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**“In Principle” versus “In Reality”:
Assessing the potential of adaptive urban governance toward urban flooding in
Ho Chi Minh City’s District 7**



Cindy Pham Nguyen

School for International Training

SIT Vietnam: Culture, Social Change, and Development

Advised by: Ms. Vo Dao Chi, Environmental Researcher, Southern Institute of Social Sciences;

Mr. Nguyen Luu Bao Doan, Lecturer, University of Economics Ho Chi Minh City

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Selected Abbreviations and Acronyms

School for International Training	SIT
Independent Study Project	ISP
Ho Chi Minh City	HCMC
Steering Center for Urban Flood Control Program	SCFC
Phu My Hung	PMH
Huỳnh Tấn Phát street	HTP
Trần Xuân Soạn street	TXS
General Statistics Office of Vietnam	GSO
Ho Chi Minh City Statistics Office	PSO
Trung Tâm Chống Ngập (aka SCFC)	TTCN
Ho Chi Minh City Department of Planning and Architecture	DPA
Non-governmental organization	NGO
People's Committee of HCMC	PPC
Department of Natural Resources and Environment	DoNRE
Department of Construction	DOC
Department of Agriculture and Rural Development	DARD
Tân Thuận Industrial Promotion Corporation	IPC
Central Trading and Development Group	CTD
Ministry of Natural Resources and Environment	MoNRE
Ministry of Construction	MoC
Ministry of Agriculture and Rural Development	MARD
Community-based adaptation	CBA

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Abstract

Flooding has become the new normal in Ho Chi Minh City (HCMC). During the rainy season, many areas of the city experience severe inundation that seriously impacts infrastructure, traffic, and economic transactions. As the effects of climate change unpredictably and rapidly manifest in Southern Vietnam, the frequency and impact of urban floods are projected to increase. In addition, within the last few decades, HCMC has rapidly developed and urbanized, transforming itself into the economic center of Southern Vietnam. However, previous studies and international experts have determined that rapid, poor development may be exacerbating urban flood issues.

In recent years, city authorities and land planners have recognized the threat of urban flooding and climate change, calling for sustainable development and investing in flood adaptation infrastructure. Despite these efforts, many local people and experts agree that measures have been largely ineffective. Furthermore, based on the Master Plan extending into 2025, the city does not appear to be slowing development any time soon. With plans to further develop into the low-lying floodplains south of Saigon, including District 7, HCMC is likely to create new flood-prone areas while increasingly vulnerability to climate change and poor development.

To better understand the issue of urban flooding and adaptation in HCMC, this paper selects District 7 as a site of study. Through a case-study approach, this research intends to explore the issue of urban flooding in District 7 within the context of climate change and rapid urbanization to determine whether the city could effectively implement a more coordinated form of flood adaptation considerate of climate change, socio-economic inequities, and community-based adaptation – otherwise known as “adaptive urban governance”. Based on interviews with 10 individuals, and observational data, and a “desk review”, relevant analysis includes an assessment of current formal efforts (i.e. programs and legislation), stakeholder analysis, and an assessment of the socio-economic and spatial inequities resulting from uneven development in District 7. This case-study of District 7 determined that, in principle, HCMC’s potential for adaptive urban governance toward urban flooding appears strong; however, in reality, current efforts are weak and insufficient, thereby minimizing the potential for adaptive urban governance.

Keywords: *climate change, urban flooding, urbanization, development, adaptive urban governance, urban planning, adaptive land-use planning*

I. Introduction

A quick Google search for “flooding in HCMC” yields an endless number of news articles, journal articles, and blogs discussing the increasing frequency and severity of flood events in recent years – especially in Bình Thạnh or Thảo Điền street in District 2. In 2017 alone, the city experienced 171 flooded points in alleyways and decentralized roads and 40 flooded points on major roads (“Water Situation up to 2017...”, 2017). This is not a surprise– evidence demonstrates that, since 1990, the number of flooded locations, frequency of floods, and duration of floods has increased in HCMC (Katzchner et al., 2016). Each rainy season brings severe flood inundation that can damage infrastructure, exacerbate traffic congestion, and hurt economic activity in the city. For example, the Steering Center for Urban Flood Control Program (SCFC) estimated that flooding caused the city VND 6,000 billion to 22,000 billion in economic damages every year (Nhan, 2018). As a densely built, coastal city built mainly on low-lying floodplain, HCMC is naturally vulnerable to flooding; experts estimate that most of the city is located 1-1.5 meters below sea level, making it “extremely endangered by inundation” (Nguyen et al., 2016, Storch et al., 2016). Furthermore, over 48% of the city is currently exposed to flood risk (Lasage et al., 2013).

However, flooding is not the only threat facing the city – so is climate change. According to the World Bank, climate change is no longer a “distant possibility but a current reality” (Eckert and Waibel 2009). In the last few decades, climate change has manifested itself in HCMC through an increase in rainfall, sea level, and high-intensity weather events like typhoons (Katzchner et al., 2012; Gravert and Weichmann, 2016). While the current effects of climate change on urban flooding is unclear, future climate scenarios anticipate that climate-related sea-level rise or increased intensity of rainfall will amplify the frequency and intensity of floods in the city (Bangalore et al., 2016; Lasage et al., 2013). As a city surrounded by and intersected with waterways, HCMC is majorly exposed to flooding– sea-level rise would only exacerbate this issue (Lasage et al. 2013). Furthermore, as a “mega-urban region”, HCMC is characterized by its high density of people, infrastructure, and assets; however, such features also make HCMC incredibly vulnerable to urban flooding and climate-related disasters in the near future (Gravert and Weichmann, 2016).

Additionally, Ho Chi Minh City’s rapid development and urbanization has exacerbated the issues of urban flooding and presents many negative implications for climate change. Various studies have cited poor urban planning and uninhibited development as a major cause of urban flooding issues in HCMC (Nhan, 2018; Katzchner et al., 2016; Huynh et al., 2013). Specifically, two processes of urbanization have contributed to the issue of flooding in HCMC: the increase in “hardscapes” and an insufficient drainage system. By developing natural greenspace, the city has decreased its drainage capacity while simultaneously increasing surface water runoff, thereby amplifying flood events. Additionally, researchers have found that

the city's development often outpaced its natural capacity; therefore, its wastewater and drainage system is significantly inefficient in handling the increased number of people and amount of rainfall (Nhan, 2018; Storch and Downes, 2011). Such issues would only intensify under conditions of climate change.

Acknowledging the concerns surrounding flooding, climate change, and poor development, the city has adjusted several policies to better incorporate practices of sustainable development and environmental protection (People's Committee of Ho Chi Minh City, 2013; Prime Minister, 2010). In addition, the city has invested trillions of VND to control tides, renovate and upgrade water drainage systems, and build drainage projects and flood prevention projects – most notably, a flood prevention system stretching from District 1 to Nha Be (“Trung Tâm Điều Hành Chương Trình...”, n.d; Nguyen, A.T., 2019, VN Express 2019; Tuoi Tre, 2019).

However, such projects re-emphasize a focus on formal (i.e. institutional), technological previous adaptation projects toward urban flooding issues. As Nhan (2018) mentions, previous research and efforts have been focused on building dykes, upgrading roads, or improving land-use planning as effective adaptation techniques. However, little research has been done to assess the institutional mechanisms driving flood adaptation decisions and the weaknesses in current governance efforts to adapt to flooding in HCMC. This study intends to bridge that gap in study by arguing for a more holistic, coordinated flood adaptation measure that fully addresses the complex issue of flooding – or in other words, adaptive urban governance.

While cities are considered “global hotspots of vulnerability to climate variation”, cities are also key players for climate adaptation and mitigation (Gravert and Wiechmann, 2016); therefore, city governments are the primary body to promote urban adaptive governance. In general, *good governance* is defined as “participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive” (Gravert and Weichmann 2016). Adaptive urban governance expands this by adding considerations of spatial and temporal scales, the existing knowledge base and strategies surrounding urban threats, future socio-economic trends, characteristics of structural and non-structural approaches, and interactions between different strategies and measures (Birkmann et al. 2010; Gravert and Weichmann 2016). Therefore, adaptive urban governance toward flooding would ideally consider future effects as well as informal methods to adapt to flooding in broader urban governance and development plans. In an era of climate change and rapid development, a governance strategy focused on preventing and adapting to future disasters is vital.

To better understand this complex issue of urban flooding in the context of climate change and rapid urbanization, this research project selects District 7 of HCMC as a site of study. As an area recently developed from low-lying wetlands and floodplains into the hottest real estate market in HCMC, District 7 is a microcosm of urbanization, climate change, and urban flooding issues. Furthermore, District 7 is the

site of two development projects: Saigon South and Phú Mỹ Hưng (PMH). Since both areas are considered high-value real estate, these spaces present socio-economic and spatial inequities that may exacerbate flooding – this will be further discussed. In addition, city authorities have set their sights on further developing the southern areas of District 7 and parts of Saigon South; renewed development on flood-plain and natural catchment areas poses great risk for flooding in District 7 (Prime Minister, 2010; Huynh, 2019). Such development could also increase the city’s exposure to climate change and the likelihood of poor development practices.

Therefore, by studying District 7, this study seeks to engage in broader discussions of climate change adaptation, urban governance, and urban development to ultimately determine whether current adaptation efforts indicate potential for the implementation of adaptive urban governance in HCMC. This research analyzes the causes of flooding in District 7, current formal projects and effort to address it, key stakeholders involved in urban flooding issues, and the socio-economic and spatial inequities associated with flooding in District 7. While this paper only scratches the surface of adaptive urban governance potential in HCMC and only begins to disentangle the institutional, social, and ecological dimensions of flooding, this study serves to broaden our understanding of what appropriate and effective adaptation looks like in times of climate change and rapid development.

II. Methodology

a. Introducing District 7 as a site of study

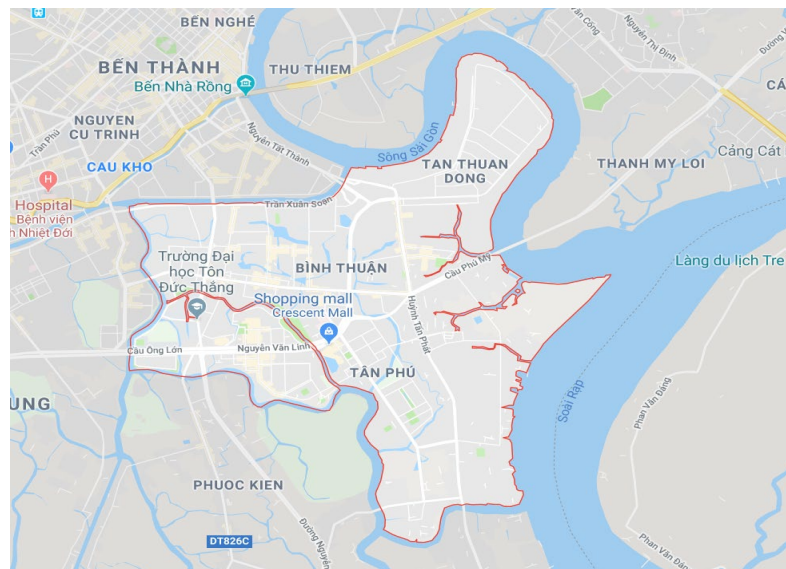
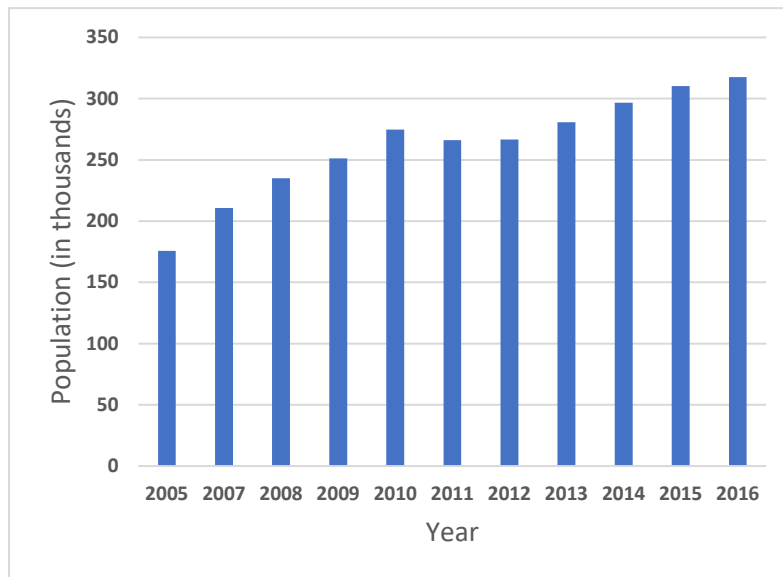


Figure 1. Map of District 7 of Ho Chi Minh City, with boundary highlighted. Source: Google Maps

Located over 5 kilometers south of the city center, District 7 is often considered the “new downtown” or a sub-center of the city (“A New Downtown...”; Huynh et al., 2012; Figure 1). According to 2017 data,

District 7 consists of 10 wards, with a population density of 9.168 person per square kilometer, and a total population of 327,223 people (PSO 2017a). Although the population density is low in comparison to other districts in or near the city center, District 7 has a steady growth rate and is the most populated out of the central districts (Figure 2). The movement to the district suggests an appealing quality drawing people in.



