerging sponge city plan is still like a strategy, with limited enforcement. Only if the different options can be transferred into the specific index and written in zoning plan, then the notions in sponge city could be realised smoothly. the As she proposed, "One of the potential work that can be done is to regulate the portion of green space for water retention and detention or the percentage of runoff that can be drainaged into urban discharge system for every piece of land." By this, the preference to plan enforcement is more emphasised than the spontaneous willingness of different participants.

7 DISCUSSION AND CONCLUSION

7.1 CURRENT ACHIEVEMENTS

Sponge City Plan (Guangzhou Government 2017) can be regarded as a plan brings flood risk in the arena of spatial planning formally. Compared with the MP1 (Guangzhou Government 2005) and MP2 (Guangzhou Government 2016), it is a big step for local authorities. It builds a new perspective to see this natural hazard, portray a new vision for an attractive, liveable and resilient city, set a more comprehensive routines to resolve problems and calls on the collaborative relationship in planning practice. As a new start, it will bring many changes.

On one hand, it seems the notion of dealing with flood risk is changing from a natural hazard framing to an opportunity framing. In previous experience, building dykes as strong as possible to defend the water and discharging water as soon as possible were highly praised. However, the nature-based infrastructure is now given more attention. Beneath this notion, lots of flagship water retention and detention projects, such as constructing wetlands, lakes, green-blue corridors at the large scale and altering paving into green in the small scale, will be claimed under the umbrella of sponge city programmes in the following years. In contrast to keeping feet dry, Sponge City Plan opens the door living with and bearing the excessive water in a relative safety range.

On the other hand, the combination of risk with other related issues, such as water pollution and waterfront recreation, show a clue in shaping mainstreaming adaptation measures and policies in the near future. It provides the opportunities to incorporate flood risk into existing other water issues and parcel it with other projects, for instance, building a piece of wetland for recreation by using brownfields, meanwhile, creating a micro water purifying and storage system. By this, the developed programs are conducted concerned with both short-term environmental benefits now and long-term climate risks in the future. Thus, flood-proof initiatives are gradually transferred from a separate concern to an integrated and multi-objective process.

7.2 CHALLENGES FOR FUTURE SPATIAL DEVELOPMENT

However, such discourse and intent cannot respond to all the concerns left before. For instance, there is no discussion about the broadcast of disease caused by mosquitos bred by water retention and detention areas. There is also a lack of methods to raise the awareness of specific knowledge and enhance the information sharing. Those missing pieces might leave the weak points which hinder the implementation of the proposed options in the near future.

In addition, there will always be a delay between the launch of a plan statement and the acceptance of this statement, let alone the implementation of the principles, options. Based on that premise, although Sponge City Plan (Guangzhou Government 2017) tries to clarify the responsibility of different actors and build a collaborative circumstance, in the near future, the actors involved in flood-proof initiatives will still be bothered with the difficulty in communicating with different institutions at practice.

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