

WHEN IS WATER ‘JUST WATER’?

LIVING IN-BETWEEN AND ACCESSING WATER IN PERIURBAN CẦN THƠ, VIETNAM

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ABSTRACT

I examine the relationships between periurbanization, local water systems, and different forms of water access in three of Cần Thơ's periurban districts. Periurban Cần Thơ has a long history of landscape and waterscape change. My research looks back to the period of French colonization to investigate how today's Delta waterscape was produced through struggles and wars among colonizers, peasants, and postcolonial governments. The canals, streams, and rivers have been shaped over time by the Delta's residents and have become deeply engrained in the residents' cultures, traditions, and lifestyles. I examine how periurban residents use these same canals to access water alongside rainwater, groundwater, piped water, and bottled water. While conducting extensive fieldwork in Cần Thơ, I asked questions about how residents have adapted to the changing landscape, what factors influence residents' perceptions of their landscape, and how residents to maintain their individual water security. To address these questions I bring together work in urban political ecology and feminist geography to understand periurbanization in secondary cities. I have developed three main arguments that run through my dissertation. First, I argue that water scarcity discourses create the impression of water scarcity at all levels despite the availability of informal water sources at the local level. Ultimately, it is often the lack of access to formal water systems in periurban spaces that create the perception of scarcity. Secondly, I argue that residents' ability to access and manage water using both formal and informal sources contributes to their ability to be resilient against the threat of water insecurity. Residents use the local periurban environment to their advantages. Finally, I argue that the Mekong Delta is a unique landscape with unique historical processes. Just as not all analyses are translatable across sites, not all water types are the same. Furthermore, the non-homogeneity of the Delta speaks to the non-homogeneity of water—different kinds of water can be appropriate, or not, for different uses and thus ensures water security for many residents.

DEDICATION

I dedicate my dissertation to my Dad, Gary Allen, who passed away only a few days after my I completed the written portion of my comprehensive exams. I'll always believe that you waited for me to finish that milestone before calling me home, I only wish that milestone could have been me completing my doctoral degree. Thank you for believing in me every day and never doubting that I would finish this project. I'll always remember to 'carry on'.

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CHAPTER 1: INTRODUCTION



Image 1: Local water supply station in periurban district of Cần Thơ. Photo shows the size of the water station and how the groundwater is first pumped and stored in the blue container. Located on the property of the local water supply station manager (personal photo)



Image 2: Elevated water tank of the local water supply station in periurban district of Cần Thơ. Water is pumped up to this tank from the blue tank on the ground before it is delivered to households. Located on the property of the local water supply station manager. (personal photo)

1.0 Introduction

In July of 2017, I met with Mr. Hồ, a local water supply station manager, who lives in a district commune in periurban Cần Thơ, Vietnam. In 2005, this small water supply station was built on 48m² of Mr. Hồ's personal property (See image 1 and 2), which was originally intended to be built in another commune. The Cần Thơ Water Supply and Sewerage One Member

Company Ltd (CTWASSCO) originally completed a survey with residents in a nearby commune, but the original plan's landowner was no longer willing to have it built on his property. Mr. Hò, being the leader of his hamlet, decided he would support the project and volunteer his land for the water station. The arrangement was beneficial for him, and he had the time available to operate the station. Mr. Hò did not pay for construction of the water station, nor is he responsible for maintenance costs. When problems arise, Mr. Hò calls CTWASSCO and a technician is sent to fix the problem.

After the water station was built, it took another five years for 70 households to register. When we spoke in 2017, the water station served 77 households out of 300 in the commune; however, the station only had the capacity for one more household to be connected. Mr. Hò said there were plans to connect more of his commune's households to another new, and larger, local water supply station in a nearby commune, but he did not know when that might happen. Furthermore, the new nearby water station also had a limited capacity, which would only serve approximately 80 percent of both commune's residents. Mr. Hò indicated that one of the reasons it took so long for residents to pay for a connection was because the water station was not originally supposed to be located in their commune. For households in Mr. Hò's hamlet and commune to connect to the water station residents must pay for water pipes to be installed directly to their homes, and also pay for the water metre and installation. Mr. Hò explained that the installation and connections cost residents approximately two to three million Vietnamese Dong (approximately CAD112.00 to CAD168.00), which can be an insurmountable cost for the majority of residents. Many residents were initially not in favour of the water station due to the cost, and continue to rely on the canals, groundwater, and rainwater for as long as possible. For households that still rely on wells and groundwater, the water quality is poor due to the shallow

depth of the wells. Mr. Hồ said that as the groundwater quality continues to deteriorate, residents will have increasing problems with the quality of their water and, hopefully, they will eventually stop using it.

As the water station manager, Mr. Hồ must clean the water tanks every two to three days, read individual household water metres, collect payments, and relay any pertinent information back to the main water supply company in Ninh Kiều district, Cần Thơ. He goes to the CTWASSCO in Ninh Kiều district once per month to review budgets and other problems. Mr. Hồ cleans the tanks very carefully, but is concerned about the substances at the bottom of the tanks after the filtration treatment. The filtration consists of water filtering through layers of sand and rock before going into the blue water tank (see Image 1), which is then pumped up to the elevated tank (see Image 2) before being delivered to local households. The station manager wants a better filtration system for the groundwater because he also relies on this water for his personal use and does not trust the quality. For daily drinking and cooking Mr. Hồ relies on approximately five to seven 20 litre water bottles per month.

Mr. Hồ is a resident in periurban Cần Thơ, where he is in a position of authority and respect being the head of the hamlet and the water station manager. His positions of authority mean that he visits each household in the hamlet, he addresses their demands and concerns firsthand whether it relates to piped water services or not, and recognizes many residents' limited financial capacity. He acknowledges that people still use groundwater and river water despite the local government providing residents regular information about heavy water pollution, and he himself relies on bottled water. However, he ignores the high level of reliance on rainwater and other water sources, and places less emphasis on the fact that some residents are not able to connect to the water station. The local government's view is that residents have very low

environmental awareness; however, he contradicts this view. According to Mr. Hồ, households in periurban areas are too reliant on the rivers and canals because they have low financial capacity to afford excessive use of piped water.

The biggest problem here is that the capacity of households is very low when they live near the river. People use piped water too economically and then use river water to supplement their supply. Therefore, demand for piped water isn't high. A lot of households are very concerned about money and this is a bit of a problem because the river is very polluted. It's hard because the river is a big part of their culture. 20 years ago, when the river water was used regularly, people used fans to precipitate the water and make it clean. Back then the river water tasted sweet. But now, with industrialization and heavy agriculture, the river is very polluted. The district People's Committee has a lot of water pollution propaganda put out and people here have a very high awareness about water pollution because there's so much in the news and on the tv. That's why this water supply station is almost at full piped capacity (Local Water Supply Station Manager, periurban district of Cần Thơ, Vietnam 2017).

Mr. Hồ's explanation of the current problems facing residents partially align with those of the local government officials, who argue that households need to have higher environmental awareness so that they stop using the canal water and stop polluting the canals. Government officials also argue that rainwater collection is not commonly practiced, and that households should use the piped water system because it actually is an affordable option. Mr. Hồ also notes that residents would rely more on the piped water system if households were not located next to the canals and rivers, and he considers households alongside the canals to be worse off because

they are more likely to use informal water sources than piped water. In contradiction to Mr. Hồ's acknowledgement of canal water use, he does not acknowledge the use of rainwater despite residents' heavy reliance on this water source. Rainwater is generally collected for drinking and cooking and is often used instead of purchasing bottled water because rainwater is said to taste better.

Mr. Hồ is both an insider and an outsider in his hamlet. As an insider he sees firsthand the daily struggles of other residents. In his daily life as a resident, he is also in a position to understand the complexity of water, the fact there are many different types of water and that each source of water has different uses. Mr. Hồ is also an outsider of the hamlet as a result of his positions of authority. When in conversation with other residents and outsiders of the hamlet, commune, managerial and government officials often separate themselves from residents. Because of his position in the hamlet, local government officials hold him in higher regard than other residents, which can lead to an 'I know best' attitude regarding how residents use, or should use, water.

My research took place in the Mekong Delta city of Cần Thơ (see Figure 1 below) and three of its surrounding periurban districts—Phong Điền, Thốt Nốt, and Cờ Đỏ. As mentioned above, one of these periurban districts is home to Mr. Hồ. The Mekong Delta is located in Southern Vietnam and Cần Thơ sits 169 kilometres South-West of Ho Chi Minh City. The city's clean water supply comes from the Hậu River and its tributary. The above story of Mr. Hồ describes the overarching problems associated with water access in periurban Cần Thơ. The story hints at some of the key issues that will be discussed at length in this dissertation, including the complexities of water access in periurban zones, the importance of residents ability to access

multiple forms of water for different needs, what factors contribute to ensuring all residents water needs are met, and the perceptions that go alongside living in periurban areas.

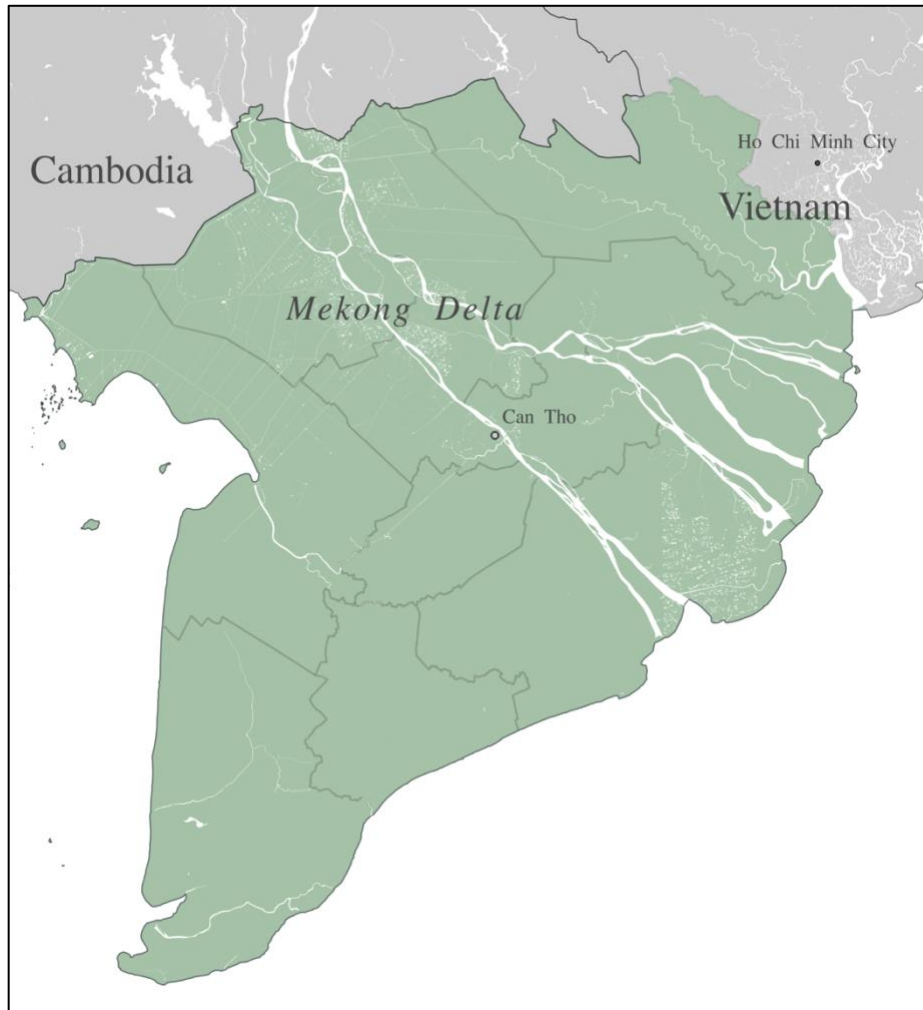


Figure 1: Map of the Mekong Delta, Vietnam (Source: Prepared by author based on GADM maps and data, 2018).

2.0 Research questions and main arguments

I structured this dissertation around four main questions and successive sub-questions. Over the course of my research project's lifespan, these questions changed and are not my original questions—I will be elaborate on this below. This section outlines my research

questions, my three main arguments, and then finishes with some contextual information to support both my questions and main arguments.

2.1 Research Questions

My research objective is to examine the relationship between periurbanization, local water systems, and forms of water access in three of Cần Thơ's periurban districts. The following are my framing questions:

1. How have periurban Cần Thơ residents adapted to the changing landscape since French colonization?
 - a. How has French colonial infrastructure in the Mekong Delta influenced periurban residents access to water?
2. What has been the prevalence of different forms of accessing water and what social differences have emerged as significant (wealth, income, class, location, or gender) to accessing water?
 - a. What factors have emerged as significant to accessing water and how do they impact local perceptions of place in periurban Cần Thơ?
 - b. What factors influence residents' expectations and perceptions of their surroundings?
3. How do residents become environmental subjects in periurban Cần Thơ, what is the extent to which they become environmental subjects, and are there limits?
 - a. How has environmental awareness been built in periurban Cần Thơ, who is responsible, and what are the limits to the awareness?
 - b. What are the links between environmentally aware residents, perception of place, and access to city services?
4. How has water security and scarcity been understood in periurban Cần Thơ?

- a. How has alarmism been created through discourse and how have alarmist claims changed the value placed on water across various scales?
- b. How do social differences create different understandings of resiliency and flexibility to water scarcity threats?

Water management planning in Vietnam is fragmented with much disconnect between the national, provincial, and local level governments. Vietnamese water management planning capacity is limited and government officials rarely see the Delta's urban and rural regions as an interconnected, complex system. The disconnect is clear within development initiatives that emphasize rural development and water security issues. In this dissertation, I unpack the complexities of water access and social resilience and how these relate to combating household level water scarcity. This emphasis on the complexities of water access helps to outline my dissertation's main theoretical framework. Ultimately, top down planning simplifies the nuances and complexities of access to water. There is a need to start water access planning at the household and family level by focusing on how people are accessing water and integrate more participatory planning the process. While this transformational agenda is not new in development or urban political ecology theory, it needs to be emphasized and continuously repeated.

My work seeks to understand some of the imbalance between the implementation of water management in periurban areas and urban areas, address the shortcomings that have emerged from rural/urban divides in development initiatives, examine fragmented understandings of water security, and examine the relationship between periurbanization and water users in Cần Thơ. To do this, I asked residents to consider more than just how they access piped water. I asked about rainwater collection, groundwater, river/canal water, bottled water (I

elaborate on the challenges of each water source in Chapter 3), and other service provisions like garbage collection and sewage system. To learn how access to these services have changed, I asked residents to talk about the landscape around their homes, and whether they perceived themselves to live in an urban, rural, or periurban area.

2.2 Main arguments

Residents of the Mekong Delta have always lived in a state of flux—one of the main characteristics of periurbanization—which makes them active citizens while negotiating access to water and other services. The above research questions helped to inform my dissertation's three main arguments:

1. Water scarcity discourses create the impression of water scarcity at all levels. However, the canals, rivers, and seasonal rains in Cần Thơ provide physical water availability for residents. It is the lack of access to formal water systems in periurban spaces that create a perception of scarcity. This is because of the limited scope of physical and economic scarcity analyses and an overall lack of multi-scalar analyses. Water scarcity should be determined at the local scale, by the people who navigate local water resource options daily as well as at larger scales. Furthermore, there is a need for more than just multiscale analysis; there needs to be a careful analysis of how issues or discourses translate across scale.
2. While some scholars (see below) argue that rural areas are more susceptible to water insecurity and the effects of climate change, periurban areas are far from exempt. At the same time, periurban areas may access and manage water better by using both formal and informal methods (Kusno 2015). This relates to the history of adaptability and resiliency in the Mekong Delta as the histories of land-and waterscape change manifest themselves

today in the form of resiliency against the threat of water insecurity. Over time, Cần Thơ residents have developed water access strategies to combat the threat of water scarcity. Residents exploited the French colonial canal infrastructure to gain access to water and continue to do so because of the current government's failure to meet daily water demands through a formal piped water system. Ultimately, people have found ways to create daily water security using their surroundings and the Delta's natural environment. Residents use the local periurban environment to their advantage.

3. Not all analyses are translatable across sites—the Red River Delta and the Irrawaddy Delta are not the same as the Mekong River Delta. Periurban Cần Thơ is a unique site because of its historical physical infrastructure legacy, its ecologies, its processes of landscape transformation, the residents, and water itself. Residents of the Mekong Delta are all different; they are in different socioeconomic positions, have access to different services, have access to different numbers of water sources, and they use each water source for different objectives. The non-homogeneity of the Delta's residents speaks to the non-homogeneity of water—different kinds of water can be appropriate or not for different uses. This leads to the argument that water planning needs to start with how people use different kinds of water for different purposes, rather than assume a single solution for all water access problems, which is typically piped water.

Prior to embarking on field research, I structured this dissertation around three main questions, instead of four, and successive sub-questions, but when constraints presented themselves during my field research, I had to adapt my questions and focus areas. The difference between what I thought possible when conducting preliminary fieldwork and what ended up being possible during dissertation fieldwork was significant and unexpected. To overcome

unexpected changes, flexibility and reflexivity in Feminist Geography (FG) were essential (Bain & Nash 2006; Billo & Hiemstra 2013; England 1994) because these feminist tools helped to change my perceptions of my research over the course of the project's lifespan. In all research projects 'the field' changes constantly, and according to England, "researchers may find that they have to maneuver around unexpected circumstances. The result is research where the only inevitability seems to be unreliability and unpredictability" (1994: 243). The use of feminist tools like flexibility and reflexivity allowed me to accept and negotiate through fieldwork challenges by ensuring that I always considered the consequences of different interactions. Lawson refers to this practice as feminist care ethics whereby the researcher "[understands] that care ethics cannot be practiced or theorized in the abstract, rather care ethics looks at the specific sites and social relationships that produce the need for care and that frame the specific content of care ethics" (2007).

I deviated from my original research plan and conducted many months of archival research to answer questions about the influence of French colonial infrastructure on current periurban water access. I made the decision to access the French colonial archives because of delays in conducting fieldwork in Cần Thơ, which is explained further in Chapter 3. This became a very productive form of research as I gained a deeper understanding of the political ecology of water access in the contemporary period. Instead of researching government influence over the past 10 years as I had initially proposed in my research proposal, I turned to the French colonial era for a true historicization of Cần Thơ and the Mekong Delta. French colonization drastically changed the Delta's landscape. Construction of extensive canals and inland water systems by the French made the colonial capital of Saigon easier to reach from Cần Thơ. Furthermore, the Delta

became easier to navigate, exploit, and monitor. In periurban Cần Thơ, residents have, since the period of French colonization, come to terms with constant political and environmental change.

2.3 Contextual information for research questions and main arguments

The above story of Mr. Hồ identifies the disconnect between policy and practice with regards to resource management in periurban Cần Thơ. The following section provides some important background information about the disconnect described by Mr. Hồ and the nature of the Cần Thơ water supply. It elaborates on why residents may not always use piped water for all of their daily needs even when it is available, and some of the overarching problems associated with water access in Cần Thơ.

The annual environmental quality performance reports from the Department of Natural Resources and Environment confirms what is explained above by Mr. Hồ as it shows the quality of the Hậu River and of the connected canals as decreasing each year. It has become increasingly difficult for the Cần Thơ water supply company to provide clean water despite environmental planning goals created for 2015 and with visions to 2050¹. At the international level with development project plans, experts do not believe that the Mekong Delta Masterplan to 2030 and vision to 2050 will produce the desired results. Experts pessimistically say that necessary changes are unlikely to happen due to unrealistic proposals based on unrealistic data. In part, the lack of motivation comes out of Vietnam's top-down approach to environmental policy making (Schirmbeck 2017). This became clear during multiple workshops² on Delta

¹ Information about Mekong Regional Water Supply Masterplan to 2030 and vision to 2050 gained from expert interview with SAWACO (Water Supply Company in HCMC). 8 February 2017.

² Workshop on Subsidence in the Mekong Delta: Challenges and Future Opportunities. March 20-12, 2017 Cần Thơ City, Vietnam; Workshop on Integrated Water Resources Management for Sustainable Agriculture Development in the Long Xuyen Quadrangle. February 9, 2017. Long Xuyen City, An Giang Province, Vietnam

climate change prevention and water management planning where proposed projects by international agencies and research centres rarely consider bottom-up approaches to project implementation.

Vietnamese government officials and country reports rarely recognize that residents use multiple sources of water daily for various tasks. If they do, government officials are more likely to recognize canal and river water as a source that supplements piped water, or as the only water source because of a resident's remote rural location. As mentioned above, there is often an 'I know best' attitude regarding how residents use water, which is, in part, why the use of informal water sources like groundwater, rainwater, and canal/river water are not encouraged. This position against informal water use has consequences for what is included, and excluded, in regional water planning (Furlong & Kooy 2017; Kooy et al. 2018).

CTWSSC is a private company that relies on profit to operate; therefore, the “company chooses to supply only those areas that promise to be profitable...with the rural areas, they cannot get back money...so they need to find areas where they can make profit” (Reis 2012: 93). Finding profitable areas to invest in water supply stations has proven difficult in periurban Cần Thơ because of the residents' above-mentioned lack of ability or desire to pay for piped water. Furthermore, because households are located along canals, “water pipes can only pump water in two directions, i.e. the network only consists of one line along the river or canal” (Reis 2012: 93). These water pipes are often small and low flow (see Image 1 above), which create problems for connected residents. During interviews with residents in the commune, they spoke about their problems with the quality of this local supply—taste, pollution levels, reliability, etc. One example is that during peak hours residents have to use other sources of water because pressure

is too low. Low pressure to the point of an inability to use the piped water is a common complaint among residents with access to piped water. Therefore, residents do not have full access despite the Ministry of Construction's 2012 Circular on Implementation Guides to Ensure Safe Water Supply, which defines "a safe water supply [as] a [stable] water supply, [maintenance of] sufficient pressure, a continuous supply, an adequate amount of water, and [ensuring] water quality according to the prescribed standards."³ The state classifies households with any connection to piped water as having water access; however, the constant water pressure problems mean they do not meet the standards of the above definition.

Another problem associated with water access is the disconnect between the government environmental propaganda campaigns and what residents claim to hear. Most of the information provided to residents on river water pollution only explains that people should not throw garbage into the river and canals. Most people know the river is polluted, and that the water quality has deteriorated in the last 10 years—the canals and rivers are a big part of everyday lives—but the level of information spread at the household level on how to prevent pollution is low. During a conversation with the local government and commune People's Committee guides we discussed Vietnamese environmental laws:

Environmental laws these days say households aren't allowed to throw garbage into the rivers and canals. They're also not allowed to bury or burn household garbage if you fall under certain government criteria. The criteria say that if people can access a garbage truck service; they have to use it. Those that can't, because roads are too small and the truck can't reach, they can bury or burn their

³ The Ministry of Construction. Number: 08/2012/TT-BXD. CIRCULAR. IMPLEMENTATION GUIDES ENSURE A SAFE WATER SUPPLY. Hanoi, November 21 in 2012. (Translated from Vietnamese to English)

garbage. It's hard to catch people who throw their garbage into the river but if they're caught, we would fine them... These are the official, national laws for the entire country (Personal communication, Periurban district of Cần Thơ, July 2017).

This suggests that Vietnamese environmental laws are good. On paper they cover a wide range of issues that should ensure healthy and protected rivers and the Law on Environmental Protection 2019 is the most recent environmental law revision since 2015 (Environmental Law Alliance Worldwide 2019).

Vietnam faces many environmental pollution challenges regarding water supply and wastewater. This is because while environmental strategies and laws are thorough on paper, their application falls short. One problem is that environmental laws and policies are fragmented and contradictory (Schirmbeck 2017; Schulte 2016). There are contradictions between environmental protection, investment/development goals, and within the laws themselves because of “unclear institutional authority” (Schulte 2016). Compared to countries with a similar GDP as Vietnam, environmental laws on water regulation are extensive but problems and contradictions remain. Without clear jurisdiction guidelines and institutional authority, many regions lack environmental monitoring and enforcement. The major disconnects between law, propaganda, and what happens on the ground is evidenced by the above quotes from the water supply manager and the government guide, by residents’ frustrations with the water supply, and the propaganda that does not follow practice. As I will elaborate on below, the propaganda and government environmental monitoring and environmental knowledge sharing efforts are about

trying to make residnets act more environmentally responsible when, more often then not in periurban areas, residents are not able to address the larger environmental problems at hand.

3.0 Conceptual framework and review

I position my research within the fields of urban political ecology (UPE) and feminist geography (FG) and, in this section, I explain how I contribute to them. To begin, under the umbrella of UPE, I review the literature, discussions, and debates on periurban development in Southeast Asia before specifying where I position myself within this body of literature. As part of this review under UPE I also discuss key concepts and discourses that are relevant to my dissertation, which include alarmism, environmentality, vulnerability, and resilience. I then turn to the field of FG where I also review the literature, discussions, and debates on gender, and the key concepts of class, historicization, and self-reflexivity.

3.1 Contributions to the field of Urban Political Ecology

Political Ecology (PE) draws insight from many disciplines including peasant studies, cultural ecology, development studies, cultural anthropology, and political economy (Agarwal 2005; Blaikie 2008; Neumann 2005). Heynen (2013) argues that during its early phases, PE neglected cities because of their ‘unnaturalness’. Zimmer claims that PE “[started] from investigating soil degradation in rural areas, [and that] this approach has only recently turned towards ecological problems in the city” (2010: 343). Swyngedouw (1996), Escobar (1999), Peet and Watts (2000), Keil (2003), Pelling (2003), Forsyth (2004), and others have worked to bring an urban perspective to PE using ideas from political economy, science and technology studies, and the notion of the production of nature (Harvey 1993). Urban Political Ecology (UPE) derives from Marxist urban geography, feminist geography, and ideas of governmentality (Doshi 2016; Heynen 2017; Lawhon, Ernston & Silver 2014; Leffers & Ballamingie 2012; Rattu & Veron

2016; Welsh 2017). It works to create “an understanding of the ‘urban’ not as a bounded city within which political-ecological contestations are played out, but as a process of continuous socio-ecological transformation” (Tzaninis et al. 2020: 4).

UPE has long been concerned with examining the socioeconomic differences between, and changes within, the urban core and the periurban (Swyngedoux 1996; Keil et al. 1998; Keil 2003; Zimmer 2010; Tzaninis et al. 2020). This is particularly useful to my own research in periurban Cần Thơ because of UPE calls to remove the conceptual boundary between the urban core and periphery while trying to understand what produces uneven development as “the core and the periphery [are] part of the same socio-environmental continuum” (Tzaninis et al. 2020: 4).

I use Lawhon, Ernston and Silver’s definition of UPE, who state that UPE is “concerned with the processes of the urbanization of nature, or the social, cultural, and political relations through which material and biophysical entities become transformed in the making of often unequal cities” (2014: 500). Power relations operate within processes of capital accumulation and the socio-natural transformations of the city. The transformation processes within cities are the socio-natural manifestations of the metabolization of nature and natural resources (water and cement) that shape the city and inform power relations (Bakker 2012; Furlong & Kooy 2017). UPE scholarship considers the consequences of landscape transformation for various uses and the relevant power relations involved. The UPE approach does not consider structures and physical infrastructure as ‘fixed’ within the physical landscape (Lawhon et al. 2014). Physical structures are part of the physical environment that generates a landscape and includes everything from water infrastructure to sidewalks (Kooy & Bakker 2008; Bakker 2012; Furlong & Kooy 2017). UPE is therefore the ideal lens with which to study water systems and periurban

infrastructure in the Mekong Delta because it helps me to see how these structures are made using Vietnamese labour and local natural resources, and how these structures, and their uses, change over time. This framework creates the space for me to analyze how water infrastructure development is a process that influences the landscape, the identities, and perceptions of its residents. My approach is similar to Kooy and Bakker's (2008; 2015) who link today's water access and power to colonial infrastructure in Jakarta. They argue that Jakarta's "city water supply has always been fragmented" (Kooy & Bakker 2015: 64). They similarly argue that "the flows of water in the contemporary city of Jakarta must be understood as a historical product, both of colonial infrastructure and discourses" (64). They also argue that there is, in actuality, no "'ideal' structured infrastructure development" (Kooy & Bakker 2008: 1843). I build on their work by arguing that every place is different with different socio-natural material histories that produce distinct power relations and identities.

Water is a common point of departure within UPE. The framework emphasizes the everyday dimensions of resource access in a changing climate, which facilitates tracing the 'flows' of water through Cần Thơ to determine who and what influences water quality, quantity, distribution, and access (Gandy, 2006; Kooy & Bakker 2008; 2015). In my research, I also drew on this approach, and observed the physical landscape, historicized it, and spoke with city planners, water distribution planners, government ministry officers, water service company employees, local water station owners, and residents. I traced involvement with water service distribution from the government level to the residential level.

I also drew from Ribot's (1998) Political Ecology article on access mapping to trace the flows of water through Cần Thơ and to trace how people benefit from these flows. According to Ribot, "access mapping involves evaluating the distribution of benefits along the chain, and

tracing out the mechanisms by which access to benefits is maintained” (1998: 307).

Borrowing from Ribot’s approach, I was able to analyze and understand who was benefiting from water infrastructure and municipal service delivery distribution and the impacts of distribution on local people’s perception of place.

The UPE lens allowed me to examine how power can shape water usage and the distribution of services in periurban Cần Thơ (Heynen, 2013; Heynen et al. 2006; Keil *et al.*, 1998; Keil 2003; Lawhon, Ernstson, & Silver, 2014; Kaika, 2005; Swyngedouw 2004; Zimmer 2010, Kooy & Bakker 2008; 2015). In examining the flow of water within the physical landscape of Cần Thơ I talked with city planners, water distribution professionals, various ministry departments, and researchers before approaching local periurban residents of Cần Thơ. Speaking with individuals of their role in water provision and access allowed me to trace past and present involvement in water distribution and usage. I also gained insight into why parts of the city have priority over others and learned what happens when water access is disrupted.

While UPE does often recognize the role of nature in cities and the nature-society divide, UPE is criticized for its use of methodological cityism (Keil 2011; Tzaninis et al. 2020). Angelo and Wachsmuth define methodological cityism as “[referring] to an analytical privileging, isolation and perhaps naturalization of the city in studies of urban processes where the non-city may also be significant” (2014: 20). This concept recognizes the city as an outcome of urbanization and considers processes of urbanization as happening across all spatial scales (Connolly 2019)—“planet-spanning urbanization” (Angelo & Wachsmuth 2014) or “planetary urbanization” (Brenner & Schmid 2012). The authors critique methodological cityism because it risks classifying cities “as discrete, bounded [places], both in the strands of research that describe the production of urban socionatures and in those that focus on environmental injustice” (Angelo

& Wachsmuth 2014: 21). I agree that methodological cityism risks not problematizing the differences between urban and rural spaces, and risks an overemphasis on researching cities as isolated spaces.

3.1.1 Periurban literature and the importance of secondary cities

While I recognize that periurbanization is a type of urbanization, the metabolic and circular flows within cities differ from the metabolic processes that transform the periurban landscape. Periurban areas should thus be a distinct consideration within UPE scholarship because periurbanization is the ongoing outcome, and extension, of urbanization but in ways that are distinct from how these processes work in cities. In this dissertation, I answer McKinnon et al.'s (2017) call to break down the urban-rural divide by researching periurban spaces outside of the urban core, and by moving my focus away from megacities to examine periurban areas of secondary cities. Periurban scholarship brings into play distinct types of rural spaces and landscapes, and processes of periurbanization will vary according to the differences in rural spaces. My research contributes to what Angelo and Wachsmuth (2014) and Tzaninis et al. (2020) offer as one of the possible directions for UPE—"to investigate processes of socionatural transformation that systematically differentiate, within specific regions or at larger scales, city from non-city – in other words, to show how urbanization produces, materially or representationally, spaces understood as urban or rural, or materials understood as natural or social" (Angelo and Wachsmuth 2014: 24). Specifically, I examine how historical and current water infrastructure, water movements, and water users are of particular importance with regards to Cần Thơ's process of periurbanization.

Periurbanization refers to the process of landscape change in the space on a city's fringe that is neither rural nor urban—but has elements of both. The people living in these spaces also

do not fit within the definitions of urban or rural because the landscape ties them to both (Harms 2011; Harms 2011b; Jones & Douglass 2008; Kelly 1999; Kelly 2000; Kusno 2013; Labbe & Musil 2014; Rigg 2003). The concept of periurban spaces grew out of McGee's concept of *desakota*, which refers to "an intense mixture of agricultural and non-agricultural activities that often stretch along corridors between large city cores [and] are characterized by dense populations engaged in agriculture" (1991: 7). In fact, McGee "coined *desakota* after the Bahasa Indonesian words, *desa*, meaning "city" and *kota*, meaning "village" (Ortega 2012: 1121). The *desakota* concept was a way to think about spaces that were neither urban nor rural, and it rethought western ideas of urban expansion (Dick & Rimmer 1998; Kelly 1999; Ortega 2012).

Southeast Asian periurban literature has followed McGee and distinguished itself by problematizing the Euro-Western-centric perspectives that position economically developed countries as the point of departure for analysis and comparison. The processes of urbanization and periurbanization in Southeast Asia are noteworthy because of the speed and scale at which they have taken place. Friedmann (2011) suggests that there are multiple ways in which to study the periurban. One such way is "the study of particular city regions and their recent and contemporary spatial histories" (Friedmann 2011). This method is particularly useful for my own research in that it ensures broad generalizations are avoided while contributing to the growing body of periurban literature. This is also in line with Tzaninis et al. who claim there is a need for "a *situated* UPE...taking to heart the empirical, theoretical, and methodological insights of feminist and Global South scholarship" (2020: 7). While this concept is not entirely new within periurban scholarship, situated UPE and situated periurban research shows the importance of studying the everyday lives of research subjects (Leaf 1999; Gururani 2002; Labbe 2011; Labbe & Boudreau 2011; Loftus 2012; Schmid 2018; Tzaninis et al. 2020). I agree with Friedmann's

(2011) and Webster's (2011) argument that 'thick' descriptions of the events that lead to change in periurban areas are necessary.