Decades ago, District 7 was considered an incredibly impoverished area with undeveloped swampland and floodplains (Du 2019; Nguyen 2019). Like much of the city, District 7 resides on infamously low-lying land next to the Saigon River (source). However, in recent years, the District has transformed from unoccupied swampland into the city's most vibrant real estate market. According

Figure 2. Population growth of District 7 from 2005 to 2016. Author's rendering with data from PSO 2010a & PSO 2017a.

to results generated on 5/12/2019 on the website “mua bán nhà đất” – the most popular site for real estate dealings and advertisements in Vietnam – District 7 has 434 vacant plots of land available to be bought and developed (“đất bán đất thô cư quận 7”). Combined with the steady growth of population, this confirms premium real estate is driving movement and development in District 7.

Furthermore, District 7 has become an area marked by its affluence and modernity (Huynh et al., 2012; Huynh, 2015). This is particularly evident in the district's two most renowned urban development projects: the Saigon South New Urban Area and the Phú Mỹ Hưng residential area (PMH). Particularly, PMH is considered a symbol of wealth, modernity, and a well-developed lifestyle for many Saigonese. Prices for apartments in PMH can be as much as 5000-9000 million VND – a figure 43% higher than that of surrounding developments (Huynh, 2015). According to Dr. Du, PMH has “changed the landscape of urban development in HCMC”, shifting focus from development in HCMC's northeast quadrant to the Southeast for renewed focus on the development of Saigon South (Huynh et al., 2012). Previously, the Ministry of Construction has praised PMH as a model of development for Vietnam (Ministry of Construction 2008).

However, District 7 was not chosen for its appeal and real estate; underlying this illustrious reputation are serious concerns with implications for urban flooding in HCMC. In September 2015, three points in District

7 were flooded following two days of heavy rain, as Tuoi Tre news reports (Figure 3). When discussing why District 7 was selected as a case study, many individuals stated that flooding is not an issue in District 7 compared to Binh Thanh or District 2 – frequently flooded areas. However, a study in 2008 estimated over 150 flood occurrences in District 7 (Nguyen et al., 2016). Together, these data point to a vulnerability to flooding in District 7.

The same 2008 study found that much of District 7 is only approximately 1-2 meters above sea level (Nguyen et al., 2016). As previous studies mention, coastal areas under 10m elevation above sea level are extremely vulnerable to inundation; therefore, District 7's ecology and topographical location makes it naturally more flood-prone (Birkmann et al., 2010). Additionally, it is vital to acknowledge the intense urbanization that District 7 has experienced. From 1999-2009, the area has experienced approximately 100-200% urban growth (Huynh et al., 2012). While PMH and the Saigon South New Urban Area have resulted in many positive externalities, especially increasing the peripheral property value in District 7, as with any urbanization, it has also been associated with negative externalities (Huynh et al., 2012; Huynh, 2015; Huynh, 2019). As an area built on previous swampland, the intense urbanization of District 7 also poses serious concerns for flooding in the future (Nguyen A.T., 2019).



Figure 3. 66 flood inundation points in Ho Chi Minh City. Source: Tuoi Tre Online (TTO) 2015

In addition, District 7 is the site of many flood mitigation projects. The SCFC, plans to resolve floods on 10 routes in HCMC, including HTP street in District 7 (“Trung Tâm Điều Hành...”, n.d.). In 2018, the city pledged VND 8 trillion to spend on a total of 218 projects to combat flooding, including District 7 (VN Express 2019a). Furthermore, various news outlets have reported that the city is expected to complete a 10-trillion VND (\$430-million USD) flood prevention project along the waterways of District 7 and Nha Be, the district directly south of District 7 (VN Express 2018, VN Express 2019a, Tuoi Tre 2019). In addition

to infrastructure and development concerns, these projects pose an interesting dimension of the prevalence of public-private partnerships in Ho Chi Minh City and particularly District 7. In District 7, one can see the Tân Thuận Drainage Project located on the corner of Huỳnh Tấn Phát (HTP) and Trần Xuân Soạn (TXS), which is slated to be completed by the end of 2019 – as discussed later, there are mixed feelings about the success of the project. The project was on halt due to investment concerns for a long time, but construction resumed in February 2019 (Tuoi Tre 2019).

Because of the lack of information around District 7, this study seeks to broaden the scope of existing research as well as provide insight into how developing districts – while risk may currently seem low – have conditions that may make them more vulnerable to urban flooding in the coming years. As the interest in finishing development in Saigon South renews while the threat of climate change looms, District 7 becomes a particularly vulnerable and interesting space. Furthermore, as the city intends to invest in flood mitigation and adaptation projects in the area, District 7 could be host to interesting public-private partnerships. Therefore, as a site where development, urbanization, and climate change intersect, District 7 becomes a site that illuminates the challenges and opportunities for adaptive urban governance toward flooding in Ho Chi Minh City.

b. Data Collection and Process

The following research was collected over a month-long period in Ho Chi Minh City and, specifically, in District 7 of Ho Chi Minh City. As previously mentioned, this research project utilized a case-study analytical approach with quantitative and qualitative aspects. There were three main methods of gathering data: “desk review” or literature review, formal and informal interviews, and observation. Since the focus of the study was on “adaptive urban governance”, much of the data was collected with the purpose of assessing institutional dimensions of flood adaptation. A review of articles and books written on the topic of adaptive urban governance toward climate change and flooding in HCMC revealed and pointed to key legislation, institutions, and policies regarding flood management and adaptation in Ho Chi Minh City. In order to read selected legislative documents (Vietnamese to English), I utilized the websites “Thư Viện Pháp Luật” (Law Library) and “Thư Ký Luật” (The Law Secretary). While “The Law Secretary” was a comprehensive online library of all legislative decisions in Vietnam managed by the HCMC Department of Information and Communication, the “Law Library” appeared to be an external organization. To find the legislative documents, I used the unique identifier code (ex: Decision 158/2008/QĐ-TTg). Both websites translated documents from Vietnamese to English.

Since gathering accurate, robust quantitative data regarding urban flooding would be difficult in a month, it was recommended I turn to reliable secondary data sources. Therefore, I utilized the statistical databases from the Ho Chi Minh City Statistical Office (PSO) to collect quantitative data on demographics

and land use in District 7. For statistics on flooding in HCMC, including flood points, annual rainfall, sea level rise, as well as a comprehensive list of projects that city authorities were pursuing, I utilized reports from “Trung Tâm Chống Ngập”, or SCFC. SCFC is also considered the center of HCMC’s flood protection and management program and has the most up-to-date information and statistics related to flooding in HCMC.

To both confirm and bolster my understanding of the institutional factors of adaptive governance, I conducted two in-person, in-depth, formal, structured interviews with HCMC experts with experience in urban planning and public policy. For both interviews, questions were prepared beforehand, but other questions or discussions came up naturally throughout the conversation. In addition, both interviews were conducted in English and later transcribed. First, I visited the Ho Chi Minh City Department of Planning and Architecture (DPA) to interview Dr. Nguyen Anh Tuan, the Director of the Architecture Research Center at DPA. As a prominent figure in the city department, I chose to interview Dr. Tuan to understand the perspective of an urban planner and authority. Second, I interviewed Dr. Huynh The Du, a prominent lecturer in Public Policy at Fulbright University. In addition, he has done extensive research on the urban planning of District 7, with specific focus on the socio-economic and land-use implications of PMH. I chose to interview him in order to gain a public policy/ consultant perspective. Therefore, both formal interviews touched on different dimensions to flood management and adaptive governance in the city.

In addition, to better understand local people’s experiences with flooding, the effectiveness of formal (i.e. government) flood adaptation programs and policies, and informal flood adaptation, I conducted informal, semi-structured with local people living near the Tân Thuận Bridge (at the intersection of Huỳnh Tấn Phát and Trần Xuân Soạn). Interviews were conducted across a two-day period (May 13th and 14th); in the end, eight interviews were conducted. Interviewees were mainly older residents and sellers around the area who had been in District 7 for a number of years, with one interviewee being a local college student. Each interview lasted for approximately 5-15 minutes, depending on the time each interviewee had available. Each interview was conducted in Vietnamese; on the first day, I conducted interviews on my own. Second, I was accompanied by a local college student from the Foreign Trade University to assist in translation, as the first day revealed many terms and language I did not personally understand. A list of questions was prepared beforehand and translated by Minh Nguyen, the SIT program coordinator, however, those were typically initiating questions to spark conversation. Naturally, conversations took a course of their own.

The last method of data collection was observations. Observations were conducted throughout District 7, but in two main areas: Nam Long Residential Area and near the Tân Thuận Bridge, where semi-structured interviews were conducted. Upon the recommendation of Dr. Nguyen Anh Tuan, I conducted an

hour-long observation of Nam Long Residential Area outside of Phú Mỹ Hưng. According to Dr. Tuan, the area used to experience heavy flooding before the roads were elevated. Therefore, I went to observe a more developed, affluent space. In addition, observations were conducted around the Tân Thuận Bridge, along Huỳnh Tấn Phát, alleyways next to Huỳnh Tấn Phát, and the Kênh Tẻ canal. The second round of observations took approximately 1.5 hours. The purpose of observations was to observe the movement of traffic, look at infrastructure, and assess drainage on the street.

This location was selected for several reasons. One, SCFC had identified the section from the roundabout on Huỳnh Tấn Phát street to past the Tân Thuận Bridge on Trần Xuân Soạn street as a particularly flood-prone area. In the first couple of interviews with local people, interviewees noted that the flooding stretched to the church on Trần Xuân Soạn street, so the study extent was extended. Second, the area was right next to the Tân Thuận drainage project in the Kênh Tẻ canal, part of a multi-trillion-dollar flooding project to mitigate flooding in District 7. Third, in comparison to the rest of District 7, the area is still quite underdeveloped; therefore, it served as an interesting study site to explore spatial and socio-economic inequities that could have implications for flooding. In addition, as a site of major development (Huỳnh Tấn Phát street has been elevated multiple times in recent years) it would be interesting to understand the various perspectives in that area.

c. Data Analysis and Synthesis

Qualitative data was synthesized to complete a stakeholder analysis, following the methodology of Ms. Vo Dao Chi. Stakeholder analyses help researchers understand the relative decision-making power and influence of a key stakeholder, as well as the power dynamic and relationship between key stakeholders. For quantitative figures, as much research has already been done on flooding and climate change in HCMC, in combination with the limited time frame of this ISP, some figures have been adapted from previous studies (and cited). For authors' renderings, graphs were created in Excel and maps were created using HCMCGIS Maps, an application that allows users to view open-source GIS files in HCMC. In addition, satellite images were pulled from Google Maps.

d. Ethics

Although the research focuses on the governance aspect of urban flooding issues, the problem of flooding in HCMC itself is not considered sensitive – in fact, when introducing my research topic to people throughout the ISP period, it was dismissed as a normal “fact of life”. Nonetheless, strong efforts were made to maintain the ethical soundness of this research. First, names and personal information of local people interviewed have been omitted to maintain anonymity. For Dr. Tuan and Dr. Du, I gained explicit, written consent to refer to them by name, position, and to refer to them in this paper. Second, interviews were conducted with consideration for each interviewee's time. Before each interview, whether formal or

informal, interviewees were asked the amount of time they had and whether they were available. Although the informal interviewees in District 7 were selected at random, I prefaced each conversation by describing who I was, the purpose of my research, which organization I was affiliated with (emphasizing I was not with a newspaper, government organization, or NGO), and asking each informal interviewee whether they had time to talk briefly about flooding in District 7. Furthermore, I took great care to interview those who lived in the area, to avoid the ethics issue of interviewing a vulnerable people such as migrant sellers. I would then ask whether each interviewee agreed to talk to me, thereby gaining explicit verbal consent for their time and interview. Finally, each informal interviewee was duly compensated before their interview – typically, an item was purchased from their shop.

e. Limitations

While I took great care to conduct this research in the most legitimate and ethical way, it should be acknowledged that there were several limitations that limited the scope and strength of this research project. First, the topic of urban flooding, climate change, and adaptive governance are extremely wide-reaching, complex, and broad topics that require time to gain a proper, grounded understanding of this issue. A month-long period was simply not enough for the amount of data collection, literature review, observation for a subject this vast. Time also made it difficult to interview more people. Particularly, in the formal interviews, I was introduced to additional contacts who would have great knowledge to contribute to this project; however, due to time limitations, it was difficult to schedule any additional appointments as many contacts were prominent figures with extremely busy schedules. In addition, I had initially hoped to observe flooding events during the ISP period; however, the rainy season does not pick up until June-July, with major flooding events in October. Therefore, given the limited time, it is unreasonable that this research is an authoritative source nor is it proper to make sweeping generalizations about adaptive governance and urban floods in HCMC.

Second, Vietnamese was a significant limiting factor. Although I speak Vietnamese, I still found myself struggling to understand certain phrases interviewees would say. In addition, the different styles in communication were particularly evident (particularly in the formal interviews) and I often had to rephrase my question to ensure its clarity. Even then, I would receive an answer tangentially related, and I lacked the vocabulary to accurately phrase my question in Vietnamese. Additionally, as many legal documents, decisions, reports, and data were in Vietnamese, I had to find easily translated web sources or spend time translating sources myself, which put a further constraint on time. I also had to search for articles in Vietnamese, to find statistics or data from sources other than the World Bank or Asian Development Bank.

