WATER MANAGEMENT CONFLICT IN PERI-URBAN AREA:
A CASE STUDY OF LANTAKFA, NAKHON CHAISI, NAKHON PATHOM

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น้ำเป็นทรัพยากรที่สำคัญแม้ว่าจะเป็นทรัพยากรหมุนเวียนก็ตาม นอกจากน้ำจะเป็นสิ่งจำเป็นในชีวิตประจำวันแล้ว น้ำยังมีความสำคัญในกิจกรรมการผลิตอีกด้วย เมื่อรูปแบบของการใช้น้ำเปลี่ยนแปลงไปทำให้เกิดความขัดแย้งขึ้นระหว่างกลุ่มผู้ใช้น้ำที่มีวัตถุประสงค์ที่แตกต่างกันในแต่ละพื้นที่ รูปแบบการใช้น้ำในตำบลลานตากฟ้าเปลี่ยนแปลงไปตามการเปลี่ยนแปลงของพื้นที่ งานวิจัยนี้มีจุดประสงค์เพื่อที่จะอธิบายสาเหตุของความขัดแย้งในการจัดการน้ำ ในตำบลลานตากฟ้าและบ่งชี้บทบาทหน้าที่ในการแก้ไขความขัดแย้งของหน่วยงานที่เกี่ยวข้องกับการจัดการน้ำ งานศึกษานี้ใช้แนวคิดกึ่งเมืองกึ่งชนบทและทฤษฎีความขัดแย้งสมัยใหม่ในการวิเคราะห์ความขัดแย้งในการบริหารจัดการน้ำในตำบลลานตากฟ้า อำเภอนครชัยศรี จังหวัดนครปฐม งานศึกษานี้มีวิธีวิจัย ได้แก่ การรวบรวมเอกสารที่เกี่ยวข้อง การปฏิสัมพันธ์และการสังเกต อีกทั้งการสัมภาษณ์เชิงลึกเพื่อที่จะเข้าใจว่าผู้มีส่วนเกี่ยวข้องตอบสนองต่อการจัดการน้ำที่เป็นอยู่อย่างไร โดยที่จะสัมภาษณ์ชาวนา เจ้าของนาบัว เจ้าของบ่อกุ้ง ผู้เชี่ยวชาญในพื้นที่ เจ้าหน้าที่รัฐทั้งจากกรมชลประทานและจากองค์การบริหารส่วนตำบล งานศึกษานี้พบว่าภายใต้การขยายพื้นที่ที่เป็นเมือง ทรัพยากรน้ำถูกนำไปใช้นอกภาคการเกษตรเพิ่มขึ้น โดยก่อนหน้านี้น้ำถูกใช้เพื่อรองรับการทำเกษตรกรรมเป็นส่วนใหญ่ นำมาซึ่งความขัดแย้งในการบริหารจัดการน้ำและคุกคามต่อสิ่งแวดล้อมสำหรับผู้อยู่อาศัยดั้งเดิมในชุมชนลานตากฟ้า โดยสรุปการเปลี่ยนแปลงรูปแบบการใช้น้ำในตำบลลานตากฟ้ามีความเชื่อมโยงกับการขยายตัวของเมือง พลวัตของพื้นที่นำมาซึ่งปัญหาที่ซับซ้อนมากขึ้นในพื้นที่แต่หน่วยงานรัฐที่เกี่ยวข้องไม่ได้ปรับเปลี่ยนการบริหารจัดการไปตามบริบทที่เปลี่ยนแปลงไป

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KHEMARIN PENSAENGON: WATER MANAGEMENT CONFLICT IN PERI-URBAN AREA: A CASE STUDY OF LANTAKFA, NAKHON CHAISI, NAKHON PATHOM. ADVISOR: ASST. PROF. PITCH PONGSAWAT, Ph.D., 101 pp.

Water is an important resource, although it is a renewable resource. Water is essential not only in our daily life, but also in production activities. Changing pattern of water using led to conflicts among different groups of water users in many areas. Lantakfa's water using was changing the pattern along the transformation of the area. The purposes of this research are to explain causes of conflict in water management in Lantakfa sub-district and to identify the roles of water management institution in the resolution of water conflict. The study will adopt the concept of peri-urbanization and modern conflict theory to analyze the water management conflict in Lantakfa, Nakhon Chaisri, Nakhon Pathom. To identify how stakeholders respond through water management in Lantakfa, Nakhon Chaisi, Nakhon Pathom the research was based on documentation, participation and observation. Additionally data for the analysis come from interview with various groups of people including rice farmers, lotus farmers, prawn farmers, area experts, and governmental authorities from Tambon Administration Organization to Royal Irrigation Department in Nakhon Chaisi, Nakon Pathom. The study found out that under extension of urban area, water resources have increasingly been used in non-agricultural activities. Since it was previously served for agriculture activities that resulted in water management conflict and environmental threats to the former residents of Latakfa community. In conclusion, changing pattern of water using in Latakfa is associated with the context of urban extension. Although the problem in water management have become more complicated, the government authorities hardly modify the pattern of management along the changing context.