My contribution to periurban scholarship is to move my situated analysis—or my 'thick' descriptions of periurban change—away from processes of change that occur on the fringe of large urban areas in the Global South, for example Ho Chi Minh City, and apply it to the fringe of secondary cities, like Cần Thơ, because periurbanization processes are not exclusive to Southeast Asian megacities. While Cần Thơ is far from becoming a megacity, it is prioritized as a region of growth by the Vietnamese government (Mekong Delta Plan 2013) and growth in and around Cần Thơ is expected. However, population size rarely determines a city's standing as a primary or secondary city.

I classify Cần Thơ as a secondary city rather than a medium-sized city because one of the issues of this literature is the concept of city size and how to define smaller cities (Bell & Jayne 2006; Bell & Jayne 2009; Fahmi et al. 2014). It is problematic to define a city based on population, "because urban hierarchies differ greatly across the world [and] urban ordering cannot be determined by principle size alone" (Fahmi et al. 2014: 2). Furthermore, the size of a city often determines its level of economic development (Rodriguez-Pose & Fitjar 2013; Marais et al. 2016). Instead, using terms like 'primary', 'secondary' and 'tertiary' help to position cities based on their national function or their role in regional development.

I chose to conduct my research in Cần Thơ because of the important role this city plays in the past, present, and future economic development of the Mekong Delta and Vietnam (Roberts 2014). Researching Cần Thơ as a secondary city is also important because of its colonial history, its location in the Mekong Delta, and because it is often positioned as vulnerable to climate change and the construction of dams upstream on the Mekong River. Furthermore, in UPE

scholarship, it is much more likely for researchers to pay attention on megacities (De Boeck et al. 2009; Moser 2012; Fahmi et al. 2014), which can risk neglecting secondary cities and leaving them understudied, (Bell & Jayne 2009; Marais et al. 2016) despite the call to study them (Becker et al. 1994; Myers 1999). However, “secondary cities...also potentially play important roles, for instance, as specialists for certain products or commodities, as capital cities or as distribution centres” (Fahmi et al. 2014: 1). Furthermore, secondary cities function as “fully urban” (De Boeck et al. 2009) spaces in that they contribute to the national economy and generate important networks. I maintain that if secondary cities function as ‘fully urban’ spaces like megacities, then the periurban spaces of secondary cities are equally important. Satterthwaite and Tacoli (2003) argue that secondary cities can play a large role in reducing regional poverty while simultaneously contributing to regional and national development. The authors maintain that “many urban enterprises rely on demand from rural producers or consumers and, often, on rural raw materials, while agricultural producers rely on urban-based traders and markets” (2003: 1). For example, Cần Thơ has long supplied many raw materials and agricultural products to the larger markets in Ho Chi Minh City.

While all megacities in the Global South have seen improvements, they also experience rapid environmental degradation and there is immense pressure on existing physical infrastructure as cities continue to expand. Therefore, it is expected that most new growth will occur in secondary cities rather than in megacities (Simon 2008; Fahmi et al. 2014; Roberts 2014; Swilling 2016). In fact, Seto (2011) claims that most mega deltas across the world “have rapidly growing secondary cities [and] many of the secondary urban centers emerged because of the growth of industrial, administrative, educational, and commercial activities” (2011: 97). Rapid growth is only one of the unique challenges secondary cities face. According to a project

funded by the Asia Pacific Network for Global Change Research, these cities also face “less institutional adaptive capacity than their primary city counterparts (McEvoy et al. 2014: 205). I take this idea one step further to suggest that periurban areas of secondary cities have even less institutional adaptive capacity to respond to formally respond and adapt to change than primary cities.

Some of the rapid growth in secondary cities is also contributed to decentralization policy in the Global South and the effects it can have on urban change and economic restructuring (Fahmi et al. 2014). For example, Fahmi et al. conducted a study in the ‘small-sized’ city of Cirebon, Indonesia and determined that “both national and local development policies affect urban change in Cirebon Region” (2014: 7). They found that Indonesian decentralization policy promoted more local development because local governments were given greater authority to manage their own regions. Vietnam has similarly experienced decentralization policy in its recent past (see Chapter 6), and I argue this policy has influenced urban change in Cần Thơ.

I operationalize the concept of environmentality in Chapter 6 alongside Vietnam’s decentralization policies to describe a broader process by which people come to value the environment and act in ways that they believe preserve the environment (Fletcher 2010; Bose et al. 2012; Jepson et al. 2012; Fletcher 2017). The concept is relevant to decentralization policy because the policy allows for greater local government authority over the type of environmental information provided to residents. The aim of environmentality is to create environmental subjects; promoting environmental awareness and people who care about the environment (Luke 1999; Fletcher 2010). According to Fletcher, “environmental education would constitute a paradigmatic example of this environmentality in action, whereby, through diverse decentralised institutions (state schools, NGO trainings, community workshops, ecotourism excursions, etc.),

norms intended to encourage *in situ* natural resource preservation are advocated” (2010: 176). I use environmentalism in Chapter 6 to discuss how local government officials have been working to create environmental awareness in periurban Cần Thơ through the use of environmental propaganda. In this case, environmental conservation efforts can be seen as a form of ‘green governmentality’; also a means to encourage people to care about the environment. However, it is more of an attempt to create a sense of environmental ethics in people so that they are more likely to act in environmentally friendly ways (Luke 1999; Rutherford 1999; Neumann 2001; Peluso & Watts 2001; Agarwal 2005; Fletcher 2010; Fletcher 2017). The problem of using environmental propaganda to encourage residents to be more environmentally conscious and more environmentally responsible is that, despite residents being largely willing to make environmentally friendly changes, they usually do not have control over the larger pollution problems in their periurban commune. The environmental response should come from the municipal, district, provincial, or national government to address the larger environmental problems like water and pollution from nearby factories and processing plants. Ultimately, this is a question of environmental justice for periurban residents.

It is important to look at the Delta’s environmental history around decentralization policy because, as Sinha et al. argue, “it mobilises a version of the past as a template for alternative development policy. It has implications for the construction of ecological history and for alternative patterns of resource use as a political agenda” (1997: 69). With respect to periurban Cần Thơ and the history of water access, I employ environmentalism to consider what has led residents to utilize different forms of water for different uses. This concept helps me to understand the role, or lack of role, of local government officials in creating environmental citizens. I agree with Gururani (2018) when she argues that “conservation is particularly fraught

in urbanizing peripheries that are caught up in rapid conversion of land and are typically characterized by multilayered, heterogeneous, and unclear regimes of property rights, sharp divisions of class, conflicting claims and stakes, and unequal access to basic social services and infrastructure” (2018: 2). Gururani’s (2018) draws from Hall, Hirsch, and Li’s notion that “all land use and access requires exclusion of some kind” (2011: 4). In fact, all forms of resource access exhibit these “powers of exclusion” (Hall et al. 2011) because “exclusion takes place through processes of regulation, force, the market, and legitimation” (Gururani 2018: 3). I agree with their argument that resource exclusion can be both positive and negative for different stakeholders, which will become evident throughout my dissertation.

The discussion of exclusion from water access illuminates the nuances of vulnerability and resilience with respect to water security—two important concepts in this dissertation. The Intergovernmental Panel on Climate Change (IPCC) defines vulnerability “as a function of exposure, sensitivity, and adaptive capacity and, moreover, exposure is taken as containing the climate stimuli impacting a system” (Garrick & Hall 2014: 618). Vulnerability can occur at different stages in an individual’s or family’s life and may not occur in all facets of their life at once. In periurban areas, some residents may experience hardship and vulnerability, but residents have many daily strategies to reduce their vulnerability and overcome water insecurity. Part of this realization came from distinguishing at the local level between economic and physical water scarcity, which affects different people in various ways. This is discussed further in Chapter 7 and, because Chapter 7 is a standalone article, there will be some repetition. On the one hand, economic water scarcity occurs when a region has sufficient water resources, but they lack the water infrastructure or financial capacity to make the resource accessible to everyone. On the other hand, physical water scarcity occurs when a region is not able to meet water demands

because there is a lack of physical water resources. Often, the physical location of a house in the periurban Delta can contribute to whether or not a household will face economic scarcity because proximity to the canals provides an immediate water source.

Periurban areas not only face challenges associated with meeting water demands based on the physical location of a household or based on competing land uses. According to Padgham et al., these areas also “face significant interlocking stresses stemming from marginalization of land and water resources, increasing exposure to climate risks, and ineffective policies and poor governance that undermine its long-term potential to address...climate change adaptation concerns” (2015: 183). The stresses inherent to periurban areas are often made worse by difficulties associated with “policy formulation and implementation (Garschagen et al. 2012: 144) because these areas often fall between the cracks of development planning (Simon et al. 2006; Garschagen et al. 2012; Beilin et al. 2013; Padgham et al. 2015).

It is for this reason that I employ the concept of resilience in this dissertation. My use of resilience is discussed again in Chapter 4 as this is a standalone article. When the people living in periurban areas are excluded from urban social services, they are required to use the local environment to their advantage. They are forced to adapt and overcome recurring periurban stressors. My reasoning is drawn, in part, from Attwater and Derry’s use of the theory of social-ecological resilience whereby “resilience is the capacity of a social-ecological system to cope with shocks and changing internal and external environments while retaining its essential function” (2017: 1). I also borrow Matyas and Pelling’s use of socio-ecological resiliency, which suggests “[resiliency] tends to be associated with the capacity of an agent to choose a vital and authentic life, the process of overcoming the negative effects of exposure (bouncing back), and the ability to cope successfully with...negative trajectories” (2014: 53). I also agree with Beilin

et al. when they argue that “resilience thinking is useful because it offers us a way of identifying and connecting system components while recognizing the complexity and dynamism of the whole” (2013: 3). The resilience framework of Tyler and Moench (2012) speaks to this argument and they see the concept as the complex relationship between three factors—systems, agents, and institutions. “*Systems* that contain human and environmental elements; *agents* that carry out actions responding to and recovering from shocks and stresses; and *institutions* that shape the ability and capacity of agents to act effectively” (Padgham et al. 2015: 195).

I take these views of resilience one step further to suggest that, in the case of periurban Cần Thơ, one of the essential functions of residents is to maintain their personal water security. Ensuring water security in Cần Thơ often means ensuring that they have multiple ways of accessing water for different uses, which ensures each water source, regardless of the quality, is used to its full potential.

Despite the concept’s usefulness to my own dissertation, there are many criticisms to be considered. Brown criticizes that the resilience discourse “demonstrates how applications of resilience in [the fields] of climate change and development overwhelmingly support the status quo and promote ‘business as usual’” (2013: 4). Brown also suggests that the use of resilience as a concept is becoming “vague and normative” (2013: 4)—a concept that is perhaps too malleable or too ambiguous. Kaika (2017) argues that “new calls for ‘safe, resilient and inclusive cities’ remains path dependent on old methodological tools (e.g. indicators), techno-managerial solutions (e.g. smart cities), and institutional frameworks of an ecological modernization paradigm that did not work” (2017: 89). Kaika (2017) continues to argue that the very definitions of resilience might not be as positive as they seem because people are not resilient by nature; people are made to be resilient through their environment. Kaika maintains that when people are

resilient they will continue to be bombarded by negative stressors. Therefore, people should not strive to be resilient; it is the stressors that should be reduced so that resilience and resilient people are not necessary.

While I agree with these criticisms, I also argue that, if used appropriately, the use of resilience can still be worthwhile. Periurban residents' ability to return to 'business as (almost) usual' in the face of stressors is precisely the reason why many are able to achieve water security year round. I do not suggest that it is 'fair' that periurban residents repeatedly face the same environmental degradation problems or seasonal resource stressors; however, I do argue that residents may be less vulnerable because they are more resilient. In order to strengthen the concept of resilience, and its wider use in geographic theory, I agree and follow through with Kaika's call "to incorporate social processes (including the complex role of communities, leadership, social learning, networks, institutions, etc.) into future methodological design and policy practices for resilience building" (2017: 95).

In the same way that resilience is criticized for being overly ambiguous, too vague, and overused, it is also at risk of sensationalizing or exaggerating the effects of stressors. Alarmist discourse is used to create a sense of urgency, danger, or exceptionality (Urquijo et al. 2015: 273). Often terms like 'catastrophic' or 'devastating' are used to create a sense of alarm despite "each of these terms [being] imprecise and [they] may convey a range of meaning" (Risbey 2008: 26). Alarmist metaphors and narratives are also used to create images of chaos and "irreversible danger" (Fischhendler 2015). For this reason I found that it was also necessary to examine the concept of alarmism and how alarmist discourses of water scarcity at the international and national levels impact local water use practices. There are many advocates working towards equal, affordable, and adequate water access in cities, but these

discussions often frame inequitable access in urban areas with an alarmist discourse of crisis and scarcity (Barlow 2010; Aguilera-Kink et al. 2000; Noemdoe, Jonker & Swatuk 2006; Mehta 2001). Over-simplified narratives minimize the complexities that exist around water scarcity. This became clear during my analyses of the Delta's history, the local government, the local environment, the physical realities of the periurban, and access to water.

3.2 Contributions to Feminist Geography

Zimmer asks “what characterizes the difference between city, peri-urban, and rural areas?” (2010: 351). I also question what defines a city and what factors do residents associate with cities versus periurban and rural areas. In order to answer these questions I ensured my research paid attention to feminist geography and to questions of gender and class. Coupled with UPE, feminist geography allowed my research to consider the everyday dimensions of water access (Gururani 2014) as a ‘situated’ analysis (Tzaninis et al. 2020).

I use Feminist Geography (FG) to explain how socially constructed identities become embedded within, and reinforce, power relations. I also draw on FG methodologies to build on and work through my fluid positionality in the field and to inform my research analysis. It provides a lens with which to look at the intersectionality between the urban/rural experiences, various individual perceptions, and gendered access to water (Faria & Mollett 2016; Nightingale 2010; Truelove 2011). As described by Nightingale, intersectionality “[explores] the production of difference through the everyday movement of bodies in space to show how subjectivities are produced out of the multiple and intersecting exercise of power within socio-natural networks” (2011: 153). FG and intersectionality highlights that gender does not exist alone—gender is one category alongside other categories of social difference including race, ethnicity, caste, and

religion (Hawkins & Ojeda 2011). According to Valentine, “the specific concept of intersectionality is attributed to critical race theorists who, rejecting the notion of race, gender, ethnicity, class, and so forth as separate and essentialist categories, developed the term *intersectionality* to describe the interconnections and interdependence of race with other categories (2007: 12). Therefore, intersectionality is not simply the consideration of social differences; it also examines the centrality of power, domination, and marginalization. By including intersectionality in research, researchers can successfully carry out feminist theory on the ground by being aware of “the limitations of gender as a single category” (Valentine 2007: 12). To carry this further, an FG framework can also help to ensure researchers are aware of the limitations of all concepts used—resilience, environmentality, vulnerability, alarmism, and class.

What FG offers feminist scholarship is what Donna Haraway calls “feminist versions of objectivity” (1991: 190). Linda McDowell similarly argues that feminist versions of objectivity are “limited and situated knowledges, knowledges that are explicit about their positioning, sensitive to the structures of power that construct these multiple positions and committed to making visible the claims of the less powerful” (1992: 413). The ability to position knowledge as situated also reduces the risk of universalizing women’s experiences and romanticizing the experiences of marginalized people (Forcey 1999; Li 2007; Shiva 1988). FG creates a space to challenge the assumptions of power relations and, through reflexivity, researchers become aware of the complex relationship and intersections between the past and the present. The FG framework creates a space to examine how positions of power can affect research outcomes (Haraway 1988; Moss 1993; Sundberg 2003).

Incorporating FG on the ground means practicing self-reflexivity, addressing my positionality, and historicizing my research site before, during, and after fieldwork. I practice

self-reflexivity by considering the implications of my research for myself and for my research participants (McDonald 2013). Before interviews I tried to think about what biases, or preconceived ideas, I might have towards my participants. Acknowledging these biases helped me to avoid holding onto the biases when conducting the actual interview. I always tried to be aware of and sensitive to the research participant's body language. As a western educated, white, young woman conducting research in southern Vietnam, I knew that I was an outsider and that my positionality during fieldwork mattered. I used a translator because my Vietnamese was not good enough to catch the nuances of the language or match the speed at which people speak. Having a translator who was my age and female helped to put my research participants at ease while also creating an alliance between my translator and me. However, being a Westerner, I had many allowances and was not expected to adhere to the same traditional Vietnamese women's norms. Recognizing my positionality and discussing it at length with my translator allowed me to recognize my privileges and limitations. What my research experience demonstrates is that "it is impossible to ignore the embodied experience of the field, especially where the spaces of fieldwork are distanced and different from the spaces of home and everyday experience (Sharp 2005: 306).

Another component of FG that I incorporate is the historicization of my research site with respect to how the Delta's canal systems were made and how the region's residents made use of them. McDowell and Massey (1984) wrote about the importance of historicization to understand the intersection of gender and class in relation to women's exploitation in the workforce. I consider the differences between women's roles pre and post Đổi Mới in the local government. Gendered divisions of labour are very much a part of the power relations at play in the Delta that shape access to water. Therefore, I draw on FG to understand the differences regarding water

access and local knowledge about various water systems between women and men at the residential and government levels.

Alber (2011) describes how conversations about gender are not merely about women, but also about gendered relations and lived interactions based on gendered experiences. Regarding water access, access and gender should be connected across local, national, and international scales to more accurately reflect upon the experiences of people. When allocating water distribution services in urban and periurban areas, decisions at the government level are made with the goal of increasing productivity. However, studies by CGIAR (2014) have shown that this method of water service allocation rarely accounted for the multiple and often differing demands of men and women. Therefore, gender should be at the forefront of water access, use and management discussions. This call is despite the fact that gender considerations are almost always required in development programs, but “understandings of gender and agendas for ‘gender sensitive development’ vary considerably between both academic and practitioner circles” (Scott & Truong 2007: 243). I argue that because there are inconsistencies in the inclusion of gender in research, feminist geographers must work to contribute to the emerging gender debates.

Class and gender are intricately linked. In this dissertation I look at the local everyday nature of class—socioeconomic differences—in Vietnam and how these socioeconomic differences manifest themselves on the ground in periurban Cần Thơ. I delve into the history of class and socioeconomic differences in Chapter 2 as it informs much of my dissertation. According to Kelly, “class is a complicated and multi-dimensional category. How we theorize it says a lot about how we see the relationships between structure and agency, economic and ‘other’ social processes, and consciousness and political action” (2007: 4). I refer to

socioeconomic differences instead of class because of the complexity and various meanings of the concept. Socioeconomic difference describes the different dimensions—“position, process, performance, and politics” (Kelly 2007: 5) in a more comprehensive way. The use of the term socioeconomic difference also helps to remove the assumption that a household’s socioeconomic position is determined by the “male breadwinner” (Kelly 2007: 6).

The consideration of socioeconomic differences within a FG framework highlights the everyday nature of these differences (Gibson-Graham et al. 2001). The everyday nature of the processes socioeconomic differences shows us that periurban residents can hold different, or even multiple, differences throughout their lives (Gibson, Law & McKay 2001). Focusing on the everyday nature of differences also speaks to the importance of historicization because the socioeconomic differences of periurban residents cannot be separated from the Mekong Delta (Smith 2000; Anthias 2005; Kelly 2007)—they are “geographically and historically contingent” (Kelly 2007: 10).

4.0 Dissertation Overview

Chapter 2 provides historical context for my research on access to water in periurban Cần Thơ. I use this chapter to offer an overview of Vietnam’s history and an explanation of how some major events or periods of time are relevant to residents’ ability to access water today. I begin with an outline of the French colonial period from the late 1800s to 1945, then provide a brief history of Vietnam from 1945 to present, which will shed light on the country’s rapid urbanization, economic growth, and current water planning.

In **Chapter 3**, I explain the methodologies and rationale behind my research—I review what I did, and how I did it. This chapter also gives a detailed outline of my field sites in periurban Cần Thơ, and goes in-depth into the limitations of my research. As FG and its

methodologies are important framings for my research, I also include how I use these methods in the field and the implications they have on me as a researcher, on my work, and on my research participants. Feminist methods help to provide a personal look into the emotional and support side of research struggles and triumphs.

I move onto my arguments and findings in **Chapter 4**, “The historical legacy of waterscape change in Cần Thơ, Vietnam and the social implications on water access today”. This chapter is based on a journal article published in the *Singapore Journal of Tropical Geography* as part of a special issue on “Deltas in South and Southeast Asia”. This chapter is therefore a standalone article with its own framework but, given the importance of historicization in FG, it is a good fit within my dissertation. As this chapter is a standalone article there is some repetition in the above conceptual framework. French colonialism brought extensive canal systems to the Mekong Delta that are still used today. I look at the historical legacies of colonialism left on the Mekong Delta and Cần Thơ and the implications this has on the complex ways periurban residents access water today for diverse purposes. Today, the Delta is home to active citizens who have the historical legacy of colonial infrastructure providing the means to combat the water access vulnerabilities that are often prevalent in periurban areas. I discuss the relationship between the changing waterscape and the social strategies that developed over time in response to the changing landscape. I intend to contribute to the literature on the French colonial period because I want to explore the effects of colonial infrastructure today and because I had full access to the Vietnamese French colonial archives. While other periods of Vietnamese history are important to shaping current water access practices, they are outside of the scope of this dissertation.

Chapter 5 looks at how the local perspectives of place in periurban Cần Thơ are tied to two main factors, Đổi Mới and gender norms. The 1986 Đổi Mới economic reforms contributed to national economic growth and development, influenced changes in national gender norms, and led to the creation of more opportunities for periurban residents. Here, I attempt to understanding why and how residents living in the same commune might perceive themselves as living in either an urban, rural, or periurban environment.

In **Chapter 6** I offer a snapshot of how current decentralization policies and the local government's environmental and social propaganda have influenced local residents' service expectations and local periurban service delivery. In this chapter, I use a gendered analysis to examine gendered differences in water access methods, and the different knowledge that men and women have about available services like piped water, garbage disposal and collection, and sewage systems.

Chapter 7, "Water scarce or water abundant? The case of Cần Thơ, Vietnam", started as a standalone article for publication in *Urban Geography*; therefore, there will be some repetition. This chapter provides an empirical picture of Cần Thơ's periurban water security and the methods used by residents to achieve personal water security. Abundant water sources do not always coincide with where large quantities of people live; people live with the threat of water shortages in many regions. Interpretations of water scarcity from international, national and regional scales of analysis are projected onto water availability at the local scale because of large, and often intimidating, global facts. This chapter looks to the periurban in Cần Thơ to argue that the discourse around water scarcity creates an impression of water crisis. A local scale analysis demonstrates that residents of Cần Thơ have the knowledge to use local water resources

in many ways, thus ensuring their personal water security. The assessment that water is scarce at the national and international scale does not translate to Cần Thơ's current situation.

Finally, **Chapter 8** concludes my dissertation. Here, I revisit my research questions, discuss some of the broader lessons, outline the main implications of my research, and examine future directions.

CHAPTER 2: HISTORICAL CONTEXT

This chapter provides historical context for my research on access to water in periurban Cần Thơ and helps to inform the analyses presented throughout this dissertation. Starting with the period of French colonization and ending with the current state of affairs in Vietnam, I look at how major events have shaped residents' ability to access water today. These major events include World War II, Vietnam's independence from the French, the Indochina War, the Vietnam War, Reunification, and Đổi Mới economic reforms. Given that Chapter four is a standalone article historicizing the period of French colonization, I only briefly discuss this period here. Đổi Mới marks the opening of Vietnam's borders to the global market and the start of modern Vietnam's major restructuring and transformation. In the second half of this chapter, I look at Vietnam post-Đổi Mới to consider the country's modern history. After Đổi Mới, urban growth became a government priority, and cities experienced high rates of economic growth and rapid urbanization. To study periurban spaces and the urban/rural divide in the Mekong Delta, I first consider the processes of urbanization before turning to its effects on administrative units, periurban land use, municipal water planning, and household water systems.

1.0 Historical overview of Vietnam: 1880s-1986

This section summarizes Vietnam's history from the start of French colonization in the 1880s to the start of the Đổi Mới economic reforms in 1986.

The French were in Indochina as Christian missionaries and western merchants in the 16th century, but colonization in the form of territorial control did not begin until the 1860s in South Vietnam (then Cochinchina). France formed French Indochina in 1885, composed of Annam (central Vietnam), Tonkin (north Vietnam), Cambodia, and Laos. While the French influence in South Vietnam officially ended in 1954, they left behind thousands of troops, a political system,

transportation networks, French architecture, and, most notable for this dissertation, an extensive canal system in the Mekong Delta used for irrigation, transportation, and as a water supply as well as government units for building, maintaining, and running these systems. According to Paige, the Mekong Delta “was the only region directly administered by the French, and most of the large land concessions were granted in this area. Almost all commercial rice production for export is concentrated in the Mekong Delta, and it is here that proprietary interests are strongest, tenancy most widespread, and land ownership by absentee interests most important” (1970: 29).

There were two main agrarian peasant uprisings in South Vietnam prior to and during WWII. “The first of these occurred in 1930-1931 in response to the falling rice and rubber prices and an extensive drought in Annam” (Paige 1970: 35). Paige (1970) and Adger (1999) agree that this uprising was, in part, in response to colonial capitalism. Despite the French eventually managing to calm the uprising, the outcomes were violent as “landlords and mandarins were executed, land was confiscated, and...local soviets were established’ (Paige 1970: 35).

The second agrarian peasant uprising occurred primarily in the Mekong Delta in 1940 and had stronger Communist ideological ties than earlier revolts (Paige 1970: 36). The Delta has long been Vietnam’s primary rice exporter and therefore has a history of “large rice estates, extensive tenancy, and inequitable holdings, [and has been] the most prone to revolutionary social movements, both political and religious” (Paige 1970: 36). Vietnamese landlords alone owned over half of the country’s fertile land making them among the country’s elites with high socioeconomic status. According to Boothroyd and Pham “this imbalance was in addition to the hundreds of thousands of hectares of fertile farmland in the hands of French plantation owners” (2000). The implications of these historical land issues are important throughout all of the

historical processes described below. For this chapter, I do not delve further into the French colonial period as I discuss it at length in Chapter four.

While the Second World War is beyond the scope of this dissertation, I point out key events that took place during this period (1939-1945). The WWII period saw the rise of the Viet-Minh, the communist-led Vietnamese resistance group, directed by Ho Chi Minh. Ho Chi Minh made considerable effort to make sure the Viet-Minh was an inclusive group. Its foundation was as a nationalist group rather than communist and tried appealing to all Vietnamese citizens to join regardless of profession, rank, or gender. One of the group's objectives was to remove French influence in the country and then later to remove Japanese and American influences (Llewellyn, Southey, & Thompson 2018). Furthermore, in the political turmoil post-WWII, North Vietnam underwent major land reform, which was largely supported by rural peasants but it also caused major chaos and bloodshed in rural North Vietnam (Moise 1983).

During WWII there were Japanese soldiers stationed in Vietnam, which reduced French influence (Cady 1966). Between 1941 and 1945 there was a sense of co-existence in Vietnam between the French and the Japanese. By 1945 Japanese were retreating across Southeast Asia and Vietnam was identified “as a fallback position for rereating Japanese troops because it could be more easily occupied, secured and defended. by March 1945, the Japanese occupation force...withdrew their support for the [French] colonial regime” (Llewellyn, Southey & Thompson 2018). That same year the French attempted to regain colonial power (Goscha 2013), and, from a simplified perspective, this led to the First Indochina War, or the Anti-French Resistance War, between the French and Viet-Minh—the Vietnamese Independence Movement. During this time, “the French high command operated from Hanoi and Saigon and organized its military operations there” (Goscha 2013: 228). So, while the French continued to control the

colonial cities through this period, their control of rural areas in the Delta weakened. In the South, outside of Saigon, the Viet-Minh resorted largely to guerilla tactics and “Viet-Minh violence was often indiscriminate” (Goscha 2013: 249), which meant they could avoid direct confrontation with the French.

In North Vietnam in 1950, the “Chinese and Soviet communists began supplying weapons, radios, medicines, and other modern materials via the northern border” (Goscha 2013: 226). This support improved the strength of the Viet-Minh in the North and, in 1952, the Chinese helped the Viet-Minh invade Laos. However, the invasion of Laos raised US concerns that all of Southeast Asia might fall under communist rule if the Viet-Minh forces progressed (Université du Québec à Montréal n.d.; World Peace Foundation 2015). Despite being initially less armed and having fewer resources, and despite increased support to the French from the US, in 1954 the Vietnamese were victorious over the French. Following the Geneva Accord of 1954, French rule officially came to an end in what was previously known as French Indochina.

After Vietnamese independence in 1954, the Geneva Accords divided the country into two zones (Dell, Lane & Querubin 2015)—North and South Vietnam—with different governments. North Vietnam implemented a centralized, Soviet-style government—the Democratic Republic of Vietnam; while South Vietnam implemented an American-style capitalist government—the Republic of Vietnam (Barker & Ungor 2018; Dell, Lane & Querubin 2015; Nguyen 2010; Odell & Castillo 2008). The North Vietnamese government had a long-term goal of liberating all of Vietnam and separating itself from American control. The National Liberation Front emerged in the rural south as the organized military opposition to the US-supported South Vietnam government. It was in 1960 that the Viet Cong was formed in South

Vietnam to support North Vietnam and consisted of former Viet Minh soldiers and south Vietnamese guerrillas.

The Second Indochina War, sometimes called the Vietnam War in the West or the American War in Vietnam, broke out in 1954 and lasted until 1975, during this war North Vietnam and the Viet Cong fought to push the Americans out of Vietnam. The North and South Vietnamese governments had two separate land reform programs during this period (Porter 1973). The North's land reform and its importance in the south is partially attributed to the North's success in the Second Indochina War. The North Vietnamese government "distributed 810 000 hectares of farmland, formerly owned by landlords or in French plantations, to 2.1 million peasant households, thus realizing the revolutionary motto 'land to the tiller'" (Boothroyd & Pham 2000). Land reform in South Vietnam was proposed by the United States and implemented by the South Vietnamese government. The land reform program in the south was largely an attempt to undermine the Viet-Minh's attempts at land redistribution policies that benefited rural peasants. The South's early land reform program in the 1950s was unpopular among rural peasants because most peasants believed that the government and its policies favoured landlords (Porter 1973). In the Mekong Delta especially, the 1950s land reform programs by the South Vietnamese government were unsuccessful because large landowners and landlords managed to increase their land holdings, and peasant farmers were not benefited (Wurfel 1957; Race 1970; Porter 1973; Minh-Tam & Preechametta 2016).

It wasn't until 1970 under the 'land-to-the-tiller' program that the South Vietnamese government achieved some variation of land reform in terms of distributing land to farmers by. Providing financial compensation to former landowners. Using the 'land to the tiller' program, proposed by American land rights activist Roy Prosterman (Prosterman 1970), land reform

during the early 1970s in South Vietnam had eliminated large-scale landlords by the government buying land from these landlords and redistributing to middle class peasant farmers (Prosterman 1970; Bui & Preechametta 2016). According to Joes, “the program, begun in the spring of 1970, soon reduced tenancy from 60 percent of the rural population to about 34 percent...In the wake of [this] program, it was clear that support for the insurgents in the Delta was waning in the early 1970s as the whole package of the government’s rural development programs was being favorably received” (Joes 2001: 131).

In Popkin’s book *The Rational Peasant*, he describes colonial Mekong Delta as being home to the country’s most rebellious inhabitants (1979). Paige agrees and takes the argument further by suggesting that much of the Second Indochina War was ultimately the result of class conflict “between backward capitalists whose only capital was land and a rural semi-proletariat whose only remaining claim was a share of the crop as a wage” (1983: 706). I agree with Paige as the concept of class and socioeconomic differences are very important in the Delta region historically and today because these historical processes shape both land ownership and class consciousness today.

On 30 April 1975, Saigon fell, and the country reunited under the Socialist Republic of Vietnam (Vu 1986; Adger 1999; Odell & Castillo, 2008; Nguyen, 2010; Barker & Ungor, 2018). Almost immediately, the post-war government attempted to organized collectivized agriculture in South Vietnam, and launch ambitious rebuilding projects across the country. One of the major infrastructure projects in the Delta was part of the ‘hydraulic mission’, which Simon Benedikter (2014) describes as “driven by the high-modernist world views of (authoritarian) governments” (547). The post-reunification hydraulic mission prioritized science and technology, or ‘high-modernism’ (Scott 1998). The orchestrators of the hydraulic mission felt that the new

Vietnamese state had sufficient capacity to manage the complex Delta waterscape and capitalize on the landscape in a way the French never could (Benedikter 2014; Swyngedouw 1999; 2007). The hydraulic mission also required large quantities of intensive manual peasant labour to construct new canals and dykes. Forced labour was not welcome by peasants and many workers refused to conduct the quality manual labour required for the construction of the new waterways (Biggs et al. 2009; Gorman 2014; Trung 2010).

The hydraulic mission and agricultural collectivization were government attempts at regaining control of the water resources, the land, and the local population after years of war and political turmoil (Benedikter 2014). Also, “land reform and agricultural collective production” were deemed “as prerequisite for a socialist economy” (Minh-Tam & Preechametta 2016: 300). Collective agriculture was implemented in North Vietnam from the mid-1950s to 1980s and the new government hoped to introduce it to southern Vietnam after reunification. However, “in some southern provinces, it remained a source of dispute until the early 1990s...it was not successful in the south of the country” (Minh-Tam & Preechametta 2016: 301).

Collectivization policies led to government officials confiscating private land, machinery, and livestock for allocation to collective farms. Collectivization ultimately perpetuated inequality and led to peasant resistance to collectivization (Dang 2010; Minh-Tam & Preechametta 2016). At the time of collectivization in southern Vietnam most peasant farmers owned and farmed small plots of land (Moise 1983). According to Moise, “no rich peasant or well-to-do middle peasant could have been persuaded that his fortunes would be improved by joining with landless or almost landless poor peasants in a cooperative” (1983). Some farmers destroyed machinery and killed personal livestock rather than allow their property to be redistributed. National collectivization policies, land collectivization, and the labour required to build and maintain the

canals dissatisfied the local population. Instead of rebuilding the Delta and its peasant population with these major projects, the national communist government left peasants out of the economic growth plan in favour of high crop yields and water infrastructure projects.