Third, both the limitation of time and Vietnamese language skills affected how I found interviewees in District 7. Initially, and in an ideal research setting, I was prepared to distribute a survey to a focus group

or a random sample of residents in District 7; therefore, I could create a more consistent environment and gain a broader perspective of urban flooding in District 7. However, I ended up employing a convenience sampling method, where I interviewed individuals that I met while walking on the street, through the market, and around the bridge. It should be noted that I often initiated conversation by buying something from the seller and then introducing my topic and asking whether they had time to talk; I found this to be the most safe and easiest way to start up a conversation. For both the formal interviews, I was introduced to both individuals through my advisor, Dr. Nguyen Luu Bao Doan, and Dr. Thanh; therefore, this was a convenience sample as well. Since this study was not built on truly random samples, it is difficult to legitimize and generalize my research findings.

Fourth, conducting a study on the effect of climate change was a significant limiting factor and issue in this research project. Both advisors expressed that while there is extensive research on the effect of climate change in the future (i.e. 10-100 years from now), as researchers, we cannot possibly pinpoint climate change as the cause of a current phenomenon – including urban flooding. Furthermore, although climate change certainly has implications for flooding, generally, it possesses complex, multi-hazard effects that are not truly understood. Therefore, any research related to climate change must acknowledge this limitation.

Lastly, it must be mentioned that a significant challenge for this research project was the lack of current, available data. From the beginning, the lack of strong data regarding flooding – especially in District 7—was a chief concern for both advisors. Although District 7 does experience significant flooding in certain areas, there appeared to be a focus on more traditional flooding “hotspots”, such as Binh Thanh District. Furthermore, much of the initial research done on urban flooding took place around 2009-2012; however, these sources would have likely used data from 2000-2009. Considering the rapid changes that HCMC has undergone in the last decade, it would be more legitimate to use the most up-to-date data. However, as previously mentioned, this was difficult to find – either because it was in Vietnamese or because I had a lack of connections to access specific databases that previous sources used (such as the HCMC University of Technology’s Water Engineering Department database, which has contributed statistical information to great sources on climate-adaptive governance). In addition, all these limitations combined to limit my ability to perform strong data or spatial analysis in which I could create my own renderings with the most up-to-date data. However, I do not feel like this de-legitimizes the approach or results I present.

III. Results and Discussion

A. Identifying flood prone areas

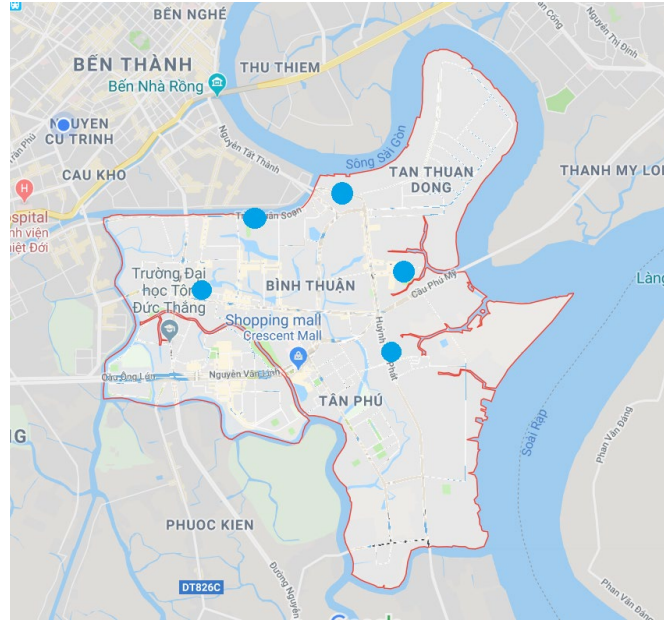


Figure 4. Map of identified flood inundation or flood-prone points in District 7. *Author's rendering.*

Part of adaptive governance is assessing the baseline knowledge and data; therefore, the causes of urban flooding must be assessed. Flood prone areas in District 7 are both “objective” and “subjective” – meaning, objective flood areas are those that have been identified by the city government (specifically, through SCFC), and subjective meaning those identified by people interviewed for this study. In total, I identified 5 flood prone areas in District 7 (Figure 4). It should be noted that although the included map only marks 1 flood point for Huynh Tan Phat street, the street has been designated as a severe point as it is often flooded to Nha Be, the district south of District 7 and is the site of many flood mitigation projects (VietnamNet n.d.; Trung Tâm Điều Hành Chương, n.d.). Objective flood points include Figures 5b, 5d, 5e while subjective points include Figures 5a and 5c (Figure 5).

While the objective points have been identified for flood mitigation projects, some subjective points have been recorded as sites of flood inundation in the past. For instance, Nguyễn Thị Thập is a subjective point that has experienced flooding in the past year (VN Express 2019b). Following one of the most recent periods of heavy rain (November 25, 2018), SCFC recorded that parts of Nguyễn Thị Thập experienced 0.20 meters of flooding – the same amount as Huynh Tan Phat street during the same rainfall event (The Steering Center for the Urban Flood Control Program, 2018). This suggests that areas previously not identified as flood-prone or the site of flood mitigation projects may be experiencing flooding.

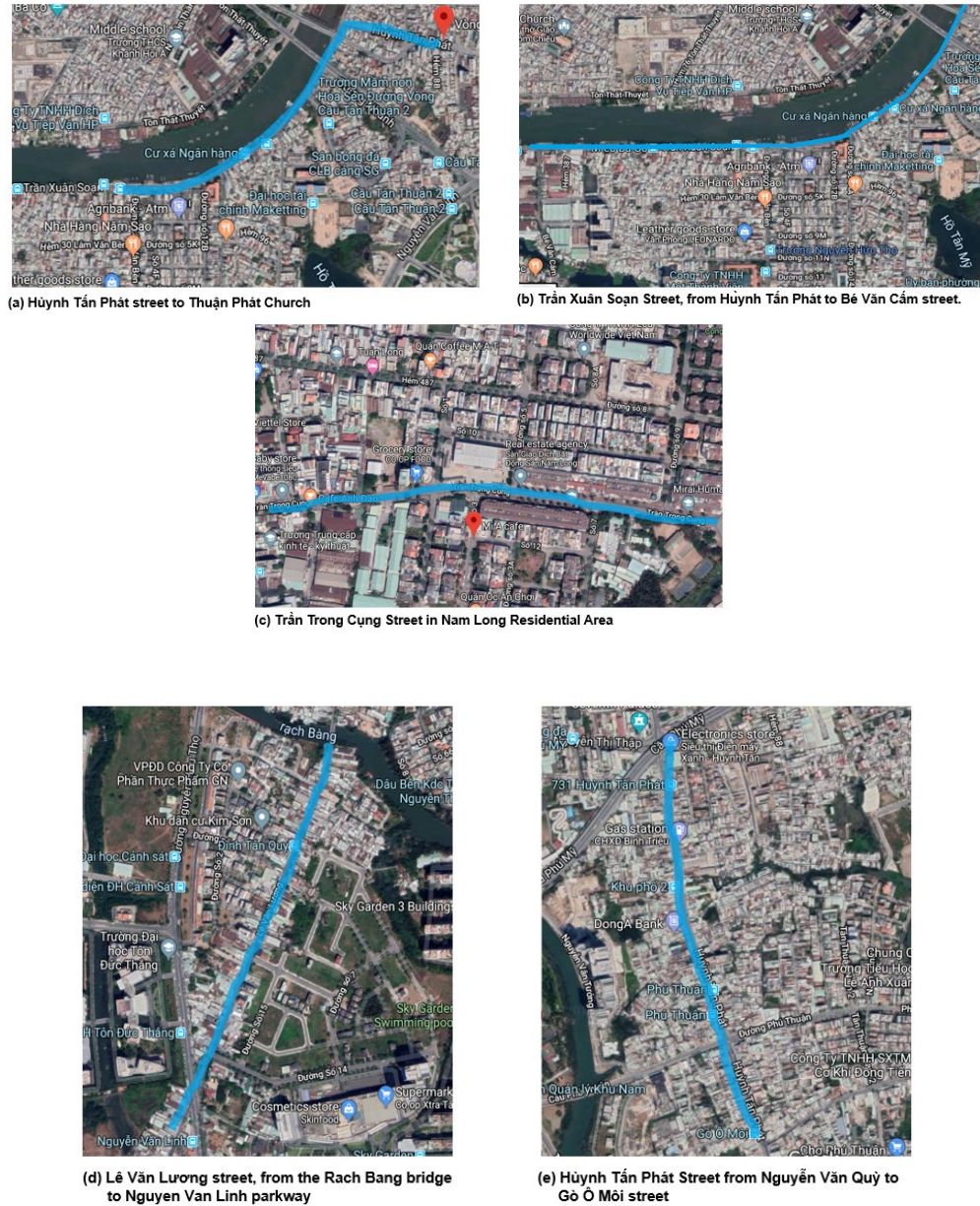


Figure 5 (a-e). Identified flood-prone areas in District 7. Author's rendering from SCFC (2017), SCFC (2017b), SCFC (2017c) and author's data.

Vice versa, some subjective flood-prone areas did not appear to be flooded – specifically, Tran Trong Cung street in Nam Long area. Upon the recommendation from Dr. Tuan, who said that the area was previously flood-prone but was unsure of its current status. I visited this area for observation. Although the day was particularly sunny, there was heavy rain the afternoon before, so I expected some evidence of flooding. However, the roads had clearly been elevated and widened, and there was ample drainage around the area – in my observation, this suggested the area was not as flood-prone as it used to be.

Despite these objective flood-prone points, there is evidence of uncertainty or unevenness of floods. When asked about flooding on HTP, interviewees acknowledged flooding in the past but quickly followed up by stating that a) flooding was no longer a serious issue on HTP and b) if there was flooding, it was not as bad as it appeared or is reported. In addition, while interviewing residents along TXS street, residents only 50-100 meters apart would give different answers regarding flooding – while one woman acknowledged there was some flooding during high-tides and rainfall events, I would walk 50 meters down the street to another interviewee who adamantly stated they did not experience flooding. In addition to the varying perceptions surrounding flooding, this suggests a spatial and physical unevenness of flooding as well.

It is also imperative to note the location of the flood-prone areas. In addition to HTP, with two flood points (Figure 5), TXS also appears to experience heavier inundation. Based on geography alone, this makes sense – it is located right next to Kênh Tẻ canal, which frequently overflows and floods during high tide and rainfall events (personal communication, May 14th, 2018). However, it must also be noted that none of the identified flood points fall within the planned area of the Saigon South development nor Phú Mỹ Hưng (Figure 4). While this could suggest that the development in this area has helped mitigate flooding, it could also be interpreted that the development in this area may be pushing flooding elsewhere, as one news source suggests.

B. Complex causes of flooding in District 7

Identifying the source of flooding is incredibly complex – the situation in District 7 is no different. However, interviews and desk review reveal three “root causes”: 1) rainfall and tides, 2) low elevation and land subsidence, and 3) poor and uneven development practices.

1) Rainfall and tides

Previous research has determined that a huge source of flooding are high rain and tide events (Tu, et al. 2011; Nguyen et al., 2016). In terms of tides, semi-diurnal tides are specifically to blame (“Huynh et al., 2013”; personal communication, May 2, 2019). Additionally, according to Dr. Tuan, the tidal regime is heavily impacted by the monsoon period. During the monsoon period, the tide rises and will flow over canals – such as the Kênh Tẻ – and flood areas of District 7 (Nguyen, 2019). For areas near TXS and Huynh Tan Phat street, residents agree that flooding is a result of tides increasing the water level of the Te Canal.

As previously mentioned, rainfall appears to be increasing in Ho Chi Minh City (Nhan et al., 2018; Du 2019). Although, statistically, the rainfall does not appear to be increasing from year to year (Figure 6), local residents report that the rain appears to be heavier, more frequent, and starting earlier than the typical rainy season. Furthermore, residents report that rainfall has become much more sporadic in Ho Chi Minh City and starts earlier – one interviewee mentioned that every

month appears to have some flood event now. In addition, while rainfall may affect the inner parts of District 7, residents along the Tê canal report that rain is not the primary cause of flooding, but rather an effect that amplifies flood events in District 7.

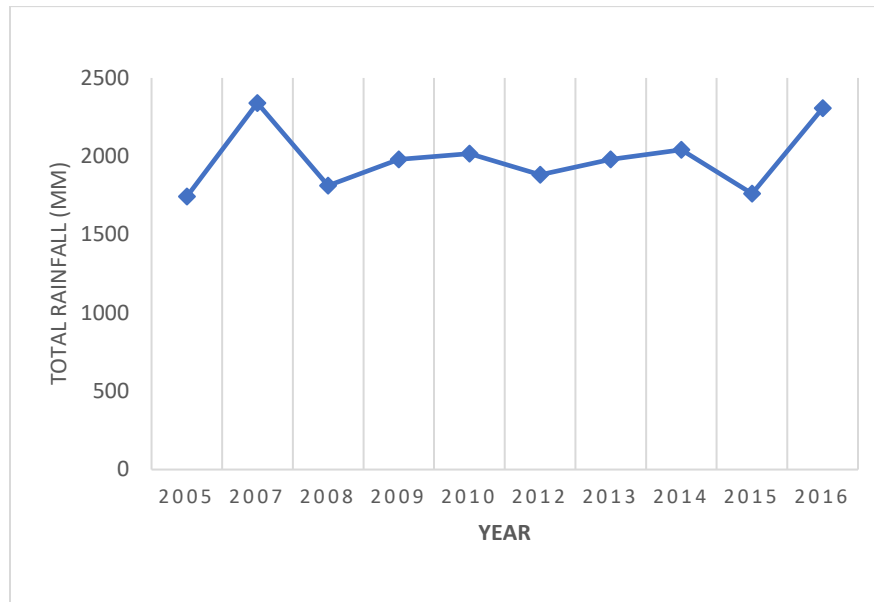


Figure 6. Changes in annual rainfall (mm) in HCMC during rainy season (May – November) over 10-year period.
Author's rendering from PSO 2010b and 2017b

While it is difficult to pinpoint the effects of climate change on tidal and rainfall events, evidence shows that these natural hazards will be amplified and become riskier in the future. Although it is difficult to develop a climate change scenario specifically for District 7 due to resource constraints, previous research indicates that the District will suffer under conditions of climate change. In warmer climates, such as Ho Chi Minh City, it is predicted that rainfall will become heavier and more frequent (Lasage et al., 2014). Specifically, sea-level rise is a climate-related cause posing great concern for flood events in District 7 (Nguyen A.T. 2019; Huynh, 2019). One study predicts that, in the long-term, rising sea levels will increase flood damage in Ho Chi Minh city by 112-115% (Lasage et al., 2014). According to a sea-level rise analysis conducted by the World Bank in 2016, under a 30cm (0.3m) sea level rise event, in 10 years, most of District 7 will be inundated by 1-meter of water; in 25 years, that could increase between 1 to 1.5 meters (Bangalore et al., 2016). For an area that is already low-lying and intersected with many waterways, this could prove disastrous for District 7.