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LIST OF ABBREVIATION

CP	Charoen Pokphand
TAO	Tambon Administration Organization
IWRM	Integrated Water Resource Management
PCD	Pollution Control Department
RID	Royal Irrigation Department
SEA	Southeast Asi

CHAPTER I INTRODUCTION

Water is an important resource, although it is a renewable resource. Water is essential not only in our daily life, but also in production activities. Thailand is located in Southeast Asia region. Like other countries, Thailand faced the problem of increasing population, urbanization, environmental degradation and industrial expansion. Water is one of the most important issues in Thailand. The expansion of urban area and industry area caused problems in water management. The severe flooding in 2011 and extreme drought in 2015 became the two major issues of water crisis in Thailand. Agriculture sector is the first biggest user of water in Thailand especially rice farming. Rice is water-dependent plant which is a staple product of Thailand. There are many conflicts between the different groups in accessing the water around the world. In Thailand, the drought in 2015 illustrated that the conflict between the state and the rice farmer in Central region of Thailand was the critical issue. General Prayuth Chan-ocha, the prime minister, suggested that rice stop growing the rice in 2015-2016's dry season. There were soldiers guarded the water gate in many irrigation system areas. It led to the conflicts between the government short-term policies in water management and water users. The power plays an important role in water management in Thailand since policy-making for water allocation. Conflicts occur over the direct extraction of water from the canal

between agricultural users; rice farmers and shrimp farmers, and non-agricultural users; factories and household. There are conflicts arising between urban and peri-urban area through water management. Most of the conflicts that had happened will be involved with the administration and authority management.

Thailand is agriculture-based, with a total agricultural area of about 265,200 sq. km. and more than 60 percent of population engages in agriculture, but agricultural production account for only about 12 percent of GDP. (Sethaputra, 2001) In Thailand, there is no single water policy. It is hard to manage the water among of different interests. Peri-urban development raised many problems on water issues since the scarcity of water to the water pollution. There are many areas facing the same problem of water issues between the different water using activities. In Lantakfa sub-district, there is a combination between urban and rural in the same area. Therefore, it led to the conflict among the stakeholder. Moreover, there is no clear water policy at the local level of administration when the pattern of water using was changed.

The research will be conducted in Lantakfa, Nakhon Chaisi, Nakhon Pathom which is the first pioneer areas to produce rice for export after Bowring Treaty in 1855. In the past, Lantakfa community is agricultural-based society in which most of people earned a living by rice farming. The plantation in this area gained the benefit from the Tha Chin River, a distributary of the Chao Phraya River. There are five villages in Lantakfa sub-district. The current population is around 7,500 persons. The

total area is 19.2 sq. km. Most of population earn their living by farming especially rice farming. At present, this area has various kinds of agriculture and non-agriculture activities. Lantakfa has been changed to urban area which has industry and developed housing around 50 percent of the area (Pintobtang & Wannarat, 2015). It led to the problem among agricultural and non-agricultural water users. The wastewater came from household, industries and also from the agricultural field; prawn farming and non-organic rice farming.

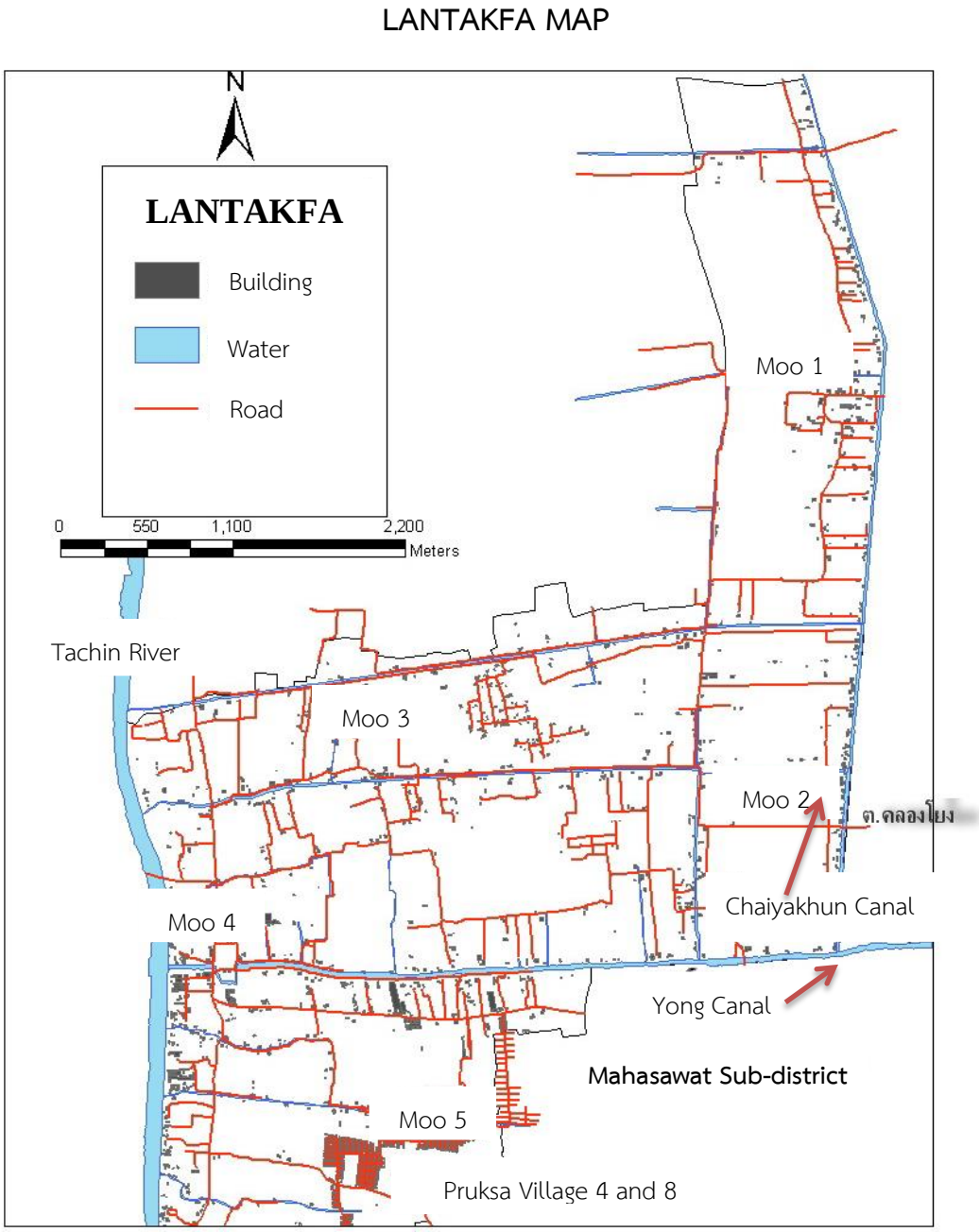
Black tiger prawn was introduced in Thailand since 1972 and expected to be export product. In 1997, Black tiger prawn farming spread to low-salty area in Central region of Thailand due to the research that the prawn grew better in low-salty area. Prawn farming in Nakhon Chaisi area caused the environment pollution when the sea water from the prawn farming diffused to surrounding areas which is used for plantation like rice farming. Moreover, these prawn farming also damaged the ecosystem. Freshwater animals cannot live in brackish water, similarly to rice. The wastewater from prawn farming directly effects the rice farming and others kind of plantation. Many prawn farmers manage the waste water by draining into the public canal and surrounding area. This action leads to the conflict among the farmers. Moreover, there is no clear policy on water management in Thailand.