Collective farming did not allow peasant farmers to benefit from high yields, which led to widespread famine and peasant marginalization. Ultimately, collectivization was ineffective and led to decreased food production. According to Bui and Preechametta, “paddy rice productivity dropped by 13.2 per cent and 19.7 per cent, respectively, in 1977 and 1978 compared with the 1976 level” (2016). By the early 1980s, Vietnam was in an economic crisis, exacerbated by high inflation, increased food prices, and a major decline in foreign aid (Dell, Lane & Querubin 2015; Nguyen, 2010; Dang 2010). I did not ask participants how long they owned their land, or how it was obtained. However, given that many research participants spoke about how their families had been living on their piece of land for generations, I assume that most peasants regained the land they had lost during collectivization.

2.0 Modern history of Vietnam: 1986 - present

In 1986, the Vietnamese state began opening its borders by instituting Đổi Mới policy and economic reforms (I discuss Đổi Mới further in Chapter 5 but I offer an overview here). During this time the Vietnamese government relinquished collectivization and embraced agricultural privatization. These changes led to substantial improvements in the overall quality of life for Vietnamese people. Agricultural privatization policies also increased rice yields, and the Delta became a major global rice exporter—known as the world’s ‘rice bowl’ (Biggs et al. 2009). By 1988, the government abolished agricultural collectivization, markets were becoming more liberalized, and the Vietnamese economy started moving from a centrally planned to a mixed-market economic system (Long et al. 2000; Nguyen 2010; Spencer 2007; Schramm &

Wright-Contreras 2017). Under a mixed-market economy high levels of state control over information and politics remained, but state management of the economy was reduced. The new economic system created space for a private sector that contributed to widespread service provision distribution and infrastructure improvements. Economic growth created new opportunities in agricultural production and led to nationwide poverty reduction.

Đổi Mới had significant impacts on agrarian policy and land use in the Mekong Delta; not all of which were positive. This mirrors the history of land access and distribution in the Delta since French colonization. During French colonization, land access was highly unequal with high rates of tenancy and sharecropping. Land reform by the South Vietnamese government after the Geneva Accord in 1954 was highly problematic and not successful until the 1970s when peasant farmers gained land from landlords. As described above, in southern Vietnam, collectivization policies in 1975 once again perpetuated inequality in the Delta. I did not ask specific questions about how residents gained access to their land, but many claimed that the land had been inherited from their parents, and most residents had always lived on their family land. Unfortunately, I did not gather any information to determine whether families obtained land during the 1970s land reform or previously. With Đổi Mới and economic liberalization, Vietnam's "agricultural development policy shifted from collectivism to the decollectivization of agriculture, i.e. the farm household was defined as an 'economic unit of production' with the authority to operate...Arable land, formerly belonging to agricultural cooperatives, has been allocated to individual farm households with long-term 'land-use rights'" (Nguyen 2013: 38). It is therefore possible that families have lived on their land in the Delta for generations without even having long-term land use rights and it is possible they have undergone many different types of land access.

2.1 Vietnamese urban growth

Vietnam's average growth rate between 1985 and 2018 was rapid, high, and averaged 6.43 percent per year (The Global Economy, 2018). Despite some negative consequences of rapid growth, unemployment rates in Vietnam were low at an average rate of 2.22 percent between 1991 to 2017 (The Global Economy, 2018). However, low unemployment rates do not result in equal income distribution. In fact, according to an Oxfam (2017) inequality in Vietnam report, income inequality has increased with rapid economic growth. High growth rates also contribute to rapid urbanization as people move to where the economic activities and jobs are located, and as cities expand to incorporate rural areas.

In 2018, 55 percent of people globally live in urban areas. By 2050, the United Nations predicts that this will increase to 68 percent and that most of the urban growth will occur in Asia and Africa (United Nations 2018). Comparatively in 2018, 35.92 percent of the Vietnamese population was reported as urban (Trading Economics 2020). Urban growth is continuing as people migrate to urban areas and as rural areas are incorporated into cities.

Rapid urban growth also occurred in Vietnam through administrative urbanization—the extension of political and geographical boundaries. For example, in 2008, the area of the city of Hanoi grew 3.6 times (Nguyen 2016) and in 2004, Cần Thơ Province became a single municipality as the city incorporated areas previously classified as rural and became the largest city in the Mekong Delta, and the country's fifth largest municipality (Spencer 2007). Cần Thơ is now a first-level city under direct control of the central government. The state expects first-level cities to grow and develop at a faster rate, so the state prioritizes these cities in terms of government infrastructure investment (Huong & Pathirana 2013). To compare, second-level cities are under the control of the provincial level governments. Many provincial governments in

Vietnam struggle to provide basic infrastructure and water services to rural and periurban areas (UNICEF 2016). Therefore, the administrative urbanization of Cần Thơ was a strategic move and should have allowed for more financial investment and should have led to improved capacity to provide services and infrastructure to periurban areas. However, incorporating rural communities into the urban boundaries in 2004 pressured Cần Thơ's already stressed infrastructure and city services. To reduce pressure and to secure land for infrastructure improvements, the Cần Thơ City government included local people and leaders as a "kind of community-based public private partnership/venture" (Fox et al. 2011: 8). With local residents' support, and sometimes with their land, the city made large improvements to the periurban landscape.

2.2 Administrative units

Based on the 2004 administrative changes, and 2015 statistics reports, Table 1 below indicates that Cần Thơ has 85 administrative units (excluding hamlets). Administrative unit counts do not include hamlets because they are small geographical spaces and are only used at the local scale to distinguish between neighbourhoods. Each administrative unit has different levels of management and the number of units per district determines the level of government involvement. In descending order from the largest administrative unit to the smallest is the district, the town, the commune, the precinct, and the hamlet. The following table shows the administrative unit breakdown of Ninh Kiều, Thốt Nốt, Cờ Đỏ, and Phong Điền districts in Cần Thơ (see Table 1). Thốt Nốt and Ninh Kiều districts are both classified as main urban districts. I did not interview residents in Ninh Kiều district but this is the main urban district of Cần Thơ and is where the main government offices are for the entire city. Ninh Kiều district has the most government involvement in the city and I use it as a point of comparison.

Table 1: Administrative units of Cần Thơ by district in 2015 (source: Cần Thơ City Statistics Office, 2015)					
Year 2015 by district	Total sub-units (excluding hamlets)	Town	Commune	Precinct	Hamlet
Ninh Kiều district	13	0	0	13	71
Thốt Nốt district	9	0	0	9	45
Cờ Đỏ district	10	1	9	0	79
Phong Điền district	7	1	6	0	79

Administration offices are used to exercise state power over their respective administrative unit via either the commune or district level People’s Councils and People’s Committees. According to the Vietnam Law and Legal Forum, “they manage all areas of social life in localities on the principle of democratic centralism and harmonious combination of interests of local people and common interests of the whole country” (2017). The specific ‘interests’ are not disclosed. The National Assembly of Vietnam decides the level of state power assigned to each administrative unit’s People’s Councils and People’s Committees. This means there is no single model to dictate how a local administrative unit is organized. However, the two main tasks of the People’s Council and the People’s Committee are to uphold the law and the Constitution and to preside over local issues (Vietnam Law and Legal Forum 2017). The breakdown of Cần Thơ’s administrative units help to inform the city’s current periurban land use.

2.3 Land Use



Image 1: Agricultural landscape of Cờ Đỏ District, Cần Thơ (Personal Photo)

Land use in periurban areas varies between commercial, industrial, residential and agricultural. In Table 2 below, I compare this land use between four districts of Cần Thơ. The table shows not only the total land size across the four districts but also that the urban core has very little land available for agriculture. Therefore, lifestyle and livelihood choices will be different in the periurban districts versus the urban core. There is more agricultural land in the districts of Thốt Nốt, Cờ Đỏ and Phong Điền compared to Ninh Kiều. However, the hectares of land allocated to non-agricultural use is relatively similar despite the overall size difference among the four districts. Given the difference between agricultural land use and non-agricultural land use across Thốt Nốt, Cờ Đỏ, and Phong Điền, it is unsurprising to see landscapes depicted in Image 3, which is a common view of agriculture in Cờ Đỏ alongside a major roadway. I took

Image 3 near shops, roadside restaurants, petrol stations, and residential areas. However, from this perspective, non-agricultural land uses are not visible and they blend into the landscape. ‘Special land’ (see Table 2) refers to commercial or industrial land—land not allocated for housing or agriculture. An example of ‘special land’ is shown in Image 4.



Image 2: Mixed use land – agricultural and commercial. Looking at a fish processing factory beside agricultural land. Photo taken from across the canal beside resident’s home. Thốt Nốt District, Cần Thơ (Personal Photo)

In Cần Thơ, 11,562.2 ha of land was classified as ‘special land’ in 2015, and only 690.8 ha of that was in Thốt Nốt district. While this is a relatively small sector of Thốt Nốt’s total area, it still has had a large impact on the residents. According to a research participant about the changing landscape and industrial land use:

“Infrastructure has really changed...there are some [factories] on the main road – Hiep Thanh fisheries company and Ca Ba Sa company. I haven’t used the river water in a long time but I think that the fish must have died because the factories

discharge too much of their waste into it. It gets very polluted because of the fish blood and fat that is discharged into the river” (Research Participant, Periurban district of Cần Thơ, July 2017).

I took Image 4 in Thốt Nốt district looking across the canal to the nearby fisheries processing factory. I was standing on a small motorbike path lined with houses, looking out across agricultural land to the nearby commercial land—a true mixture of periurban land uses.

Table 2: Land use by hectare in Cần Thơ 2015 by research site district (source: Cần Thơ City Statistics Office, 2015)										
District	Total	Agricultural Land					Non-agricultural land			
		Total	Land for agricultural production	Aquaculture land	Forestry land	Other	Total	Home	Special use land	Waste land
Total across all of Cần Thơ	143,896.2	115,506.1	113,152.2	2,347.8	0	6.0	28,291.1	7,636.1	11,562.2	98.3
Ninh Kiều district	2,923.3	633.4	618.2	15.2	0	0	2,280.4	913.6	860.3	9.6
Thốt Nốt district	12,202.4	7,992.6	7,322.9	669.7	0	0	4,127.4	1,139.6	690.8	82.4
Cờ Đỏ district	31,981.5	28,166.3	27,373.8	787.9	0	4.6	3,815.3	1,378.2	1,927.4	0
Phong Điền district	12,526.1	10,457.8	10,456.8	1.0	0	0	2,066.1	618.7	562.7	2.2



Image 3: Houses lining canal in Thốt Nốt District, Cần Thơ. Looking at houses from a bridge over the canal to show proximity to the water source. One household also has a personal water storage tank next to the canal for ease of access. (Personal photo)

The most noticeable landscape characteristic in Cần Thơ is that residential homes are usually alongside waterways (see Image 5 above). In most of Vietnam the law states that the zone 10 meters from the riverbank belongs to the Vietnamese government and therefore cannot have a permanent structure built on it. Residents only sometimes follow this law and the classification of a ‘permanent’ structure seemed negotiable. In neighbourhoods off the main roads, the walking and motorbike paths are often between the houses and canal. As the city government upgrades roads from walking paths to motorbike paths, the state asks residents to donate their land for the upgrade. For improved road access many are happy to do so. However,

when the roads are widened and improved, this land is ‘donated’ by residents without compensation.

Over the past two decades Vietnam’s urban spaces have been developing at the urban fringe as cities have expanded outward with increasing demands for land, resources, and infrastructure (Pham, Raghavan, & Pawar 2010). To demonstrate this growth Table 3 below compares the average population per district in 2010 and 2015. It also shows the total area of each district, the population density per district, and the population growth per district. Compared to Table 3, in 2015 the overall growth rate of Can Tho was 6.86 percent per year. The largest growth occurred in the main urban district and the smallest growth occurred in Cờ Đỏ district.

Table 3: Area and average population in Cần Thơ 2015 by research site district (source: Cần Thơ City Statistics Office, 2015)						
District	Area (km²)	Average population (person) 2010	Population Density 2010 (km²)	Average population (person) 2015	Population Density 2015 (km²)	Growth Rate (%) annually
Ninh Kiều district	29.23	246,743	8,441.4	260,833	8,923.5	5.7
Thốt Nốt district	122.02	160,558	1,315.8	168,022	1,377	4.6
Cờ Đỏ district	319.82	124,818	390.3	126,549	395.7	1.4
Phong Điền district	125.26	100,166	799.7	101,965	814	1.8

As elaborated above in Chapter 1’s conceptual framework, periurban areas are spaces in transition on the periphery, or fringe, of a city. They include both agricultural and non-agricultural activities and are associated with the daily movement of people between the city’s

core and its fringe (Douglass 2006; Khan et al. 2013; Simon, McGregor, & Thompson 2006). The defining characteristics of the periurban rest in what Neil Smith calls ‘the vortex of social nature’ (2008). The vortex is the confluence of uneven power relations, uneven ideologies of place, uneven transformation of the local landscape, and uneven access to resources and services.

In a country where categories of rural and urban play important roles in social order, the periurban stays in a state of flux because it is simultaneously urban and rural. Li Zhang (2002) argues that individuals living in the periurban experience both exclusion and power, and that these feelings are necessary to build a socially and economically fulfilled life. Erik Harms (2011) suggests that people can feel both excluded and powerful in the periurban despite the area’s contradictory nature. This is because of local perceptions of place that determine personal framings and opinions of people’s surroundings. The categories of urban and rural help to reinforce “idealized conceptions of spatial order” (Harms, 2011; 238); produced through everyday negotiations in the periurban. Classifying rural and urban into distinct administrative units contributes to how the government manages each area—they also do this by the ordering first- and second-level cities, discussed above. Distinct categories contribute to the separation between urban and rural governments whereby neglect from both governments often creates unequal access to services for those households beyond the urban boundary (Saksena, et al., 2014). I argue that classifying the periurban as urban should benefit the region; however, this is not always the case.

2.4 Water Planning

The Vietnam Ministry of Planning and Investment 2009 Census was the last full census in Vietnam prior to my research—they are conducted every ten years. The Census defines safe

water as: “coming from an indoor or public tap, a bore well, a protected dug well, or rain water” (2011: 51). The definition explains why the World Health Organization statistics can claim that 98 percent of Vietnamese households have access to clean water (WHO 2015). There have been clear improvements in access to water across the entire country since the last national Census in 1999. However, the results show unequal access between urban and rural areas in that urban residents had higher access to safe water (Ministry of Planning and Investment, 2011). The World Bank’s (2011) Vietnam Water Utilities Database claims that access to water and sanitation services in cities depend on city size—larger city size correlates to better access.

The 2009 Census defines hygienic toilets as “flush toilets with septic tanks or sewage pipes” (Ministry of Planning and Investment 2011: 53). It classifies access to sanitation as access to hygienic toilets, of which there have also been improvements since 1999. As urban residents are more likely to have access to flush toilets, the Census suggests they have better living conditions compared to rural residents. This classification is problematic because it lacks consideration for households that dispose household sewage into fields and gardens as fertilizer. Also, the lack of consideration for periurban areas in the Census does not account for multiple means of access to sanitation. Despite national improvements in the last decade, wastewater treatment and sewage management operates at a low capacity.

Vietnam has made significant improvements in recent years to the sanitation and wastewater treatment sectors despite the Asian Development Bank claiming that “less than 10% of urban wastewater in Viet Nam is centrally treated” (Asian Development Bank 2015: 2). By 2009, six Vietnamese cities had functioning wastewater treatment plants (World Bank, 2011)—Cần Thơ City was not one of them. By 2012, Vietnam had constructed 17 municipal wastewater

plants (World Bank 2013). By 2018, Vietnam had 41 wastewater treatment plants in operation (Nguyen 2018).

In February 2014, an industrial wastewater treatment plant went into operation in Thốt Nốt Industrial Park, Cần Thơ. However, according to the People's Committee of Cần Thơ City Urban Development and Resilience Project Plan, this plant “mainly [serves] seafood companies operating in the industrial park” (2015: 17). The most recent wastewater treatment plant in Cần Thơ, and biggest in the Mekong Delta, went into operation in August 2015 at the Tra Noc Industrial Park in a periurban district of Cần Thơ. The wastewater system “includes 10,885 metres of pipelines and 13 reservoirs. Treated water is discharged into Sang Trang Canal and the Hậu River” (Vietnam News 2015). Only companies inside the industrial zone use this treatment plant. If companies of the Tra Noc Industrial Park discharge treated wastewater, they pay lower tariffs (CDIA 2015). There are two wastewater treatment plants for industrial zones but no treatment plants in Cần Thơ City for urban wastewater. There are also no garbage treatment plants in Cần Thơ City and the proposed plants for the Mekong Delta are much too small to accommodate the 650 tonnes (Vietnam Net 2017) of waste that the city generates each day.

2.5 Household water planning

As is common with rapidly developing economies, infrastructure and service investments did not always keep up with Vietnam's high GDP growth. UNICEF's 2016 water, sanitation and hygiene report showed that access to piped water in urban areas reached 98 percent in 2012 but that only 61 percent have an in-home connection. Access to piped water means a household has the potential to have piped water in the home, but due to cost of connection, or poor quality of piped water some households do not have a piped water source. These figures fail to address service provision conditions, gendered or marginalized access, utility leakages, and exclusion

based on hierarchical city areas or periurban areas. It also does not distinguish between primary, secondary, and tertiary urban areas or between urban centres and periurban areas. There are also financial considerations linked to the above access figures that can distort reality. According to the UNICEF 2016 report, “the reliability of the data on which [the programs] figures are based is disputed and may overestimate the access rates” (8). Furthermore, there is an absence of local government enforcement for quality service provision and a major disconnect between urban and rural governments in coordinating water infrastructure (Dutt et al. 1994; Kaika, 2005; Loftus & Lumsden, 2008).

The disconnect between urban and rural water infrastructure access is apparent in periurban Cần Thơ when examining how residents access various types of water—many residents use multiple methods to draw daily water; some complex, and some simple. As seen in Image 5 above, the houses sit on the canal embankment allowing easy access to the canal. Most residents do not use the canal or river water for drinking or cooking purposes, but almost all households will use the canal or river water in some form. If residents must use the canal water for drinking and cooking they are often aware of the potential negative effects, and they take as many precautions as possible. When filtering and cleaning the river water and groundwater most residents let the solids from the water precipitate, which pulls the solid debris out of the liquid.



Image 4: Ground water pump and process of precipitation. The fan is not shown but it would sit beside the water basins to combine sediments into a solid on the water surface (Personal photo)

Image 6 shows part of the ground water cleaning and precipitation process. To precipitate the solids, they place the container of water in front of a fan and then collect the solids from the water surface. The fan acts as a very weak centrifuge that ‘spins’ and presses the sediment into a solid they scrape off the surface of the water. After the solids precipitates, they leave it to sit in containers for approximately two days. The final step is to boil and store the water in containers for cooking and drinking.



Image 5: Small and 'large' water pipe system. The small pipe goes to the commune water supply station and the large pipe goes to the district water supply station. Some periurban areas have access to both commune and district level stations. They are above ground and these are running alongside a bridge. (Personal photo)

Most households want access to the commune or district piped water system (see Image 7) regardless of other sources available to them. As the rivers and canals become more polluted, residents will pay for access to piped water so they have one more access choice. The piped water systems are subject to frequent disruptions because pipes break, and the small water supply station tanks need frequent cleaning, which shuts down the supply. Image 7 shows two exposed

pipes along the side of a footbridge. This is a common sight and shows how vulnerable the exposed pipes are to breakage. There are two different sized pipes in Thoi Dong commune, Cò Đỏ district. The small water pipe is the commune water supply and residents often complain about the notoriously low water pressure and that the poor quality of the water leaves black sediment after boiling. The large water pipe is significantly better, but it is also more expensive per litre of water and its geographical distribution has a smaller reach.



Image 6: Household rainwater collection barrels sitting outside alongside the house walls. Covered to keep out debris, animals, and insects (Personal photo)

Residents regularly collect rainwater and many rely on it as a primary water source. Many houses will have anywhere from one to eight rain barrels lining the outside house walls.

Families or individuals who cannot afford the cost of a 200 litre rain barrel will fill any spare 20 litre water jugs they have available. This is a common practice used to offset the cost of buying bottled water for drinking. If only used for drinking water, four to five large 200 litre ceramic barrels will last a family of four the entire dry season. Image 8 above shows these 200 litre ceramic barrels and how they are covered and secured to prevent debris from contaminating the rainwater. Residents collect rainwater from drainage off the roof and it sits in the barrel for two to three days, which lets any loose debris settle. After the water sits, they transfer it to a clean water barrel and cover, to keep it free from debris, insects, and animals.

Resident's use of the various water sources does provide them with their basic water needs, but what the above descriptions of the various water sources demonstrates is the tiered nature of each water source and the efforts that each resident must commit to for water access. Each provides residents with different water needs that when combined can make up full water access. Even as demands for water in Vietnam are changing, the ability for residents in the Delta to have multiple sources of water is important and speaks to the Delta's historical processes.

3.0 Conclusion

This chapter provided a review of historical processes and the historical legacies of water access in periurban Cần Thơ. I offered a brief historical overview of Vietnam in order to provide a full understanding of the current political landscape. I then provided an account of modern history in Vietnam since Đổi Mới by discussing economic growth, urbanization, and general landscape planning. This allowed me to provide context on the administrative and physical landscape of periurban Cần Thơ. The modern historical overview demonstrated how Đổi Mới opened up the economy and started a flourishing private sector that changed the country as a

whole. However, access to and distribution of social services like garbage collection, sewage systems, and water systems did not match Vietnam's economic development progress.

Access to the various forms of water in periurban Cần Thơ is the outcome of how residents use the material legacies of French colonial infrastructure development coupled with Vietnamese administrative practices since French colonization. The canals were constructed by the Vietnamese people during the period of French colonization, and since then, piped water systems have been built through contemporary government practices. The historical processes mentioned above also all have historical legacies that shape water access practices today. Where periurban residents are settled, land ownership, land uses, and the various water sources all have important distinct historical legacies that informs my research.

CHAPTER 3: METHODOLOGY—NEGOTIATING RESEARCH AND ‘MAKING IT WORK’

Human behaviour reveals uniformities which constitute natural laws. If these uniformities did not exist, then there would be neither social science nor political economy, and even the study of history would largely be useless. In effect, if the future actions of men have nothing in common with their past actions, our knowledge of them, although possibly satisfying our curiosity by way of an interesting story, would be entirely useless to us as a guide in life. (Vilfredo Pareto In Cours d'Economie Politique, 1896-7, Vol. 2, 397)

In this chapter I discuss the specific steps taken to answer my research questions outlined in Chapter 1. The primary goal of my research was to examine water users in the Mekong Delta's periurban districts to understand how residents incorporate various forms of water access into their daily lives and how their daily practices shape local perceptions of place. This chapter begins with a discussion of my research epistemology, which outlines my use of Feminist Geography (FG) methods. I then turn to a description of how my research project came to fruition. I give an overview of what brought me to York University, the importance of language study, my site selection process, a general discussion of how the research was possible, and then the archival and interview processes. The final section of this chapter describes my research sites in Cần Thơ's periurban districts to paint a picture and set the scene for ensuing chapters.

1.0 Research epistemology

My point of departure is water. Over the course of this project I traced the flow of water through the city of Cần Thơ and three periurban districts to determine who and what influences water quality, quantity, distribution, and access from both historical and contemporary

perspectives. I identified key stakeholders to determine who are vulnerable and what vulnerability means for resource and service access in periurban Cần Thơ (defined in chapter one). The discussions I had with residents in periurban Cần Thơ during field research interviews were more than just interesting stories about people's lives in the Mekong Delta. Residents' stories about their daily water use told me about the region's history, the current state of water affairs, and projections for the future.

Learning about residents' daily lives and their vulnerabilities (or lack thereof) during fieldwork was challenging, and it forced me to face my own vulnerabilities. Incorporating FG methods into my research project not only informed my research, but it helped navigate the difficulties of fieldwork. I take this section of my methodology chapter in part from a coauthored work in progress with my fellow PhD candidate in Geography at York University, Kim Roberts. Prior to starting graduate school, we understood that successfully completing a PhD program would require self-discipline and self-reliance. Our work would mostly be our own, and much of the journey would be independent. Studying feminist methodologies opened up our perspectives and gave us tools to share our emotional experiences (Lopez & Gillespie 2016) as researchers, graduate students, and feminists. Kim and I went through many similar experiences and timelines for completion of our research since the beginning. We learned to use our similar circumstances to our advantage and challenged each other to think critically about our perspectives and understandings. We learned early in the PhD process that having friendships with people who share similar research goals was integral to our academic success. Much of the geography literature on friendship is based in geographies of care (Bowlby 2011; Lopez & Gillespie 2016) and focuses on how friends share burdens and support each other. While the geographies of care resonated with us to a certain extent, we broadened our understanding of the

importance of friendships and emphasized how academic friendship is an important tool for feminist praxis. Academic friendship as feminist praxis helped us to challenge each other and delve deeper into the more problematic areas of our research, while also providing a safe space to process the challenges.

Kim and I used our academic friendship as a means to figure out how to incorporate feminist methods into practice during research. At the start of our journey to become feminist geographers, we did not carry the necessary vocabulary to discuss our positionality, the historical context, or our feminist research goals. Given our backgrounds working in Southeast Asia before conducting dissertation fieldwork, we expected the research process to be relatively simple. However, we quickly realized during preliminary fieldwork that we were wrong. We like to refer to this as our “Oh, fuck” moment. This was the moment where our friendship developed as a means for feminist praxis and we began to discover the necessity of feminist methodologies in our research and academic lives. Using friendship as an FG tool helped us to bring self-reflection to a new level. Informal co-reflection informed large aspects of each other’s work.

2.0 The project: ‘Making it work’

I incorporated feminist methodologies into my research project from the beginning, well before I had the vocabulary or background to realize it was a part of my project. However, as mentioned above, the more I understood the FG literature and methodologies, the more engrained they became in my research. In this section, I describe how my research came to fruition, and the processes involved. To start, I examine the importance of studying the Vietnamese language, which leads to how I chose three periurban districts in Cần Thơ as my research sites. I then turn to the factors involved in making my research project a reality after I

selected the site. I then finish this section with a review of the processes involved in my archival work and interviews.

2.1 Language

Learning the Vietnamese language influenced my decision to conduct this research in Vietnam. I began studying Vietnamese during my undergraduate degree in International Development because I needed some language skills for an eight-month placement in Hanoi. The time spent learning Vietnamese before the placement in Hanoi and during the placement meant I had already built a foundation. English is not widely used at the provincial or commune level in the Mekong Delta. During my preliminary fieldwork trip to Cần Thơ I realized that prioritizing the continuous study of Vietnamese would be valuable. I devoted considerable effort to improving my Vietnamese language skills during and after the preliminary trip.

I attended the Southeast Asian Studies Summer Institute at the University of Wisconsin–Madison as an important pre-fieldwork, eight-week intensive Vietnamese language study. I took part in the intermediate group classes alongside Vietnamese-American students who spoke Vietnamese at home but lacked formal written knowledge of the language. I was the weakest link. My classmates could converse fluidly with each other and the teacher and had mastered listening and tones; things I struggled with. These barriers forced me to work even harder and helped me improve my pronunciation and tones.

Language ability provided greater insights on the broader contexts of my work because much can be lost in translation. Even though I could never conduct a full interview in Vietnamese, or converse quickly with research participants, I could introduce myself and the project. I was comfortable with small talk and the friendly ‘get to know you’ Vietnamese conversations. During almost every interview we did, research participants appreciated my

intermediate level attempts at communicating, and helped participants to feel more comfortable with my presence. These interactions helped motivate me to continue private Vietnamese lessons during fieldwork thanks to a generous language award from the York Centre for Asian Research.

2.2 Selecting a research site

I conducted preliminary fieldwork the summer of my first year in the PhD program. My intention was to establish the necessary groundwork for further dissertation research. The eight-week period was used to find a research site, make contacts, and determine the feasibility of my research questions.

Most of the literature that I read before preliminary fieldwork focused on Ho Chi Minh City and Hanoi—Vietnam’s two biggest cities. This emphasis in the literature is due to their large populations and that they host most of the country’s NGOs, universities, and government funded organizations. Given that both cities host most of the country’s academic and NGO resources, doing research in these cities is easier for locals and foreigners alike. Instead, I conducted research in Cần Thơ, a secondary city with a notable university and that is a relatively well-researched location despite being often overshadowed by the country’s main hubs.

Prior to selecting Cần Thơ, I considered other possible research sites included Hue in central Vietnam, Hai Phong in coastal northern Vietnam, and Ha Tien in the Mekong Delta. During the rainy season Hue experiences heavy flooding. I was interested in researching how excess water runoff was managed alongside daily water access demands. There is limited published research about Hai Phong but it interested me to learn about coastal city water access in a heavy tourist area near Ha Long Bay. My third choice, Ha Tien, in the Mekong Delta, would have been an interesting research site because of its coastal location on the Cambodian border. In

the end, water planning experts in Hanoi advised me to consider Cần Thơ, the capital of the Mekong Delta despite the other locations having many research possibilities.

Conducting research in Cần Thơ would make the research experience easier than the above-mentioned cities because of its status as a first-class city and proximity to Ho Chi Minh City. The city is also home to a well-established university and a reputable Water Resources Department. Given Cần Thơ's colonial past, I could find a reasonable number of journal articles written about the city and its history, which formed a starting point. While in Cần Thơ I developed a relationship with the Water Resources Department through whom I could obtain a research visa and gain the necessary permissions to move around the city's periurban districts. During my initial meetings with the Department I learned more about the city's long colonial history and about the water infrastructure developed during the French colonial era. I also became interested in the fact that despite being in a low-lying delta, the city rarely experiences severe weather events. As I did not have the appropriate government permissions, during my initial visit to Cần Thơ I could not visit the periurban districts.

2.3 What made the research happen?

I was unprepared for organizing fieldwork in Vietnam despite having convinced myself otherwise. I was confident in my language skills, had previously worked and conducted research in Southeast Asia, had written my detailed research proposal, and was the recipient of prestigious research grants—the International Development Research Centre (IDRC) 2016 Doctoral Research Award and the Bentley Research Fellowship. However, all of my preconceived notions and previous experiences had not prepared me for research in the Mekong Delta. Despite thinking this research project was under my control, it was not.

The initial process to gain official permission and a research visa into Vietnam was a challenge from the beginning. My first time living and working in Hanoi I interned for a water resources non-governmental organization (NGO)—The Centre for Water Resources Conservation and Development (WARECOD). I was a naïve undergraduate student oblivious to the administrative processes that brought me to the country the first time. Conducting preliminary fieldwork did not require official permissions as I was not engaging with a specific research site or gathering specifically targeted data.

In contrast to my previous time in Vietnam, to procure official permission to conduct research, I first needed to obtain an official affiliation with Cần Thơ University. I contacted the head of the Water Resources Department—whom I had met during preliminary fieldwork—and requested to begin my dissertation research. I bought a plane ticket many months in advance, submitted paperwork to both the Vietnamese government and Cần Thơ University, which included a detailed research proposal, specific interview questions, interview locations and dates, and precise information on who I wanted to interview. In the end, it took many months of delays to procure the correct research visa and to begin my field research.

My research team in Cần Thơ was exceptional. Local fieldwork would not have been possible without their support. Anh, my translator, I met by chance. She had seen my IDRC and Bentley Research Fellowship grant announcement and contacted me. Anh had recently completed her master's degree at Chiang Mai University and was from Cần Thơ. She was fluent in English and her research interests were in a similar field as mine; we had an overlap in geographic theories, frameworks, and vocabulary. While she was not affiliated with Cần Thơ University, our similar research interests and her ability to speak her mind made her invaluable from the beginning. As per my agreement with Cần Thơ University, I also hired a Cần Thơ

University student, Luat, to act as a research assistant despite already having hired Anh. The extra person on the research team was not always necessary but having more than one person to talk over ideas and revisit daily events proved useful. I will discuss a specific example in the interview section.

2.4 Stepping back in time: Archival research

Initially, I planned to conduct archival research at the end of my research period, if time permitted. My plan was to gather information about the past by talking with informants about their experiences with the natural environment and water infrastructure. However, given that I needed to wait almost five months before starting interviews, I needed to fill my time. This led me to the Vietnamese National Archives II in Ho Chi Minh City. The Vietnamese National Archives II consists of documents related to the French colonial period in Vietnam between 1880-1945. I went into the archives searching for information on the province and city of Cần Thơ starting in 1910. Initially, I was also looking for any information starting from 1880, but the majority of these documents were not legible, and record keeping in the early colonial period was not as detailed. I looked through the archival index books for any information pertaining to land use in Cần Thơ, its districts, and relevant waterway construction projects.

Permission to access the National Archives is granted on a case-by-case basis as there is no systematic declassification of government documents. To request permission, I needed to apply with a research proposal, an official letter of affiliation from Cần Thơ University, and an official letter of support from my supervisor at York University. Foreign researchers undergo a three-tier approval process, which includes approval by the archive director, approval from the central government agency overlooking the archives, and then approval from the document storage staff in Ho Chi Minh City. Surprisingly, gaining archive permission was the easiest part

of all of my time in Vietnam. The information I found in the archives turned out to be unexpectedly useful for understanding water access today in Vietnam and is why I dedicated so much time there in the beginning. This was also the one aspect of my research I could do independently because I did not require a translator, a research team, or a government guide. Speaking French became one of my greatest assets as all the documents from the French colonial era are in French.

I could submit three pages of document requests each day, with about five to ten documents per request page. For each document, I had to explain how I expected each document would be useful. I learned to only request a maximum of two document request forms per day and to never request a document more than once. Each document is classified so once access is denied, they would not grant it under any circumstance. This meant that I ended up accessing only about 60 percent of the documents I requested. Requesting documents was a painstaking and methodological task. Nothing is digitized so to find a document to request, researchers must flip through large relatively unorganized index books that listed the title of each document folder. However, the methodical reading of these lists, and then taking hand-written notes in French from the colonial documents turned out to be my favourite part of the research experience. I spent a large proportion of my time reading through French colonial archives, which ended up changing a lot of my research focus. I started seeing patterns in how the colonial water infrastructure played a major role in water access behaviours today.