2) Low elevation and land subsidence

Another commonly cited reason for inundation is the low elevation of District 7 and future issues of land subsidence. When asked why Huynh Tan Phat and other areas of District 7 appeared to flood, many residents responded that the street was situated at a lower level than others. Low elevation and sea-level rise combine to produce a disastrous flood effect. For instance, in November 2008, a 1.54 meter tide event was recorded; since most of District 7 is 0.5 to 1.5 meters above sea-level, this event would likely cause disastrous flooding (Eckert and Waibel, 2011; Nguyen et al., 2016). Furthermore, SCFC stated that flooding on Huynh Tan Phat street was due to the road being lower than the tide peak (SCFC, 2017; SCFC 2017b).

In addition, the city is sinking (Huynh, 2019). According to a 2016 study, many areas around HCMC are sinking at an average speed of 10.0 mm per year; however, in District 7, land could be subsiding at an alarming rate of 15.0mm per year (Nguyen, 2016); this is likely because District 7 was constructed on marsh and swampland. According to Dr. Du, this would naturally cause the land to sink over time (Huynh, 2019). Additionally, the tapping of groundwater increases rates of land subsidence (Nguyen 2016). Out of all local interviewees, only one interviewee adamantly stated that flooding is compounded by land subsidence. However, the relationship between land subsidence and flooding is also evident in the number of road elevations in District 7. According to Dr. Du (2019) and the local people, the roads were frequently elevated. Some residents reported that roads in District 7 had been elevated 4-5 times. In combination with other causes of flooding, land subsidence is sure to continue exacerbating urban flooding in District 7. Urban planning laws seem to lack consideration of land subsidence (Table 1); however, adaptation will require policies that address this issue if development continues to occur in District 7.

3) Poor and uneven development practices

Chief among reasons for urban flooding in HCMC is poor urban planning and development. While tides and rainfall are considered primary causes, rapid urbanization has compounded the flood problem (“Handbook on Climate Change...” 2013). As Dr. Tuan simply put it: “the lowland areas of District 7 should not have been developed as it is now” (2019). Previous research, formal interviewees, and informal interviewees unanimously agree that the development pattern in District 7 is exacerbating much of its urban flooding issues.

Before its development, as a swampland and floodplain area, District 7 was a natural catchment area for water (Nguyen, 2019; Du 2019). However, from 1989 to 2009, the amount of “sealed” areas – concretized area -- doubled (Katzchner et al., 2016). The majority of District 7 is 80-90% sealed (Huynh et al., 2013). While driving through District 7, the concretization is clear.

Aside from PMH, which has purposefully set aside some greenspace, there is little to no greenspace left in District 7. Most of the area has been built into residential housing, commercial area, or even industry (Huynh, 2019). Therefore, planning of District 7 failed to consider the importance of preserving greenspace and natural drainage areas, indicating poor development practices on the part of the city and district.

Local residents expressed concern about the pattern of development in District 7. Many lamented that before development, water would run into the natural waterways and water bodies (“*ao*”) throughout District 7. However, these had been filled in and replaced with concrete houses and roads, effectively eliminating spaces for water to run and increasing surface water (Huynh, 2019). Dr. Du stated that while District 7 was less dense compared to other districts, it suffers from an issue of urban sprawl; combined with the projected development in the area, this could increase concretization and the level of surface water in the city, thereby exacerbating flooding (2019).

Another development related issue is poor urban planning. From 1999 to 2009, areas of District 7 experienced 100-200% growth (Huynh et al., 2012). In the initial advertisements for PMH, the residential area simply wrote “wanted: one million citizens” (Waibel, 2009). However, according to both Dr. Du and Dr. Tuan, the drainage system is simply not equipped to handle the population and infrastructure growth in District 7. District 7’s growth outpaced its development (Nhan 2018). A typical problem of developing metropolis’ is an inability to cope with rapid growth and expansion, which leads to a lack of basic service provisions and infrastructure – especially sewage and drainage systems (Du 2015; Birkmann et al., 2010). When asked whether the drainage system was at max capacity, Dr. Du stated that it has been overflowing for several years now (2019). Local residents also stated that the drainage was old and needed upgrading. According to a data collected by SCFC after a major flooding event in October 2016, the entity reported that the main reason for flooding on Huynh Tan Phat and TXS street were poor or failing drainage systems (The Steering Center for the Urban Flood Control Program, 2016). Additionally, one local interviewee and both Dr. Tuan and Dr. Du stated that the drainages also suffered a human problem: improper waste disposal. According to the local interviewee, roads often flooded because local people would litter on the roads, causing the drainage system to be blocked and incapacitated to handle any flooding. In my observation, I noticed that many of the drains were clogged with garbage, and people often pushed garbage inside the drains.

Lastly, District 7 suffers from issues of uneven development. Driving through District 7, the spatial disparities are clear; the further one gets from Phú Mỹ Hưng – a spacious, low-density development – residential areas and roads become tighter, and the presence of alleyways increase. Dr. Nguyen states that such high-premium real estate developments both draw populations in

because of their urban services (low-density, spacious, amenities); however, they increase pressure on urban development in the peripheral areas, which could lead to poor development outside highly-valued areas (2019). When shown a map of District 7, Dr. Du stated that the mix of informal and formal housing developments were pushed toward the Kenh Tẻ canal, likely compounding the experience of flooding in that area (2019). Local interviewees along the canal agreed – while flooding on the upgraded, main road seemed to lessen, flooding in the alleyways has increased. Although Dr. Du acknowledged that the city likely considered growth and rapid urbanization in its master plans for District 7, he expresses strong reservations that these plans were seriously effective in mitigating the intensity of development (2019). This indicates a lack of adaptive capacity in past and current governance efforts related to land planning and urban flooding.

C. An assessment of current formal and household adaptation approaches

Generally, in Ho Chi Minh City, adaptation toward urban flooding is typically a construction project funded by the government; in District 7, adaptation methods are the same. According to the SCFC, since 2016, projects have been implemented to control tides on inundated roads in District 7, including the severely



inundated HTP and lightly inundated TXS (“Water Situation up to 2017...”). Based on the interviews, the main methods of adaptation in District 7 are road elevation and the Tân Thuận drainage project. Many projects are focused on HTP, as it is consistently suffers from severe inundation (“Water Situation up to 2017...”, 2017; Tuoi Tre Online, 2015) (Figure 7).

Figure 7. Huynh Tan Phat street post-elevation and upgrades. *Author's photo.*

According to Dr. Tuan, Tran Trong Cung street in the Nam Long residential area and HTP were elevated relatively recently, and flooding seemed to be alleviated in both areas of the District. When asked about the elevation of HTP, residents along the street and in the alleyways observed that the road had been elevated but disagreed on the number of times the road had been upgraded. Some estimated lower (2-3) while some insisted the number of elevations was higher (5-6). Nonetheless, residents agreed that the elevations had helped alleviate flooding – for most of the interviews, local residents would start about by stating that HTP street was either not flooded or not as flooded as before. When asked to clarify the “low” flood height now,

2 interviewees compared the flood height to half of a motorbike tire. Most pointed the height of curbing recently placed on the side of the road (Figure 7). Although one resident said that the curbing was rather ineffective in preventing floods, residents remarked that these flood levels were better now than before the upgrades.

In addition to elevating the road, some alleyways were also elevated. In the alleyway, interviewees near the market noted that government and local people had worked together to elevate the alley a couple times in the past. However, aside from this elevation, it was unclear whether other upgrades were formal (i.e. government-funded) or informal, private (i.e. household) adaptations. For instance, through personal observation, I noticed that every home in the alleyway either had ramps or a set of stairs leading to its first level, which was at least 1 to 1.5 meters off the ground. Although a previous study of household elevation in HCMC determined that residents agreed the measure was highly effective (Nhan, 2018), the results were unclear in the alleyway. While some residents adamantly insisted that they had not experienced inundation in a long time, one resident said even after elevating their home 2-3 times, they still experienced inundation. It should be acknowledged that this resident was living next to the canal, so it is likely their proximity to the canal increased their vulnerability to flood.

The second adaptation project in District 7 was the Tân Thuận sewage project (Nguyen A.T. 2019). The project has been going on for the last 3-4 years but was halted due to investment concerns. As previously mentioned, the project resumed construction in early 2019, with completion anticipated by the end of the year (Tuoi Tre, 2019). It's a well-recognized formal adaptation to urban flooding; when asked whether or not the government did anything to mitigate flooding in District 7 or the area, half of the residents pointed to the drainage project. As part of a broader plan to mitigate tide-related flooding in the city, and with such high investment, there appears to be high hope from the government that the drainage project will work (VN Express 2019a). Local people are hopeful too. For 2 interviewees – one living next to the drainage project and the other selling under the Tân Thuận bridge, they insisted that the project would likely solve the issue of flooding on Huỳnh Tan Phat street. A few others expressed hesitation when asked about the project, stating that they were unsure on its actual impact but were hopeful. When asked about whether or not they believed the Tân Thuận drainage project was going to be effective, one resident adamantly stated no. When asked to clarify their response, the resident laughed and stated: “because if they ‘dam’ up one side to stop flooding in one area, its only going to cause flooding in another area of District 7”. Therefore, although the effectiveness of the project is unclear, to some residents, it is clear the government is attempting to alleviate flood concerns through the drainage project.



Figure 8. Above view of the Tân Thuận drainage project (left). Current construction on the Tân Thuận drainage project (center and right). *Author's photos.*

However, the Tân Thuận drainage project also illuminated some oddities in District's 7's urban flooding situation. Although all local interviewees acknowledged that flooding had not become such a serious issue until the last 7-10 years, residents living directly next to the drainage project noted that the construction was compounding flood issues. One interviewee living directly across from the project argued that, because construction blocked them from the canal (a major drainage source) and alleyway infrastructure was low, they were experiencing worse inundation. Another resident mentioned that flooding was worse near the start of the project (the “head” of the alley”) compared to inner parts of the alleyways. I observed that the construction project, the degraded intersection of Huynh Tan Phat and TXS, and water levels in the canal are exacerbating flooding and concentrating flood risk in that area. These responses have 2 implications: 1) the drainage project was improperly planned or had failed implementation and 2) formal adaptations, especially construction, may be limited in effectiveness.

Additionally, there seemed to be a geo-spatial factor influencing perception of the Tân Thuận drainage project. When asked whether the government pursued measures to mitigate or adapt to flooding in District 7, typically, residents closer to the drainage project acknowledged the project and stated its importance. However, residents down TXS street – even if they were 50-100 meters away from the project – did not acknowledge it or any government measures beyond elevation. When these residents were prompted about the drainage project, then they remembered it and agreed it was a government project. Therefore, in addition to the unevenness in inundation or impact along Huynh Tan Phat and TXS street, there is also disparity in perception that appears to be correlated with space.

Overall, the effectiveness of these formal construction projects is unclear. While specific or consistent household adaptation/ informal measures were difficult to determine due to inconsistencies or lack of answers in interviews, a few residents stated that local people were often left to deal with flooding on their own. In addition to spending money to elevate their homes, 2 residents noted that alleyway residents pooled their resources together to a) elevate the alley or areas of the alley and b) buy an electric pump. Another interviewee stated that people would use anything to either scoop or “sweep” the water out of their

homes. Dr. Tuan argues that elevation measures will not improve flooding in the long term; what city authorities must focus on is creating catchment and drainage areas in spaces that have been occupied by concrete homes and spaces (2019).

The variation in answers depending on an interviewee's distance to the Tân Thuận sewage project indicates: 1) a lack of awareness of flood adaptation efforts, 2) gaps in flood information that should be provided by the government, 3) an indifference toward flooding. Many interviewees stated that flooding was "*bình thường*", or a normal occurrence. Despite the adaptation projects, local residents felt that flooding was a fact of life and they had to live with it. Some remarked that flooding would only occur for a few hours, twice a month during rainy season – not a big deal. However, if flooding impacts and experiences are different every 100 meters and every resident acknowledges they must adapt to flooding in some way, it appears there should be greater institutional effort to support these informal or community-based adaptation efforts. One of the limits of the institutional system is the inability to address flooding impacts in all areas, especially more informal environments (Gravert and Weichmann, 2016). This resource and capacity limit encourage the formal system to focus on more utilitarian measures, like construction of drainage systems or dykes; in principle, these should be effective. However, to pursue adaptive governance, there must be more coordination between informal and formal systems (Gravert and Weichmann, 2016). Oftentimes, households living in more flood-prone areas are already having to adapt and cope; therefore, city authorities should take greater care to acknowledge and encourage these efforts for a more comprehensive form of flood adaptation.