This study will explain causes of conflicts in water management and explore the conflict mechanism in water management in Lantakfa sub-district. It focuses on the conflicts that occur among the stakeholders in this area. The study will focus on

the ability of farmers to participate in negotiation among the stakeholders in solving the problem. There are emerging contradictions between the agricultural water users and non-agricultural water users. The water management system is characterized by different level of power as a resource over accessing of fresh water.

There are various kinds of stakeholder who shared the use of water in this area. Each group of users has an impact on each other. Shrimp farming, for example, drained brackish water to natural water resources. Negotiation processes and the ability to access water are determined by the participants' social position and power. The village's social communities are highly heterogeneous and characterized by strong power differences (concerning capital, access to market, labor and authority). Even though conflicts about accessing water do arise and the existing institutional arrangements for the distribution are quite weak. Nevertheless the exercising of these rules and the sanctioning differ according to the water availability. Fieldwork research methodology includes documentary research, participatory observation, and in-depth interviews of key informants in the community. In order to solve the conflict, we have to know the root of conflict and the existing mechanism and institution in charge in Lantakfa sub-district.

Figure 1 Lantakfa Map



1.1 Problem Statement

This study will address the problem of peri-urban conflict in the issue of water management. The conflict in Lantakfa is significant to study because this area combines with agriculture activities and non-agriculture activities. Non-agriculture activities expanded from the urban area, but the old villager still depend on agriculture activities. The mix of land used between agriculture and non-agriculture activities led to the conflicts which in water issue is very important in this area. In urban area, it has a clear plan on water supply and waste water treatment and in rural area, the activities are mostly agriculture activities. Therefore, the area like peri-urban has the combination styles between rural and urban. There are no such an infrastructure like urban in peri-urban so the non-agriculture water users like industry has to drainage the waste water to natural water resource. Then, the chemical from the disposal will contaminate and has impacts on agriculture field especially organic rice field. It is worthy to study such conflicts in peri-urban because of the expansion of urbanization from Bangkok. Many new developed housing projects located at the periphery of metropolitan. Lantakfa sub-district is a good example and can be a representative of the peri-urban area around Bangkok.

1.2 Research Question

The research will carry out in Lantakfa, Nakhon Chaisi, Nakhon Pathom as a case study; it seeks to understand conflicts in water management in Lantakfa sub-district. The problem needs to be identified in order to manage the conflict properly. The

development plays important parts in water management especially through water management policies. It will focus on water allocation through peri-urbanization, broadly understood to mean the system of processes and institution through which society enables and constraints the use of water, when and under what circumstance.

The thesis is framed by the following question:

How does the water management conflict occur in Lantakfa, Nakhon Chaisri, Nakhon Pathom?

1) Who are the key actors – individuals, institutions and social networks involved in the water management of peri-urban in Lantakfa sub-district?
2) What capacities do they have that will allow them to deal with water-related vulnerabilities?
3) What is the mechanism that manages water conflicts in Lantakfa sub-district?

1.3 Conceptual Framework

The study will adopt the concept of peri-urbanization, modern conflict theory and water scarcity to analyze the water management conflict in Lantakfa, Nakhon Chaisri, Nakhon Pathom. The peri-urbanization focused on the extension of urban area and mixture of land used in Lantakfa area. While the area transforming to be peri-urban, the authorities' management is the area that does not change along the transformation. Fresh water was delivered to industry factory and developed housing.

Farmers who are powerlessness over the water management policies have to find their own channel to contact with the government authority or change their way of life. It is clearly that the new comers get privileges in water using especially in the drought period. As a result, this situation led to the conflict among different water using group. Therefore, it is important to understand the conflict and causes of them through theory of conflict. Moreover, Lantakfa has a special characteristic that it was a fertile land all year. The problem is not on lacking of water, but on accessing the water resources. The government does not allow farmer to open the water gate to pump the water into the rice field.