2.5 Research Site

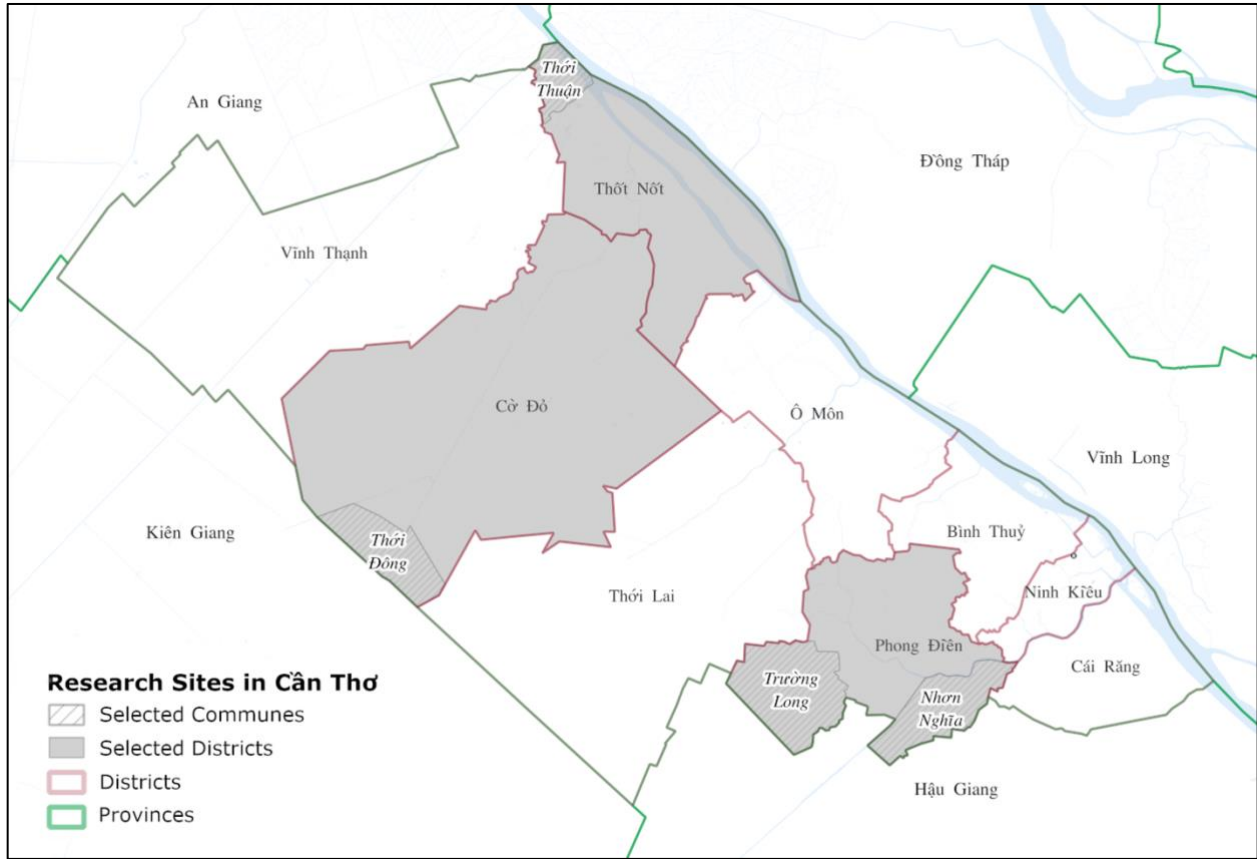


Figure 6: Map of Research Sites in Cần Thơ, Vietnam at the commune and district levels (source: Prepared by author based on GADM, 2018 and OpenStreetMap Foundation, 2018).

I conducted my research in four communes, within three periurban districts of Cần Thơ: Nhon Nghia and Truong Long communes, Phong Điền district; Thoi Thuan commune, Thốt Nốt district; and Thoi Dong commune, Cờ Đỏ district (see Figure 2). Cờ Đỏ is the largest of the three districts (31,981.5ha), followed by Phong Điền (12,526.1ha) and Thốt Nốt (12,202.4ha) (see Table 2). I spent most of my time in Ninh Kiều district as it is home to Cần Thơ University, the provincial level administrative and government offices, the city's main water centre, and is also the main hub of the city (see Figure 2). Figure 1 shows the close proximity of Phong Điền district to Ninh Kiều district. Initially, because of the distance between these districts, I expected Phong Điền to 'look' the least 'rural' of all three districts, to have better infrastructure, and have

better access to services compared to Cờ Đỏ and Thốt Nốt. However, proximity to Ninh Kiều did not mean Phong Điền was prioritized more in terms of water service distribution and access to services. In reality, Phong Điền was the least residential of the three research sites (see Table 2).

To reach Nhon Nghia commune, Phong Điền district (see Figure 2), we drove by motorbike for 30 minutes before reaching a pay ferry to cross the large Xà No canal (see Image 9).



Image 10: Ferry canal crossing. Phong Điền district, Cần Thơ (Personal photo)

This canal crossing is a necessity for Nhon Nghia residents because the commune does not have a bridge to cross the canal—something that the residents say is slowing down the commune’s growth. To reach Truong Long commune, Phong Điền district, there is no ferry crossing and the commune is located only a short walk off the district’s bustling main road. Despite being so near the main road, the path leading to the house shown in Image 10 was a small walking path.



Image 11: Canal water is the primary water source of this household. The canal is at the front of the household and water is put into the ceramic container during high-tide for daily use Phong Điền District, Cần Thơ (Personal photo)

The household in Image 10 does not have access to piped water and does not expect to receive any in the future. Instead, she uses the canal next to her home during high tide for everything

except drinking and cooking. For drinking and cooking she collects rainwater using a rain water barrel that sits outside to collect runoff from the roof.

2.6 The Interviews

This section outlines the interview processes and the types of interviews I conducted for my dissertation research. Here I also discuss the Vietnamese university system and the national political views of social science research to highlight some of the underlying factors that can create daily struggles when conducting research in Vietnam.

During French colonization, very little was invested into the higher education system and “as a result, after independence Vietnam had very weak institutional foundations to build on” (Vallely & Wilkinson 2008: 3). Furthermore, until Đổi Mới, Vietnam was not accessible to international researchers (Waibel & Ehlert 2012). In 2005, the Vietnamese government implemented Resolution 14/2005, a resolution to reform national higher education by 2020 with the goals of improving teaching quality, increasing enrollment, being internationally recognized and competitive, improving university research capacity nation-wide, and building accountability and leadership (Hayden & Lam 2007; Huynh 2016; Trines 2017). Higher education in Vietnam has come a long way from its traditional style of “teaching without research” (Huynh 2016) but there are many claims about how far the national higher education reform has yet to go (Denison et al. 2017; Huynh 2016; Ly 2013; Tran 2014). Criticisms includes “a lack of new ideas; limited knowledge of research methodologies; and a shortage of research skills...The lack of research expertise and the extremely poor information resources that researchers can access in Vietnam are one of the biggest obstacles” (Denison et al. 2017: 20). Furthermore, academic institutions are highly centralized and most decisions are made by the central government, which promotes a lack of accountability and corruption (Vallely & Wilkinson 2008).

I partly attribute the lack of research capacity to access restrictions for both Vietnamese and foreign researchers. Despite lifting some research restrictions since the late 1980s, the Vietnamese government system does not often welcome critical social science research. Therefore, for a long time, interest in the social sciences has been low (Phuong & Thi 2016). A study completed by Huynh found that “academics in sciences of biology, physics, and health/medicine published more articles than the academics in the social sciences” (2016: 23). This is thought to be in part because there are stronger international relationships between applied science departments, which improves academic research capacity and builds stronger research management. The social sciences in Vietnam are also thought to be lagging because of a lack of research grants and limited state funding, most likely due to a distrust of critical social science research and the associated methodologies.

The most common methods for conducting research are those that produce quantitative data that are statistically significant and have a big enough sample size. Therefore, for social science research, surveys are most commonly used because a large sample size can be used and surveys have greater statistical power to validate results. Ethnographic and “qualitative methods such as participant observation and long in-depth interviews are considered unscientific or at least irrelevant” (Waibel & Ehlert 2012).

“Why do you not have any measurement equipment if you study water?”

“Why do you need so much time talking to people?”

These questions were repeated for the duration of my research period in the Mekong Delta. I would explain that I was not a hydrologist taking water samples, but that I was in fact a social scientist studying how water is used and how people and households access water daily.

Some people would ask why and tell me that people in the Mekong Delta already have access to water.

More often than not my research questions were met with laughter. Government officials acted as if I was wasting their time and, even though they had received my interview questions in advance, would ask “what is the point?”. In Vietnam, the social sciences are rarely applauded for contributions to research, or even seen as valid science. At times, it was difficult to see past the critical remarks and self-doubt that my project had merit. However, over time and thanks to my skilled and very positive research team, I saw that my research had merit. The formal interviews, and my overall research struggles, highlight the disciplinary misunderstandings between Vietnamese and North American institutions.

Each interview took approximately 30 minutes to one hour to complete. I was required to gain official government permission letters to visit my research sites and conduct interviews. To receive official permission, I submitted a highly detailed research/work plan that included dates and times of each anticipated meeting, specific names of whom I would interview, and the exact interview questions. It was normal for my official permission and work plan to be revoked. When this occurred, I would resubmit the paperwork and begin the process again.

Despite the complicated official procedures, I conducted diverse interviews during fieldwork to gain detailed, in-depth descriptions of both local everyday water access practices and local government practices. During every interview I simultaneously conducted simple observations and took detailed notes of what was happening in my surroundings. The practice of considering interview locations and surroundings is an essential component of feminist qualitative research methodologies (Elwood & Martin, 2000). The interview location can set the tone of a session: it matters whether it takes place in a formal setting of a government board

room (Image 11), or an informal setting at a family table outside of a resident's home (Image 12).



Image 12: Conducting formal, structured local authority interviews at Phong Điền District government offices, Cần Thơ. Standing with Anh (far left) and Ms. Hanh (middle). April 26, 2017 (personal photo)



Image 13: Conducting semi-formal, in-depth local resident interview at resident's home in Thốt Nốt District, Cần Thơ. Sitting with Ms. Hanh (left) and Anh (right). July 11, 2017 (personal photo)

Notes that I took after interviews reflect the importance of recording observations as research:

“We were taken into a boardroom with one of those beautiful massive wooden tables. This one had a unique twist...a cut out in the center with faux grass and faux flowers ‘planted’ inside. It was very elaborate. Once we were seated with the men sitting across from us, Ms. Hang introduced us and explained my research. By the looks I got, they didn’t understand...I found this strange because they had the questions in advance and I could see that they had their scripted and printed answers laying in front of them...”

(Personal reflection notes: Local Authority interview with the Cần Thơ Water Supply Company and the Department of Agriculture and Rural Development, April 4, 2017, Cần Thơ, Vietnam).

Looking back on my reflection, and analyzing it alongside the interview responses, provides worthwhile insights and promotes self-reflexivity. Engaging in reflexivity allows me to consider my positionality and how my presence, or lack of presence, during interviews can change the response given by informants. Interviews and meetings that occur inside formal spaces always feel more rigid and government officials expect a level of ceremonial greetings of respect that I did not encounter during household interviews in residents' homes.

Initially, I planned to conduct all interviews and surveys alongside my translator. I would interview or survey, at random, within each commune and only speak with those who agreed, on their own terms, to participate. In reality, however, random selection was not possible because the government guide assigned to my research team only let me speak to the individuals they chose. There was very little random selection apart from a drunk individual who I describe below and exemplifies the need to 'go with the flow'. Cần Thơ University required that a university representative accompanied me for each day of field interviews to ensure that I followed protocol. She would also show my permission letter to the commune level People's Committee, 'sign us in', and introduce us to our appointed government guide at the beginning of each day in the field. My research team each day thus included a university administrative staff member, a university appointed research assistant who helped with some translations and administrative tasks, my translator, and then one or two government guides from the district or commune People's Committee office.

The lack of choice I felt was troubling at most stages of my research. During some interviews it was clear that the research participants were not given a choice but to participate. When it was not explicit in body language, Anh was sure to let me know when we were unwelcome in the participants' homes. On these occasions, I would try my best to show extra

gratitude for their time and try to reduce the time spent in their home as much as possible. On one occasion, the participant was very drunk. The local government guide had told him I needed one more individual for an interview and the guide wanted it done quickly so he could go home. I removed that interview from my analysis. Furthermore, I could not reschedule for another date in this commune. Another instance occurred when a woman was in a rush to pick up her children from school. Understandably, she was distracted and gave short answers until telling us she had to leave. This was the only instance in which a research participant did not do what was asked by the government guide.

Over the course of my research, I conducted 62 household surveys. I used the surveys to gather more general knowledge about water access practices in periurban households. Generally, surveys are used to assess large populations and to collect large amounts of data. While I did not have a large sample size, I primarily used the surveys so that I could statistically analyze water access questions and responses. Each survey took approximately 30 to 40 minutes to complete and I asked 80 questions. The questions covered individual information, physical dwelling information, water supply in general, the participants' evaluation of their water supply systems, and their expectations of future water supply. These questions allowed me to compare all households across the three districts.

Having an RA in the field during interviews meant, in the eyes of the university, that we could finish all the household surveys in half the time. After the first survey, I was told that my RA would conduct surveys simultaneously because he could complete three surveys in the time I could do one. I could only negotiate that my RA would only conduct half the surveys scheduled each day. I felt conflicted over how this might alter my results because I could not ask my own follow-up questions and the university had instructed my RA to ask no follow-up

questions to speed up the survey process. In an effort to engage with feminist research methods, I built a gendered analysis of the survey question results. I kept track of which households my RA interviewed and which households Anh and myself interviewed. I also made notes on which households had a government guide present for the interview and for which questions the guide answered on behalf of the research participant. These notes became important when analyzing whether my informants were more likely to open up in their answers with women and a westerner present versus a male Vietnamese. This use of compromise helped me to both reduce the sense of panic I felt about losing control over my project and allowed me to consider where I could include feminist methods in my project design.

I conducted 24 in-depth interviews with residents of Thoi Dong commune in Cờ Đỏ district, Nhon Nghia and Truong Long communes in Phong Điền district, and Thoi Thuan commune in Thốt Nốt district. I conducted them in the same communes and districts as the household surveys. I meant for these interviews to engage with FG to understand everyday water uses and practices while simultaneously asking questions about residents' personal thoughts and feelings about living on Cần Thơ's fringe.

During in-depth interviews and surveys alike, I avoided geographic jargon and specific geography terminology like 'periurban' and 'water access'. Instead, questions included the following topics: comparing where they lived to how they thought people in the city or the countryside lived; explaining how they interpreted where they live; explaining how they use each of their listed water sources throughout the day; how families ensured safe access to drinking water; and whether they worried about running out of rainwater during the dry season.

I interviewed eleven government officials to trace the flows of water through the city of Cần Thơ, and to determine if there was a difference between what residents and government

workers understood as water access. I wanted to understand the connections between the various government departments and how departments overlapped in terms of water distribution. To do so, I met with various commune and district People's Committees, local water supply station managers, the Department of Natural Resources and Environment (DONRE), the Cần Thơ water supply company, the Ministry of Construction, the Climate Change Office of Cần Thơ, and the Department of Agriculture and Rural Development (DARD).

At the end of my fieldwork year, I was not sure whether I could fulfill my research goals. In September 2017, my latest government permission letter was revoked again at the very last minute—due to a typo in the paperwork. This meant that I might not finish 40 percent of the combined household surveys and in-depth interviews that I had planned. Despite continuously asking to be informed about new schedule information, I could not get answers. I knew I needed another month for new permission letters, and no one could guarantee whether permission would be revoked again. In the end, I could not complete the remaining surveys and in-depth interviews for reasons unrelated to the permission letters. Accepting that I would leave Vietnam without fulfilling my fieldwork goals was difficult. Ultimately, I decided that I had enough information to answer my research questions and reach my broader research goals despite not being able to complete as many interviews as originally planned. During fieldwork I learned that as a researcher I did not have control of very many situations and that if I wanted my project to move forward I would have to accept this fact. I became acutely aware of the implications of formal research ethics, which generally assume researchers have complete control over the project and research situation. However, my experience did not allow me to make many decisions on my own about who I would interview or sometimes even about the questions I was able to ask. It

was only when I learned to step outside of the stress of not having control over my research that I made the greatest strides in my research project, and in my personal development.

4.0 Conclusion: A reflection of positive and negative outcomes

Upon reflection, if my research had gone according to my original schedule, I would not have conducted extensive archival research in Ho Chi Minh City. Archival research became the part of my project where I saw the most progress in relation to answering my research questions concerning water access, and I even developed new questions for upcoming interviews through this research. I thus found the archives were the best use of my time. As issues came up and schedule delays started to become a regular occurrence, I spent even more time at the archives. As a result, I am able to devote an entire chapter of this dissertation to the findings of the archival research. Writing and working through chapter four, historicizing the Delta, ended up being the most enjoyable part of the dissertation process.

At the end of my field research I had completed 60 percent of the planned interviews, meaning my final sample size was 40 percent smaller than I originally planned. However, I had also gathered significant archival data. Choosing to wrap up my research prior to meeting my interview target project was difficult but ultimately, the number of research participants I did speak with provided me a large enough sample size answer my research questions. The remaining interviews would have only served to give myself a larger sample size to analyze.

As a final note, I might add that, feminist methods taught me that I should draw from my own observations and personal journals kept during fieldwork. Ultimately, these observation notes ended up being a large part of the final research materials. Critical human geography does more than aim for strong arguments based on large sample sizes, it also calls for more time spent with fewer research participants to gain in-depth understandings.

Leaving a large portion of my intended interviews uncompleted was acceptable because of the emphasis I ended up placing on archival and historical research. Ventresca and Mohr (2001) argue that “archival work provides a basis for defining key questions, establishes a base of evidence, and supports debates about familiar forms and mechanisms” (4). Archival work also helps to determine certain path dependencies, power structures, and processes of change that are difficult, and often impossible, to discover with interviews and observation alone. As stated by Ventresca and Mohr, “the complexity of the task leaves open an especially wide space for intellectual disagreement” (2001: 4). I appreciate archival work for the ability to interpret, draw on, and build on historical findings in similar ways that Kooy and Bakker (2008) utilized archival materials. Archival materials also allowed the opportunity to look for information that is most directly useful for my research.

CHAPTER 4: THE HISTORICAL LEGACY OF WATERSCAPE CHANGES IN CẦN THƠ, VIETNAM AND THE SOCIAL IMPLICATIONS ON WATER ACCESS TODAY⁴

1.0 Introduction

French colonial rule expanded over three regions of Vietnam between 1862 and 1945: Tonkin (north), Annam (central), and Cochin China (south) (Nguyen-Marshall 2005). The Mekong Delta, previously Cochin China, is home to an extensive canal system measuring approximately 1,708km (Vietnam Water, Sanitation and Environment JSC 2016). During French colonization, the canal projects were meant to act as transportation networks, a water supply, flood control and drainage, and irrigation. The canals were also meant to make passage between Saigon and the Delta faster and safer. The colonizer's goals were not met because they could not plan effective systems for the physical landscape, and also because peasant farmers claimed the water system for their own purposes. While the canal systems were only one of the historical legacies left behind from French Colonization, the influence of the French changed the face of both the landscape and waterscape of the entire delta region. The large-scale infrastructure interventions may not have fulfilled the original goals, but they shape local resilience practices today.

Cần Thơ sits in a low-lying floodplain in the middle of the Mekong Delta and experiences flooding events three to four months per year (Pham, Ehlers & Subramanian 2009). While relatively safe from extreme weather events, its low terrain makes it prone to occasional extreme flooding or drought (Vietnam Water, Sanitation and Environment JSC 2016). Today, the

⁴ Allen, Sarah (2020). The historical legacy of waterscape changes in Can Tho, Vietnam and the social implications on water access today. *Singapore Journal of Tropical Geography*. <https://doi.org/10.1111/sjtg.12313>. This chapter is a slightly revised version of this published article.

Delta is a unique landscape and home to 17.5 million people—approximately 22% of the national population (General Statistics Office of Vietnam 2014). In 2009, nearly 30 percent of the Delta’s population was urban based on state classification, while 76 percent of the population was rural and engaged in agriculture (Huynh 2011). Established in the mid-18th century (Shannon 2009), Cần Thơ is the Delta’s largest urban centre and home to approximately 1.2 million people (General Statistics Office of Vietnam 2014). The City is expected to grow at a moderate pace due to inward migration from rural areas and an increase of industrial zones (Huong & Pathirana 2013). The city’s growth has put pressure on existing infrastructure and increased demand for water (Moglia et al. 2012).

Asia is home to 60 percent of the world’s population (World Population Review 2019), and most of that population lives in a delta (Saito 2001). Deltas across South Asia, East Asia, and Southeast Asia have experienced important transformations—both positive and negative—and the people in these landscapes manage to, over time, adapt to these unique changes. This article contributes to the wider literature on the global importance of delta systems. While the Mekong River Delta is unique, it shares characteristics with other deltas, including the Indus, Ganges-Brahmaputra-Meghna (GBM), Irrawaddy (Ayeyarwady), Chao Phraya, Mekong, Red (Song Hong), Pearl (Zhujiang), Changjiang (Yangtze), and Huanghe (Yellow) rivers (Woodroffe et al. 2006: 277). They all experience the effects of seasonal rains that inundate the low-lying floodplains (Chan et al. 2012). Human activities like dam construction, intensive agriculture and aquaculture, drainage canals, industrial development, and urbanization have influenced Asian Deltas (Chen et al. 2005; Hara et al. 2005; Hori & Saito 2007; Saito 2001). Deltas feel the immense environmental pressures and the negative side-effects of rapidly developing economies. Asian Delta related problems are associated with poverty and a lack of decision-making and

policy development capacity (Chen et al. 2005) to overcome such problems. Identifying the differences, complexities, and implications of the Mekong's historical legacy can contribute to the growing body of important literature on the adaptability of the Asian delta's populations. I suggest that despite the distinct histories of direct and indirect colonization across the different deltas, residents have adapted and built resiliency out of the successes and failures of the colonizers.

In the Delta, histories of land- and waterscape change are manifested today in the form of resilience against the threat of water insecurity. Over time, residents in Cần Thơ have developed water practice strategies to combat the threat of water scarcity. In the past, residents exploited the failures of the French colonial canal infrastructure and that exploitation continues today because the formal piped water system does not meet demand. Kooy and Baker (2008) made a similar link in Jakarta where they connect today's water access and power to colonial infrastructure. They also follow a similar approach in studying colonial infrastructure and using archival data to form their arguments. Exploring the pertinent resiliency literature alongside archival and empirical research, I offer an analysis of how the residents of Cần Thơ act as active citizens and how they became resilient to uneven access to water resources.

2.0 Methodology

I base this chapter on eight-months of fieldwork between December 2016 and August 2017 in Cần Thơ and Ho Chi Minh City, Vietnam. In Ho Chi Minh City, I did extensive archival research at the Vietnamese National Archives II, with a focus on the period of French Colonization—1880 to 1945—in the province of Cần Thơ. Archival documents include colonial census data, personal letter correspondence, government documents, and city/provincial planning documents and associated maps. I use a qualitative approach to the archives to explore the

politics around the Delta's canal project and the struggles that the French government encountered over the course of the project. I then link these colonial projects and struggles to current circumstances in Cần Thơ.

In Cần Thơ, I conducted two types of interviews with residents: in-depth interviews with residents of three communes, and household surveys across four communes. I conducted these interviews in three periurban districts of Cần Thơ–Phong Điền, Cờ Đỏ, and Thốt Nốt. A combination of in-depth interviews and surveys were used to allow for detailed, in-depth descriptions of local everyday water access practices. I asked research participants questions about their daily water use and about the changing landscape. Interviews and surveys were coded for keywords to identify themes and common responses to my questions. I also used coding to create frequency charts and graphs on occupation and water sources.

3.0 Historical analysis of the Mekong Delta and Cần Thơ Province during French Colonization

In this section, I examine water infrastructure development and peasant politics during French Colonization to inform contemporary water use habits in the periurban districts of Cần Thơ. I focused exclusively on the period of French Colonization because I had access to this period of archival data when doing research. The relevant political processes of the time included class struggle and the 'quiet encroachment' of peasants, which "describes the silent, protracted but pervasive advancement of the ordinary people on the propertied and powerful in order to survive and improve their lives" (Bayat 2013). Both processes also contributed to the formation of French perspectives. These elements of the past are a factor in what has created today's resilient and active citizens (Schramm & Wright-Contreras 2017). As discussed below, the extensive landscape and waterscape changes in the Delta were not always successful and the

results were often frustrating to both colonizers and Vietnamese. The Vietnamese were often able to adapt and benefit from the landscape changes brought on by partly failed development initiatives.

The period prior to French colonization is outside of the scope of my research but it is important to note that canals have a long history in the Delta. The earliest canals in Mekong Delta history date back to the ‘Fu Nan’ period (100 B.C.E to 550 C.E), but according to Biggs “there is no evidence of major canal projects or dense settlement in the Mekong Delta for more than 1000 years after the decline of ‘Fu Nan’” (2005: 3). In 1818, it was Vietnamese King Gia Long, the first Emperor of the Nguyen dynasty of Vietnam, who commissioned the construction of a 67 kilometer long canal from Chau Doc (an inland Vietnamese city on the Cambodian border) to Ha Tien (a coastal Vietnamese city on the Cambodian border). Two other similar projects occurred during this period to connect Saigon to the Mekong River. Therefore, prior to French colonization, the Vietnamese were already using some canal systems in a smaller capacity.

French engineers capitalized on, expanded, and added to the few canals that were already there. They achieved part of this by introducing steam-power and dredging technology in the Delta in the late 1880s (Biggs et al. 2009). Using a combination of data from 1929 and today, the map below (Figure 3) shows both the canal systems built by 1929 (dark blue and highlighted), which are also still in use today, and the canals added to the region since (light blue). The display of the 1929 canals alongside today’s canals shows how much the landscape has changed in and around Cần Thơ. The map also shows provincial and municipal boundary changes in Cần Thơ between 1929 and today. The main canals were commissioned by the French before 1929 and since then many smaller canals were added by the French. While some canal extensions were

added even later by the Vietnamese government, the majority were commissioned by the French using Vietnamese labour.

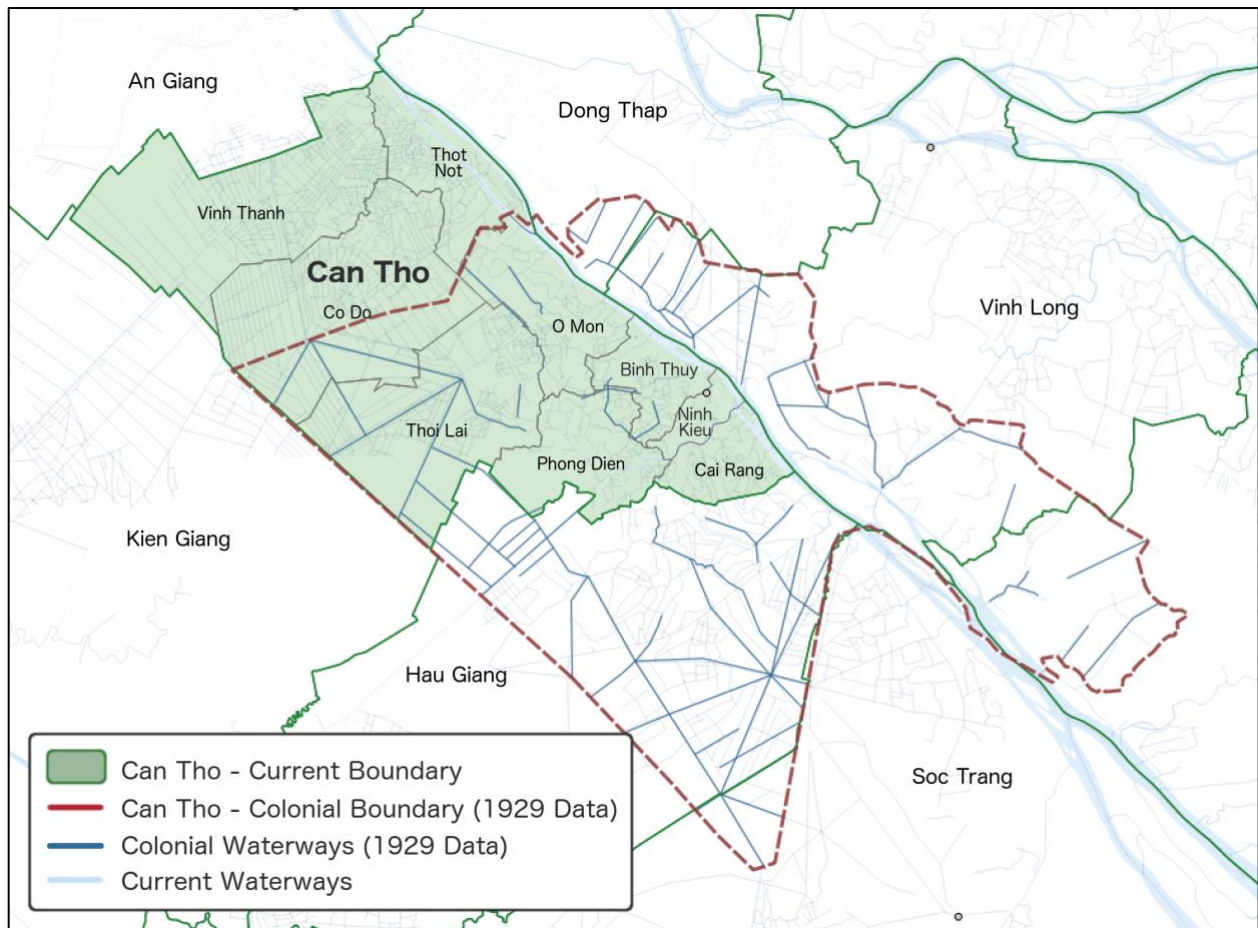


Figure 7: Map of Cần Thơ, Vietnam: Overlay of Colonial and Current Waterways and Provincial Boundaries (Source: Prepared by author based on Vietnamese National Archives II, 1934-1936 Document No. 5248 and GADM maps and data, 2018).

Scott (2009) claims that colonial authorities in Southeast Asia strived to bring their state resources and its people under their control. The ‘enclosure movement’ in Vietnam was, “an effort to integrate and monetize the people, lands, and resources of the periphery so that they become... *rentable*” (Scott 2009: 4). As colonizers went into unfamiliar places in the Delta, they needed ways to understand the new terrain and to simplify governance (Scott 1995; 1998) in the

face of ecological complexity. According to Anderson's *Imagined Communities*, European map-making involved processes of classification and, in Southeast Asia, the colonial powers needed to be as precise as possible when 'filling in the boxes' of these maps (2006). To simplify the landscape, they used mapping "to produce a comprehensible mapping of a complex local reality for the purposes of the outsiders who rule it" (Ravis 2019) and, to reorder the people who inhabit the mapped area (Biggs 2010). Ultimately, simplification was used to create a legible, controllable landscape. As also discussed by Scott, in the end, the unruly landscape and its people kept escaping this control.

In Vietnam, simplification involved large-scale water infrastructure projects. These projects were meant to improve enforceability of French rule, improve the Delta's waterway navigability, and improve rice production and transportation. The above map (Figure 2) shows how the canals are straight lines and often form almost grid-like systems in the region. The colonizers planned the location of each canal; mapped them out to try and control the location of future settlements and meeting points. This waterscape planning not only made it easier to transport agricultural products out of the Delta, but also provided a navigable, mapped, and 'readable' landscape for the French. Simplification initiatives altered the Delta and its people, but state building was difficult for the French because the terrain was unfamiliar and unruly.

French colonization was justified through the concept of the *mission civilatrice* (the civilizing mission). Justified by a sense of French superiority, they meant the *mission* to introduce Indochina to Western civilization in the form of modern politics, new technology, industrialization, social reform, and poverty alleviation. The idea was to perfect, and 'civilize' (Scott 1998) the Vietnamese population (Kähkönen 2008 ; Nguyen-Marshall 2005). Cần Thơ was at the centre of the 'civilizing' efforts because it had potential as a regional centre. It sits mid-

stream in the Delta at the confluence of the Hậu and Cần Thơ Rivers and is far enough away from the sea to avoid salinization. It could also act as a bridge city between the capital, Saigon, and the rest of the Delta (Shannon 2009). According to Cần Thơ's 1931 population reports, it had approximately 30,000 inhabitants, including 220 French nationals⁵. In 1929, Saigon's population was 123,890 inhabitants, including 12,100 French nationals (Epstein 1931). This population comparison shows the importance of Cần Thơ as a regional hub.

3.1 Water infrastructure projects and readable landscapes

Mapping the complex ecological landscape and construction of the canals had three purposes—control, transportation, and agriculture. The first purpose was to create a readable landscape where more efficient control over both the regions ecology and local population was possible (Käkönen 2008; Scott 1998). Simplification and readability occurred in multiple ways. As the pre-colonial era waterways were already being used for local markets and meeting places (Biggs 2010), adding more waterways could bring more households, markets, and entire villages onto the canal banks. More people living and spending their time on the embankments meant that the French government knew where a larger proportion of the population was. Retrieved archival documents demonstrate how the increasing number of people settling on the embankments led to French petitions to separate villages and change village boundaries. The separation and renegotiated village boundaries created smaller and more manageable spaces⁶. As seen in Figure

⁵ Documents related to population. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

⁶ Document No. 41554 related to territorial rearrangements in Cần Thơ 1910-1917. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

2, Cần Thơ's provincial and municipal boundaries have changed since the colonial maps were drawn, but what remains is the physical infrastructure.

The second purpose of the canal system was to allow for easier navigation between the Delta and Saigon. By expanding the pre-colonial canals navigation and the movement of goods became much safer and easier. Furthermore, as Saigon was the center of the colonial state, the French needed to transport rice harvested in the Delta to Saigon quickly and safely. At the time, it was considered impossible to travel overland, and sea travel was dangerous. Therefore, they built canals to connect the Delta to Saigon thus reducing the time to reach Saigon from 16 to eight hours (Biggs 2004: 72), and avoiding dangerous sea travel.