D. The issues with governance toward flooding in District 7: assessing the top-down approach, power dynamics, and institutional instruments

a. Stakeholder Analysis

Although the previous section of analysis focused on formal adaptation approaches, this section of analysis intends to assess the institutional factors driving real-life adaptation in District 7. This analysis seeks to dissect the top-down approach to governance, power dynamics within the realm of urban flooding, and current institutional instruments used to guide urban flood adaptation in District 7 and the rest of the city.

In Ho Chi Minh City, governance is top down; decisions are typically passed from the central government, through regional and city bodies, then to districts, which communicate with various wards (Huynh et al., 2012; Goedecke and Walsh, 2016). Governance toward urban flooding in HCMC also follows a top-down pattern from three levels of government: central, city, and district and ward. Additionally, as Dr. Du explains, urban governance involves three "pillars": government, business, and community (2019). Figure 9 illustrates the three pillars. In addition to the three main pillars, two other entities occupy "peripheral" spaces of influence in urban flood governance in District 7: civil society and international

institutions. Typically, civil society and international institutions play a “consultancy” role; as entities disconnected from the central government, civil society and international institutions have different access to resources, connections, or can interact with the community in a much better capacity (Huynh, 2019). In principle, government, business, and community should share the same amount of power and influence, while international institutions and civil society remain connected, but in secondary roles.

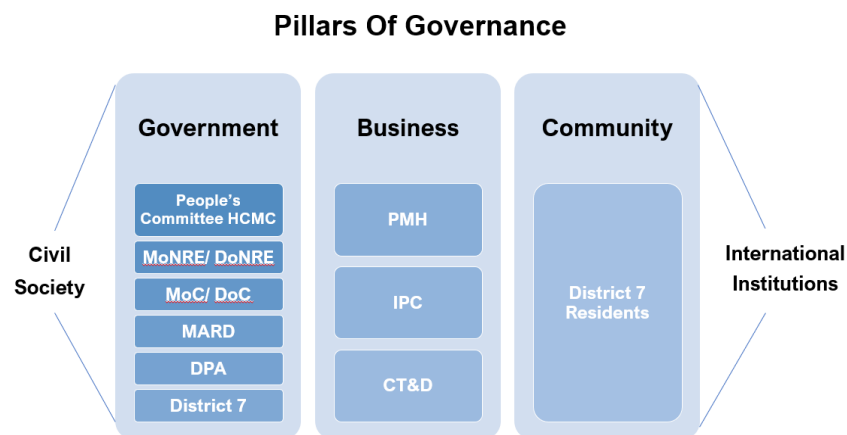


Figure 9. Graphic of the "3 pillars of governance" with stakeholders related to the issue of urban flooding in District 7 separated into their respective pillar. *Author's rendering.*

Using a stakeholder analysis, this research attempts to determine whether this structure applies in District 7. A truncated stakeholder analysis (given the time limit) requires 2 steps: 1) identifying and mapping key stakeholders; 2) assessing their influence.

Figure 10 maps identified stakeholders to assess the structure of governance and power dynamics related; Figure 11 lists the key stakeholders and their roles in terms of flood governance. Clearly, the structure appears top-down. Decisions begin at the central government then passed through the relevant Ministries. Generally, Ministries coordinate and supervise legislation and regional departments, often coordinating among the various departments (Gravert and Weichmann, 2016, Ho Chi Minh City's People's Committee, 2013). At the city-level, the People's Committee of HCMC (hereafter, PPC) is the authority. It submits legislation to the central government, as well as certifies and approves projects occurring within the city (Prime Minister, 2008). Furthermore, it coordinates and supervises the departments related to flooding in HCMC (Figure 10). It should be noted that the various departments either manage, coordinate, or supervise a program directly related to flood governance in HCMC – the SCFC and the Climate Change Steering Board. In addition, the Department of Construction and the Department of Planning and

Architecture manage the city's Master Plan and the city's Urban Master Plan, respectively (Goedecke and Walsh, 2016; Nguyen, A.T., 2019).

Key actors not included within the governance structure are universities (stakeholders 10, 11, 16) and investors or financiers (stakeholders 12, 13, 14, 15) (Table 1). Like civil society, universities are more peripheral and play consultancy roles, often providing research or data. In terms of flooding, the universities tend to work with the Department of Natural Resources and Environment (DoNRE), Department of Planning and Architecture (DPA) and SCFC to support government initiatives or provide critical information and capacity (Nguyen, A.T. 2019; Nguyen et al., 2016). While investors and financiers are considered part of the three pillars of governance, they do not make direct decisions for flood adaptation and governance in HCMC and, theoretically, must work with the governance structure for approval of their plans and to secure permits (Huynh et al., 2012).

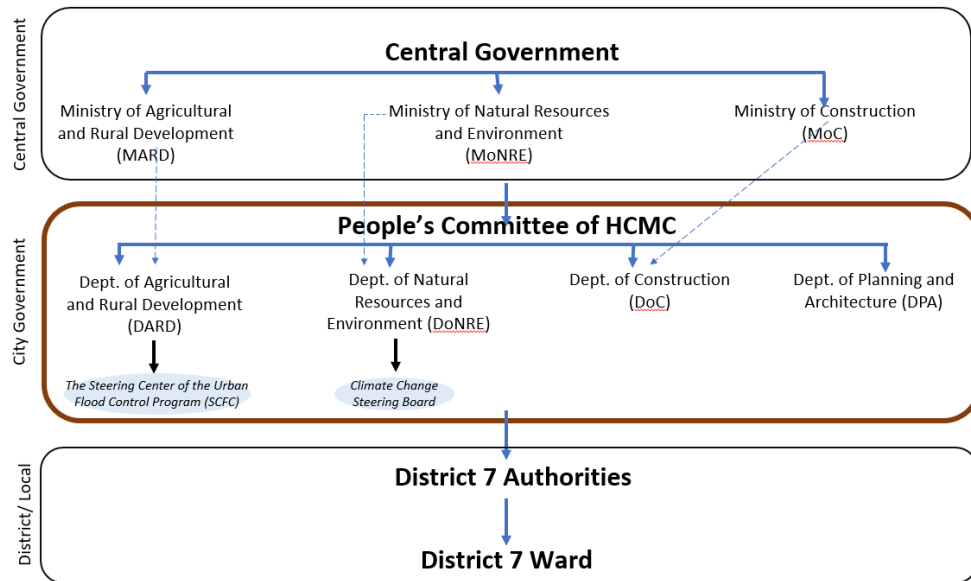


Figure 10. Identifying and mapping stakeholders related to governance toward urban flooding in District 7. Ovals signify related government programs; dashed lines symbolize hierarchal management between Ministries and Departments.
Author's rendering.

An analysis of the key stakeholders follows (Table 1). In this analysis, legitimacy refers to the level of institutional (i.e. governmental) decisions the stakeholder can make; resources refer to the financial or physical capacity, as well as the explicit responsibilities of the stakeholder; relationships refer to the other entities the stakeholder coordinates with, associates with, or assists. While the hierarchal position of the Ministries is located higher in hierarchy than the city-level government, in terms of urban flooding in District 7, the managerial positions that ministries occupy have little influence at the district-level, aside from proposing relevant legislation.

According to Figure 10, city-level agencies have the highest level of decision-making power or influence over flood adaptation in HCMC. The PPC and all relevant HCMC departments, rank a “3” in each of the categories, demonstrating their high-influence and decision-making power in District 7. The District and ward level governments, however, have little to no influence – oftentimes, the District is following plans handed down from the department (Figure 11; The Steering Center for the Urban Flood Control Program, 2016).

	Potential key stakeholders related to urban flooding adaptation in District 7	Position and core functions			Role or form of Stakeholder Involvement
		Roles/ Legitimacy	Resources & Responsibilities	Relationships	
S1	People’s Committee of Ho Chi Minh City	3	3	3	Authority; certifies projects and legislation
S2	Ministry of Natural Resources and Environment (MoNRE)	2	2	2	Managerial; supervises and coordinates climate change efforts
S3	Ministry of Construction (MoC)	2	2	1	Managerial; develop strategies, projects, and plans
S4	Ministry of Agriculture and Rural Development (MARD)	2	2	2	Managerial; oversee dike management and disaster prevention
S5	Department of Natural Resources and Environment (DoNRE)	3	3	2	Implement plans and manage Climate Change Steering Board
S6	Department of Construction (DoC)	3	3	3	Implement flood reduction plan, manage Master Plan
S7	Department of Planning and Architecture (DPA)	3	3	3	Implement Urban Master Plan, manage drainage and urban development
S8	Department of Agriculture and Rural Development (DARD)	3	3	3	Manage dikes; oversee SCFC
S8	District 7 Authorities	2	1	1	Implement plans and coordinate within communities
S8	Climate Change Steering Board	1	2	1	Consultancy and data collection
S9	The Steering Center of the Urban Flood Control Program (SCFC)	2	3	3	Data collection, implement projects to resolve flood issues
S10	Vietnam National University – Climate Change Program	1	2	2	Consultancy and data collection
S11	Ho Chi Minh City University of Technology – Water Resources Engineering Program	1	2	3	Consultancy and data collection
S12	World Bank, Asian Development Bank	2	3	3	Consultancy and investment

S13	Phú Mỹ Hưng Corporation (PMH)	1	3	2	Investor
S14	Tân Thuận Industrial Promotion Corporation (IPC)	1	3	2	Investor
S15	Central Trading & Development Group (CT&D)	1	3	2	Investor
S16	Megacity Research Project – Brandenburg University of Technology	1	2	3	Consultancy and data collection
S17	District 7 drainage project (Tân Thuận)	1	1	1	Affected
S18	Local People	1	1	1	Affected

Table 1. Analysis of Identified potential key stakeholders to determine their level of decision-making power (roles, resources, and relationships) for urban flood governance in District 7. 1= little to none, 2= some, 3 = powerful. *Author's rendering.*

Between the university stakeholders, only the HCMC University of Technology and Megacity Research Project are identified as key stakeholders with strong networks (Table 1; Figure 11). In my interview with Dr. Tuan, he mentioned collaboration with both research institutions in the past, especially the Megacity Research Project (2019). Lastly, while other stakeholders play some decision-making role, local people and the Tân Thuận drainage project are listed as those affected by urban flooding management and governance decisions. Both stakeholders also possess little to no influence over governance decisions.

Graphic Representation Of Key Stakeholders

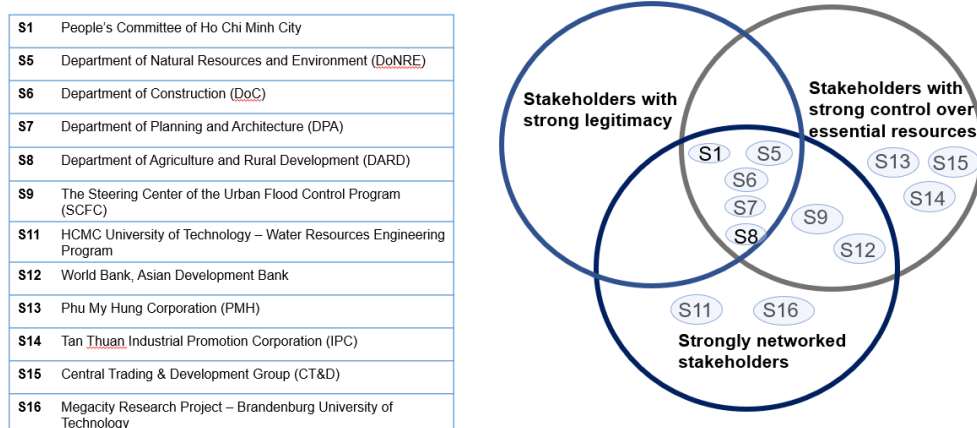


Figure 11. Key stakeholders identified and placed in appropriate venn-diagram representing stakeholders with strong legitimacy, control over resources, and networks. Total of 12 key stakeholders identified. *Author's rendering.*

As previously stated, the city-level governmental bodies are the most powerful stakeholders and decisionmakers in terms of urban flood governance in District 7. Although the SCFC is not high on the

hierarchy of governance in HCMC, it has many responsibilities related to flooding, including implementing drainage projects, gathering data on flooding (especially on Huynh Tan Phat and TXS street), and advising the People's Committee ("Watering Situation up to 2017..."). Additionally, to implement effective drainage projects (like the Tân Thuận drainage project), it must coordinate between the investor, district, and residents to ensure successful completion ("Progress of Implementing Projects..." 2017). In addition, international financial institutions (here, the World Bank and the Asian Development Bank) both have control over resources and a strong network to other key stakeholders (Figure 11). Both have been especially present in Vietnam during its development, and have conducted research on flooding projects, socio-economic vulnerabilities, and climate change in the past (Huynh, 2019). Additionally, SCFC has disclosed its plan to use World Bank loans to fund tide-related flood projects in 2019-2020, including in District 7 (Trung Tâm Điều Hành Chương Trình, n.d).