1.3.1 Peri-urbanization

Peri-urbanization is a term that defined the area that mixed rural and urban features. The expression originates from the French word périurbanisation, which is even used by INSEE (the French statistics agency) to describe spaces in the urban fringe, both in a qualitative (e.g. diffusion of urban lifestyle) and in a quantitative (e.g. new residential zones) sense. In others term, 'peri-urban' refers to the urban fringe and the geographic edge of cities as a place, it refers to the movement of goods and services between physical spaces and to the transition from rural to urban contexts as a process and finally, as a concept, it refers to an interface between rural and urban activities, institutions and perspectives(Marshall, Waldman, MacGregor, Mehta, & Randhawa, 2009). Peri-urban is still conceptualized as a heterogeneous mix of urban and rural features. The peri-urban is characterized by high, and often

increasing, population density, small landholdings, rich countryside homes, poor slums, diverse sources of income, a lack of regulation, contested land tenure rights, uncoordinated conversion of farmland to housing, pollution, environmental problems, intensified resource exploitation, considerable economic dynamism and a severe lack of service provision (Friedberg 2001; Simon et al 2003; Briggs 1991). In the case of Latakfa, it was considered as peri-urban area which is mixture between urban and rural activities.

1.3.2 Modern Conflict Theory

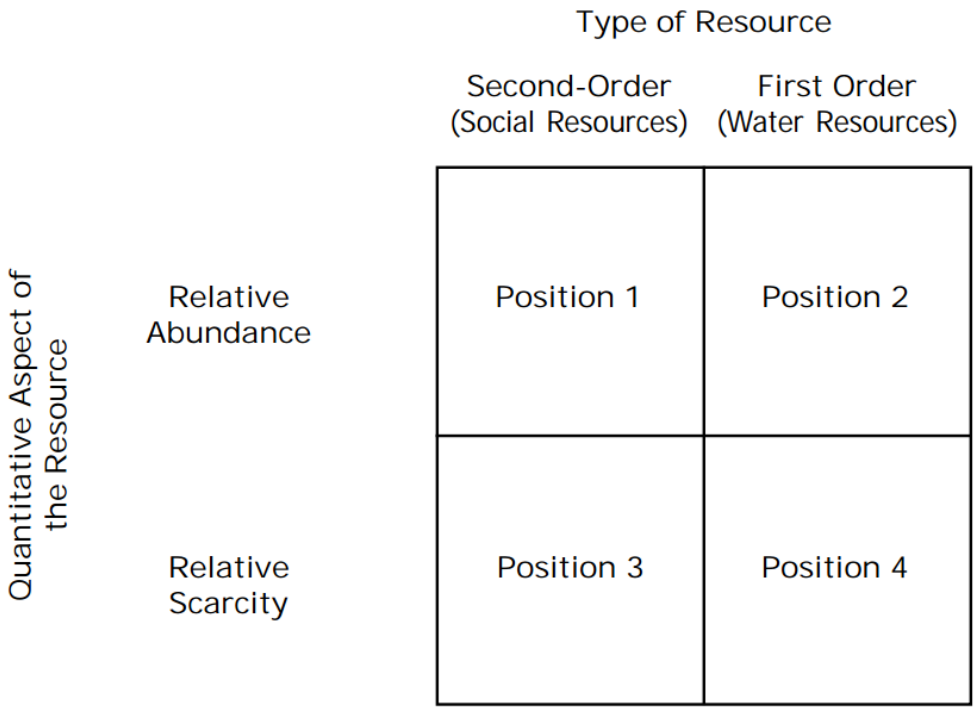
Modern conflict theory has a notion that social structures are created through conflict between people with differing interests and resources. Individuals and resources, in turn, are influenced by these structures and by the "unequal distribution of power and resources in the society." (Knapp, 1994)

1.3.3 Water Scarcity

Normally, we understand that water scarcity means the shortage of water or lack of water, but it is quite different because water scarcity covers various meaning since the delivery of water until the shortage of water. Water scarcity should be defined as a condition in which demographically-induced demand for water exceeds the prevailing level of water supply (Turton & Warner, 2002). Ohlsson (1998) categorized the resource in two groups which are a “first order” and “second order”. The first order resource is natural resources and the second order resource is a social

resource which refers to the need (Turton & Warner, 2002). The concept can be fit in the matrix as in the figure 1.2.