Finally, the third purpose of the canal system was for intensified agriculture. Ultimately, “the aim was to ‘free’ the rice farming systems from the local seasonally changing water conditions and enable double- and triple-cropping systems in all parts of the Delta” (Kähkönen 2008: 206). The canals helped to make the Delta more suitable for agriculture by allowing for constant irrigation and drainage.

Regional budgets in the early 1900s for Cần Thơ province show a heavy emphasis on canal and bridge building projects. In fact, the 1910 regional budget shows that most spending was for these projects. Between 1866 and 1936, “1,360 kilometers of main canals, and 2,500 kilometers of auxiliary canals were dug” (Shannon 2009: 54) for transportation, access, irrigation, and drainage. A combined total of 3,860 kilometers of canals were built with heavy machinery and corvée labour—forced, unpaid labour. But a matter of months after a canal was dug, it would often develop silt bars rendering it impassable. Tidal fluctuations caused problems for the French engineers and because of a lack of knowledge of the ecological landscape they did

not realize these problems until much later. The Delta is very flat so tidal effects occur over 100 kilometers inland from the sea. The “tides [cause] water flowing in the tidal creeks and canals to reverse their currents daily” (Biggs 2010: 34). The tides made maintenance a reoccurring problem. According to Biggs (2004), during the colonial era, the intensity at which they dredged canals was equivalent to the dredging of the Suez and Panama canals—approximately 174 million cubic meters (66). Despite major setbacks and many canals being rendered impassable, they did improve navigation through the delta.

Colonizers wanted to build the canals and keep them dredged to continue improving rice production, navigation routes, and general livability across the Delta. However, using ‘corvée’ labour did not improve the living conditions for the local forced labourers. The lack of labour compensation by the French continued despite colonizer’s intentions to abolish corvée labour on large-scale infrastructure projects. Even after corvée labour was, in theory, abolished by the French government in 1879 (Biggs 2004), contractors rarely paid wages to the peasants conducting manual labour because the large-scale canals were expensive to build and maintain. Even after introducing steam-powered dredging machines, that required less manual labour, most day laborers were not compensated (Biggs 2010) due to such high costs of the overall project.

Waterway tolls and water consumption taxation were some of the earliest methods used to capitalize on, commercialize, and control water usage in the Delta. The proposed budgets for the early 1900s for Cà n Thợ province show the expected income gains from these river tolls. While I recognize that some of the archival information collected is not extensive, it demonstrates the importance of taxation and tolls in regional budgets as the taxations were implemented before completion of the canals. Until 1925, the expected, and actual, gains increased significantly every five years from 1900 to 1925. It was not until 1925 that income

from river tolls decreased, until this item stopped showing up on the provincial budgets⁷. The evidence shows that this decline and eventual stoppage of river tolls was partially due to the failures of the *mission civilatrice* and the canal projects. The canals did not meet colonial goals because they were impassable at low tide from the formation of silt bars meaning difficult regulation of river toll collection. Using the silt and sediment islands that developed over time in the waterways as ‘meeting points’ meant that the canals were no longer only used for irrigation and navigation, but as part of the unruly landscape. While waterway tolls declined and became irrelevant, water consumption taxes and tariffs continued to grow. Even after admitting, through correspondence and municipal budget reports, that the water consumption tariff imposed in 1930 was too high and complicated, in 1943 the French Administrative Mayor of Cần Thơ proposed to increase the consumption tax again⁸. Although he wanted to increase daily average consumption levels, he also believed the increase in price would not compromise the goal of maximum consumption levels for the water plant.

3.2 Rice production Intensification

The French believed that one way to maintain power over Cochin China was to gain an economic advantage in the Delta. Three of the goals of the *mission civilatrice* were to ‘tame’ the local population, capitalize on the Delta’s water resources, and intensify rice cultivation (Givental 2014; Kähkönen 2008; Shannon 2009). By the 1930s, the Mekong Delta played a major role in global rice exporting. Despite playing a major role in global rice exporting, the French

⁷ Documents entitled: Initial regional budget for Cần Thơ Province 1925; 1915 Initial regional budget for Cần Thơ Province; 1910 First regional budget for Cần Thơ Province; Initial regional budget for Cần Thơ Province 1920; Initial and supplementary budget for Cần Thơ Province 1935. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

⁸ Document No. 56836 related to municipal Budget of the Mixed-Commune of Cần Thơ, 1943. Translated from French to English by author. Retrieved between January 2017-August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

had difficulty increasing rice production. According to Käkönen (2008), this was mainly because of peasant and colonial conflicts whereby the French prioritized rice exports at the expense of local people. There was pressure for the colonial state to increase production levels, shown by archival reports composed in 1944 by French Agricultural Engineers to the Agricultural Hydraulic Services. By 1944, the French colonial era was nearing its end, and colonizers were concerned about decreasing rice production. There was extensive correspondence about the mistakes that led to lower productivity than expected. Discussion within these reports always came back to problems experienced with the canals. One problem was not differentiating between canals for water control (agriculture, irrigation, drainage), and canals for navigation. Other problems were that they ignored the ecological landscape and the interests of peasant farmers. Hindsight provides an interesting perspective for why they made certain choices during canal construction. French government correspondence shows past beliefs about how much improvement they thought necessary. The following is an excerpt from a collection of documents related to rice cultivation problems in Cochin China in 1944:

At the moment, the majority of the population is content to live in poverty. In Indochina, we need to gradually condition the lands likely to give year round harvest to allow the population to live more normally. Unfortunately, poverty alleviation...is not possible under current conditions⁹.

This excerpt shows disregard for Vietnamese agricultural production methods and for traditional Vietnamese livelihoods in the Delta. The colonizers interpret Vietnamese traditional agricultural methods as perpetuating poverty. Colonial powers everywhere in Southeast Asia used the ‘lazy

⁹ Agricultural Hydraulic Services, Agricultural Engineer to the Indochina Office of Rice Cultivation, 30 August 1944. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

native' discourse (Alatas 1977) to justify wanting increased peasant farmer labour, and corvée labour, to increase rice surplus. Archival reports from 1944 show attempts to control the canals for irrigation where The Governor of Cochin China told the Governor General of Indo China that “it is the control of the water which ensures consistency in yields”¹⁰. What this statement does not recognize is that the tidal fluctuations plaguing colonial engineers could have benefited the rice fields too (Biggs 2010). The French wanted peasant farmers to use the irrigation and drainage canals to their advantage, even if that meant forcing peasants to use new farming techniques. However, the French struggled as Vietnamese farmers resisted the advanced farming techniques that could have produced the colonizers' desired yields.

Taxes and land rental had been part of Vietnamese society long before the French arrived. However, because Vietnamese and French tax and land rentals worked differently, the colonizers claimed any land that was ‘unclaimed’ or ‘unoccupied’ under French law. The new large-scale canal systems turned large quantities of land previously not usable for agriculture into irrigated farmable land by introducing drainage and irrigation. Once claimed by the French, they gave the land in large quantities, at no cost, to French citizens who then rented it to Vietnamese farmers (Ngo 1991). Archival research from 1919 to 1929 on rental agreements for rice fields in Cần Thơ Province show rental conditions as being fixed annual rental fees on a per hectare basis for 30 francs for three hectares. They made annual payments at the end of each agricultural year, or before the end of December. The land was primarily intended for rice cultivation and rental

¹⁰ Document No. 53079 Report on Agricultural Hydraulics, Constituencies of Agricultural Hydraulics 1944-1945. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

agreement lengths were for three, six, or nine years¹¹. It was possible for the Vietnamese to buy the land outright, but it was very expensive. To create and emphasize a class-divide among Vietnamese, they also granted land, at no cost, to Vietnamese nationals called ‘collaborators’ (Ngo 1991). Prioritizing who had access to land was one part of what created a “two-class system in which peasant labour created the only form of wealth and landlords simply confiscated this wealth in the form of rent” (Paige 1975: 319). In response, farmers organized protests and performed localized acts of resistance in response to the imposed land policies by reclaiming previously seized land (Biggs 2004).

Despite the efforts of the French to have a ‘bird’s-eye view’ (Käkönen 2008) of the Mekong Delta, they had limited ability to understand and read the waterscape; seen through the shortcomings of the *mission civilatrice*. Had the French understood the flat Delta they could have foreseen the fast canal closures and ‘dead points’ where silt filled the canals faster than could be dredged. Near the end of the colonial period, the colonial state started to recognize some mistakes made during the colonial era. In a report in 1944 to the Governor General of Indochina, the Governor of Cochin China wrote:

Since its creation a decade ago, the Agricultural Hydraulics Services has given rise to frequent criticism... Obviously, for a long time we have only been concerned with navigation and we have made many errors with regards to agriculture. There are no longer people who deny the harmful effects of digging the Phung-Hiep canal star or of the digging of the Quan-Lo to Phung-Hiep canal. This led to the abandonment of land

¹¹ Document No. 60157 Rental Agreement for Rice Fields in the province of Cần Thơ 1919-1929. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

*across a large region. There is also no one denying the drying up of rice fields caused in some places by the digging of canals which resulted in too much drainage.*¹²

This quote implies that the French realized the problem with prioritizing navigation and transportation over irrigation and drainage. It also demonstrates how they failed to understand the Delta's physical geography—a common occurrence in the history of Delta's globally (Douglas & Okonta 2018; D'Souza 2015). To some extent, the colonialists accomplished part of their *mission* because the canals were already mapped by the French and therefore rendered 'legible'. The canal maps allowed the French to know where the Vietnamese settled along the canals. However, the Vietnamese were able to utilize the failures of the French by using 'dead points' as 'meeting points' (Biggs 2010), which shows not only how residents used the canal's silt platforms to their advantage, but also how the French accepted their inability to maintain dredging.

4.0 The Current Delta waterscape

A large proportion of Cần Thơ's periurban population live on the banks of the Delta's historical canal systems. What used to provide peasant farmers with irrigation and drainage for agriculture, daily household water, and transportation networks still do the same today. These same waterways now also contribute to a wider variety of household income-generating activities. In the following section, I first outline periurbanization in Cần Thơ to give context to landscape change since the end of French colonization in 1945. I then examine residents' current water access methods and diversity of occupations in relation to colonial era canal infrastructure. I look at how Cần Thơ, and the Delta region, have moved away from a primary focus on rice

¹² Document No. 53079 Report on Agricultural Hydraulics, Constituencies of Agricultural Hydraulics 1944-1945. Translated from French to English by author. Retrieved between January 2017 – August 2017, Vietnamese National Archives II, Ho Chi Minh City, Vietnam.

production to being influenced by commercialization, agriculture, residential, and industrial use and how residents' ability to adapt to the changing landscape is, in part, due to a long history of resiliency and adaptation.

4.1 Conceptualizing periurbanization

There are many definitions scholars use to define the term periurbanization, as they seek to characterize the process by which primarily rural landscapes on the fringe of cities gain urban characteristics (Friedmann 2011; Harms 2011b; Labbe & Musil 2014; Leaf 2002; Rigg 2006; Webster 2002). For this chapter, I borrow from Fox et al. who define periurban areas as: “transition zones where urban and rural activities are juxtaposed and landscape features are subject to rapid modifications induced by human activities” (2011b: 2). I also borrow Friedmann's definition of the periurban: “a zone of encounter, conflict, and transformation surrounding large cities” (2011b: 426). However, in contrast to Friedmann's argument that periurbanization only occurs around large cities, I emphasize that periurbanization can occur on the fringe of cities of any size. Using these definitions together highlights how fast landscapes change and how the transition is rarely smooth. Asian Deltas have long experienced changing agricultural and land-use patterns (Volker 1983) which, when combined with the effects of an increasing population in periurban areas, have impacted the local environment. Across many Asian deltas the periurban is a large part of the national landscape, and land-use demands often involve conflicts between residential, industrial, agricultural, and commercial needs (Allen 2017; Garschagen, Renaud & Birkmann 2011; Maneepong & Webster 2008). The periurban does not fit neatly into either category of ‘urban’ or ‘rural’ and they are often “spatially and politically undefined” (Wright-Conteras et al. 2017).

In 1936, the Delta's official population was 4,483,000. This is from the final French colonial census and is "thought to have underestimated the population size by at least 10 to 20 percent. This was because the population figures were based on the tax rolls, and people avoided being taxed" (Banister 1985: 5). Thereafter, with increased mechanized agriculture, the population grew rapidly. Land redevelopment intensified and eventually, large amounts of agricultural land was redeveloped for urban use—mainly between 2001 and 2009 (Fox et al. 2011; Labbe & Musil 2014). Administrative urban growth occurred in the early 2000s when the Vietnamese central government designated Cần Thơ province a municipality by reclassifying rural areas (Fox et al. 2011; Nguyen 2016). As such, a large part of Cần Thơ's new municipality became ambiguous and undefined regardless of being an officially defined administrative boundary.

4.2 Analyzing the relationship between livelihoods and water infrastructure

The Delta's residents are not new to changing landscapes and large-scale redevelopment initiatives whether it was colonial water infrastructure projects or periurbanization. Residents expect change, which contributes to why they have been able to adapt to periurbanization and become resilient active citizens (Schramm & Wright-Contreras 2017). While conditions in the Delta render some residents vulnerable to these changes, vulnerability does not always impede their resilience. The term resilience has grown in popularity in government planning, with non-governmental organizations, and within the media (Cretney 2014; Matyas & Pelling 2014). As mentioned in Chapter 1, the term has many definitions, understandings, and implications, which are often vague and varied (Matyas & Pelling 2014). For my purposes, I borrow Matyas and Pelling's use of socio-ecological resiliency, who say "[resiliency] tends to be associated with the capacity of an agent to choose a vital and authentic life, the process of overcoming the negative

effects of exposure (bouncing back), and the ability to cope successfully with...negative trajectories” (2014: 53). This definition speaks to the ability of an individual and/or household to build, over time, the capacity to live with and adapt to changes in their physical and social environment. Therefore, I understand resiliency as process-oriented and undergoing constant change (Folke 2006; Garschagen, Renaud & Birkmann 2011; Matyas & Pelling 2014; Walker et al. 2006)—much like the periurban landscape.

Many of Cần Thơ’s local periurban residents consider their surroundings ‘urban’ despite the landscape being partially agricultural and many residents engaging in agricultural activities or farming (see Figure 2). I attribute part of the ‘urban’ sentiment to income generating opportunities and the advantage of households’ proximity to waterways. The combination of income activities may not be as readily available were it not for the semi-urban landscape covered in an extensive canal system developed in the colonial era. Furthermore, the periurban proximity to Cần Thơ’s main urban districts allows for a daily commute into the city centre. The relatively short distance to the city centre also gives families the opportunity to send high school graduates to university without bearing the cost of supporting them to live in the city centre—a major concern of periurban families.

Part of residents’ ability to access water for livelihoods is due to land rights, a complicated matter in Vietnam because the State “holds all legal rights to land,” (Sumera 2017) but citizens have a right to use the land. According to the State, land includes “forests and mountains, rivers and lakes, water sources, natural resources lying underground, wealth in the sea, the continental shelf and airspace” (Diem 2011). The Vietnam Land Law 2013 states that the commune and district People’s Committees are responsible for managing and protecting riparian

land. This land is leased by the State to households, who are then encouraged to invest in the use of the land while complying with environmental and landscape protection regulations (Socialist Republic of Vietnam 2013). Despite the 2013 Land Law, there is a lack of water management regulations, guidelines, and enforcement to ensure resource protection. This factor is favourable for periurban residents' ability to access and use their surrounding waterways for multiple purposes but also speaks to the greater concerns over Cần Thơ's fragmented water management.

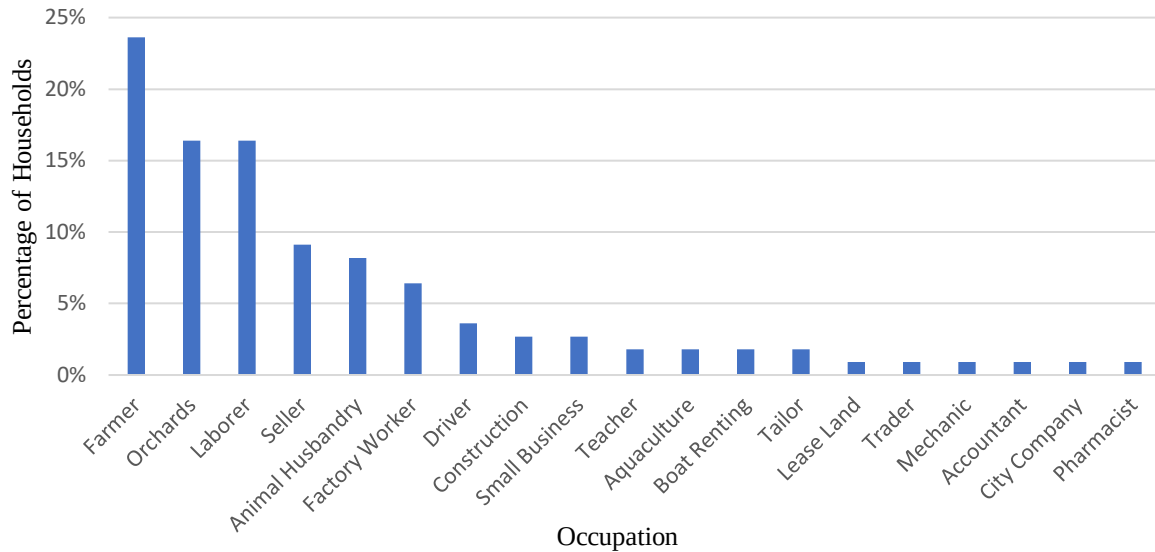
Figure 4 shows the variation in income-earning opportunities among the 62 households for which I gathered data. The most common livelihoods (7)—farming, orchard growers, farm hired laborer, animal husbandry, aquaculture, boat renters, and leasing land—all require the canals. Regardless of the distance away from the main urban district of Cần Thơ (Ninh Kiều), orchards and rice farming remain the main occupations (see Figure 4). Many households have more than one occupation requiring the canals. An example from my household surveys comes from a family of five:

We don't have any rice fields but we do have 0.1 hectares (10,764 square feet) for flowers that we sell. We raise chickens and are raising 100 right now. These are countryside chickens so they're very high quality and not from a factory. We also have a boat to hire out and we will navigate it through the canals for the renters.

(Research Participant, 5 May 2017)

I offer another example from a household of five capitalizing on the proximity to canals for earning income. The family has two main sources of income. They breed eels in a sectioned off part of the canal, and work as day labourers who open and dredge canals in the area (Research Participant, 5 May 2017).

Figure 4: Percentage of Households Engaged in Each Occupation in 3 Districts of Cần Thơ



(Source: Prepared by author based on Household Survey data)

While most households rely mainly on farming activities, there is a diverse range of occupations integrated into the area. During in-depth interviews, residents would talk at length about both their increasingly modern lives and the many income-generating activities of their family—often made easier because they live along the canal. A pertinent example is a family of six and according to the family’s grandmother:

I am retired and so is my husband. My son works in our rice field and my daughter-in-law has a small business out of the house selling drinks. We have a pond at the back of the house that we fill from the canal to use for aquaculture. We used to do this ourselves but now we rent out the pond for others to use. (Research Participant, periurban district of Cần Thơ, 5 May 2017)

The attraction of the periurban is the accessibility of fields and canals while simultaneously engaging in other income-generating activities. A research participant spoke about how his family of four uses their land to grow longan fruit. Because of where they live, a trader comes to

the house and buys the fruit to take to market. Besides growing longan, the father is a mechanic and also raises pigs to supplement the family income (Research Participant, 9 May 2017).

Cần Thơ's historical legacy prioritized water infrastructure and canal networks. Today, most households, neighbourhoods, rice fields, and orchards sit on the bank of a waterway. Were it not for these canals, many households could have difficulty maintaining livelihoods that require direct water access. Furthermore, the adaptability of the Delta's citizens to the ever changing landscape throughout the colonial era has played a role in the resilience of households today; in how they use the local environment to their advantage. In fact, approximately half of the participant households had between two to five income generating occupations. As demonstrated, the colonial history of water infrastructure contributes to residents' choice of occupation and the ability for residents to have multiple occupations that require the canals contributes to residents' improving quality of life in the periurban.

4.3 Residents as active water consumers

There are many factors, both major and minor, within the Delta to limit equal access to water resources. These factors include uneven rainfall distribution, an increasingly unpredictable dry season, poor infrastructure, and general inequality in access to water resources. In South and Southeast Asia, investment in water infrastructure rarely matches population growth (Moglia et al. 2012). In Cần Thơ's periurban, access to a piped water system can be unequal because of high costs, physical installation constraints, or a household's location. Many residents worry about the cost of installing the water pipes from the main road to their homes. In the periurban areas, the State only installs municipal water pipes on main roads and it becomes the responsibility of each commune's residents to pay for the pipe extensions and taps. For residents with piped access,

they also worry about the high cost of water usage and use the water sparingly. The physical location of residents' households, and whether their land is inside or outside of municipal planning initiatives, will also determine access to piped water. Furthermore, all of these factors are exacerbated because, as regional living standards increase, the demand for improved, cost-effective, water infrastructure increases (Graham & Marvin 2001; Schramm & Wright-Contreras 2017).

The undefined nature of the periurban results in a large proportion of residents with unequal access to formal piped water supply systems. A general distrust in government infrastructure is evident in the periurban and this is partly because they are often ignored in terms of municipal service access. Periurban residents also tend to not expect the same level of service access as urban core residents because of their 'in-betweenness'. In fact, some residents do not think they will ever receive piped water. One research participant said:

The local government has had a plan in place for many years to bring piped water to our road and we sometimes are told that the water pipes are coming in one month and we should prepare money. So far, that's not happened but the money is ready. Until it comes for real, I won't believe it. (Research Participant, periurban district of Cần Thơ, 5 May 2017)

This example demonstrates feelings of being 'left-behind'. I offer another example to explain the distrust of formal projects. Here, the research participant can never access piped water:

The riverbank here belongs to our neighbour so we can't access the piped water – they live at the end of this path so we can't get access to the residential pipes at all.

(Research Participant, periurban district of Cần Thơ, 4 May 2019)

The participant said there is nothing to be done for their family but they are not worried about seasonal water scarcity because they have access to the canal in front of their house and to their neighbours canal. This shows the importance of neighbourhood cooperation in formal water access and that the livelihood of this family need not be compromised because they can still access water in some capacity.

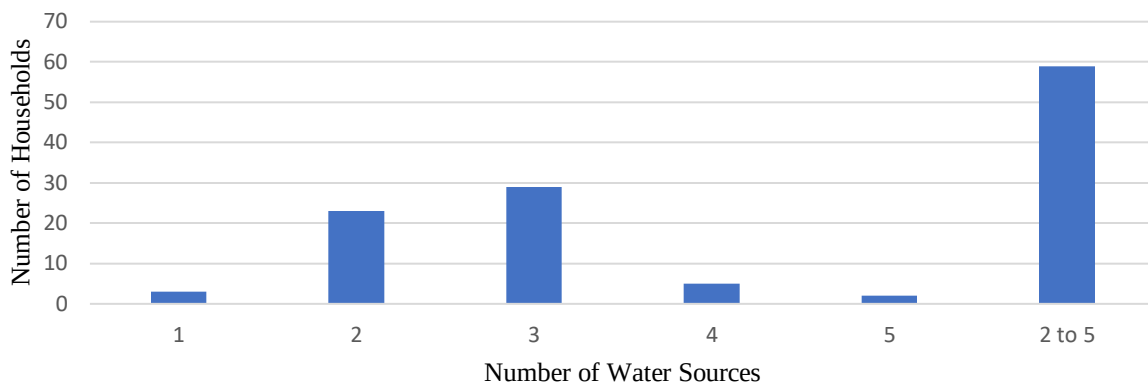
Despite unequal access, residents are resilient by adapting to government failures and unequal treatment. I saw daily resiliency in the informal strategies and flexibility required for water access. I borrow from Schramm and Wright-Contreras (2017) the idea that periurban residents are active consumers of water resources because they make daily water use choices. The authors look at how people reach beyond passive consumerism, which happens when users comply with their service provision, in their water usage and access habits. This is important to my analysis of resiliency in the periurban because of how deeply entrenched residents are with the history of the Delta's canals in their daily lives. Most times, regardless of formal access, residents will often continue to use informal water sources even though the local government and water service providers rarely encourage it. A local water supply station manager shared his views on why informal water access is so prevalent:

The capacity of household water supply station usage here isn't very high because we live near the river and on the canals. They use piped water too economically and use the river water instead so demand for piped water isn't that high here. Many households are really concerned about money and there's a problem with that because the canals are very polluted. But, it's such a big part of our culture. (Research Participant, periurban district of Cần Thơ, 9 May 2017)

Residents are not encouraged to use informal sources for many reasons. The biggest reason, as given by the water supply station manager, is the declining quality of river and canal water. The concern over quality is valid but there is a disconnect between what the canal/river water is actually used for versus what local officials believe it to be used for. Poor water quality in the Delta is well-known and according to the World Bank (2019), “nearly one-fourth of the Delta’s population did not have access to clean drinking water and instead relied on contaminated natural water sources”. Discharged untreated industrial wastewater is the primary cause of the Delta’s water pollution (UN Environment 2018). Poor quality of the canal/river water means residents use it as the last resort for drinking water. They mainly use it for non-consumption purposes like irrigation, animal husbandry, or washing clothes.

I identified five water sources at the household level: rainwater, bottled water, piped/tap water, ground/well water, and river/canal water. Figure 5 below shows that 95 percent of participant households draw on between two to five water sources for daily usage. Most households draw on two or three water sources and fewer households draw on four or five sources. Figure 5 shows that in periurban Cần Thơ, reliance on the formal piped water system is minimal. Although the region’s canals are a big part of local culture, many residents spoke about their concerns over the declining canal water quality. Therefore, while residents can still use the canal water for some activities, they need alternative water access measures in place for potable water. Water quality problems are serious in the Mekong Delta and yet, as active consumers, residents can secure water access not just because of the accessibility of the canals, but also because residents have the space to store rainwater barrels, and to store treated pipe, ground, and canal water. Residents can secure access without the added worry of seasonal water scarcity due to an overreliance on one water source.

Figure 5: Number of Households with 1-5 Water Sources Across 4 Communes, in 3 Districts of Cần Thơ



(Source: Prepared by author based on Household Survey data)

There are two main reasons most households draw from two to three water sources. The first is the amount of work required as each source requires varying degrees of effort. Rainwater collection and groundwater extraction both need extensive household-based infrastructure in the form of storage containers and pumps. Rainwater collection has other limitations beyond storage capacity. While it can be used freely during the rainy season, it becomes scarce during the dry season and is therefore rationed. When rainwater runs out during the dry season, residents will often purchase bottled water or groundwater. However, groundwater can also be problematic due to arsenic contamination and complaints by residents that washing clothes with groundwater turns them yellow (Ozdemir et al. 2011; Wilbers et al. 2014). The following is an example of the decision-making around a water source:

We use a combination of well water and piped water. We don't have the space to store well water and rain water so that's why we only use well water; we wouldn't even use rainwater if we had space for it because it's a lot of work. We use aluminium to treat the well water and we store it in a big cement container that's 100 cubic meters. It's left

there to precipitate with the aluminium to be treated. (Research Participant, periurban district of Cần Thơ, 11 July 2019)

This family used piped water and groundwater based on their available storage space and the ease of access. It requires strategic planning for household water infrastructure as it takes knowledge of the system, regular maintenance, and cleaning. Research participants demonstrated elaborate knowledge of their chosen water systems based on the required planning for seasonal water consumption habits, cleaning schedules to avoid contamination, and water purification techniques. All of this requires active agency by the residents.

Residents do not have the luxury of being passive consumers of water services when even piped water requires extra work to become potable. They must actively decide their household's water use based on the surrounding landscape and then adapt accordingly. Residents' adaptability depends on their everyday flexibility, their ability to apply that flexibility in the near future, and their level of vulnerability (Evers & Pathirana 2018). While government infrastructural adaptation strategies are part of current government plans, households are more likely to implement non-infrastructural adaptation strategies because of residents' "strong social capital" (Evers & Pathirana 2018). An example of non-infrastructural adaptation is when a family uses bottled water in the dry season when their rainwater supply depletes. The very nature of periurban spaces allows for active engagement with different water options to ensure adaptability to seasonal water scarcity and polluted canal water (Schramm & Wright-Contreras 2017). Many residents in the periurban areas are flexible and have a history of adapting to a changing environment thus showing the importance of community perspectives. They are less likely to fall into a victim trap from insufficient modern water system infrastructure. When problems arise with one water source, they can easily adapt and move onto a second source.

5.0 Conclusion

I have argued that the existence of the historical canal systems and the general failures of French colonial infrastructure projects have allowed for active and resilient citizens in Cần Thơ's periurban districts. Residents have been able to achieve some of what French colonizers sought to capitalize on. Today, residents capitalize on the extensive canal system for both livelihood opportunities and to ensure access to some form of water for various purposes, especially when piped water is inaccessible.

The French colonial regime mismanaged the region's vast water resources because they failed to understand the Delta's unique ecological waterscape. Colonial engineers also prioritized colonial navigation and transportation goals over the wellbeing of peasant farmers. Similarly, today's planners are not aware of the complexity of how residents access water. The flat Delta-scape meant rapid sediment flow that led to closures of recently dug canals. Canal closures also resulted in unexpectedly large costs associated with dredging to maintain the large-scale navigation and transportation plans between Cần Thơ and Saigon. Local peasant farmers used the silt bars and shallow canals to their advantage over generations. I have shown how this agency and resiliency continues today. In today's periurban Cần Thơ, residents are experiencing landscape change from socioeconomic factors and environmental degradation. According to Evers and Pathirana (2018), they also "do not benefit from the (inner) urban disaster risk management measures... [but, they] are also profiting from higher market demands from the urban areas" (5). Furthermore, in the periurban there is more individual and household based agency compared to community agency regarding access to water. Residents engage in both agricultural and non-agricultural income-generating activities (Angeles & Hill 2009; Schramm & Wright-Contreras 2017; Varis 2008; Webster 2011). The combination of income-generating

activities can be formal or informal, and they can choose to capitalize on the nearby canal systems, or not.

What the above analysis demonstrates is residents' flexibility in periurban areas. The historical canals give residents the opportunity to generate income from the land and water around their homes if they choose to utilize it. Furthermore, residents may not always have a choice to use piped water or not, but they do have the choice between rainwater, river or canal water, ground water, and bottled water. Deltas are inhabited by active citizens who have adapted to the changing landscape for generations. The ability for Cần Thơ's residents to adapt to using various types of water sources is a sign of resilience because ultimately, residents are able to quickly adapt to seasonal weather patterns, water availability, and piped water interruptions. With multiple water sources, residents are able to anticipate future change and respond accordingly. At the same time, households with less water source options can potentially be more vulnerable because they do not have the same flexibility to respond to stress and change. Residents' adaptability to seasonal water changes demonstrates the importance of incorporating a participatory planning approach to water management in the region to encompass the complexities of water access that top down planning initiatives can miss or ignore.

CHAPTER 5: THE INFLUENCE OF ĐÔI MỚI AND GENDER NORMS ON LOCAL PERCEPTIONS OF PLACE

1.0 Introduction

Quán Khánh

*Đứng trên trông theo cánh hắt heo,
Đường đi thiên thẹo, quán cheo leo.
Lợp lều, mái cỏ tranh xơ xác,
Xó kẽ, kèo tre đốt khảnh kheo.
Ba chạc cây xanh hình uốn éo.
Một dòng nước biếc, cỏ leo teo.
Thú vui quên cả niềm lo cũ,
Kìa cái điều ai gió lộn lèo.*

- Hồ Xuân Hương

Tavern by a Mountain Stream

*Aslant, staring at a trembling landscape:
A twining road, a tottering teahouse,
A hut with a thatch roof, ragged, pathetic,
A slitted, scrawny bamboo beam,
Three tree clumps, bending, coquettish,
An emerald green stream, scanty grass.
Pleased, I forget my old worries.
Look: someone's kite's spiralling.*

- Hồ Xuân Hương

Vietnamese poet Hồ Xuân Hương lived between 1772 to 1822 and Vietnamese school curriculum has long taught her poetry, with an exception between the 1960s to 1990s because of its sometimes suggestive or erotic content (Dinh 2008). The country has valued her poetry, and other poetry, for centuries, which exemplifies its cultural importance in Vietnam. Hồ Xuân Hương's above poem *Tavern by a Mountain Stream* reflects on a small hut serving tea on the roadside. The hut appears tattered and small, but the country landscape is pleasant and beautiful. Many Vietnamese poets write similar pastoral poetry; they highlight the beauty, simplicity, and innocence of rural Vietnam. The popularity (Jamieson 1992) of pastoral poetry reinforces the images of rural Vietnam as being a place of simplicity and longstanding tradition.

There is a link between poetry and geography. Geographers tell stories based on interpretations of their research subjects, much like poets (Jamieson 1992). Both geographers and poets help shape perceptions of place based on personal interpretations. In the past, geographers researching Asian societies contributed to Western and European perceptions of 'the Orient' as romanticized places of backwards people and differences. Pastoral poetry often reinforces stereotypical depictions of 'the Orient' and romanticizes rural life by calling it simple, serene,

and under-developed. Adams et al. (2016) describe this as ‘Place Meaning’, which is the ascribed symbolism of rural and urban spaces that “reflect symbolic meanings people ascribe to places”. Place meaning can change and evolve with the landscape.

In this chapter, I argue that Đổi Mới economic reforms and changing Vietnamese gender norms contribute to residents’ perception of place in periurban Cần Thơ. I begin with the 1986 Đổi Mới economic reforms that contributed to national economic growth and development and improved living conditions across the entire country. Đổi Mới also contributed to periurbanization and a widening income gap between people living in urban and rural areas. The following section discusses the influence of household gender norms on the local perception of place using primary research from my fieldwork in periurban Cần Thơ. I then discuss the relationship between gender norms in the Vietnamese government and local perceptions of place by examining the gaps between gender laws on paper and in practice. Finally, I analyze the gendered perspectives of place in periurban Cần Thơ. Ultimately, urban residents often expect more in terms of access to services, rural residents expect less, and periurban residents’ expectations are somewhere in-between. Similarly, periurban residents’ perspectives of whether they live in urban or rural areas are somewhere in-between.