The only stakeholders identified as solely having control over essential resources in District 7 were the three big investors in District 7: PMH, IPC, and CT & D. Private investors are the biggest drivers of development in District 7 – point in case, the Phú Mỹ Hưng Corporation. According to Birkmann et al., private players are playing an increasingly important role in terms of urban governance due to their power and influence to shape development (2010); as demonstrated in previous analysis, poor and rapid development has proved disastrous for urban flooding issue in District 7. Dr. Tuan states, theoretically, power over urban planning and development should be top-down; however, in reality, investors play a key role in influencing whether development is environmentally conscious or well-planned. As investors are interested in short-term benefits (i.e. making money), they are likely to "cut corners" during the plan implementation period, thereby increasing negative externalities and increasing the amount of poor development (Huynh, 2019; Nguyen A.T., 2019). Although PMH is seen as a successful, sustainable model of development, the following analysis will demonstrate that there may be unaccounted negative externalities and implications for flooding. Furthermore, previous research has argued that HCMC is still pursuing a "growth-first" strategy; investors possess a lot of power as they build high-value real estate and continue to fund the development of the city (Nguyen A.T. 2019; Gravert and Weichmann, 2016). If IPC and CT & D continue to develop Saigon South New Urban Area with a growth-first mentality, it is likely to lead to more poor infrastructure with low capacity to address urban flooding.

Additionally, Dr. Du argues that, although the government appears to have strong decision-making power regarding urban flood governance in principle, in reality, the capacity, resources, and motivation to accomplish flood adaptation projects and address climate change is extremely low (2019). He states that issues of flooding are low-priority; rather than seeking long-term adaptation to flooding, the government would prefer to work on short-term solutions as they occur. Additionally, climate change is a neglected

topic (Gravert and Weichmann, 2016). While climate change is likely to exacerbate urban flooding issues in District 7, city authorities view it as an issue happening “far into the future”; therefore, there is little motivation to take strong action and address it now (Huynh, 2019).

The capacity and competency of the local government is also low (Huynh, 2019). In terms of policy reform or coordinated adaptation efforts, an already overburdened city government is under immense pressure to stretch itself beyond its current capacity (Birkmann et al., 2010). Furthermore, a lack of financial capacity prevents the city from pursuing more “variable interests” like flooding (Gravert and Weichmann, 2016). In my observation, I believe that a lack of reliable data and resources to fully understand the urban flooding issue is a source of incapacitation as well.

Therefore, in principle, the governance structure for urban flood adaptation in District 7 appears to be even, with responsibilities, roles, and decision-making power clearly defined. However, as this analysis demonstrates, governance is highly uneven and insufficient. As Figure 12 demonstrates, business plays a bigger role in influencing land-planning decisions regarding real estate in District 7, thereby exacerbating urban flooding issues. Civil society and non-governmental institutions are barely existent, as they are not considered key stakeholders. While international institutions provide some resources and funding, Dr. Du notes that they suffer from the same resource and capacity issues as the central government, often rendering them ineffective (2019). Lastly, despite District 7 generally being a more affluent area, citizens often occupy a small role in decision-making spaces and bear many negative externalities associated with poor governance or development decisions, like urban flooding (Huynh, 2019).

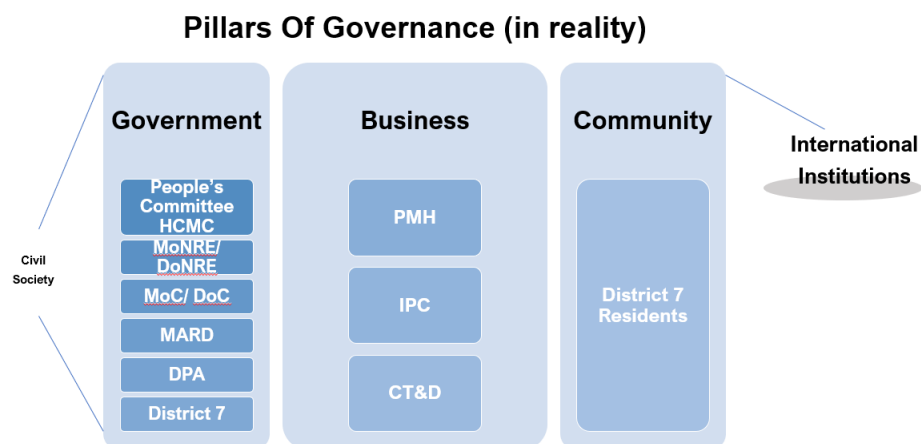


Figure 12. Re-iteration of the "3 Pillars of Governance". A more accurate representation of the power dynamics present in urban flood governance in District 7. *Author's rendering.*

b. Legal Frameworks for flood adaptation and governance

Assessing the potential for adaptive urban governance toward urban flooding issues requires an analysis of how well current legal frameworks both address urban flooding and divide the responsibilities of governance toward urban flooding. Since legal frameworks provide guidelines for years into the future, it is imperative that institutional instruments explicitly consider and plan for current and future threats of urban flooding in order to be truly adaptive.

Legislative Instrument	Legislation No.: Date	Key Agency or Department	Flood adaptation or mitigation measures mentioned
The Irrigation Plan for Flood Control for the HCMC Area up to 2025	Decision 1547/QD-TTg	Ministry of Agriculture and Rural Development	Initiative to increase natural drainage capacity along streets near city center and rivers in peri-urban areas; however, does not oblige planners nor developers to consider flooding or climate (Gravert and Weichmann 2016; Ministry of Agriculture and Rural Development, 2008)
Decision on Promulgation of the Plan for Organizing the Implementation of the Flood Reduction Program for 2018-2020	No.5674/ QD-UBND	People's Committee of Ho Chi Minh City coordinating with various departments in city	By 2020: resolve 15/37 flooded routes, 28/179 alleyways. Improve drainage system and control tides through construction projects. Coordinate with various depts. to achieve flood implementation goals (People's Committee of Ho Chi Minh City, 2018)
Decision on Approval of the National Target Program to respond to Climate Change (NPT-RCC)	NTP-RCC 2008	Ministry of Natural Resources and Environment (MoNRE)	General plan to address issues related to climate change and ensure integration of climate issues in spatial, sectoral, and socio-economic plan. No mention of urban flooding (Gravert and Weichmann, 2016; Prime Minister, 2008)
Approving the Overall Planning for Socio-Economic Development in HCMC to 2020, Vision to 2025	Decision No. 2631/ QD-TTg	People's Committee of Ho Chi Minh City	Drainage-specific goals include connecting urban households to drainage, solving rain-caused flooding, increasing length of storm drains. Ultimate goal is to solve rain-based flooding and tidal inundation by 2025 (People's Committee of Ho Chi Minh City, 2013).
Law on Construction (updated 2014)	50/2014/ QH13	Ministry of Construction	Generalized protections for environment and consideration of climate change in terms of construction planning and building. Vague response to flooding (National Assembly, 2014b).
Approving the Adjustment of General Planning for Construction of Ho Chi Minh City to 2025	Decision No. 24	Ministry of Construction	Complete rainwater drainage system. Additionally, describe "local solutions" for flood points as: building temporary dikes, elevating roads, and installing placing valves (Prime Minister, 2010).

Approving the Revision of the Vision of General Planning for Vietnam Urban Development up to 2025, vision to 2050	Decision No. 445/ QD-TTg 02/12/2008	Ministry of Construction	Desire to protect natural landscape, including water systems. Infrastructure should prevent flooding in urban areas (Prime Minister, 2009).
Law on Environmental Protection (updated 2014)	55/2014/ QH13	Ministry of Natural Resources and Environment	Explicit focus on response to climate change, in coordination with goals of the Socio-Economic Plan. Vague mention of flooding (National Assembly, 2014a)

Table 2. Selected legislative instruments that influence flood adaptation and management in Ho Chi Minh City. Author's rendering, with sources cited in table.

HCMC has a couple legal frameworks to specifically address flooding: the 2025 Irrigation Plan and the Implementation of the Flood Reduction Program for 2018-2020 (Table 2). Both outline construction projects, including drainage renovation, and identifies the Climate Change Steering Committee and People's Committee coordinate entities (Ministry of Agriculture and Rural Development, 2008). However, as Gravert and Weichmann mention, the 2025 Irrigation Plan does not ensure developers consider flooding and climate change within development plans (2016). A previously assessed, poor urban planning and development is a cause of urban flooding in District 7; therefore, this failure to oblige developers to consider flooding in the planning process could pose problems for urban flooding in the future (2016).

Aside from city-level programs, at the national scale, two major laws are intended to address climate change hazards, such as flooding: Law on Environmental Protection and Law on Construction (Table 2). Although both explicitly stated that climate change must be explicitly considered in land-use projects and construction, both had vague plans that were loosely related to flood adaptation (National Assembly, 2014a; National Assembly, 2014b). The Law on Construction did note that construction plans in Vietnam should effectively respond to climate change and prevent natural disasters (National Assembly, 2014b). Therefore, while flooding is not explicitly stated, if HCMC must follow this national law, it is potentially obliged to consider development that is adaptable to urban flooding. However, Goedecke and Welsch imply that the Law on Construction has high potential for integrating environmental considerations within the planning and governance process (2016).

It is important to note that the city is run by master plans with three fundamental elements to its formal planning landscape: spatial (land-use and master planning), socio-economic, and sector (trade, transportation, social affairs, etc.) (Huynh et al., 2012; Birkmann et al. 2010). In terms of urban flood governance, researchers tend to look at urban planning legislation and frameworks because spatial planning is a primary tool and problem-solving strategy for sustainable development and adaptation (Katzchner et al., 2016). Furthermore, urban planning plays a key role in building adaptive capacity by controlling land-use, resources, and development strategies (Gravert and Weichmann, 2016). For instance, to improve infrastructure to increase water infiltration capacity, one study calls for the city to integrate flood risk

concerns in land-use planning and design of new projects (Tu et al. 2009). Upon review, the Law Adjusting the General Construction Plan for HCMC states that the city's development should strive for low density and avoidance of reducing surface area for drainage (Prime Minister, 2010). Furthermore, the Revision of the General Planning for Vietnam Urban Development states that developments should adhere to other irrigation plans, develop to prevent flooding in urban areas, and prevent sprawl (Prime Minister, 2009).

At first glance, it appears that Ho Chi Minh City possesses a proper legal foundation for good governance practice and adaptation to urban flooding; however, a closer look reveals a disconnect between the principles and reality. For one, there is vague to little mention of District authority's responsibilities, aside from implementing and overseeing construction projects. Second, there is serious lack of integration of urban flooding concerns or climate change directly into the planning process across much of the legal frameworks, as adaptive governance calls for. Instead, policies exhibit a "growth-first" mentality (Goedecke and Walsh, 2016). For instance, the development objectives for the Law Adjusting the General Construction Plan for HCMC revolve around the city becoming the "central urban area" of the southern economic region and becoming the center for "trade, service, education... [and a] transport hub" (Prime Minister, 2010). Although the Law appropriates for technological adaptations to flood, it does not call for integration of flood concerns into land-use planning or development (Table 2; Prime Minister, 2010). In addition, the Socio-Economic Master Plan is considered the guiding framework for master planning in HCMC, and the spatial plan should be coordinated with it. Although it addresses socio-economic changes and vulnerabilities in relation to drainage and links socio-economic development with climate change, it also does not appear to mention the need for integration of such environmental concerns into planning frameworks (People's Committee of Ho Chi Minh City, 2013).

Although the National Target Program for Response to Climate Change (NTP-RCX) is a legal framework for the entire country, as a megacity hugely vulnerable to climate change, it has some pertinence for Ho Chi Minh City (Huynh et al., 2013). Particularly, one of its key objectives is to integrate climate change issues into socio-economic, sectoral, and spatial development strategies and plans (Prime Minister, 2008). Additionally, the NTP-RCC obliges different sectors to submit appropriate climate change action plans (Prime Minister, 2008); in reality, only two lower agencies complied (Gravert and Weichmann 2016). The failure of these plans and departments to integrate environmental concerns, particularly urban flooding, into their guiding frameworks or adhere to other legislation indicates a lack of coordination or follow-through in governance structures.

Previous research has referred to these issues of coordination, implementation, and responsibility sharing as "institutional fragmentation". For instance, Eckert and Waibel note that urban planning and development in HCMC is dominated by single-sector and single-project approaches (2009). As previously

discussed, most of the legal frameworks refer to construction projects as a form of flood adaptation, particularly drainage projects. In addition, there is a lack of coordination among the departments. As Gravert and Weichmann state, the lack of intersectoral coordination is a barrier to environmentally-sound planning and governance (2016). When asked whether various departments in the city were coordinated to address the issue of urban flooding, Dr. Du stated that, in principle, agencies related to transportation, environment, and urban planning should work together (and as discussed, the legal frameworks present an organization of implementation); however, in reality, agencies pursue their own plans and lack the competency for efficient coordination and communication (2019). This failure to coordinate is evident when confronted with the sheer number of administrative bodies with unclear responsibilities (Goedecke and Walsh, 2016). For example, when asked about SCFC's role in urban flood governance, Dr. Tuan appeared confused and needed to be reminded of what the organization was. While this could have been a translation issue, he also presented me with many entities that I tried to search with little information on whether they were still active or pursuing flooding. Therefore, institutional fragmentation and coordination issues appear to be seriously hindering effective governance toward flooding in the city and, specifically, in District 7.