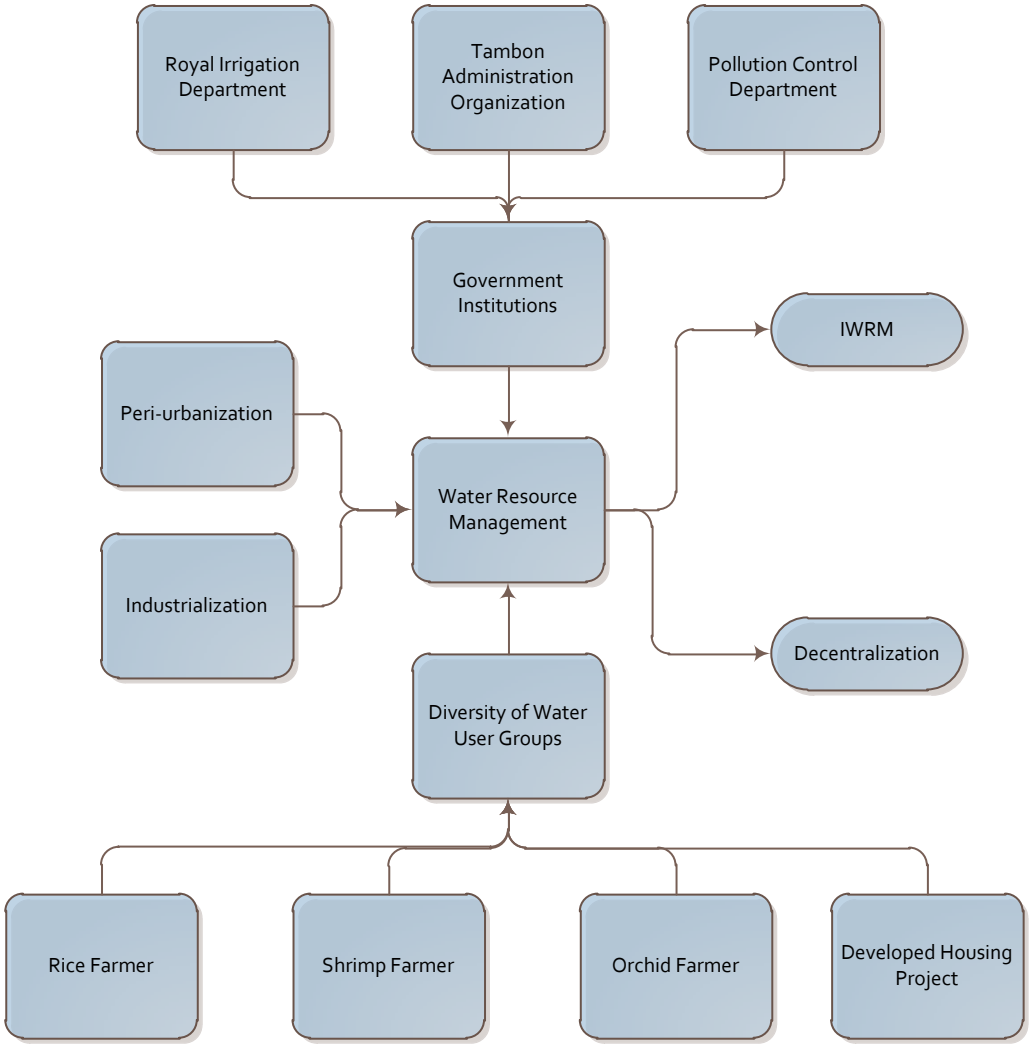
Figure 2 Resource Matrix



Source: *Ohlsson (1998)*

In conclusion, the conceptual framework will be explained in the diagram as shown in Figure 1.3.

Figure 3 Diagram of Study



1.4 Objectives

The objectives of this thesis are as following:

(1) To explain conflicts in water management in Lantakfa sub-district.

(2) To identify the roles of water management institution in the resolution of water conflict.

1.5 Hypothesis

There are water management conflicts in peri-urban area. The conflict occur from various factors (e.g. government policy in water management) With the different type of using water, the conflicts raise among various groups of people who have asymmetric power in water distribution in peri-urban area where urban and rural met. While water problem in peri-urban area like Lantakfa is more complicated, the current water management institution still function similarly to what it did before. Therefore, it lacks mechanisms of conflict resolution. The conflict will even be more severe in the drought period.

1.6 Methodology

The research employed a qualitative approach, presenting a case study, based on documentary analysis and in-depth interview of key informants from government institutions and peasantry. The design of qualitative research is flexible. This method can generate in depth study of a particular situation and give meaningful results with a small sample group. Case study approach is employed because of it describes a lot of in-depth, detailed information from a single case. Dynamics of power, interests and knowledge will be studied in selected cases and events such as interventions, conflicts, competition and conflict resolution between and among stakeholders. Methods to be used are stakeholder analysis, analysis of community history, village and natural resource maps, seasonal calendar of resource use, and transact walks.

1.6.1 Data Collection

i) Documentation

Historical data and archival research (records of agricultural data/yields, news archives) will be gathered in order to understand the historical of water management in Nakhon Chaisi district. The current policy of water management in Thailand will be reviewed both in national level and sub-district level.

ii) Participant and Observation

The process of water management in the area of rice farming, prawn farming, factories and households will be observed. I will participate in cultivating, harvesting and milling in the rice field of Lantakfa through the collaboration with Ban Chanote-Klongyong-Lantakfa Community Enterprise. Participant observation technique will be used to see the interaction between the different groups in water management in Latakfa sub-district. Moreover, in this study the changing of water in the canal along the dry season in 2016 will be observed.

iii) In-depth interview

The primary group of informants for this community study includes farmers which including organic and non-organic rice farmers, lotus farmer and prawn farmer. Interviews will also be held with secondary informants from other segments (e.g. others kinds of plantation, municipality, factory owner, developed housing dwellers, area experts and government authorities) of Lantakfa a sub-district in order

to collaborate or supplement qualitative data gathered from the primary group of informants.

The main investigation will focus on the background of the community, current situation of water using, conflict among the different kinds of water using, among the government and the farmers, and the old resident and the new comer. The key informants in the study will be as follows:

(1) Rice farmers

The rice farmer in Lantakfa sub-district will be interviewed. This includes both organic and non-organic rice farming. Normally, farming is not individual but it is family earning. In this area, it has Ban Chanote-Klongyong-Lantakfa Community Enterprise which has ten families for members to produce organic rice. Subsequently, Mrs.Nantha Prasarnwong, the president of Ban Chanote-Klongyong-Lantakfa Community Enterprise and the members who are organic rice farming will be interviewed.