While people’s surroundings are “not an objective entity” (Budds 2004: 324), their perceptions of the place they live are often a social construct based on the individual’s positionality and personal experiences (Dang, Li & Nuberg 2014; To 2009). In the Mekong Delta, the effects of climate change are both objective and subjective. The effects are objective because many are measurable—like sea-level rise and increased salinization. Local resident’s perceived risks to climate change however are subjective because if residents perceive themselves to be water secure, they might perceive the effects of climate change as minimal

(Dang, Li & Nuberg 2014). The perceived abundance of the local environment and of local natural resource supplies can change an individual's perceived risk (Adams et al. 2016).

2.0 The influence of Đổi Mới

The government's view and portrayal of the peasant population shifted from one of peasants as peaceful and simple in the pre-Vietnam War era, to one of peasants as national heroes during the Vietnam War, and then to one of peasants living backwards lives during Đổi Mới reform. During Đổi Mới, the Vietnamese government called upon peasants to mobilize under the guise of national defense in order to build a new, reunified country. Instead, this call created second-class citizens; peasants earned a lower socioeconomic status and faced exclusion from access to basic services (Nguyen & Locke 2014). Erik Harms (2014) questions whether the promised post-Đổi Mới urban dreams materialized or not. While the shift from a centrally-planned economy to market-socialism and privatization led to urban development, it also left destruction.

In the past 30 years, the national absolute poverty levels have been on a steady decline as income levels have increased and cities have grown quickly. Rather than being a state-initiated program, it was individuals wanting to buy land that spearheaded urban development (Leaf 1999; Nguyen & Locke 2014). In the 1990s, the government classified large amounts of land as urban and thus, individuals capitalized on the fact that the government made claiming land easy (Leaf 1999; Montoya 2017; Nguyen & Locke 2014). However, what started as an opportunity for individuals to buy land and for cities to urbanize, became a socioeconomic divide between those who could afford to buy land and those who could not. Compared to the pre-Đổi Mới era, the reforms contributed to a much more liberalized country, but socioeconomic differences meant marginalization and exclusion (Ngo 2018) for some, and access to land, resources, and city

services for the country's elite. This kind of land purchasing reflected increasing wealth in the urban core of some cities, while economic growth in other areas of the city lagged. This produced spatial inequalities not just between urban and rural areas, but also between urban and periurban areas. Ultimately, it was the country's elite who were able to purchase land in cities that had access to urban services that continued improving compared to people who were unable to purchase land near the urban core and have thus been subject to lesser or no city services in rural or periurban areas.

Today, urbanization and urban-based economic growth is a nation-wide priority but, despite growth and overall national improvements, improved living conditions and access to services like garbage collection, sewage systems, and water systems are uneven (Montoya 2017; Varis 2008). Despite decreasing overall poverty levels, income inequality between those living in urban and rural areas has increased. I attribute part of this inequality and uneven access to city services to an overreliance on top down planning that can simplify the different needs of residents. Income inequality has grown because, according to Steinfeld and Khi Thai, "by 1993, 56% of the investment capital was devoted to Ho Chi Minh City and its adjacent provinces; another 30% went to Hanoi and Haiphong. Subsequently, wealth inequality between urban and rural areas was exacerbated" (2013: 24). By the end of the 1990s, to address the widened income gap between urban and rural areas, the government had implemented rural welfare and social development programs (Steinfeld & Thai 2013). These programs helped to improve national rural literacy rates, life expectancy, and general wellbeing. However, despite some success in rural areas with these social development programs, most of the national economic growth emphasis was on urban development, which often left rural areas neglected.

Urban development has been a national priority since the early 1990s and a city's national rank determines its level of development priority. Cần Thơ is a first-class municipality controlled by the central Vietnamese government because of its economic influence. Cần Thơ gained first-class city status in 2009 and since then upgrading and expanding existing infrastructure in Cần Thơ has been a national priority. Infrastructure and development projects received funding from the central government and from the World Bank. There are three main program groups including urban upgrading, dike and urban lake upgrading, and general development and urban adaptability enhancement (Khoa 2017). Most of the projects under these upgrade programs prioritize the main urban core districts of Ninh Kiều and Bình Thủy rather than the periurban districts.

Đổi Mới led to urban upgrading projects that were prioritized in the urban core, which contributed to disconnect between urban and periurban areas. The periurban districts receive trickle-down funding to improve the quality of life and access to municipal services. However, these improvements are not to the same extent as what the urban core receives. This disconnect between districts contributes to residents' mixed perceptions of place because, as discussed below, economic development initiatives can be exclusionary when government resources go into developing areas with higher economic potential but do not prioritize social needs and access to municipal services.

3.0 The influence of gender norms in households

In this section I discuss the relationship between gender norms and perceptions of place in periurban Cần Thơ. Đổi Mới led to social and economic change, and altered gender relations in Vietnam. There is a “Vietnamese woman's collective identity based on the history and cultural folklores of Vietnam” (Duong 2001: 191). It portrays women as martyrs, warriors, “national

treasures, and laborers in war and in peace” (Duong 2001: 191) in literature and poetry. Hồ Xuân Hương, the above poet, often positioned herself as being a voice for Vietnamese women. Even before Đổi Mới, Vietnamese women were responsible for family finances and were the financial heads of households (Beresford 1994; Desai 2001; Long et al. 2000). However, Vietnam is a long-standing patriarchal society (Drummond 2006; Long et al. 2000) and handling money does not offer status or power for women. In Vietnamese families, handling money is a domestic responsibility and the male head of the family will give their wages to their wife because she is responsible for the family’s daily finances. Women use the wages to raise the children and budget household expenses. Vietnamese women are the family’s ‘noi tuong’ or ‘internal marshal’ and traditional Vietnamese women are expected to manage the family’s household and finances “so that [their] husband can be free to pursue other ‘noble’ things, such as poetry or other cultural activities” (Duong 2001: 228). The modern Vietnamese language also shows evidence of a patriarchal society where women refer to themselves using the pronoun ‘em’. The pronoun ‘em’ is used when the speaker, male or female, presents themselves as younger or hierarchically lower to the person with whom they are speaking. In the home, a woman will refer to herself as ‘em’ when speaking to her husband, regardless of age, and thus positions herself as weaker, less powerful, or less important than her husband (Duong 2001).

Academically, Vietnamese women are often understood in two ways. The first sees women as burdened with too many expectations and obstacles after Đổi Mới presented new opportunities (Beresford 1994). This view is also reflected in national law, which claims that women have complete equality because of the strong matriarchal history in Vietnam. Following this understanding, women struggle to take on social roles in their communities and men have access to more information and opportunities. I sometimes found this during interviews. For

example, a 32-year-old married woman with two children talked about the household tasks she completes alongside fishing to sell her catch to local vendors and helping her husband with the gardening. According to the research participant, “I work all day and don’t have time to go anywhere. I wouldn’t know if the local government said anything about the local environment or gave us a place to meet and discuss this” (Research Participant, periurban district of Cần Thơ, July 2017). This woman works very hard and perceives the constant labour as a characteristic of the countryside. She shares the same perspective as another research participant—a 50-year-old woman—who sees herself as a housewife but who also works daily alongside her husband in the fields. She said she was not educated enough to understand what the local government said about protecting the environment. In the interviews, 18 percent of women made similar statements; that they did not either have the time, energy, or educational background to pay attention to, or understand, the environmental information distributed by the local government. I found evidence to support the argument that with increased opportunity and national economic changes over the past 30 years, women sometimes do not have time to engage with their local community and increase their environmental awareness because they often work long hours.

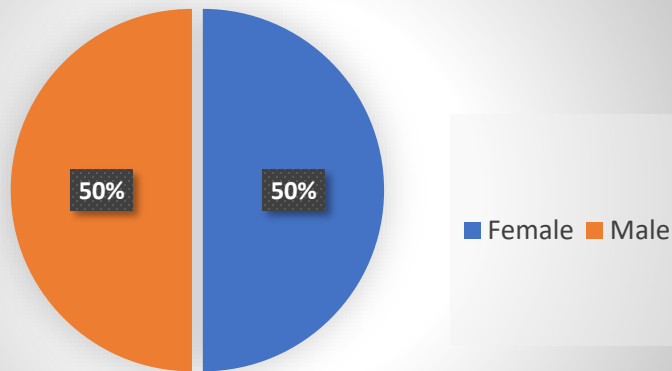
The second understanding of women’s role in Vietnamese society argues that the current economic system creates new opportunities for women regardless of their education level (Montoya 2017). Women contribute to the national economy and now see fewer barriers to taking part in income-earning activities. Given that periurban communes are connected, and movement between the periphery and the urban core is easier, it encourages female entrepreneurship. According to this argument, women also use their social positions outside of the home to gain more respect within their communities (Montoya 2017). A 59-year-old female research participant who lives alone provided an example of this:

I have a temporary labour job...I get electricity free from the government to help me out. I have a small garden with vegetables and coconut. I sell these at the market and on the street in the district...From the TV and the news, I hear about food safety...The street radios and loudspeakers have messages saying we should keep our house clean and neat and put the garbage in a proper place (Research Participant, periurban district of Cần Thơ, July 2017).

This woman claims to live simply and without family support. Regardless, she has two income-earning activities as a labourer and a market vendor. She also knows of the environmental protection measures provided by the local government. Contrary to the women cited above, she considers herself an active member of the community and listens to the environmental information provided. She also considers herself to live in an urban area because of the ease at which she can bring her produce to the market, and her ability to take part in many community events. In fact, 82% of female respondents claimed to know of some form of environmental information—garbage collection methods, how to keep houses clean, information about keeping rivers clean, and others—provided to households by the local government.

At the household level, because of women's involvement in income-generating activities, gender influences and norms are subtle. This subtlety became clear during field interviews because I expected most participants to be female as the interviews took place during the day when, traditionally, women would stay home. However, as shown in Figure 6, the research participants were equally male and female, which shows the complexity of household-level dynamics and suggests that women were just as likely to be out of the house working during the day.

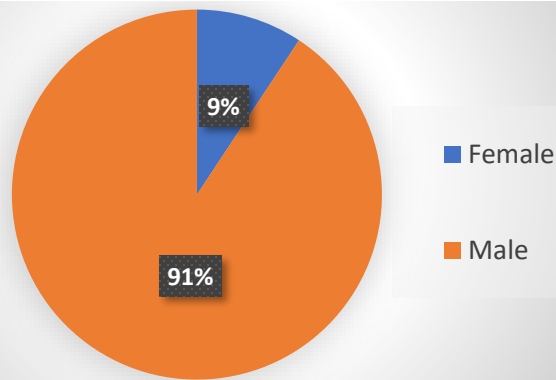
Figure 8 : Gender of Research Participants



(Source: Prepared by author based on Household Survey data)

Figure 6 supports the argument that the current economic system of Vietnam has created more opportunities for women to earn incomes. An example from my interviews supporting this argument involves a man who identified with living in the periurban because of his, and his wife's, ability to access multiple sources of water daily—something he does not think possible in urban or rural areas. He said that having access to three sources of water makes it possible for his wife to raise pigs and for him to garden, both of which would not be possible in an urban area. If they lived in a rural area, there would not be as many customers for his mechanic shop nor for his wife's small home-based food stall.

Figure 12: Gender of Administrative Head of Household



(Source: Prepared by author based on Household Survey data)

Despite women having more income-earning opportunities, Figure 7 shows that men remained the formal head of the household 91% of the time for administrative purposes. As discussed above, household decision making is generally a domestic task performed by women. Administrative requirements in Vietnam need a single family member to name themselves as the head of the household. This is generally the oldest male in the household (Desai 2001). This pattern is consistent with Vietnam's patriarchal family values. When there is no eligible male, a female would, by default, become head of the household, which occurred in only a small percentage of research participant households.

The mixed-gender of research participants provided an interesting perspective on men's and women's relationships with various water sources. According to a 43-year-old male research participant:

I use the river for gardening...The rain I use for drinking...My wife is the person who does all the housework and raises the pigs. My responsibility is gardening. My wife takes

care of the rainwater systems too... (Research Participant, periurban district of Cần Thơ, July 2017).

This research participant did not have access to the piped water system and said that he did not know what is required to maintain the rainwater system as this is something his wife does. He also did not know what household tasks required water or which tasks needed which water source. This is a common occurrence within periurban Vietnamese families where women do, on average, twice as much daily housework as men (Desai 2001). While I rarely interviewed men and women together, female participants were more willing than male participants to discuss their water systems at length. Most times, men admitted to not being in charge of maintaining the household's water supply source. This suggests that female research participants had much more extensive knowledge of the various water sources that their family relied upon daily, even when a male family member performed the task.

4.0 The influence of gender norms at government level

Đổi Mới led to nationwide poverty reduction, but the reforms did not always improve gender inequality. At the district/municipal level of government, female representation is low in part because of a lack of support for female advancements in and out of the working environment (Choi 2018), gender stereotypes, and patriarchal attitudes at home and the workplace. However, in the upper levels of the national government there are women in high government positions. For example, Ms. Nguyen Thi Kim Ngan is the Chairwoman of the National Assembly and Ms. Nguyen Thi Kim Tien was the country's only female Minister of Health (Hoang, Tuan & Thuy 2019) from January 2016 to November 2019 (Social Republic of Vietnam Government Portal 2020).

Gender equality is a national development priority written into the country's legal frameworks. Legal frameworks include targets for women's representation in the public sector but the government targets are rarely met, in part because of a lack of frameworks or plans to achieve gender equality (UNDP 2014). According to the UNDP Vietnam women's leadership report, in 2016 it aimed to reach 35-45 percent "of positions to be held by women in Committees of the Communist Party" (2014: 7). In 2016, female representation in the national government was only 27 percent (Choi 2018; Ismail 2018). In 2017, female representation at the provincial level was 26 percent and only 24 percent at the district/municipal government level (Choi 2018).

During interviews at the district/municipal level, there was only one instance where a female was present—in contrast to 50 percent female research participants at the household level (see Figure 5). During the interview, the woman was discredited, and they told me she could not offer good enough information and that I should only direct questions towards her male counterpart. On a personal level, I noticed the influences of gender norms as being much more prevalent during formal interviews with local government officials versus informal interviews with residents. Self-reflection notes after formal interviews included how I rarely felt taken seriously, or how the men I interviewed would not direct their responses in my direction and only addressed my male research assistant although he did not speak during the interviews. An excerpt from my self-reflection notes is:

I felt that they mocked many of my questions when answered. The men I interviewed at the Ministry laughed—especially about my gender questions and my questions were often redirected... "you should talk to someone else about that" (Self-reflection field notes, Cần Thơ, Vietnam, April 2017).

During interviews with local government, discussions about gender were often difficult to move forward. Initially, many officials would laugh and reply that in Vietnam women and men are equal but, when pressed further for their opinions about gendered canal usage, responses changed to show how women use water and understand the various water sources differently than men. Three different research participants responded by saying:

Women these days don't use canals anymore. They used to use canals to bathe and sometimes men still use them for bathing. Women also complain more about water quality from the canals for some reason (Local Government Research Participant, Cần Thơ, April 2017).

There must be differences in how women use water here. For example, with daily water use. Women have more demanding uses of it than men because they wash clothes and dishes and do the housework (Local Government Research Participant, Cần Thơ, April 2017).

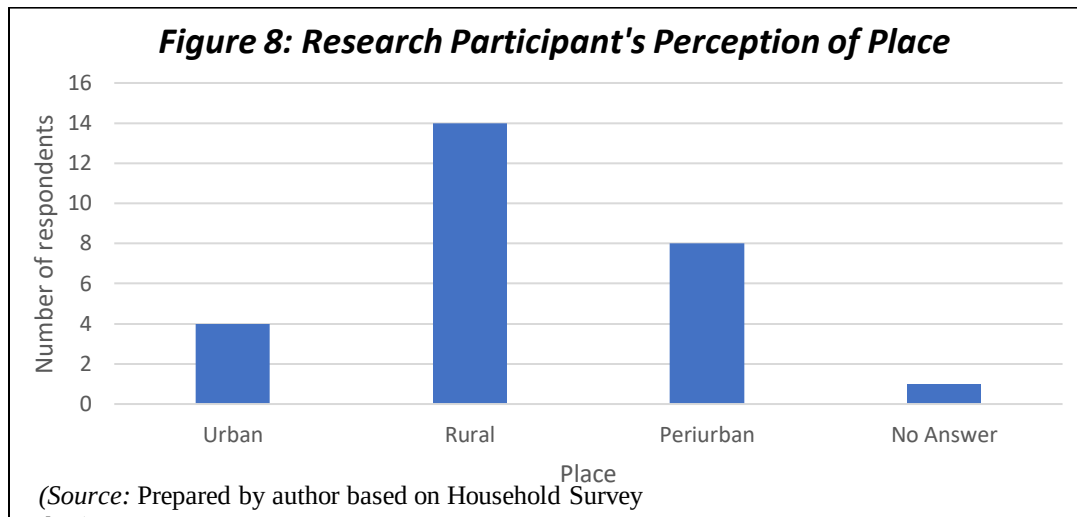
It depends on men and women's cultural roles. Women do all the housework so they might have more concerns (Local Government Research Participant, Cần Thơ, April 2017).

The periurban district and municipal government officials perceived canal usage a habit from the past and did not seem to understand the complexities of the periurban's various water sources. This misunderstanding occurs despite both genders using various water sources for daily livelihood activities and contributes to the patriarchal views about what makes up women's domestic roles.

5.0 Analyzing perspectives of place in periurban Cần Thơ

Periurban residents' perspectives of place include many complex factors constructed in part through Vietnam's transformation to market socialism (Nguyen & Locke 2014) through Đổi Mới, a long history of Vietnamese nationalism and romanticized peasant heroics, and the influence of gender norms. This section discusses the link between perception of place and the gendered perceptions of place among residents.

Residents do not always identify with the administrative classifications of the landscape in which they live. As seen in Figure 8 below, residents in the same commune will have very different perceptions of their landscape. Despite Cần Thơ being a city province, periurban residents are less likely to identify with their municipal boundaries. Instead, most residents identify with living in a rural area and approximately half of the residents perceived themselves as living in a space in-between. During interviews with research participants I did not use the terms urban, rural or periurban. Instead, I asked residents to describe where they lived compared to common stereotypes of the city or the countryside. Most residents who described the periurban talked about living in-between the city and the countryside where they have a mixture of both places. Below I offer a gendered analysis of Figure 8.



I asked research participants to describe their surroundings and to think about the differences between cities and rural areas and then asked how they would describe where they lived. Participants described the number of people, infrastructure, and social life found in urban, rural, and the periurban areas. Research participants described cities as having lots of people, traffic, events, and opportunities. They described cities to be elegant and developed, with beautiful people who do not work hard yet earn better money. This further develops what I described above about how wealth has become associated with the urban. According to participants, cities also have garbage services and cleaner rivers and canals. A 58-year-old female research participant said, “the city is a happier and more fun place... They have more development in the city... [It] is more elegant and more luxurious. If you have a house in the city, live there” (Research Participant, periurban district of Cần Thơ, July 2017). Residents, like this woman, are more likely to perceive themselves as living in a rural area because they focused on the lack of infrastructure and services in their surroundings, which further reinforces the above mentioned inequality with respect to the country’s elite buying land in urban areas. Perspectives like this contribute to why, of all the in-depth interview respondents shown in Figure 8, only 19 percent of female participants and no male participants claimed to live in the

city. As described above, since Đổi Mới, women have had more opportunities to lead fulfilling lives in and out of the family home. I suggest that this is why some female respondents said that they associated urban living with higher standards of living. A 58-year-old woman said she leads a happy life, and only city people are happy. This woman does not have access to piped water and relies only on the canal for her livelihood but still perceives herself to live in an urban area based on her level of happiness. Most women I spoke to admire the city because the Vietnamese government has long prioritized urban development over rural development. Interestingly, the residents who identified with living in an urban area (see Figure 8) were actually the least likely to have a newly renovated home or to have access to piped water. I speculate that the association between identifying with living in the urban and the likelihood of not having improved houses or piped water is likely due to the national decrease in rural poverty levels.

Despite prioritized urban development, national urban poverty has been increasing while rural poverty is decreasing (Nguyen & Locke 2014). Some participants made note of this and discussed certain negative perceptions of urban life. These participants explained that they were fortunate to live outside of the city because they said cities are dirty, very expensive, and overall lonely places to live. Many participants explained that in cities people are lazy because they earn more money and do not have to work as hard. This laziness means they have more opportunities to waste time and drink alcohol. I found that these negative perceptions of urban life were equal between female and male participants.

Residents describe rural areas differently. Of all in-depth interviews, 50 percent of all male participants and 52 percent of all female participants identified with living in a rural area. On one hand, like the poem at the start of this chapter, many residents see rural areas as peaceful, comfortable, and simpler when compared to life in the city. These perspectives are, in part,

because of the ease of accessing food from fields and water from the canals, similar to accessibility of food and water in the periurban. A 66-year-old male research participant who identifies with living in a rural area said, “it’s very quiet and peaceful living here. Life here is stable and secure. You can go to the garden and get your vegetables whenever you want... I have lived in the countryside since I was born and that’s never changed” (Research Participant, periurban district of Cần Thơ, July 2017). This man positively describes his perceived rural surroundings and feels a sense of security and power from the ease of accessing food and water. Others described the rural more negatively. For example, many participants described the lack of conveniences and services in rural areas—no water access, limited electricity, and no transportation. They also said that people in rural areas must work hard and cannot take breaks. These negative perspectives pinpoint the feelings of exclusion from social services, opportunities, and even happiness.

Similar to what is discussed above in Hồ Xuân Hương’s poem, residents have ideas about rurality that date back centuries. These ideas of rurality as peaceful and prosperous were strengthened during the Vietnam War when peasants mobilized to fight through images of national heroics (Nguyen & Locke 2014). However, these same ideas transitioned out of images of national heroics to images that perceive peasants as dirty and a burden to the urban environment (Turner & Schoenberger 2012). While these ideas were not explicit during interviews, it was an undertone of many conversations. Most residents have lived on the same land for generations and vacated their land only during times of war. Those who ‘feel rural’ in their environment expressed that they would not be comfortable living in Cần Thơ’s main urban district—this opinion was equally expressed between male and female participants. In their

current environment residents do not feel isolated, poor, or alienated, all of which are sometimes thought of as consequences of living in an urban area.

According to Figure 8, 33 percent of research participants perceive to live in a periurban area. These residents claim that over the past 10 years their surroundings have seen major infrastructure improvements in the form of permanent marketplaces, hospitals, schools, and roads. Residents with this ‘in-between’ or ‘middle ground’ perspective say that they work very hard but that life is better than in rural areas because they have access to many services unavailable in rural areas. In the periurban areas, participants perceive opportunity and focus their attention on the area’s economic growth. Similar to how the periurban is a space in-between the urban and rural, perspectives of the landscape are also mixed. A 65-year-old female research participant said:

We used to live in [the rural area] and there is no comparison to here... now we have a much easier life because we have more than just farms and gardens. We still work really hard here, it's not like we live in the city. So it's not a city here, but it's not rural either (Research Participant, periurban district of Cần Thơ, July 2017).

Perceptions of the periurban landscape are a mix of the images of urban and rural areas (Harms 2011). Some residents’ perceptions of their periurban environment mirror Erik Harm’s analysis that says periurban areas contain both exclusionary forces and power (2011). Interviews with participants suggest that in periurban areas residents have access to multiple water sources and they can use these water sources for livelihood activities. On the one hand, they have access to food from their gardens and fields, which gives them the power of food security. On the other hand, residents are excluded from access to sewage services and have minimal access to water

and garbage services. Residents also claim to have more opportunities and feel that achieving happiness and a balanced life is possible. Despite the residents' positive perspectives on their surroundings, I expected there to be an association between their positive perspectives and the likelihood of them identifying the area as periurban. However, only 24 percent of all female participants identified their surroundings as periurban while 50 percent of all male participants identified with living in the periurban.

The above descriptions of urban, rural and periurban life and of the landscape shows how people who live in similar places can have different expectations of that landscape (Soini, Vaarala & Pouta 2012). Expectations include service provisions, general happiness levels, and income generating opportunities. These expectations contribute to where residents perceive themselves to live—whether that is in an urban, rural or periurban area.

6.0 Conclusion

This chapter speaks to how residents have adapted to the processes of change in the periurban landscape since Đổi Mới. Here I sought to answer one of my main research questions (see Chapter 1) pertaining to socioeconomic differences between residents, and to examine how Đổi Mới and national gender norms have contributed to residents' access to water. Perceptions of place change and fluctuate alongside the periurban landscape and these changes depend on several contributing factors. I thus examined how Đổi Mới reforms and changing national gender norms have contributed to the differentiation between residents' perceptions. Đổi Mới economic reforms changed the entire country by contributing to national economic growth and development, urbanization and periurbanization, poverty reduction, and women's empowerment in the home and workplace. Economic growth and development also created more access to income generating activities for women and men. However, with growth came a widening

income gap between people living in urban and rural areas as well as very slow progress in achieving equal gender representation in government. Ultimately, Đổi Mới did lead to widespread poverty reduction, but the reforms did not always improve gender equality.

In this chapter, I demonstrated the complexity of local residents' perceptions of their surroundings including elements of rural, periurban, and urban landscapes. Residents' different perceptions of periurban Cần Thơ were not based only on gender but were also based on the residents' occupation, water access ability, and their level of household improvements. These local perceptions highlight the importance of participatory planning initiatives in Cần Thơ's periurban communes that can work to take into account residents' different needs and wants. Perceptions were also based on the individual, and how they perceived the general livability of their surroundings and their happiness level. Livability refers to the level of local infrastructure, the ability to access services like garbage and piped water, the availability of multiple water sources to reduce reliance on piped water, the ability to engage in income-generating activities, and overall happiness. Most often, perceptions depended on residents' comparisons with their past experiences and whether they perceived the landscape changes to be positive or negative. In the end, in answering one of my main research questions (see Chapter 1), I determined that the bases of residents' perceptions of liveability is highly gendered regardless of whether men and women had similar answers to some questions because water access and usage is gendered.

CHAPTER 6 : LOCAL GOVERNMENT INFLUENCES ON ENVIRONMENTAL POLICY AND ENVIRONMENTAL AWARENESS

1.0 Introduction

The excessive use of plastic straws and single-use plastics is in part due to people's fear of germs; however, plastic straws have been dubbed "the world's most wasteful commodity" (Smith 2017) and have been recently added to the list of to-be-banned single-use plastic items. Plastic straws are small and lightweight, and so usually end up in the ocean rather than in recycling bins. While they only account for a small portion of the ocean's plastic waste, the small size also means they are often mistaken for food by marine life (Parker 2018; Smith 2017).

The 2018 World Environment Day theme was 'Beat Plastic Pollution' and the focus was on Southeast Asia because Vietnam, China, Indonesia, the Philippines, and Thailand produce 60 percent of the ocean's plastic waste (Government of Canada 2019; Nguyen 2019; Tanakasempipat & Kittisilpa 2018). These economies have grown exponentially in the past three decades and so has the demand for consumable goods. However, these economies lack the waste management infrastructure to keep up with the high demand and thus are unable to manage the high levels of plastic waste. In Vietnam, plastic bags are everywhere and everything comes in a plastic bag wrapped in a plastic bag. Plastic is often considered an addiction (Tanakasempipat & Kittisilpa 2018), an addiction that results in Vietnam discharging 1.8 million tons of plastic waste annually (Kiet 2019). This figure is expected to increase by 2020. Vietnamese plastic pollution is problematic because less than 10 percent is recycled or disposed of properly. This causes 'white pollution', or plastic litter, which is commonly found in waterways, along roadsides and on beaches.

Plastic is widely used because it is convenient, cheap, sterile, and durable. Over multiple years in Vietnam I saw street vendors preparing takeaway meals and marketplace vendors wrapping everything in excessive amounts of plastic. Plastic containers were packaged individually within plastic bags, and then they were all placed inside another plastic bag. Sauces were placed in two or three plastic bags, and these were all placed inside another bag. Empty beverage containers, plastic bags, plastic lids, and straws littered the streets because many people threw them on the ground after they are done with them, regardless of whether there is a garbage can nearby.

During my fieldwork in 2017 I did not see or hear any anti-plastic campaigns. When I returned to Vietnam in 2018-19 to write this dissertation anti-plastic campaigns were everywhere and the campaign to reduce single-use straws had gained popularity. There are countless platforms and organizations who are spearheading the plastic campaigns. In 2016 international environmental groups gained worldwide traction on the campaigns against plastic waste (Buranyi 2018). In Vietnam, the plastic waste problem has recently started to become a national priority and, the Vietnamese Prime Minister Nguyen Xuan Phuc (Tuoi Tre News 2019) is “committed to significantly reducing its pollution by 2025 through its newly revised National Strategy for Integrated Solid Waste Management” (Government of Canada 2019). Universities are also starting to ban plastic straws and plastic water bottles on campuses (Chinh 2019).

Despite positive changes being made throughout the country and many businesses adopting single-use plastic alternatives, such as eco-friendly straws, we do not know if this is just a trend by consumers and businesses or if this is a long-term commitment. Many restaurants and coffee shops that have changed to more eco-friendly straws still serve beverages in plastic cups with plastic lids and plastic carrying bags. There is currently lots of national attention on

reducing plastic consumption, which is being implemented into public policy and environmental law. The growing public awareness through environmental campaigns and the improvements to environmental laws are encouraging to see; however, despite Vietnam having a history of very rigid and thorough environmental laws and policy, there have long been problems with monitoring and enforcement.

The above demonstrates that the anti-plastic movement in Vietnam is driven by environmental groups as much as by consumer power. Consumer actions are in part driven by environmentality, also known as green governmentality. This term emerged out of Foucault's governmentality, which, according to Nancy Peluso and Michael Watts, "embraces the calculated practices by which the state and other institutions and practices direct categories of social agents in specific ways" (2001: 6). Rutherford (2018) described governmentality as the way authorities promote state goals and ideals that encourage its residents to govern themselves. Environmentality then considers how residents work toward environmental management and conservation on their own terms. I also look at the various authorities that promote environmental issues to understand how residents become involved as "self-governing subjects" (Rutherford 2017: 3) on environmental issues. Environmentality highlights the "deep and durable relationship between government and subjecthood" (Agarwal 2005: 162) while examining how environmental subjects are created on their own terms, in response to government efforts. Recent plastic campaigns in Vietnam amongst the Vietnamese youth is a pertinent example of environmentality. This type of environmental subject in Vietnam is also new and differs from the environmental subjects I encountered in the Mekong Delta in 2017.

In this chapter, I examine periurban Cần Thơ's residents' environmental awareness and knowledge in 2017 in respect to residents' access to municipal services. While anti-plastic campaigns and the fight against single-use plastic straws are not part of my research, the introduction to this chapter offers another perspective on environmental subject formation. The country's youth are mobilizing around environmental protection issues and the Vietnamese government is making open statements about the importance of waste reduction and management. In this chapter, I argue that decentralization policies and the local government's environmental and social propaganda have influenced local residents' service expectations and service delivery. As discussed in Chapter 1, central to my argument is the concept of environmentality, which links government attempts at environmental rule to the residents' perceptions of their contributions to protecting the local canals and river systems relative to the services that the residents receive. I argue here that decentralization policies have allowed for more environmental propaganda across Vietnam. Environmentality is related not only to access to services but is also linked to the general propaganda about the local environment.

I started my research with a focus on residents' access to water but I quickly noticed the interconnectedness between water accessibility and garbage and sewage removal. During interviews with local residents and local authorities about water access, I noted that problems with the local sewage and garbage systems were weaved throughout the conversations. In this chapter I offer an analysis of local government influences on residents' perspective of place in the periurban landscape. Government influences includes the use of decentralization policies implemented since Đổi Mới and the use of environmental and social propaganda. I follow with an examination of Vietnamese environmental policies and an analysis of environmentality

among periurban residents. The analysis looks at local residents' environmental awareness and knowledge claims based on my primary research in periurban Cần Thơ.

2.0 Impacts of decentralization policies on periurban service provisions

In this section, I argue that the central and local government influence public perceptions of place through decentralization policies. The local government refers to the district level and commune level People's Council and People's Committee offices, which maintain the Constitution and its laws. The level of responsibility and state authority varies between local government offices of Vietnam's provinces, districts, and communes. As a general rule, Vietnamese law states that the provincial level government has more state authority than the district and commune level government; the level of authority is dependent on the size and capacity of each administrative unit. For this reason, because the commune administrative level is the smallest, many of its employees work only part-time.

In the 1990s, the Vietnamese economy opened up and the government began processes of decentralization (Vu 2016; Wescott 2003) with the central government transferring some central state authority to local government bodies (de Wit 2009; Fritzen 2006; Nguyen 2009). Decentralization was meant to promote self-sufficiency and independence across the different levels of government. It has continued to expand but remains "limited to fiscal and administrative decentralization rather than political or personnel decentralization" (Vu 2016: 188). Instead of creating a space for local government units to work together, decentralization can risk fragmenting the local governments and, it has been argued (Vu 2016) that decentralization can create competition between local governments over state budgets. Fragmentation has generated a sense of localism and ultimately reduced the capacity of many district and commune level governments to govern (Vu 2016), leading to poor delivery of public

goods and services, a lack of public participation opportunities, and a lack of overall government transparency. Generally, the capacity of the district and commune level governments is greater in higher-income areas than in low-income areas because of budget allocations from the central government.

The lack of capacity in lower income periurban areas has constrained the ability of the local government to deliver formal piped water systems and to maintain water quality. During interviews, research participants told me that over the past 10 years they have noticed the quality of the river water deteriorating, and therefore, residents are demanding more access to piped water. Despite piped water distribution improvements, local government officials explained to me during an interview that providing piped water to urban areas is more cost-effective. The following is an excerpt from that research participant:

Urban water supply in the city is good enough to meet [people's needs] but the rural water supply system does not...we can't ensure quality [of the water] in rural areas. Costs are high [for a water system] and rural living standards are less than in urban areas so we have to think of the cost mainly (Local Government Research Participant, Cần Thơ, Vietnam, April 2017).