Overall, strategies proposed do not often sufficiently match the reality of the governance space, which is “characterized... by a lack of provision of public infrastructure and constraints of formal planning processes of urban development in HCMC” (Birkmann et al., 2010). Dr. Tuan implied these were issues with a top-down, hierarchal system of governance (2019); Dr. Du adds that this is the prevalent system of governance and decision-making in HCMC (2019). As Goedecke and Welsh state, the top-down system often overburdens and stretches the capacity of lower governments (2016). Combined with issues of motivation previously mentioned, it appears that legislation regarding urban flooding remains “words on a paper” – Dr. Du agreed with this statement (2019). Although the city-level government possesses the highest decision-making power toward flood adaptation and management in HCMC, it appears it still suffers from inherent issues in the highly centralized, hierarchical government structure of Vietnam. Therefore, while the legal frameworks surrounding urban flooding, flood adaptation, and climate change adaptation appear to be strong and considerate of environmental issues, “on the ground” in District 7, the effectiveness or implementation of these policies appeared to have been lost in the governance structure.

E. The implications of socio-economic and spatial disparities for urban flooding in District 7

A part of successful adaptive urban governance is incorporating socio-economic changes and vulnerabilities into the governance, land-use, and land-planning process. According to Birkmann et al, socio-economic vulnerability – specifically poverty – has a negative impact on the baseline resilience of urban systems and their populations (2010). The same study determined that the “complex interactions of

coupled socio-ecological systems and transformations” were not sufficiently addressed by city authorities and legislative instruments (Birkmann et al., 2010). Therefore, one of the most important reasons that District 7 was selected as a site of study was the perceived disparity between high-premium real estate areas (Phú Mỹ Hưng and Saigon South) and the areas outside such developments – such as along the Tê canal (intersection of HTP and TXS). As development in Saigon South New Urban Area is not complete, this assessment focuses on the implications of Phú Mỹ Hưng on urban flooding issues in the rest of District 7.

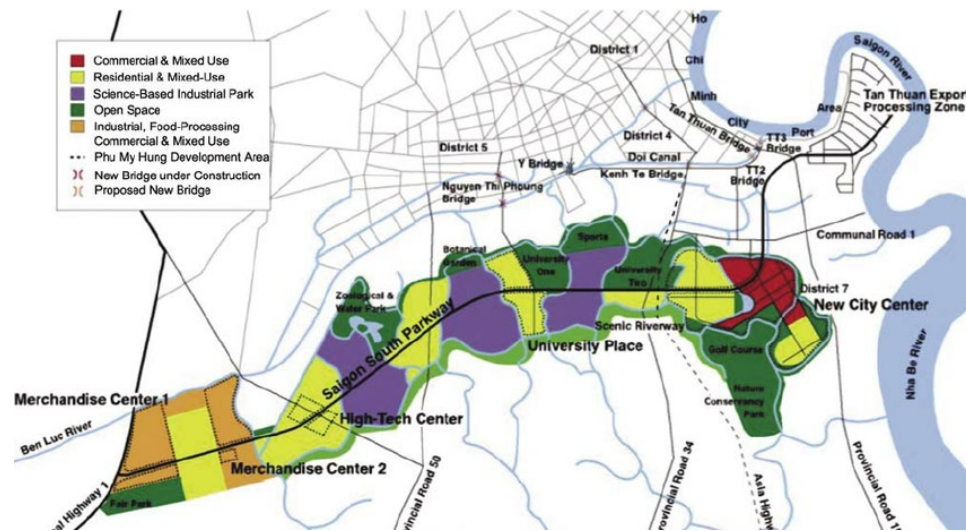


Figure 13. Proposed Saigon South New Urban Area development plan. *Source: Waibel 2009*

Phú Mỹ Hưng is often described as a perfect model of development; in fact, throughout my interview with Dr. Tuan (a resident of Phú Mỹ Hưng) consistently praised its master plan (2019). On a visit to the PMH corporation, the opening presentation kept describing it as a “wonder of development” and characterized it as a mythical city “rising from the swamps” (personal communication, April 1st, 2019).

In a sense, PMH’s praise and success is warranted. For one, the development of PMH is correlated to a real estate boom and high property values in District 7 (Huynh et al., 2012; Huynh, 2019). In addition, As Dr. Tuan describes, the area was developed with sustainability in mind. In the master plan, PMH made efforts to preserve the canal system in order to integrate natural drainage into the urban infrastructure. In addition, while the rest of District 7 is paved with impermeable materials (i.e. concrete), PMH utilized both materials and a paving pattern that allowed for surface water to be absorbed (Nguyen A.T. 2019; Van, 2015). Therefore, by following a sustainable master plan, PMH appears highly equipped to handle flooding issues, whereas the rest of District 7 is experiencing mild to severe inundation. As Hoang Hai Van describes it, PMH is the “un-flooded urban area” (2015).

However, Dr. Du argues that PMH’s success is only partial and highly controversial, with strong implications for urban flooding issues in District 7 (2019). For one, to build PMH, developers had to fill in

wetland and swampland (Huynh et al., 2012). Dr. Du argues that filling in these natural landscapes – “*tây hồ*” – eliminated a vital natural drainage and catchment area (Huynh, 2019). Although PMH’s development on low-lying cannot be pinpointed as an exact cause of urban flooding in other parts of District 7, it is likely that developing another low-lying area and wetland reduced District 7’s and reducing overall drainage capacity did not positively affect urban flooding. If this is the case, then areas of District 7 with poorer development, high rates of soil sealing, or already diminished drainage capacity would likely suffer more from inundation.

Second, as Dr. Du notes, one of the most pressing concerns surrounding PMH is its impact on gentrification and segregation in District 7 (Huynh et al., 2012). Dr. Du argues that PMH represents a “prestigious gated community” – or residential areas with restricted access and privatized public spaces (Huynh et al., 2012). In our interview, Dr. Du states that while there is not a physical gate surrounding PMH, there is certainly a socio-economic barrier (2019). As Waibel describes, PMH and Saigon South were areas developed for Vietnam’s “*nouveaux rich*”; therefore, the price of housing in PMH is out of reach for the average Vietnamese (2009). When traveling to PMH, I clearly observed the two separate worlds that make up District 7: rich and poor. While PMH looks like a Westernized development reminiscent of Singapore or spacious neighborhoods in California, surrounding it lies a world of more dense, mixed formal and informal settlements. Therefore, as both Dr. Du and Dr. Tuan acknowledge in their interviews, the rich are living in these well-developed, low-density areas while the poor remain in peripheral areas with higher density, poor development, and serious infrastructure issues (Du 2019; Nguyen A.T. 2019).



Figure 14. Comparison between Phú Mỹ Hưng (left) and a less-developed area underneath the Tân Thuận Bridge (right). Phú Mỹ Hưng is clearly more spacious, with natural greenspace and a drainage area. The section under Tân Thuận bridge has a degraded road, crowded housing, and the canal is blocked off for construction. *Author's photo.*

Both Dr. Du (2019) and Dr. Tuan (2019) agree: the poor suffer more from urban flooding and will suffer more from climate change in the future. In my observations (and confirmed by Dr. Du), settlements along the Kênh Tẻ Canal and Tân Thuận Bridge are the poorer areas of District 7. According to Dr. Tuan,

the area near the Tân Thuận bridge is relatively poorer and more underdeveloped in comparison to PMH (2019). In general, poor people are more vulnerable to natural disasters, such as floods, because their incomes are more dependent on weather and they have less resources to adapt to major shocks (Bangalore et al. 2016). Although I did not ask local interviewees around the Tân Thuận bridge to disclose their socio-economic impacts, since many were sellers, many mentioned that flooding often blocked key roads or transportation routes or ruined their merchandise, thereby prevented them from selling their goods. However, in Phú Mỹ Hưng, there were little to no street-side sellers or small shops; rather, PMH had commercial fronts in large developed blocks. Combined with its high drainage capacity, it is likely that economic activity is not as impacted by flooding in comparison to poorer areas closer to the canal.

The “gated community” effect of PMH and a booming housing market in District 7 could also push lower-income populations to settle in more flood-prone areas, such as canals. As Bangalore et al. reports, push poor people often settle in riskier areas since they are unable to afford to live in areas less vulnerable to natural disasters, such as flooding (2016). However, areas near canals are often plagued with inadequate basic infrastructure; as previously mentioned, the area near the Tê Canal is often inundated due to poor and old drainage, as well as degraded roads (Huynh et al., 2012). In my personal observation, the intersection of TXS and HTP street (near the canal) needs to be upgraded. Despite past efforts to fix many parts HTP, as a major transportation routes (semi-trucks hauling products or materials go through this road all day), the road still seems severely degraded. Due to its proximity to the canal, one can understand why flooding is so frequent in that area.

Another aspect of this socio-economic and spatial inequality is that wealthier households are seeking low-density, better-designed urban areas to live in; those who cannot afford such residences are stuck living in narrow alleyways (Huynh et al., 2012). It is important to note that this study is not generalizing all alleyway residents as poor; rather, it is arguing that a socio-economic divide could be preventing those in vulnerable spaces from increasing their adaptive capacity by moving. Alleyways are generally more flooded. When interviewing residents who lived along the main road (i.e. HTP and TXS), a few interviewees remarked that the area directly in front of them had not experienced severe inundation; however, the alleyways were still dealing with severe flooding issues. In 2017, it was reported that there were 171 flood points in alley ways alone (“Water Situation Up to 2017...”, 2017). Walking through the alleyways, one can clearly see why flooding would be exacerbated. Alleyways in District 7, especially near Tân Thuận bridge and canal, are extremely narrow. Some alleys appeared to be disconnected from the main road and the main drainage or sewage system, likely increasing their vulnerability to flood. As Dr. Tuan noted in our interview, alleyways in District 7 may be utilizing informal drainage systems – these are likely insufficient to handle flood inundation (2019). Furthermore, one alleyway was directly next to the drainage

project and canal. The interviewee there said they had experienced inundation in their home as a result of the water level in the canal rising.



Figure 15. Alleyway in District 7 near HTP and Trần Xuân Soạn. Author's photo.

Lastly, residents in alleyways noted that although the government made attempts to deal with flooding on the main roads, the same efforts were not being implemented in the alleyways. When asked whether those in alleyways were considered in policies or plans related to flood adaptation, Dr. Tuan stated such policies do not consider those in alleyways, thereby those living in less developed areas, enough (2019).

This one-month study should not be considered concrete evidence that the development of PMH or high-value real estate is certainly exacerbating flooding in other parts of District 7; the results are unclear. Nonetheless, increasing the “gated community” effect in District 7 should be a top concern for developers and city authorities for two reasons. One, high-priced developments could prevent lower-income residents from living in areas that are either better adapted or adjusted to flooding, or with better resources to deal with flooding. Second, high-priced real estate could increase uneven development patterns that exacerbates flooding for those in less-developed areas; for instance, those living near the canal are experiencing more inundation than those around the Saigon South New Urban Area and Phú Mỹ Hưng. Without proper attention paid to residents in peripheral or less urbanized areas during development or redevelopment, such residents in District 7 could be pushed “further to the edges of the city and society” (Huynh et al., 2012). If development in District 7, specifically the Saigon South New Urban Area, remains geared toward more affluent individuals with a desire for spacious residences and future policies do not consider mitigating floods in areas with more socio-economic or spatial vulnerabilities (i.e. along canals/ waterways and in narrow alleys), then adaptive urban governance toward urban flooding has little potential in HCMC.

IV. Conclusion and Directions for Future Research

At the end of my interview with Dr. Du, he shared the analogy of the “frog in a pot”: if you throw a frog into a pot of boiling water, it will sense the threat and jump out immediately. However, if you throw a frog into a pot of water and slowly turn up the heat, it will not realize it is slowly boiling until it dies. While morbid, this analogy describes the issues of effective adaptation and governance toward urban flooding issues in District 7. Despite the significant vulnerabilities and threats, the local interviewees often expressed that flooding was never “that bad” – if anything, floods lasted a few hours and people were able to move about their daily lives.

However, this attitude of indifference toward flooding is also evident into spaces of governance. As previously discussed in this research, coupled with a lack of capacity, governance in HCMC lacks significant motivation to effectively address the issue of urban flooding in District 7 and beyond. As Dr. Du cites, this normalization of “short-term” concerns – such as urban flooding – prevents consideration for other long-term issues that exacerbate “short term” concerns, like climate change or uneven development. However, like the frog in the pot, a governance system that waits until issues become disastrous will ultimately falter. Therefore, in the context of climate change and rapid urban development, city authorities must take great care to address the issue of urban flooding before it becomes too late.

Ultimately, District 7 possesses “two sides of the same coin”: it is both the culprit and bearer of urban flooding and climate change (Du 2019). The duality consistently explored in this case study of District 7 presents great implications for adaptive urban governance toward flooding and other complex issues in Ho Chi Minh City. Generally, poor urban development practices are exacerbating issues of flooding, and the vulnerable areas and populations that are increasingly impacted by the inundation. However, as demonstrated through the analysis on current formal adaptation efforts, stakeholders, and legal instruments related to flooding in HCMC, the city government is also the best entity suited to solve this problem. “In principle”, many of the formal structures discussed appeared effective and well-planned. Therefore, while current institutional efforts have mixed effectiveness and there appear barriers for implementing adaptive urban governance, the continued focus on urban, sectoral, and social development creates ample opportunity for adaptive urban governance principles to be implemented. As the city continues to pursue a “growth-first”, economic-oriented development plan, including completion of the Saigon South New Urban Area project, now more than ever, there is space to redirect previously poor planning and governance to adopt new principles that ensure protections against flooding, uneven development, and exacerbated climate change effects.