(2) Lotus farmer

Lotus farming uses water very much in planting so this group will be affected from the drought and unplanned water management. I will interview two lotus farmers in the area. The farming used many chemical in the process. It will be useful to know the process of water and water treatment after planting.

(3) Prawn farmer

Prawn farming was introduced in Thailand not so long. This kind of farming used water and money so much in investment. This kind of arming has a great impact on natural water resources because it used brackish water in process. When the brackish water was drained to the canal, it polluted the fresh water used in other agricultural activities. Without the infrastructure in water treatment, the problem is extremely severe. Although it has a great impact, this activity is still allowed because the power of this group which is rich or has political power or both. For this group, it is very hard for interviewing so the question will focus more on the transition to prawn farming.

(4) Developed housing residents

Developed housing resident was considered as the new comer from the outside of area. Most of them dwell in the urban fringe and work in the urban area. There is a linkage between peri-urban and urban area through regularly migration. Developed housing projects in Lantakfa are mostly close to agriculture field and drainage the sewage to the area around the project. Without the infrastructure like in urban area, there will be a problem of water pollution that affected to the farmer. I will select three representatives from developed housing projects to interview.

(5) Factory owners

Factory owners will be the key informant in the same aspect as the developed housing residents. Due to the lack of infrastructure in water treatment, the question will focus on how they deal with the waste water from the factory. The questions will be the same as the question for developed housing residents.

(6) District Administration Organization

At the local level, District Administration Organization will be the key informant in the position of government representative. The bureaucrat from Lantakfa sub-district administration about the current and future plan in water management will be interviewed.

(7) The area experts

For the area expert, I will invite three academic to be my interviewee. The first one will be Associated Professor Prapart Pintobtang, Ph.D., Faculty of Political Science, Chulalongkorn University, who has done researches in this area for a long time. The second one will be Assistant Professor Dr.Abiluck Kasempholgoon, Ph.D, Faculty of Liberal Arts, who is the expert in folklore in the area. The last one will be Assistant Professor Tawan Wannarat, Faculty of Arts, Silpakorn University, who researched in Salaya which is the closed area with Lantakfa sub-district.

(8) Royal Thai Irrigation Department

Royal Thai Irrigation Department (RID) is an important government authorities in water management. The aim of establishment of RID in the past was to support water for agriculture. Nowadays, the functions of RID was changed to management of the water for water supply in urban area. The water for agriculture field was not the first priority in water allocation. When there was a problem in the area. How does RID respond to water problem in the area? I will interview the current policy and the plan to solve water conflicts in Lantakfa area.

1.7 Constraints and Limitation

The study has an important limitation. This has to do with people sensitivity especially for the group of people who was accused of causing the waste water in the public canal. Therefore, it is hard to access the information from shrimp farmers. It depends on attitude of people whether they want to answer the questions in the interview. Some of the interviewer probably provides biased information because of their interests. Moreover, there are limitations on information of water quality which is a scientific method that beyond the scope of the study.

1.8 Significant of Research

First, water is an important issue nowadays because it was used in production activities and consuming in household. The conflict in water management between agricultural sector and non-agricultural sector was rising in the peri-urban where the

mix of urban and rural in the same area. The study will explain the conflict from water management that occurred in this area.

Second, the study will connect the related theories which are peri-urbanization to modern conflict theory to reveal the role of existing institutions regarding to water management policy and their mechanism in conflict resolution.

Third, this study will also be beneficial to the Lantakfa community in the long term to manage the essential resource like water and also policy maker in water policy to planning the water management plan for the expansion of urban, maintain the environment and mitigate the conflict among the interest group.

In conclusion, the case study area, Lantakfa, have been demonstrated the water management problem in peri-urban area of western Bangkok that changed its function of land through the time from rice farming for exportation after Bowring Treaty to the area for supporting the expansion of urban. Therefore, it is important to know the current situation of water management conflict in the area. It will help government authorities to plan for future management in new area. Moreover, this case can be a representative area for the urban fringe in Thailand.

1.9 Ethical Issues

As the study on this issue is too sensitive, the researcher concerns about conflict among the different groups. Negative results that may raise the conflict more severely will be avoided. The names of key informant will not be revealed as

confidential information. For the person who did not want to disclose themselves, I will use pseudonym replacing their real names. Before the researcher interviews and observes target samples, consent will always be asked. Moreover, the questions in the interview will not stimulate the conflict among the group.

CHAPTER II LITERATURE REVIEW

2.1 Introduction

Water is an important resource especially in the area that depends on agriculture activities. Lantakfa area is one of the areas in Thailand that depends on agriculture. From the changing of society and the development of economic growth, urban area was extended to the fringe area of Bangkok which is the capital city of Thailand. Lantakfa as peri-urban area has to be changed along the whole society. There are conflicts in water using in Lantakfa sub-district from changing the pattern of water and land using.

This chapter intends to review the water resources management that related to the development in developing country like Thailand in the area of Lantakfa, Nakhon Chaisi, Nakhon Pathom. It is important to understand the problem through the existing work which related to water conflict in peri-urban area. It combines with three sections. An overview of various relevant concepts will be provided including conflicts, peri-urban and water management. From this information, it creates a conceptual framework for understanding the conflicts and solutions in water management in Lantakfa sub-district. This overview is an important part to clarify the understanding of theory and term that used in this this study to answer how water management conflict occurs in Lantakfa, Nakhon Chaisi, Nakhon Pathom.