This local government worker explained that the water supply system in periurban Cần Thơ is still officially classified as rural and is mainly under the direction of the district and commune level People's Committee. The justification for neglect in providing water in periurban areas comes down to the challenges of financial capacity and the high costs of installing piped water (Spencer 2007). It is normal for government workers to classify the outer districts of Cần Thơ as rural despite the city's official municipal boundaries.

Cần Thơ is classified as a first-class city under the central government (see Chapter 2 for more information) but through decentralization, some authority has been delegated to the city's district and commune level government offices. These offices play a large role in municipal service distribution. Based on the hierarchical nature of Vietnamese government, local authority figures generally show more loyalty to their superiors and higher levels of government rather than to the residents (Fritzen 2006).

One pertinent example from my research is from my interview with the small-scale local water supply station manager in periurban Cần Thơ discussed in Chapter 1. The water supply station was built in 2005 on the resident's personal property, which allowed him to become the water station manager. The station manager is responsible for conducting maintenance on the station, reading household water clocks, distributing monthly water bills, collecting payments, and relaying pertinent information or complaints to the main water supply company in Ninh Kiều district. In exchange for his services, the manager does not pay for his household water supply, and he has gained a higher status in the community, which puts him in a position of authority. The station manager said he enjoys the opportunity he has been given in his commune and that he has a lot of satisfaction from providing residents with piped water; he takes his role very seriously. He also gains authority from the relationships he has built with the Cần Thơ Water Supply and Sewage One Member Company (WASSCO) and the district level government officials. During the interview, the manager said that the Cần Thơ WASSCO often rewards his work and rarely reprimands him because he seldom receives complaints from the commune's residents. The water station manager's claim of receiving no complaints about the supply station services contradicts what residents claim. Residents said that they would like the opportunity to voice complaints about the quality of their water supply, but they either do not know how or do

not want to create problems. A research participant said, “I am very happy to have some water access so I cannot complain” (Research participant, Periurban district of Cần Thơ, May 2017). It was common to hear from residents that it was better not to complain because they would rather have some piped water rather than none.

That a commune resident gained a position of authority highlights the growing number of opportunities for ambitious individuals under the state’s decentralization policies. The system that has given authority to the commune’s water station manager is part of a system that rewards discretion and rewards the appearance of resource conservation because both can contribute to future regional development opportunities and growth (Fritzen 2006). In the above example, there is limited community involvement that could keep local authority figures accountable. Public participation can be limited because of a lack of information about residents’ rights, a lack of awareness about the issues presented, and a general lack of experience with public participation (de Wit 2009).

3.0 Vietnamese propaganda

The national, provincial, and local governments influence residents through environmental and social propaganda. The overuse of propaganda in the past has deterred some residents from paying attention to current environmental messages, but the same techniques are still used today. Vietnamese propaganda posters have lined the streets of Vietnam for decades, but the messages that these posters emphasize have changed. Propaganda art of the past depicted environmental principles that promoted continued resource exploitation. An example is a poster with the written message: “Plant many trees so the country is rich and beautiful” (McElwee n.d.). Posters with this caption, or similar captions, would usually depict industrial city symbols and happy labourers. Today, instead of seeing posters about war and resistance, they promote

development, modernization, disease prevention, and environmental awareness (Qiuyi 2016).

Today the posters still increase awareness of government policies, and they try to capture attention immediately using bright colours, positive images, and clear language (Mydans 2000).

Propaganda often has a negative connotation, which comes from “its history of power and control” (Vidal 2003); however, it is simply a means of spreading information and ideas. Propaganda can be spread in different forms and often depends on the socio-historical context of the producing government (Jowett & O’Donnell 2019). Propaganda posters were first used in communist Russia and were a tool of communist countries during the 20th century (Mydans 2000). Propaganda posters first started appearing in Vietnam in the 1940s to communicate social and political messages, and they remain a national symbol of Vietnamese identity (Mydans 2000; Qiuyi 2016). In the early 1990s, they were one of the only forms of advertisement, but now they compete with capitalist advertising. Despite national importance, the vibrantly coloured posters are often viewed by the public as a dated method to spread national ideals, which can lead to low public interest in the poster’s message.

Vietnamese propaganda posters might seem like a tool of the past and largely ignored, but propaganda is still used widely in other forms to spread important environmental information. In periurban Cần Thơ, propaganda agents are representatives from the commune People’s Committee who share pertinent information with residents. According to Jowett and O’Donnell (2019), “their purpose is to send out ideology with a specific objective to a target audience for the benefit of the institution but not necessarily for the good of the receivers” (324). This style of information dissemination is visible in the periurban area given the hierarchy that exists between residents, local authority figures, and the People’s Committee members. Furthermore, as in the above example with the commune water station manager, residents are

often unaware of how to voice concerns. Being unaware of where and how to voice concerns about water services is in part due to the hierarchical nature of the propaganda style of information dissemination. Government officials relaying precise, scripted, information to residents is similar to how propaganda posters disseminate information; both benefit the government more than the intended audience because the messages reach a wide audience rather than allow feedback and questions from residents. Another similarity is that, in many cases, the public fails to receive information (Jowett & O'Donnell 2019), they actively chose to ignore it if the information presented goes against traditional or cultural beliefs, or they are not able to make changes. What this demonstrates is that propaganda and efforts to create environmental subjects are not always effective tools. Furthermore, propaganda efforts try to make residents feel responsible for the state of their environment when, in reality, residents often do not have control over the large-scale pollution occurring in the area.

Traditionally, Vietnamese environmental policies prioritized controlling people's resource use, and policies gave less attention to protecting the resources themselves. However, the central government recognized that environmental policy promoting economic development over conserving the environment is unsustainable (Chapman 2017). The 2016 12th National Party Congress of the Communist Party of Vietnam report began to address the country's sustainable development and environmental concerns; the report reviewed and set objectives for the 2016-2021 period. One of the report's main objectives was to link sustainable urban development with economic growth and environmental protection (Chapman 2017; Communist Part of Vietnam 2016). Despite the progress of this report toward environmental policies, enforcement remains the biggest challenge. The lack of enforcement mirrors the main disconnectedness of

decentralization in that there is a lack of proper implementation at the commune level. In addition, there is no consistency between provinces.

While writing this dissertation in 2019 and 2020, across the country, local businesses, local people, and the government have been making strides towards improving the state of the environment. In Vietnamese cities, especially among the country's engaged youth, the issue of plastic waste and solid waste management are top priorities. The Ho Chi Minh City People's Committee has launched multiple plans to reduce the use of single use plastic items and is in the process of working with the Department of Education and Training to educate students and local residents about environmental issues and the impacts of pollution (Saigoneer 2018). These processes work to create environmental subjects, local residents who follow the environmental rule of law because they want to, rather than because they are obeying a directive.

The current environmental movement in Vietnam has come a long way in a very short amount of time in a country where, according to Nguyen and Datzberger, "civic activism in authoritarian Vietnam [is] very difficult...and freedom of speech is still highly restricted" (2018: 4). In fact, one of the first instances of public environmental outcry occurred in 2008 in response to severe potential environmental impacts of the construction of two alumina plants in central Vietnam. The central government's inability to silence criticisms of the project led to stricter and more regular environmental reviews and assessments of the project (Chapman 2017). It was not until 1 May 2016 that the biggest public mobilization and protest occurred over an environmental issue in Vietnam. In this case, it was in response to a toxic spill from the Ha Tinh Steel company that contaminated approximately 200km of Vietnamese coastlines with toxic cyanide (Borton 2018). While the first protest was peaceful, the second protest one week later was met by widespread government attacks on the protestors in the form of violence and civilian arrests

(Nguyen & Datzberger 2018). The environmental activism around the spill is considered the disaster's silver lining and has helped to grow local environmental involvement in Vietnam.

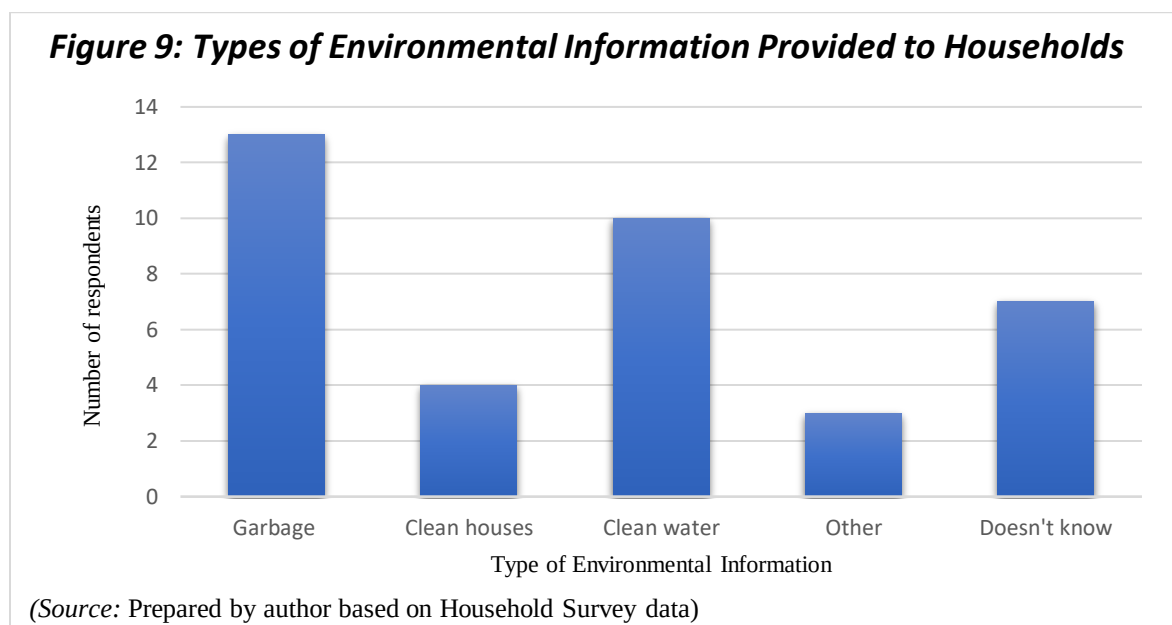
The increase in local environmental involvement in Vietnam contributes to the increase in the above-mentioned anti-plastic national campaigns and nation-wide environmentalism. However, despite improvements, in June 2017, blogger and environmentalist Nguyen Ngoc Nhu Quynh “was sentenced to 10 years in prison after being found guilty of committing national security offenses and spreading ‘anti-state propaganda’” (Borton 2018). What the lack of opportunity for civic activism highlights, despite the progress made, is that the Vietnamese environmental movement is relatively new and, despite the government's call for environmental policies and sustainable growth, much of the environmental movement is not supported by the central government.

4.0 Analysis of local environmental subjects in periurban Cần Thơ

This section examines Cần Thơ's periurban environmental subjects to understand how environmental rule occurs. According to Pamela McElwee, “environmental rule occurs when states, organizations, or individuals use environmental or ecological reasons as justification for what is really a concern with social planning” (2016: 5). I examine a specific point in time in 2017 and look at the type of environmental information given to periurban residents to offer some insight into the state of environmental awareness. I then address the relationship between environmental awareness in the periurban and local resident's access to municipal services like water, garbage, and sewage to answer whether residents are better environmental subjects if they have access to more services.

During field interviews with residents, I asked questions about what kind of environmental information residents could recall learning from the local government. Figure 9

below shows the environmental information and propaganda residents claim to receive from government officials who spread propaganda in the resident's communities. I asked these questions to determine the effectiveness of Vietnamese government led environmentality. Figure 1 demonstrates how, of the 37 research participants, 19 percent claimed that they did not have the time, energy, or educational background to either understand or pay attention to the environmental information disseminated by the local government. Of the 19 percent who claimed they did not know what information the government distributed, 86 percent were female respondents. The high percentage of female respondents who did not know suggests that women may struggle to take part in some aspects of local environmental protection (further information on this is found in chapter 5). Figure 9 also shows that most respondents recall hearing how to dispose of garbage and about how to keep the rivers and canals clean by not throwing garbage into the rivers and canals. Unfortunately, I can only disclose what information residents claim to have received from government officials as I did not receive this information from government officials themselves.

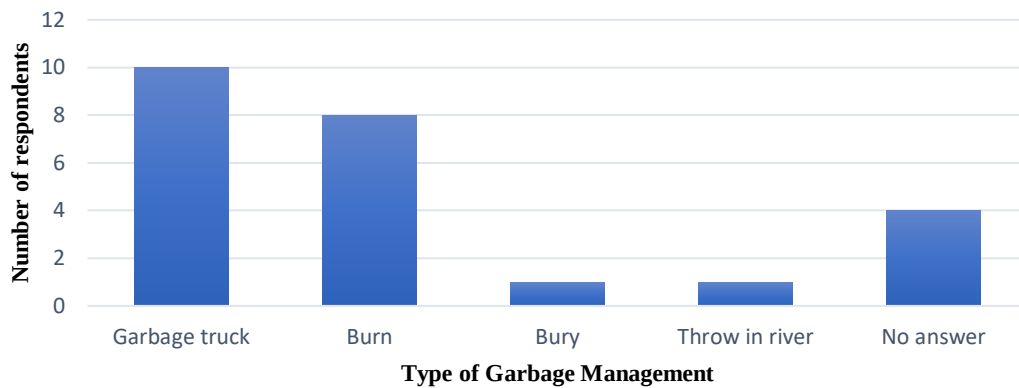


Rural and periurban Vietnam experience problems with household garbage management (Viet Nam News 2017). On December 8, 2018 a waste-to-energy plant opened in Thoi Lai District, Cần Thơ, and “the facility is designed to treat 400 tons of waste per day, while generating 60 million kilowatt hours of electricity per year” (Huynh 2018). The waste-to-energy plant has the capacity to treat up to 70 percent of Cần Thơ’s daily solid household waste. According to the Department of Construction, prior to the construction of the plant, the city’s household waste went to three different burying and incineration sites in three periurban districts (Huynh 2018; Viet Nam News 2019). The plant is a big move forward in household waste management and is part of Cần Thơ’s new national strategy to 2025.

4.1 Analyzing access to household waste removal

During the time of my research, the local government was already trying to raise awareness about household waste management (see Figure 10 below). However, given discussions with research participants regarding their perspectives on the state of waste management, it is difficult to know how long it will take before they utilize the plant to its fullest potential. In 2017, Cần Thơ did not have this waste-to-energy plant and, despite having access to garbage truck removal services, garbage piles lined the roadways, clogged canals, and polluted agricultural and household land. According to a Vietnamese news source, it is not possible to take garbage to nearby treatment plants due to the lack of adequate facilities in the Mekong Delta (Tuoi Tre News 2017). When garbage trucks collect household garbage it goes to one of Cần Thơ’s three overloaded landfills to be burned or buried, which causes major problems for surrounding residents. During interviews with residents, academics, and local government workers, all claimed to be concerned about household garbage in the Mekong Delta.

Figure 10: Household Garbage Management Solutions



(Source: Prepared by author based on Household Survey data)

At the individual household level, residents manage their garbage in one of four ways (see Figure 10). Garbage trucks and burning garbage are both sanctioned by the government despite the government trying to discourage the use of burning where possible. Despite most research participants claiming not to throw garbage into the canals and rivers (see Figure 10), there is an alarming quantity of garbage clogging the waterways. In fact, according to one participant:

I throw [my garbage] into the river. Everyone does it in the countryside so I'm not worried about being fined...I see the garbage truck drive by sometimes but I don't know if it stops here since most people just throw [their garbage] into the river anyway

(Research participant, periurban district of Cần Thơ, July 2017).

Residents are generally very cautious about what they say in front of government workers for fear of reprimand, of making trouble, or of appearing to speak ill of Vietnam. During the above interaction, my local government guide was present but that did not discourage the participant from saying something that contradicted government policy. The participant was not worried about being fined for dumping garbage in the canal, which suggests an obvious lack of

monitoring or enforcement of proper garbage disposal measures. What this also demonstrates is that residents are not likely to be ‘environmentalized’ by the local government despite the disseminated environmental propaganda. There is also a lack of monitoring and enforcement although most of the government disseminated environmental information is about household garbage management.

Research participants’ answers to my question about how they dispose of household garbage varied almost as much as answers about household water access. I noticed that, similar to households having one to five water sources to draw from, they also have multiple methods to dispose household garbage (see figure 10). Many households claim to leave garbage outside for the garbage truck but many did not know if the garbage was always collected. Given the amount of garbage sitting in piles on the roadside, the lack of capacity of the city’s landfills, and the proximity of canals and riverbanks to the roadside, large quantities of household waste go uncollected and find their way into the nearby river systems.

Residents who use garbage truck services are generally those who perceive themselves to live in either urban or periurban areas and speak highly about the ease of using the garbage trucks. Officially, garbage trucks are classified as an improved service because it is a newer service for most residents. In most locations, the provincial government fund garbage collection. Two research participants said:

I gather [my garbage] and put it on the street. The truck comes every day. I don’t pay for it, the government does. We put plastic bags into the bins and put compostable things into the garbage (Research Participant, periurban district of Cần Thơ, July 2017).

We gather it up and leave it to be collected. Before we would just throw it in the river

but we stopped about two years ago when it started to be collected (Research Participant, periurban district of Cần Thơ, July 2017).

There are many reasons for either no garbage trucks or infrequent garbage collection. The first is due to poor road infrastructure. Often roads are small dirt paths or very narrow concrete paths inaccessible to vehicles larger than motorbikes. Another reason for the lack of service is the distance from a main road. The farther a commune is from a main road, the less likely the residents will have garbage collection. These are two of the main reasons residents will burn or bury their garbage.

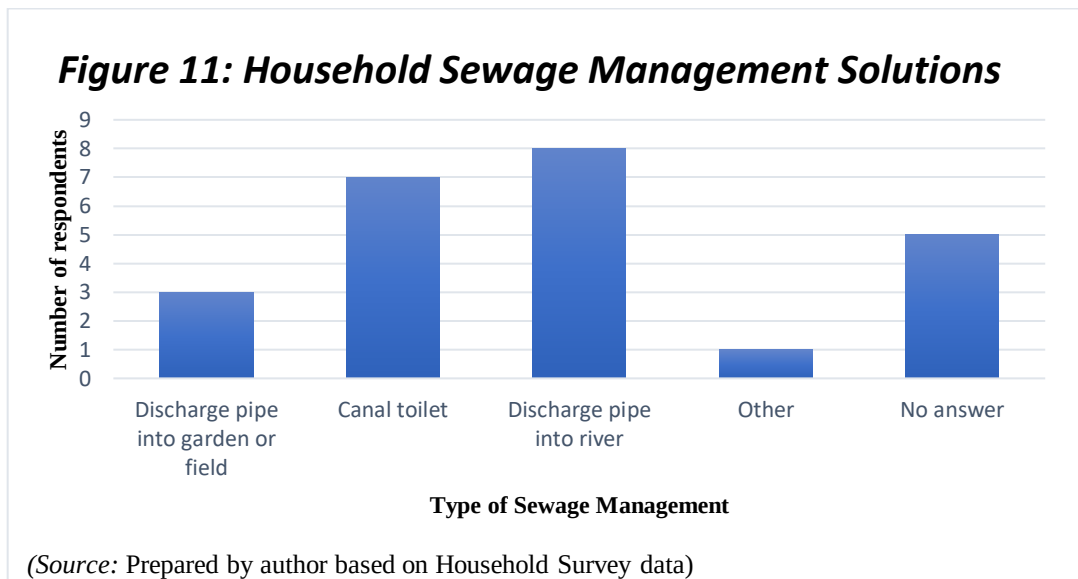
I gather it and burn it. The garbage trucks don't come here. No one will punish you in rural areas if you burn or throw away garbage in the river here. You're only punished for those things in the city (Research Participant, periurban district of Cần Thơ, July 2017).

We gather [the garbage] and burn it. The garbage truck can't reach here yet but we'd use it if we could. Some people in this area have recommended that we get a truck but many people are against having one. They say it's unnecessary because we can easily burn it or bury it (Research Participant, periurban district of Cần Thơ, July 2017).

The final reason for lack of or insufficient garbage removal is because of the poor state of the city's landfills. The incinerator for Cần Thơ's landfill was shut down soon after it became operational because "the company was not satisfied with the treatment prices local authorities said they could afford to pay" (Tuoi Tre News 2017). The lack of financial capacity of the provincial governments speaks to problems associated with decentralization. Ultimately, a lack of interest in practices that benefit the environment is exacerbated by the lack of available facilities.

4.2 Household sewage systems

Prior to beginning my research I expected there to be some formal household sewage system like the piped water systems. I expected a divide between households that used the formal sewage system and households that used alternative solutions, and I expected it to coincide with forms of water access in a household. In Ho Chi Minh City, urban building regulations require septic tanks for each physical dwelling to be emptied every one to ten years (Nguyen, Tran & Nguyen 2013). Given Cần Thơ's population size I expected similar regulations. What I found, however, is that Cần Thơ lacks a formal household sewage system. Households discharge sewage directly into the surrounding rivers and canals (Daniel 2018).



During my research I encountered four types of household sewage management solutions (see Figure 11). Discharging household sewage into gardens and fields for fertilizer is a common practice, and a method used globally; it is often branded ‘organic’ fertilizer (Orlando 2017). A research participant said, “We have a very long house and a long garden at the back of the house. Our sewage goes directly into the gardens”. While only 12.5 percent of research

participants use this strategy, 62.5 percent of participants claim to discharge sewage directly into a river with a pipe or by a canal toilet (see Figure 11). When asking residents about sewage management they generally reacted with disdain and hopelessness that their household sewage was going directly into the canal which most residents use daily. There is a high level of awareness about the health effects of raw sewage in one of the major water sources. According to one research participant:

I have a toilet behind the house and it goes straight to the canal back there. I make sure to do everything else [washing, collecting water, and bathing] in the canal section in front of the house (Research Participant, periurban district of Cần Thơ, July 2017).

Residents who dispose of household sewage directly into the canals and rivers do not see an alternative solution. The biggest difference in perspective of place is between residents using canal toilets and residents with discharge pipes from the house into the river. Canal toilets, or pond toilets, are toilets situated on a platform over the canal “that discharge waste directly into canals and rivers” (IUCN 2016). In 2014, the Ministry of Agriculture and Rural Development claimed that “54 % of all toilets in the delta are still pond toilets” (IUCN 2016). Those using canal toilets are the most likely to identify as rural residents with rural living standards while those with hygienic, septic or plumbed, toilets are likely to identify as urban or periurban residents. The more proactive residents who use their household sewage as organic fertilizer identify with living in the periurban. The residents who identify with the urban and periurban are the most likely to have a pipe that discharges the sewage whether it is into the river or into gardens as fertilizer.

Periurban residents often expect more from their local government regarding their current sewage situation.

Sewage goes directly into the river. [The government] should treat it first but because it's the government who would do this job we can't do anything about it ourselves. So there's no solution (Research Participant, periurban district of Cần Thơ, July 2017).

[Sewage] goes from the big pipe and then into the river water directly. In my opinion, it should be treated first but all the people here just have it go into the river and the government does it too. No one really cares to stop (Research Participant, periurban district of Cần Thơ, July 2017).

Both participants see their situation as hopeless given the lack of government action, and highlights the problems of decentralization. Without a formal sewage system in Cần Thơ's main urban district, it is unlikely that the periurban districts will gain sewage improvements soon. The local government workers classify the periurban districts as rural spaces and therefore, their perceptions of the current sewage disposal solutions are expected. According to a commune level local government worker:

Because this is a rural area there is no strategy or projects for sewage. This is not a bad thing though because it is just households so it is not so dirty (Local Government Participant, Cần Thơ, July 2017).

Another reaction from a research participant to household sewage is one derived from a lack of education and awareness. An example is from the following participant:

It goes to the river. Everyone does this so I do it too. I don't think about this at all but it can't be that bad since everyone does it (Research Participant, periurban district of Cần Thơ, July 2017).

As shown above in Figure 9, participants' recollection of environmental information disseminated by government does not include information on sewage management and disposal. I suggest that the lack of sewage disposal information provided by the local government is because of a lack of provincial level capacity for sewage systems. Decentralization means each province can decide what type of environmental information they disseminate, and the Cần Thơ government emphasizes household garbage because this is a much more noticeable problem, with more cost friendly solutions available.

5.0 Conclusion

In this chapter, I addressed my third research question, on how residents become environmental subjects, the degree to which residents have become environmental subjects, and the limits of environmentalization in periurban Cần Thơ. This chapter also speaks to my overarching theoretical framework whereby access to city services is diverse amongst the residents in periurban Cần Thơ and makes clear that planning initiatives should reflect these differences by focusing on the everyday dimensions of access to water, garbage, and sewage services. I examined how Vietnamese decentralization policies might have contributed to periurban residents becoming environment subjects, or not. I asked questions about how the local government contributed to environmental subject building and whether or not this had been achieved. Finally, I asked questions about the links between environmentally aware residents, their perception of place in periurban areas, and their access to city services.

I determined that the availability of municipal services and access to environmental knowledge help to shape local perceptions of place and have the potential to form environmental subjects. In this way, periurban residents can have power over their environment, but simultaneously experience exclusion from services. I examined how decentralization policies and the local government's environmental and social propaganda have influenced residents' service expectations and periurban service delivery. I interpreted what residents were saying about the information they receive from the local government to unravel their local perceptions of place. I did this by analysing residents' environmental knowledge and about their access to sanitation, garbage and water services. Future considerations on this subject could provide a deeper examination of gendered dimensions of service provision knowledges.

Overall, I expect that the capacity of Càn Tho's district and commune level governments to remain low, and that improvements in access to formal garbage and sewage solutions will be slow, for many reasons. The first is that periurban districts and communes are separate entities from the main urban district despite being part of the same municipality (de Witt 2009; Fritzen 2006; Wescott 2003). The second reason is poor coordination between neighbouring commune and district People's Committee offices due to fragmented decentralization. Finally, the capacity for local government environmental propaganda to succeed in the periurban is low based on the low awareness about many environmental issues and the limited scope of the type of environmental information disseminated to residents.

Research participants were unlikely to take part in environmental practices that would improve the local environment, for many reasons—whether it was because of a lack of will, a lack of awareness, a lack of access to proper services, or an inability to act on their environmental knowledge. Government propaganda has been largely ineffective for historic

reasons, but also because periurban residents do not have the facilities that would enable them to follow government policies. Another reason for a low level of environmental action could be that many residents felt as if they had no choice but to dump garbage and sewage directly into canals and rivers because of the lack of proper facilities or formal sewage systems. Low environmental action does not mean residents have no environmental awareness, but as long as they do not have a more environmentally friendly option in terms of garbage pickup and sewage facilities, I cannot say there is no ‘desire’ for positive environmental action. In many cases, it is the inability to act that perpetuates fewer environmentally friendly habits. In this case, residents are made to be environmental subjects responsible for the environment even when they have little to no control over the larger-scale, ongoing pollution from nearby factories and agriculture. This ultimately becomes a question of environmental justice because the response to these larger pollution problems should come from the commune, district, provincial, or national government and be implemented alongside the residential propaganda campaigns that promote environmentally responsible garbage disposal.

Ultimately, Vietnam’s weak decentralization policies have undermined the capacity of local governments, and have increased the gap between urban and rural disparities and service distribution. This gap is unlikely to close because the more densely populated areas with higher GDP earning potential will always be prioritized over poorer areas. The commune level government is the smallest administrative unit, but, “despite being the ‘foundation of our public administration’ in Ho Chi Minh’s Phrase—[the commune] is unlikely to see major changes in its resources or authority, given the current administrative culture of control that marks most officials at the provincial and district levels of government” (Fritzen 2006: 18).

CHAPTER 7: WATER SCARCE OR WATER ABUNDANT? THE CASE OF CẦN THƠ, VIETNAM¹³

1.0 Introduction

Over time demand for water resources has increased globally. The Food and Agricultural Organization argues that: “water scarcity is one of the greatest challenges of the twenty-first century” (2016). The location of abundant water sources do not always match where the world’s largest cities are located. As such, many urban areas live with the threat of water shortages, and it is estimated that approximately one-third of the global population experiences physical water scarcity (Kummu et al. 2010). The Asia and The Pacific Policy Society (APPAS) states that the country of Vietnam experiences severe water scarcity and point to the large Mekong Delta region specifically (Thang 2018).

Global discussions of the Earth’s resources should include debates around water scarcity. At an international scale, many countries share water resources with neighboring countries (International Water Law Project n.d.). Therefore, concern over water resources and the need for clear international or transboundary regulations for water conservation make sense. For this reason, many countries share regional cross-boundary commissions and agreements to manage waterbodies. In Southeast Asia, the Mekong River Commission (MRC) was set up among the Mekong River’s shared countries – China, Myanmar, Laos, Thailand, Cambodia and Vietnam – to coordinate water management (Mekong River Commission n.d.).

The Mekong River Delta is a vast area spanning two countries—Cambodia and Vietnam—with diverse landscapes and waterscapes. Regional perspectives of scarcity should not be taken as fact at the local scale despite the Delta being identified as a densely populated area

¹³ Allen, Sarah (2019). *Water scarce or water abundant? The case of Can Tho, Vietnam*. Urban Geography. 40(7): 1030-1038. Doi: 10.1080/02723638.2019.1617009. This chapter is a highly revised version of this published article.

with the potential for water shortages. The regional perspective used by the MRC and others is often considered to be the most useful for understanding water supply and demand because in many cases regional understandings are thought to determine local understandings or situations with respect to water management and availability. However, misconceptions can be created over access to water at the local scale due to large, and often intimidating, global and regional interpretations that are presented as determining local processes (Cain & Gleick 2005; Phu 2007; UN World Water Development Report 2003). Anna Tsing's discussion of scale and scalability is particularly relevant to this chapter. Tsing speaks to the problems of translatability across scales, and says that scalability is "the ability to expand—and expand, and expand—without rethinking basic elements" (2012: 505). Furthermore, some analysis of processes are scalable, and some can translate from site to site without scaling up. Some writings in political ecology question these ideas and the attention to scale leads political ecologies to open up the question of local, regional and global processes in shaping water access—and people's agency in accessing water (Gibson-Graham 2002).

Cần Thơ is often positioned within the same larger regional scale analysis (Vietnam Investment Review 2018). As the region's largest city, it is thought to have greater potential for water demands in excess of supply, and for water stress. Cần Thơ's positioning as vulnerable can be partially attributed to the serious drought in 2016 that affected the entire Delta region (Boudreau, Pham & Chau 2016). The drought should not go unrecognized, but some academics claim that the Delta did not experience as many water shortage problems as did Ho Chi Minh City (Vietnam Net 2016). During the rainy season local residents in Cần Thơ do have a physical abundance of water and during interviews with research participants in the research sites, they

rarely claimed to worry about quantity and water scarcity—even in the dry season, which contributes to their ability to withstand major drought.

I argue that the discourse around water scarcity can create the impression of a water crisis. The unequal access to formal water systems in Cần Thơ’s periurban creates the perception that the region is water scarce. However, the expansive canals, river systems, groundwater, and seasonal rains in the region do provide physical water access. Physical and economic scarcity analyses rely on experts for classification; however, water scarcity should be determined by local residents, on a local scale, who navigate their local water resource options on a daily basis.

I employ Rijsberman’s (2006) understanding of physical and economic water scarcity, who defines water insecurity as occurring when a large percentage of a population cannot access safe and affordable water to meet basic daily requirements over a long period of time. It is the scale of analysis that defines scarcity (Rijsberman 2006) and economics plays a large role in water access.

2.0 Periurban Cần Thơ, Vietnam

Cần Thơ is the Mekong Delta’s largest city and is home to approximately 2.1 million people. A large proportion of Cần Thơ’s landscape is periurban – a region under constant change where both urban and rural activities occur side by side (Fox, Spencer, Saksena, & Nguyen 2011). According to Labbe (2019), periurban areas face unique “governance and planning challenges” (2019: 41) where the periurban acts as a “[zone] of encounter between institutional arrangements, governing practices, and socio-spatial relations and, as such, they open up an insightful window onto the changing governance of land development and capital investment during the regional urbanization process” (2019: 41). Periurban Cần Thơ thus faces unique demands—ranging from pressure on resources, uneven or lack of access to services, and the loss

of agricultural land. Pressure on the landscape comes from varying landscape demands—residential, industrial, agricultural, and commercial—all of which occur in periurban Cần Thơ (Allen 2017; Maneepong & Webster 2008).

Urban and periurban areas experience water scarcity differently than rural areas. As cities urbanize they must manage higher population density, which puts more pressure on freshwater resources (Diaz-Caravantes 2012). Residential periurban areas often put less pressure on resources compared to their urban counterparts (Prakash 2010) because, in the periurban region, residents have the opportunity to access water through multiple channels – formal (piped water system) and informal (rain, river/canal, and groundwater).

Cần Thơ gained its periurban areas in 2004, when the city extended its municipal boundaries to the entire province (Pham, Raghavan, & Pawar 2010). This process is known as administrative urban growth (Nguyen 2016). The periurban districts illustrate the above-mentioned land use demands and the differences between physical and economic water scarcity. Cần Thơ's historical canal and extensive river systems provide many ways for residents to ensure water security and navigate potential scarcity by adapting to water use practices that match the local environment (Pereira, Cordery, & Iacovides 2009). In fact, being neither fully rural nor urban and people living alongside the canals and rivers is the region's main advantage.

There is a tendency for planners, academics, organizations, and governing bodies to assume that in cities, water access is primarily attained through formal piped water systems. There is the opposite belief in rural areas, where the assumption is that the primary form of water access is through informal means such as groundwater, rainwater and canal/river water. As soon as periurban Cần Thơ became classified as urban, water scarcity analyses stopped accounting for these multiple informal water sources. This highlights not only the necessity of multi-scalar

water analysis, but also calls for a careful analysis of how issues or discourses translate, or how they may not translate, across scale (Tsing 2015). Furthermore, scales can be produced through discourse in the same way that periurban is a produced scale, and canals and other physical infrastructure are produced material scales. It also shows the need to consider multiple sources of access in the urban and periurban, as well as how all forms of access contribute to achieving household water security.