There appears some effort and movement toward a system of adaptive urban governance. As recently as 2018, a former city official acknowledged that poor urban development and planning restricted

effective city-wide responses to future threats of climate change and urban flooding. In addition, the former official called for a master plan which integrated strategies for adaptation, incorporated industries and people, and pursued a more holistic governance framework (Tuoi Tre, 2018). This indicates that some authorities – key decisionmakers -- are interested in ending a traditional governance model that prioritized short-term solutions to long-term problems. Moving forward, the city-level governments must act upon this interest and pursue anticipatory and well-coordinated policies to finally effectively address urban flooding and broader issues of development and climate change.

Based on this brief assessment, I make several recommendations that could quickly and effectively push forward a model of adaptive urban governance toward flooding in District 7:

Recommendations:

1) Invest in household or community-based adaptation (CBA) efforts

As residents living in already inundated areas, many households and communities are already adapting to flooding, sometimes without the government's help, and are likely to know the issues of flooding better than government officials. However, household and communities may be lacking capacity to effectively address the flooding issue on their own. In the spirit of pursuing a more decentralized model of governance, the city government should look to invest in community-based adaptation (CBA) to educate the community about proper adaptation and the risks they face from urban flooding and climate change and equip them with tools to self-address such issues, thereby potentially filling a capacity issue related to the hierarchical governance. This bottom up approach has had positive effects in District 4 (Schinkel et al. 2011).

2) Ensure investors in District 7 are aware of their obligation to sustainable, adaptive development

Poor, uneven, unplanned development is a main cause of urban flooding. As investors hold many resources and are instrumental in development decisions, ensuring that investors remain accountable to their proposed plans, as well as obligated to prevent sprawl and high-density development. Overall, holding investors accountable appears the best way to prevent poor development that further exacerbates urban flooding issues in District 7.

3) Revise development plans to include people in alleyways

As determined by the study, alleyways are likely to experience disproportionate effects from urban flooding. In addition to being narrow and connected to informal drainage, oftentimes, people who live in alleyways have less resources to adapt to flooding or are lower-income residents. Adaptive governance requires considerations of socio-economic vulnerabilities; therefore, alleyway issues and residents should be addressed in development or adaptation plans.

4) **Better collection or disaggregation of district-level data**

A lack of data is compounding the issues related to government coordination, competence, and successful adaptation. Therefore, collecting more district-level data or disaggregating city-wide statistics would allow for better, more considerate planning. Furthermore, this could grant district-level authorities more authority in the urban flood governance space, thereby increasing bottom-to-top decision-making that is encouraged in adaptive urban governance practice

5) **Make efforts to integrate climate change into plans and increase awareness of climate change**

Despite the previous research done to demonstrate the effects of climate change, local interviewees rarely expressed concern for climate change or pinpointed it as a cause of increased rainfall, water level in the canals, or increased frequency of urban flooding. This indicates a lack of awareness and lack of information sharing on part of the government. Therefore, governance should include education or workshops for local people in District 7 to become aware of how climate change could impact their livelihood in the future. Lastly, climate change considerations must absolutely be integrated into every development, land-use, construction, or socio-economic development framework.

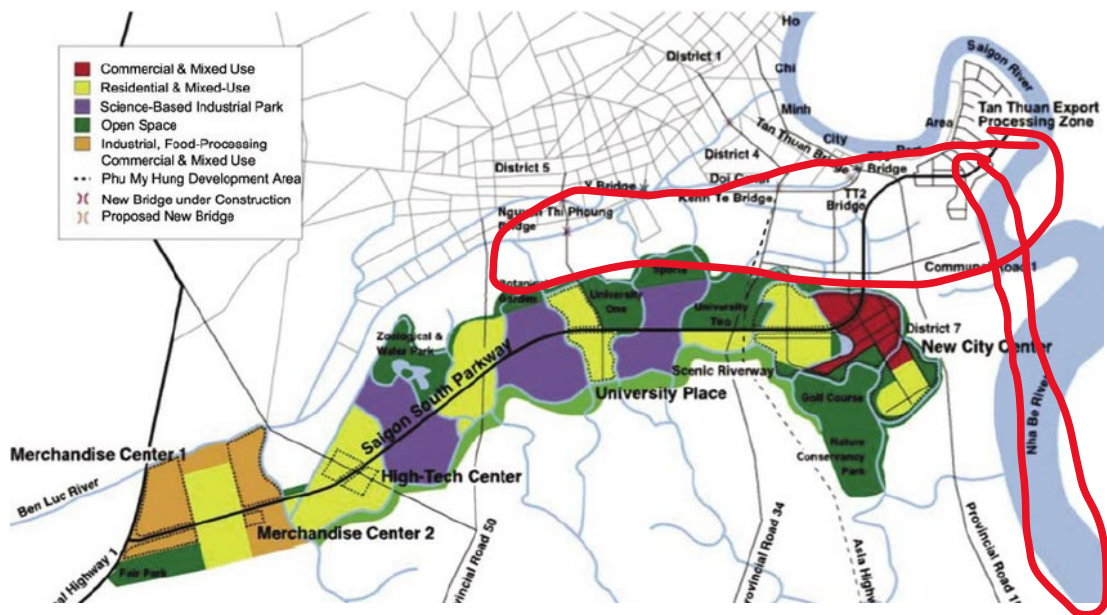
In addition, this research only scratched the surface of urban flooding and adaptive urban governance toward flooding in HCMC. Therefore, in terms of urban flooding and adaptive governance in District 7, future research or work could focus on:

- Assessing the socio-economic inequities of spatial development and urban flooding
- Determining whether socio-economic status and population density affect flood investment decisions in HCMC
- The role of civil society on influencing effective urban flood or climate change adaptation, especially in places where the government may be lacking
- Strategizing an effective climate response at the district-level

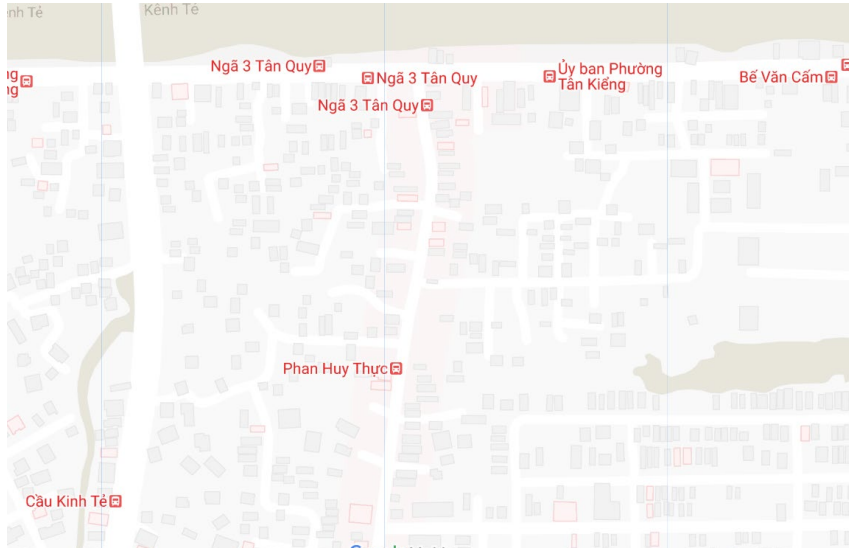
Overall, this case study of urban flooding adaptation and governance in District 7 sheds light on the complexities of flooding in times of climate change and rapid development, as well as illuminates the challenges of ensuring strong governance principles become reality. However, based on the data and analysis presented, the opportunities to transform the current approach to urban flood management to adaptive urban governance is high— it is now only up to the city and other key-decisionmakers to “jump out of the pot” before it is too late.

Appendix A – Prepared formal, structured interview questions

1. In your opinion or observation, what is the effect of climate change on urban development in Ho Chi Minh City?
2. What are the general demographics of District 7 (socio-economic status, population density, approximate number of households)?
3. What is the urban layout of District 7 (sewage/ wastewater or roads)?
4. From your perspective, what are the causes of urban flooding in District 7?
5. How does development exacerbate flooding?
6. Are there infrastructure or development-related issues in District 7? Do these infrastructure issues have implications for urban flooding?
7. Where are flood-prone or vulnerable areas?
 - a. Why are these areas considered vulnerable or flood-prone?
 - b. Is it related to development or is it related to planning?
8. What are current efforts or projects to adapt to urban flooding in District 7?
 - a. Formal?
 - b. Is there support for building capacity of household level adaptation?
9. Who are the stakeholders, decision-makers, and actors who deal with urban flooding adaptation, and what are their roles?
 - a. Do we have specific institutions to deal with flood adaptation? Civil Society (i.e. flood risk management project TTCN?)
 - b. Are they effective?
 - c. What are their weaknesses?
10. How are various sectors or formal institutions in HCMC (adaptation, planning, developers) coordinated to address the issue of flooding?
11. What is the level of consideration for flood risk and/ or climate change/ environmental services (wetlands, swamplands, natural storm protection areas) in current development or urbanization projects?



- a. Have there been issues related to "uneven" development in District 7? (ex: Saigon South planned urban development)
- b. For homes in alleyways or near the main road, can their infrastructure or local people adapt to the urban flooding?
Area near Cầu Kinh Tế, Lê Văn Lương St.



Area near Trần Xuân Soạn St.



- c. Are people in alleyways or away from the new urbanized area considered in urban adaptation or mitigation policies?
12. Are there socio-economic or spatial inequities in District 7 that may impact urban flooding risks or adaptation efforts?
13. Do certain areas of District 7 (for example, Phu My Hung) play formal or informal roles in exacerbating or improving urban flood adaptation?

Appendix B – Prepared questions for Informal, semi-structured interviews with local people

Vietnamese (translated by Nguyen Anh Minh)

1. Anh chị sống ở Q7 được bao nhiêu năm rồi?
2. Tại sao anh/chị lại chuyển tới Q7 sống ạ?
3. Anh chị có nhận thấy quá trình đô thị hóa và phát triển của Q7 trong vòng 15 – 20 năm qua không? Và nó như thế nào ạ?
4. Lần đầu anh/ chị thấy hiện tượng ngập lụt ở Q7 là khi nào ạ?
5. Theo anh/chị, hệ quả nào của biến đổi khí hậu dẫn đến quá trình ngập lụt ở đô thị?
6. Theo quan sát của anh/chị, đâu là những tác động mà người dân địa phương đang gánh chịu do ngập lụt ở đô thị?
7. Ngập lụt ảnh hưởng đến đời sống của cá nhân anh/chị như thế nào ạ?
8. Trong thang điểm từ 1 – 10, anh/ chị lo lắng như thế nào về vấn đề ngập lụt đô thị?
9. Theo anh chị, đâu là những khu vực ngập lụt nặng nề nhất (đặc biệt là các khu vực gần lưu vực sông ngòi) ở Q7?
10. Nhà của anh/ chị có nằm trong hệ thống cống rãnh chính của thành phố không?
11. Anh chị có biết các chương trình ứng phó với ngập lụt nào không? Anh/ chị đã và đang tham gia vào những chương trình nào?
12. Các khó khăn về tài chính trong các chương trình ứng phó ngập lụt này là gì? Mất cân đối trong kinh tế xã hội? (Tại sao có những nơi lại bị ảnh hưởng bởi ngập lụt nghiêm trọng hơn những nơi khác?)
13. Anh chị có đề ý nhiều về các chương trình chính thống (ví dụ của nhà nước) ứng phó và cải thiện vấn đề ngập lụt ở đô thị không? Và anh chị có tin các biện pháp này sẽ có hiệu quả? Tại sao có hoặc không?
14. Chính phủ có tham gia tích cực vào công tác ứng phó với ngập lụt không?
15. Đâu là những rào cản chính trong việc ứng phó với ngập lụt ở đô thị?
16. Trách nhiệm này là của ai?
17. Anh/ chị có nghĩ là người nghèo đang hứng chịu hậu quả nghiêm trọng hơn từ ngập lụt?
18. Anh chị có quan ngại về những tác động dẫn đến ngập lụt của các dự án đô thị hóa trong tương lai ở Quận 7?
19. Anh chị có đang áp dụng hoặc nghĩ rằng các biện pháp ở quy mô cộng đồng nhỏ hoặc tại hộ gia đình nào có thể giúp xử lý vấn đề ngập lụt này không?

English

1. How long have you lived in District 7?
2. Why did you move to District 7?
3. What urbanization or development have you observed in District 7 within the last 15-20 years?
4. When did you first notice flooding in District 7?
5. What do you think is the effect of climate change on urban flooding, if any?
6. From your observation, what do you believe are the main impacts on local people from urban flooding?
7. How has it personally affected you?
8. On a scale of 1-10, rate how concerned you are about urban flooding.
9. In your opinions, what are the flood-prone areas in District 7?

10. Is your home connected to the main sewage line?
11. What are adaptation programs that you are aware of? Have you participated in any?
12. Financial difficulties in adaptation? Socio-economic inequities (i.e. why are some areas more affected than others, and do you believe that has to do with income?)
13. How aware are you of current formal projects to adapt or improve the urban flooding issue? Do you believe current formal (i.e. government) adaptation methods are effective? Why or why not?
14. Is the government doing enough to address flooding?
15. What are the main barriers to effective urban flood adaptation?
16. Whose responsibility is it?
17. Do you think that poor people have it worse?
18. Are you concerned about the impacts of future urbanization projects in District 7 on flooding?
19. Are there community or household level solutions that you are involved in or believe will be effective?

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