2.2 Conflict

2.2.1 Conflict Definition

The concept of conflict has various in term of definition and phenomenon. However, the most widely used definition of conflict is the situation with incompatible goals of parties. In this study, conflict was defined as “the pursuit of incompatible goals by different groups”. In a case study of Lantakfa sub-district, different water using groups have struggle over water in quality aspect. The conflicts in Lantakfa did not come from water shortage in the dry season but dry season is only one of factors of conflict.

2.2.2 Modern Conflict Theory

The founder of modern conflict theory was C. Wright Mills. Mills argued that social structures are created through conflict between people with differing interests and resources. Individuals and resources, in turn, are influenced by these structures and by the unequal distribution of power and resources in the society (Knapp, 1994). The power elite of American society, (i.e., the military–industrial complex) had "emerged from the fusion of the corporate elite, the Pentagon, and the executive branch of government." Mills argued that the interests of these elite were opposed to those of the people. He theorized that the policies of the power elite would result in "increased escalation of conflict, production of weapons of mass destruction, and possibly the annihilation of the human race." (Knapp, 1994)

2.2.3 Stage of Conflict

To understand the inclusiveness of conflict concept, the conflict staging that has been well marked by Eric Brahm, will be considered and adapt into this conflict theory. The figure 2.2 will be the unique concept of conflict staging (Brahm, 2003).

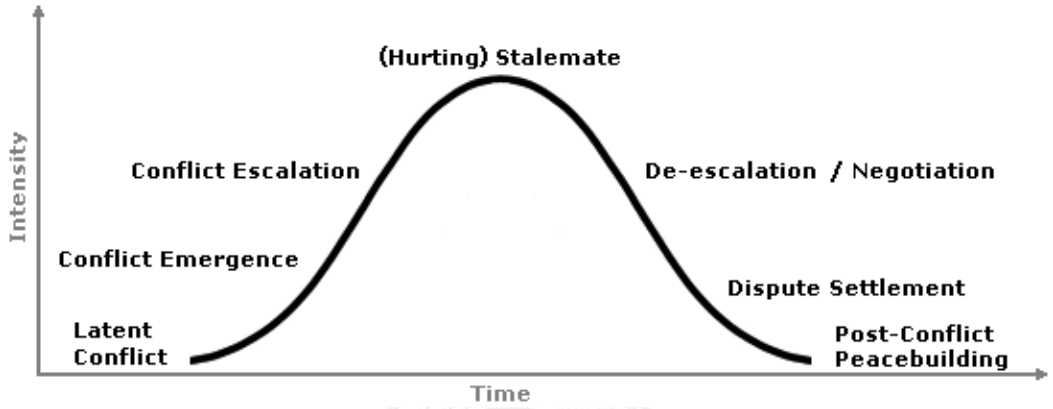


Figure 4 Stage of Conflict (Eric Brahm)

1) Latent conflict

The first phase is "latent conflict" that exists whenever individuals, groups, organizations, or nations have differences that bother one or the other, but those differences are not great enough to cause one side to act to alter the situation. Differential power, resources, differing interests or values all have the potential to spark conflict if a triggering event occurs (Brahm, 2003). Latent conflict is often rooted in economic inequality, or in groups' unequal access to political power. The government authorities may be unresponsive to the needs of a minority or lower-power group. Strong value or status differences may exist. In this stage, the conflict will never emerge.

2) Emergence

After a conflict has remained latent for long time, a triggering event marks the emergence or the "eruption" phase of the conflict. This event may be the first appearance of the conflict, or it may be a confrontation that erupts in the context of a protracted, but dormant, or low-level conflict (Brahm, 2003). The event may be perceived as a threat to a particular group's well-being or existence.

3) Escalation

Escalation refers to an increase in the intensity of a conflict and in the severity of tactics used in pursuing it. It is driven by changes within each of the parties, new patterns of interaction between them, and the involvement of new parties in the struggle (Brahm, 2003).

4) (Hurting) Stalemate

Once conflicts escalate for a while, they often reach a stalemate: a situation in which neither side can win, but neither side wants to back down or accept loss either. Stalemates emerge for a number of reasons: failed tactics, depletion of available resources to fuel the conflict, a reduction in support of the conflict by group members or allies, or costs becoming too high to continue (Brahm, 2003).

5) De-Escalation

All conflicts, even intractable ones, eventually wind down and are to some degree transformed, so that they become regarded as tractable. Collective identities do change, sometimes abruptly, when state borders change or when states break up or even dissolve (Brahm, 2003). Conflict de-escalation and transformation are often associated with reduced grievances, at least for members of one side. This change occurs as relations between the adversaries change, in the course of the struggle.

6) Settlement/Resolution

As an intractable conflict comes to an end, the components of the conflict start to change. New or greatly changed collective identities become dominant. If most or all of the underlying causes of the conflict are finally remedied, the conflict may be resolved permanently or at least for a long time (Brahm, 2003).

7) Post-Conflict, Peace Building and Reconciliation

Brahm (2003) said that even after a settlement is reached and a peace agreement is signed, this is by no means the end of the conflict. The settlement has to be implemented. If it is just a conflict between two people, this may not be hard: those two people do what they agree to do, and past problems may be solved (Brahm, 2003).