3.0 Analyzing theoretical approaches

An Urban Political Ecology (UPE) framework helps to analyze how power and the process of peri-urbanization can influence both the physical landscape and the discourse of water scarcity. UPE sheds light on the everyday dimensions of resource inequality and uneven access. I employ it in this article to look at differences in water scarcity discourse and scarcity indicators alongside empirical evidence from periurban Cần Thơ. The UPE literature looks at how water, cement, infrastructure, etc., shape and then reshape an area and influence power relations. Some pertinent examples are Kooy and Bakker's (2008) research on water and colonial infrastructure in Jakarta, Indonesia, Furlong and Kooy's (2017) work on water networks in Jakarta, and Gururani's (2018) work with city networked sewage systems in Gurgaon, India. Furlong and Kooy (2017) conducted research on Jakarta's networked infrastructure and the unevenness of household water access. They argue that "centralized piped water networks are absent, or very partial, in many cities in the South" and that by "focusing on piped water masks the diverse realities of what 'connection' means in Southern cities" (2017:889). Similar to my argument, they emphasize that informal water connections are also important considerations and that there is no "universal infrastructure ideal" (2017: 889). Ultimately, I agree with Furlong and Kooy when they say that residents "can have a variety of good reasons for choosing not to connect to

the [formal] network or to retain other [water] supply options in addition to their piped water connection” (2017: 889). One of the biggest points of comparison between cities and periurban areas across Southeast Asia is that residents have a variety of water sources that provide different types of water for different uses.

As mentioned before, core urban areas must generally rely on networked infrastructures, like municipal water systems (Monstadt 2009). However, in rural and periurban areas, municipal water supply services are usually poorer quality, more unreliable, or non-existent (Pereira et al. 2009)—thus the importance of using of UPE to consider how people experience day-to-day water use. In Cần Thơ’s transitional periurban landscape, unequal service distribution is common despite the periurban districts being part of the city’s municipal boundaries.

In the everyday, more time and effort go into accessing water in the periurban areas compared to the urban areas. Also, periurban areas are different than urban areas so periurban residents use water differently than residents in more densely populated urban areas. In particular, periurban residents have more space for gardens and other water demanding enterprises like animal husbandry; however, the quality of water needed for animal husbandry is not the same quality of water required for drinking, cooking, or bathing. Residents in periurban and rural areas work hard to make water safer for those uses where clean water are important (drinking and cooking) if they rely on more than just the formal system—they boil, filter, let sit, treat with chemicals, or precipitate with fans. A participant from my research study uses both formal and informal water sources in his daily life, and there is a special process to treat each source. According to the participant:

We don’t have a place to store rainwater so we don’t use it. Even if we had the space we probably wouldn’t use it because it’s a lot of extra work. We have a well for washing and

we use chemicals like aluminium to treat that water. Then, we store it in a cement container that's 100 cubic meters and let it precipitate. Piped water we store in a small container to use every day. We have to treat this too because it's kind of slimy. We do the same thing with piped water as with groundwater to treat it—chemicals and let it precipitate. (Research Participant, periurban district of Cần Thơ, July 2017)

Another participant from periurban Cần Thơ does not have access to the formal water system because the pipes cannot pass through the grave site located beside her home. According to the participant:

I store rain water for drinking and cooking. For washing I use the canal. . . I store enough rain water for the dry season . . . and since moving here I haven't had any worries about not having enough water. If I run out of rain water [during the dry season] I can just buy bottled water to drink. (Research Participant, periurban district of Cần Thơ, July 2017)

UPE's analysis of the processes used to ensure safe access to water illustrates both material and social constraints because these residents do not always rely on formal systems. Even when they have access to the formal system, other measures must be taken to make it usable for drinking, cooking, washing, cleaning, and bathing (Heynen 2013; Lawhon, Ernstson, & Silver 2014; Zimmer 2010). These stories of water access also show us how informal water access ensures flexibility and adaptability, which are key components to achieving water security.

A large-scale analysis by a governing body or international organization would classify the above area as being water scarce of usable water for daily needs. This is mainly because of the limited use of formal water systems (municipal piped water system). However, a closer look at peoples' water strategies shows that they do not lack sufficient water. They have many other sources of water that do not show up in the larger scale mapping of water access. While not all

water is potable from the source—this is true of piped water too—residents are able to use different kinds of water for different needs based on the water quality. Residents also have methods for treating water to upgrade it. Residents happen to have access to multiple sources of water due to the available physical infrastructure (canals and groundwater) as well as the seasonal weather patterns (rainwater). In this case, the infrastructures and water ecologies are local, and they cannot be easily translated into a regional analysis. Here I suggest that there is not always translatability across sites (Gibson-Graham 2006; Tsing 2015).

There are different categorizations, understandings, and measures of scarcity. The most recognized are economic and physical scarcity, and demand-side and supply-side scarcity (Asheesh 2003; Falkenmark & Widstrand 1992; Gleick 1996; Hoekstr et al. 2009; Ohlsson 2000; Sullivan 2002). All definitions and types of scarcity agree that water scarcity is likely in situations of limited resources shared by a large population where per capita use exceeds supply. Physical scarcity refers to the lack of a physical quantity of water. Economic scarcity is when there is enough physical water to support the population, but there is a lack of technology, infrastructure, human capacity or financial resources to supply the entire population with quality water (FAO 2009).

Supply-side and demand-side claims are rather obvious; however, the concern today is that there are now many situations where demand exceeds supply (Falkenmark et al. 2007; Kummu et al. 2016). A pertinent example today of demand exceeding supply is Cape Town, South Africa where there is a large population and water use restrictions in order to ensure some level of demand can be met. Supply-side threats occur with unsustainable usage and pollution degrading supply (Powers 2018). Furthermore, Cape Town has received international publicity for its water supply problems. Planners and scholars who examine global water supply issues are

at risk of using what happened in Cape Town as an indicator of what will happen in other places. However, there is a distinctiveness to the Delta compared to Cape Town and elsewhere; the historical legacies in terms of infrastructure, settlement patterns, the monsoon climate. There are also distinctive water uses in Cần Thơ that range from gardening, orchards, household uses, and historically developed cultural practices like the history of maintaining small ponds.

Wide-spread unequal water access can be a determining factor for whether scarcity is a supply or demand issue (Rijsberman 2006). Factors contributing to unequal access can be spatial, demographic, or socioeconomic (Pereira et al. 2009). However, the type of scarcity is difficult to determine and largely relates to its scale of analysis – international, national, regional, or local. The scale of analysis can also be urban, rural, or periurban. Gururani speaks to the problems associated with analyzing places as urban or rural. She argues that “even though [villages] and their outskirts are central to the urban fabric and some of the city’s densest areas, they are largely abandoned by the state...[the residents] are virtually neglected by the state and left to simply make their own arrangements” (2019: 146). In this case, ‘being left to make their own arrangements’ means residents must ensure they do not face water scarcity on their own by using multiple types of water. Each scale of analysis can render different results, which is why the addition of local, place-based research is imperative (Crona et al. 2013). The very concept of scalar analysis means the consideration of more than one scale at a time (Scholes et al. 2013), an approach that has been developed by UPE theory.

Most scarcity indicators have been developed over the past 25 years and assess the quantity of water needed to sustain life. One of the most popular indicators, the Falkenmark indicator, measures water runoff available for human use on a national scale (Brown & Matlock 2011). It considers per capita water usage and distinguishes between environmental and human-

induced water scarcity. The main critique of the Falkenmark indicator is that it does not use a multi-scalar analysis because it neglects local and regional scale measurements in national water averages (Brown & Matlock 2011; Falkenmark 1989; Vorosmarty et al. 2005). Scarcity indicators, similar to the above-mentioned types of scarcity, are problematic when they are illegible at the local scale (Adger et al. 2001). Another problem with indicators is that the daily minimum water requirements vary between indicator from 2 Litres to 80 Litres of water per person per day (Brown & Matlock, 2011; Gleick 1996). The large range reflects inconsistencies between indicators and the factors included in the consideration of a minimum requirement of water per day. This shows a need for a multi-scalar analysis to determine water scarcity. These indicators also treat water as a uniform of singular material, rather than varied. Water comes in different forms and each form can be used for a different purpose. There is a need to differentiate different kinds of water and then conduct a scarcity analysis for each different kind of water, which should be done in addition to differentiating water scarcity by scale.

A discussion of water scarcity indicators links the alarmist discourse on water to my larger argument that these discourses do not address questions of scale and differentiated water. The lack of consistency between indicators contributes to how water scarcity discourses misalign water issues at different scales. They make the assumption that it is unproblematic for an analysis to highlight large-scale scarcity and translate it to the local scale. For example, the Guardian commonly promotes an alarmist approach to water shortage and scarcity concerns (McKie 2015; Watts 2018). This is not to say these articles are false at a larger scale, rather, that they neglect considerations of scalability while simultaneously failing to distinguish between different kinds of water and scarcities. The Guardian's 2015 article by Robin McKie writes how water shortages will lead to a global water crisis. The Middle East's physical water scarcity is compared to

California, Pakistan, and South Asia. There is a problem of nonscalability (Tsing 2012) when three places with distinct water dynamics are treated as if they are the same. This problem goes beyond different administrative units as well because each location has different ecologies, climates, water uses and more.

Beyond news media, international governing bodies and non-government organizations can also generalize water scarcity issues. Many reports mix and combine Southeast Asian water issues, ignoring the diversity of how the region experiences water scarcity (Pacific Council on International Policy 2017). An example comes from The Asia Society's (2009) report on Asia's water future in which Vietnam is discussed as a single unit of analysis. The report references the vulnerabilities of Vietnam's water resources due to many low-lying areas and extreme weather events. In Vietnam, this is true in some regions, but Cần Thơ sees comparatively little in the way of extreme weather events. Local participants from my research sometimes spoke about the large floods they remember from 1978 and 2000. According to one participant:

There have been storms here in the past but weather in this area is very stable.

Sometimes we get strong winds – just like other places and we feel the side effects of storms but they're never as bad as in other places. This is the Land of the Buddha so we are very protected. (Research Participant, periurban district of Cần Thơ, July 2017)

Throughout my research I found that Cần Thơ's periurban residents talk about flooding events from the past and feel that they have measures in place—higher built roads and extra water storage—to withstand future droughts or floods.

The collective feeling of water security is one factor in why the Mekong Delta did not experience the same intensity of water stress as Ho Chi Minh City during the abovementioned 2016 drought. Residents in periurban Cần Thơ prepare for the dry season and potential drought

years through informal water access and storage like rainwater collection and ponds. They also actively try to save water on a daily basis. For example, one of my research participants with access to piped water also uses river water and rainwater daily. According to the participant:

It's very important to save water because in the dry season we sometimes don't get enough water from the river to water our garden, so we have several ponds too. When the water level is high, I store the water in the ponds and save it for my garden. (Research Participant, periurban district of Cần Thơ, July 2017)

The practice of storing excess water in ponds ensures that this family can grow longan fruit in their garden to sell. They also store rainwater in 10 barrels that are filled throughout the rainy season to be used for drinking water in the dry season. Ponds and rainwater collection ensure both a drinking water supply and an income generating activity. These practices that do not require monthly payments within the formal water supply system are the norm across the area.

Another example of how residents ensure water security year-round is from a research participant with a family of two. This participant is a xe ôm driver (motorbike taxi), cleans motorbikes, and works for the local government. He ensures water security by using three different types of water daily and ensuring there is always enough groundwater stored for the dry season. They store a large quantity of groundwater because it does not cost them to use it and they say the quality is good for many of their daily needs.

We have a well for washing dishes and clothes and for bathing, but we use piped water for cooking. We use bottled water for drinking only. We have nowhere to store rainwater so we don't use it and we wouldn't use it even if we did have space because it's a lot of extra work. We store the well water in a 100m³ cement container and we

also store the piped water in small containers. We use groundwater freely and [storing water] is very important. (Research Participant, periurban district of Cần Thơ, July 2017)

What these examples demonstrate is that the classifications of scarcity should be more robust (Damkjaer & Taylor 2017). As the scarcity classifications are currently, they reflect a one-dimensional understanding of water access and security in relation to formal piped water access. Water can be accessed in multiple ways, each for a different purpose—the classifications should reflect this.

4.0 Conclusion

The language used in international organizations' reports and in the international media contributes to stereotyping Southeast Asia (the people, ecologies, infrastructure, histories, and water itself) as being homogeneous and unable to cope in the face of water scarcity. There are risks with homogenization and the issue of water scarcity and availability needs to be context driven through multi-scalar and multi-sited analyses. Furthermore, the analysis of water scarcity should consider questions of translatability across scales and sites. Urban and periurban discourses of water shortage, alongside scarcity indicators typically rely on the availability of, and access to, formal piped water, whereas the significance lies in residents' ability to access informal water resources for uses appropriate to the quality of these sources and the differences of the water and the different uses. Informal access for multiple uses allows residents to perceive themselves as water secure.

This chapter demonstrates the importance of distinguishing between types of water scarcity and of incorporating a truly multi-scalar analysis that prioritizes local experiences. International and national representations of Vietnamese water scarcity differ from what is

experienced at the local level in periurban Cần Thơ. There, residents do not see themselves as water scarce due to their ability to access water informally or in addition to the formal piped water system. There is an abundance of water available to residents and, depending on financial capacity, they can choose how to use what is available. The story of Cần Thơ's water availability is just one scalar perception of water scarcity. Therefore, water scarcity perceptions largely depend on the combination of scales analyzed – global, national, regional, city, district or commune level.

CHAPTER 8: CONCLUSION

This dissertation set out to examine different understandings and perspectives of water security and the relationship between periurban landscapes and water users across three periurban districts of Cần Thơ. Using an urban political ecology and feminist geography lens, I examined various elements and factors contributing to residents' perception of place. These elements included historical infrastructure and legacies, Đổi Mới economic reforms, gender norms, decentralization policies, government environmental and social propaganda, and alarmist discourses. All of these elements contributed to the availability of, and residential access to, city services like piped water, garbage disposal, and sewage systems. With special focus on water security, I examined residents' relationships with various water sources (rain water, well water, river/canal water, bottled water, and piped water) in the periurban landscape and how these relationships may have changed over time.

My research objectives changed over the course of my PhD. The ideas and research plan I had going into my first year were completely different from the research proposal I submitted to the geography department in my second year. My research proposal objective was to examine the relationship between urbanization, water users, and water security within the city of Cần Thơ. I wanted to employ an urban political ecology framework to better understand how different groups of people access water and to examine how power, water usage and distribution, and urbanization can influence the urban landscape and gender roles associated with water access. My initial research objectives were meant to build upon and challenge the current literature by shifting the predominant focus from large cities in the global South, such as Ho Chi Minh City, onto secondary urban landscapes. The biggest changes from my research proposal to my final project were a change in focus to the periurban areas of Cần Thơ instead of urban areas and

incorporating a feminist geography lens alongside urban political ecology. Another change was that I conducted extensive archival research before conducting any other research in Cần Thơ. I conducted many months of archival research, initially because of delays in accessing my research site; but then leading to additional archival research I would not have done otherwise. This led to a new set of questions about the influence of French colonial infrastructure on current periurban water access. Instead of looking at recent government and Delta history in the past ten years, I historicized my research site by researching French colonial era canal construction.

I argue that my research has contributed to the growing body of periurban literature and has enhanced existing knowledge. My two biggest contributions are also published articles (see Chapter 4 and Chapter 7). First, My use of the French colonial archives in Ho Chi Minh City to understand current water access in periurban Cần Thơ is a worthwhile analysis of the changing waterscape and the social strategies that developed over time in response to those changes. Furthermore, my archival work contributes to, and builds on, Kooy and Bakker's (2008) important work linking today's water access and power to colonial infrastructure in Jakarta.

Second, my argument in Chapter 7 considers alarmist discourse and water scarcity; it also speaks to the overall themes of my dissertation—perception of place, and water differences. Arguing for more multi-scale and multi-sited analyses is not new, but examining the differences in interpretations of water type and water scarcity, especially at the household level, is important. Furthermore, this chapter pulls together the findings of my dissertation and brings them to the forefront of current water policies and discourses.

What I contributed to existing knowledge through my empirical research is an understanding of the risks associated with resource vulnerability and the strategies that exist on the ground that are used to overcome them. I found that, in most cases, there was great value in

the informal types of water and informal methods of water access. I problematized the use of scale by considering why the Delta cannot be translated or applied to other places or scales much like how water is not just water—there are different types of water for different uses. As periurbanization does not only occur on the fringe of megacities, I also contribute to the literature on secondary cities by highlighting their importance and influence in Southeast Asia. As cities in Southeast Asia continue to grow, secondary cities are starting to be prioritized. In Vietnam, Cần Thơ has long been an important place in the Delta's history and it continues to be essential to the country's economic growth plans. Finally, I contribute to feminist geography in that, while my research may not be inherently feminist in nature, my methodology is feminist. My research demonstrates that all research can be feminist by historicizing the research site and adding self-reflexivity into my research analysis.

In chapter four, I examined the historical legacies of French colonization for the Mekong Delta's waterscape and the implications for today's periurban residents' access to water. Canal systems were only one of the historical legacies left behind from French colonization, as the French changed the face of both the landscape and waterscape of the entire delta region. While large-scale infrastructure interventions by the French did not fulfill the original goals of the French colonial administration, they play a large role in periurban residents' lives today. Cần Thơ's periurban residents are able to utilize the colonial era canal systems to build resiliency against the threat of water insecurity. In Chapter 4, I argued that the existence of the historical canal systems and the general failures of the French colonial infrastructure projects have allowed for active and resilient citizens. Residents are able to capitalize on the extensive canal systems for livelihood opportunities that would not be possible if not for the nearly constant water supply. Furthermore, the almost constant water supply from the canals ensures access to a form of water

that can be used for various purposes, especially when piped water might be inaccessible. This chapter helped me to answer questions about residents' understandings of water security and resilience. It has also helped me to understand how water access has evolved since French colonization, what residents do at the local level to ensure access to water, and what residents are able to do because of the Delta's availability of water. Residents are flexible and therefore resilient because, in addition to piped water and canal water, they have access to other sources of water, including rainwater and ground water, which allows them to anticipate seasonal water patterns and respond accordingly.

I argued in Chapter 5 that Đổi Mới and gender norms are two main factors that contribute to local perceptions of place in periurban Cần Thơ. I argue that people's perceptions of place are often based on social constructs and are related to an individual's positionality and personal experiences. Đổi Mới marked Vietnam's turn to modernity and these reform policies helped reduce national poverty rates and prioritized national economic growth and urban development, which led to nationwide social and economic change. Đổi Mới also altered gender relations in Vietnam because, as the country opened up and the economy grew, women's roles changed. While women are generally still in charge of the family's household and finances, women are also increasingly expected to contribute to the family's income. Academics have argued that the combination of Đổi Mới and changing gender norms are both positive and negative for women. On the one hand, the changes can be negative because expectations of women are too high after Đổi Mới presented new opportunities. On the other hand, the changes can be positive because, regardless of a woman's education level, there are new opportunities for women to earn an income—there are arguably less barriers for women now. I found that my research supports both of these arguments.

Vietnam's economic transformation through Đổi Mới and the long history of Vietnamese nationalism have greatly influenced the country's current gender norms. For this reason, I linked residents' perceptions of place with gendered perceptions of place. I found that residents do not always identify with the administrative classifications of the landscape in which they live. I learned that when residents focused on what was lacking from their surroundings, they were more likely to identify with living in a rural area. The majority of women research participants admired city life, which coincides with urban development priorities of the Vietnamese government since Đổi Mới. However, despite women speaking in admiration about city life, I discovered that the negative perspectives of urban life were equal between female and male participants.

In Chapter 5, I further examined the social differences that are significant to accessing water. By asking questions about the prevalence of different forms of accessing water and what social differences emerged, I discovered that social networks or community/neighbourhood arrangements are not as apparent as I expected them to be. However, female participants tended to understand the complexities of accessing multiple sources water for various needs more than male participants.

In Chapter 6, I examined periurban residents' environmental awareness, environmental knowledge, and how the type of local environmental knowledge relates to residents' access to municipal services. While offering an analysis of local government influences on residents' perceptions of place, I argued that decentralization policies and the local government's environmental and social propaganda contribute to residents' service expectations and service delivery—piped water, garbage collection, and sewage systems.

Decentralization policies allowed for provincial level decision making. What this meant for environmental awareness was that the provincial government decided what type of environmental information was disseminated and how it was disseminated. The Cần Thơ government emphasized household garbage because it is a noticeable problem on the landscape and there are faster solutions to this problem. I determined that the availability of municipal services and access to environmental knowledge shape the local perceptions of place and can form environmentally minded subjects. In this chapter I attempted to answer questions about residents' environmental awareness and action in periurban Cần Thơ—or lack thereof. At the beginning of my research project I wanted to learn about the role of community networks in accessing resources. While I did not learn as much as anticipated about the role of community networks, commune or household relationships in accessing water resources, I did find that environmentality is not as pronounced as I expected. Many commune members are not always aware of the environmental consequences of their actions, and many do not follow the government issues environmental propaganda. Environmentality has limits and there are many reasons why residents might not take part in environmental protection. Low environmentality does not mean residents have no environmental awareness, but I argued that residents might not have the ability to act on environmental concerns because of a lack of government services. Environmentality can thus be contrasted with an environmental justice lens, which addresses disparities in who is actually responsible for environmental degradation, who bears the consequences, and who might thus be responsible for maintaining healthy environments.

In Chapter 7, I provided an empirical analysis of Cần Thơ's current periurban water security situation and examined how residents access water to maintain water security year-round. International organizations' global reports on the state of Southeast Asia's water

resources risk homogenizing the issue of water scarcity. I argued that the water scarcity discourse can create the impression of a water crisis at the local scale. I looked at how experts form perceptions of scarcity and how, at the international, national, and regional level, they fail to account for informal water sources at the local level. What I determined was that multi-scale and multi-site analyses are necessary before classifying an area as water scarce. The scalability or nonscalability of a place also shows the importance of recognizing that different kinds of water are used for different purposes. There is a need to differentiate between different kinds of water and conduct scarcity analyses accordingly. Cần Thơ's periurban residents have the knowledge to use the local water resources in many ways, which ensures household water security. This chapter attempted to answer how water security and scarcity are understood in periurban Cần Thơ by examining the alarmist discourse alongside physical and economic water scarcity discourses.

I also discussed how some issues and analyses are translatable across sites while others are not. Centralized, formal, piped water systems are unevenly distributed in many cities across Southeast Asia and the Global South. Formal piped water is also not always the primary water source for many urban and periurban residents who choose to draw from multiple water sources for their daily water needs. These analyses are generalizable and can be translated across sites because it speaks to the downfalls of the 'universal infrastructure ideal' (Bakker et al. 2008; Furlong and Kooy 2017). However, not all aspects of a research study are translatable across sites. I argued that the local water use differences vary across sites and are therefore not translatable based on the specific land and waterscape characteristics of Cần Thơ.

The nature of the periurban is that it is a region undergoing constant change. As such, there are many directions I can see this research going. For this project specifically, the ideal

next step would be to keep returning to the periurban communes and districts in Cần Thơ to understand the changing periurban landscape and to understand how water access methods are changing. Another next step could be to answer questions around whether the government's environmental propaganda will produce results and lead to more engaged residents, or will other methods be employed to combat the periurban's environmental problems.

By examining how periurban residents access water resources I expected to gain an understanding of how local water systems and city water policies are shaped. This is one direction I would like to see further research. While I did contribute to the knowledge of local water sources, I would have liked to delve deeper into the relationship between the local water sources and Cần Thơ's city water policies and future water policy plans. The Mekong Delta is undergoing a unique transformation, especially in terms of planning for climate change impacts. I would like to look at the different climate change mitigation plans in circulation and analyze their potential effectiveness, and whether or not they take into account the delta's periurban residents. It would also be worthwhile to further research the Delta's wastewater and garbage facility programs and future plans. I would like to examine whether or not the Delta's future plans coincide with current environmental propaganda and if there are future plans to create more environmentally knowledgeable residents.

Upon reflection, there are many aspects of my research that could have gone differently. Had it been possible, I would have liked to conduct two interviews with every resident—one interview during rainy season, the other interview during the dry season. This would have allowed me to examine seasonal water use differences, and whether residents voiced the same types of concerns depending on the seasonal rainfall—in a region where a large percentage of the periurban population collects rainwater and relies on canal water, this seems particularly

important. Revisiting my research sites and speaking with research participants more than once would have been beneficial to build stronger relationships in each commune. Finally, I did not complete 40 percent of my interviews due to complications and, while I do not regret this decision, having a larger sample size would have provided me with more data to support my claims.

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APPENDIX: Interview Questions

Expert Interview:

1. Name of organization/institution
2. What are the objectives of this organization/institute/company?
3. Please explain a little bit about your research and/or projects you are involved in.
 - a. What role do you play personally?
4. How do you define resiliency?
5. How do you think resiliency would be defined at the local level in cities?
6. Are you aware of any water resiliency projects for the future of southern Vietnam?
7. In general, which areas of a city would you consider to be the most resilient to water scarcity?
 - a. Why?
8. What do you think some of the climate change resiliency strategies on the ground are?
 - a. Do you think these have changed over the past 10 years?
 - b. Why or why not?
9. Do you think these strategies have developed because of specific resiliency strategy focused programs or have they developed over time gradually?
 - a. Why or why not?
10. What do you think the role of resilient infrastructure is to alleviating water scarcity in cities?
11. What does resilient infrastructure look like?
 - a. Do you think it's too ambitious of a plan to have resilient infrastructure?
 - b. What mechanisms need to be in place to ensure equal distribution of resilient infrastructure?
12. Do you think gender is important to consider in climate/water resiliency projects in the city?
 - a. Why or why not?
13. In your opinion, what is water security?
14. In your opinion, what causes water scarcity?
15. How do you think water security can be achieved?
 - a. Who needs to be involved?
16. Which groups of people would you consider to be the most vulnerable to water scarcity?
 - a. Why?
17. In general, which areas of a city would you consider to be the most vulnerable to water scarcity?
18. Which strategies do you think work best to develop water security in vulnerable places of the city?
 - a. How can these strategies best be implemented if they aren't already?
19. What can you tell me about the relationship between urban and rural water management?
 - a. Where is there overlap or gaps?
 - b. What does this mean for people living in the peri-urban/fringe areas of the city?
20. How do you define gender?
21. Do you think women and men have different roles when it comes to accessing water?
 - a. Why or why not?

22. Do you think men and women, different social groups, or different areas of a city might have different understandings of water security?
23. Have you noticed gender becoming more or less of an issue in Vietnam – especially in relation to water resources?

Household Survey Questionnaire:

Participant Number	
Location of Interview	
Interview Date	

Dear Sir/Madam,

My name is Sarah Allen and I am a Ph.D candidate studying geography at York University in Canada. I am doing research on water access and what conditions are required to ensure water security and what creates water scarcity in Can Tho. I would be very grateful if you would answer my questions to the best of your ability, even if the question might not seem relevant to you. All of the information I collect will be kept confidential and your name is not associated to the questionnaire.

Thank you very much,

Sarah

Individual Information

- A. Sex of person interviewed
 - i. Female
 - ii. Male
- B. Age of person interviewed
- C. Position in household
- D. What is the gender of head of household?
 - i. Male
 - ii. Female
- E. How many members in the household?
- F. How many men?
- G. How many women?
- H. How many children?
- I. What are the occupations of household members?
- J. Do you use water with your job?
- K. Explain
- L. Education levels
 - i. No formal education
 - ii. Primary school
 - iii. Secondary school
 - iv. High school
 - v. Post Graduate

PHYSICAL DWELLING INFORMATION

- A. How long have you lived in this household?
- B. If you moved from somewhere else, where did you move from?

- C. Why did you decide to move here?
- D. Have you made any structural changes to your house since you have lived here?
- E. What have these changes been?
- F. Have you made any changes to your house due to environmental changes?
- G. Is there anything about your house that you think will need to be changed in the future because of environmental changes?
- H. If yes, what?
- I. Do you have a garden where you grow food for your own consumption?

WATER SUPPLY in general

- A. What do you use water for and how do you use it?
- B. Do you treat your water that comes from a well?
- C. Do you treat your rainwater?
- D. Do you boil your tap water?
- E. If you collect rainwater, where do you keep your water tank to store it and what does it look like?
- F. Are you worried about your rainwater sources running out in the dry season?
- G. Explain?
- H. Do you use water economically?
- I. What is your personal assessment of water resources in this area in terms of quality and quantity?
- J. What is the main source of water for members of your household (multiple responses are possible)?

Water Source	Frequency of using this supply		
	Daily	Weekly	Monthly
Piped water			
Water vendor by truck			
Cart with small tank			
Dug well (private)			
Public tap			
Bottled water			
Rainwater			
Surface water (canal, river)			
Other			

- K. Where is the water source located?
- L. Do you know how much water you use per month?
 - i. Yes_____
 - ii. Not sure
- M. What is your month water bill?

Evaluation of your water supply

	Very good	Good	Normal	Bad	Very bad	Difficult to answer	No response
B. Water pressure							
C. Colour of water							
D. Taste of water							
E. Smell of water							
F. Opinion of water supply company in general							
G. Information provided by company							
H. Fair contract with company							
I. Piped connection cost							
J. Piped connection quality							
K. Pipe system cost							
L. Pipe system quality							
M. Pipe system maintenance cost							
N. Pipe reparation							
O. Pipe reparation cost							
P. Quality of water-meter							
Q. Frequency of water supply							
R. Reliability of water supply							
S. Bill delivery reliability							
T. Frequency of water testing and analyzing							
U. Information provided about water testing							
V. Complaint services							
W. Others							

Expectations of Future water supply

	Already Have	Should have but do not	Want to receive in the future
B. Piped water line inside house			
C. Set up of public taps			
D. Reliable information provided by water supply company			
E. Regular Einformation provided by water supply company			
F. Ease of signing contract with water supply company			

G. Reduced cost associated with connection costs and maintenance			
H. Better quality of water connection and water pipes			
I. More timely upgrades and maintenance to piped water system			
J. Expand piped water system and improve existing one			
K. Repairs done in a timely manner at a reduced cost			
L. Better reading of the water-meter			
M. Bill printed correctly			
N. Improve payment system			
O. Improve water treatment			
P. Improve water quality after treatment (colour, taste, smell)			
Q. Improved water pressure			
R. More consistent water availability			
S. Have a place to voice complaints			
T. Have complaints answered			
U. Others			

V. Would you be willing to pay to have these changes implemented?

W. How much would you be willing to pay? Please explain.

X. Is it a simple process to raise complaints or easy to voice your concerns?

Y. What is the process?

In-Depth Interview

Participant Number	
Location of Interview	
Interview Date	

Individual Information

Q.1. Description of the interviewee

- a. Age
- b. Name
- c. sex
- d. How many members of the family do you support?
- e. What is your occupation?

Q.2. When you tell people where you live, what do you say?

Do you consider yourself part of the city of Can Tho? Why or why not?

WATER USE

Q.3. What household tasks do you use water for every day and what sources do you use for each? Where are these located?

Q.4. Do you think saving water is important? Why or why not?

Q.5 Can you tell me what you do to save water?

Q.6 Can you tell me what you like about your daily water-use habits?

Q.7. Do you remember a time when the water you use has made you sick?

Are you worried that it will in the future?

Q.8. Can you tell me about what worries you the most about your water sources?

Q.9. Can you tell me about a time when you were worried about not having enough water?

PHYSICAL DWELLING INFORMATION

Q.10. How long have you lived in this household?

Q.11. Have there been any changes to the landscape around your house since you have lived here?

- a. What was the surrounding area like 10 years ago?

Q.12. How many houses used to be in this area and when did more people start to move here?

Q.13 Have you noticed a change in the quality of the water you use?

In the past 10 years?

Q.14. What kind of infrastructure changes have happened in this area in the past 10 years?

- a. Are they promoted by the anyone/the government?
- b. What kind of role does the government have in these projects?

FLOODING

Q.15. Do you experience flooding or have you in the past?

- a. If yes, what do you do when it floods?
- b. Has the frequency of floods increased or decreased in the past 10 years?

Q.16. Are there any neighbourhood or community efforts that are used when there is extreme weather? What are they?

If yes, how did they develop? (was it put in place over time or by a special program?)

GENERAL

Q.17. Where does your household garbage go?

a. Has this changed in the past 5 or 10 years?

Q.18 Where does your household sewage go?

a. Has this changed in the past 5 or 10 years?

Q.19. What information have you heard from the television or newspaper about climate change?

Q.20. What information have you heard from the television or newspaper about keeping the rivers clean, about well water, or about rain water?

Local Government Interview

Participant Number	
Participant Name	
Location of Interview	
Interview Date	

1. What department do you work for in Can Tho?
2. How long have you been with this department?
3. What is your main role working here?
4. Do you think social science or natural science is more important when addressing climate change risks? Why?
5. What do you consider to be the main water related problems in Can Tho?
 - a. Do you think there is enough water for everyone in Can Tho? Why or why not?
6. What does an adequate water supply look like?
 - a. What would be necessary to make this a reality in Can Tho?
 - b. Do you think there are enough financial resources to provide everyone in Can Tho with an adequate water supply?
7. What do you think people get their water from?
 - a. Do you think it's all from one place?
8. What is Can Tho's strategy for water resources protection?
9. Do you think certain parts of the city are prioritized over others in terms of water distribution?
10. Do you think there have been changes over the past 5-10 years with how people use water resources? ***Rephrased question to ask about trends with people's understanding of water***
11. Do you think men and women have different concerns when it comes to water security and access?
12. What types of climate change resilience strategies are there in Can Tho?
 - a. Do you know how many of these address water securities directly?
13. When community participation occurs, what does it look like?
 - a. Do you think improvements can be made?
 - b. How often do you inform the public and get feedback from the general public on projects?
14. What is the importance of the canals in Can Tho?
15. How has the importance of the canals changed in the past 10 years?
 - a. Do you think men and women have different uses of the canals?
16. Do you know how many households are connected to the water supply system in Can Tho and do you think it meets quality standards?
 - a. How many households are not connected with the water supply system of Can Tho?
 - b. Do you think the water treatment process is sufficient? Why or why not?
 - c. Do you think the water quality provided from the water supply system is sufficient? Why or why not?

17. Do you know if there is leakage occurring in the water system?
- a. Do you know why or why not?
 - b. Do you know the rate?
 - c. Are there strategies in place to reduce water leakage?