The study will focus more on latent conflict phrase because it is the most appropriate one to describe the situation in Lantakfa sub-district among the different water using group. There are differences that bother water users, but those differences are not great enough to cause one side to act to alter the situation'

2.3 Peri-Urban

Peri-urbanization can be defined as "a process in which rural areas located on the outskirts of established cities become more urban in character, in physical, economic, and social terms, often in piecemeal fashion" (Webster, 2002). There are many definitions in peri-urban depending on the perspective. The peri-urban was shaping when there were changes in the fringe of the city due to the expansion of urbanization. This area is able to grab the attention from urban geography in the United States and in Western Europe. The study in the beginning was focused on the processes that were shaping the peri-urban fringe. The peri-urban fringe was considered as the place where urban and rural met. The term urban fringe was used for the first time by American geographers describing changes in the population composition of Louisiana, and during the 1940s and 1950s it was widely adopted in the academic literature, under the meaning of an area where the suburban growth was taking place and where urban and rural uses of the land were mixed, forming together a transition zone between city and countryside.

The most recent literature reviews on peri-urban was done by Nottingham and Liverpool Universities (1998) that recognize “the complexities of building a spatial framework around what is essentially an amorphous and mobile site for the interaction of various social, economic and cultural processes and interlinkages between the rural and the urban.” For the Renewable Natural Resources Research Strategy of the UK’s Department for International Development defines the peri-urban interface as “characterized by strong urban influences, easy access to markets, services and other inputs, ready supplies of labor, but relative shortages of land and risks from pollution and urban growth” (quoted in Nottingham and Liverpool Universities, 1998),

Nottingham and Liverpool Universities’ own working definition can be built upon fragments of their discourse:

> *Certainly, peri-urban is a concept referring to a zone or area where urban and rural development processes meet, mix and inter-react on the edge of the cities. [It is] often not a discrete area, but rather a diffuse territory identified by combinations of features and phenomena, generated largely by activities within the urban zone proper. [...] the development of a peri-urban area is an inevitable consequence of urbanization. As cities in developing countries continue to grow, the peri-urban area moves outward in waves.” (Nottingham and Liverpool Universities, 1998: 8-9, 1)*

Rakodi uses a definition stressing the relationship between urban and the immediate rural areas being the result of a process over time:

> *The peri-urban interface is a dynamic zone both spatially and structurally. Spatially it is the transition zone between fully urbanized land in cities and areas in predominantly agricultural use. It is characterized by mixed land uses and indeterminate inner and outer boundaries, and typically is split between a number of administrative areas. The land area which can be characterized as peri-urban shifts over time as cities expand. It is also a zone of rapid economic and social structural change, characterized by pressures on natural resources, changing labor market opportunities and changing patterns of land use. (Rakodi, 1998: 3)*

Mbiba and Huchzermeyer (2002) reviewed the current state of literature on peri-urban research in sub-Saharan Africa. The research in sub-Saharan Africa has been led by multi-lateral and bilateral development agencies. These agencies are in urban development field. The review found out that the research in peri-urban topic has remained mostly descriptive. It could be said that no theory was applied in research. Moreover, it did not mention the rapid and contentious peri-urban transformations associated with globalization. They argued that not only is there conflicting conceptualization of what peri-urban is or should be, but there are also conflicting views on the nature and meaning of processes taking place there. The

authors mentioned specifically to the processes of change in peri-urban areas, highlighting the contradictions entailed in the competition for entitlement s to peri-urban land and infrastructure, between international and local players and between the local elite and the poor. Due to the locational advantage of peri-urban areas, much economic activities move to these areas. Later on, there are the impact on environment which results from water consumption and waste-water disposal. There are competitions on land between agricultural and residential sectors. (Mbiba & Huchzermeyer, 2002) Furthermore, winners are the local elites – officials, politicians and headmen, who exploit their access to resources, and their ability to dictate over land entitlements. They concluded that the existing peri-urban literature has not engaged deeply with the causes of peri-urban contradictions and conflicts, and the peri-urban should not be considered as static but as a dynamic sphere.

In Thailand, Sajor and Ongsakul (2007)also worked on review mixed land use and equity in water governance in peri-urban Bangkok. The authors used the northern area of Bangkok in the case study. They argued that certain characteristics of existing land- and water-sector-related management institutions in Thailand encourage a disproportionate shift of the environmental burden to small farmers. Furthermore, this inequity will likely to be patterned and inscribed in the peri-urban geography of the mega-cities of Southeast Asia.

It is clearly that there is less research with theoretical applied in sub-Saharan Africa. The same as in Thailand, there is less research that study in peri-urban

transformation process. (Mbiba & Huchzermeyer, 2002) also mentioned the conflict raised in peri-urban area especially among the local people which is categorized in two groups; the local elite and the poor. There are conflicts between the local elite and the poor similarly to the case study in Lantakfa sub-district. In the case of Lantakfa sub-district, the local elites exercise their power to get the privilege in accessing and managing water resources. The study suggested that peri-urban research has to bridge the activism gap and to understand how affected communities restructure their institutions and livelihoods within the context of these world-driven changes. From the summary by Sajor and Ongsakul (2007), the inequity in people participation in water management will be patterned in the peri-urban of the mega-cities of Southeast Asia.

2.3.1 Desakota Model

In *Beyond The "Third World City": The New Urban Geography of Southeast Asia,* Peter J. Rimmer and Howard Dick explored the research which occurred in Southeast Asia. The industrialization has been the driving force of rapid urbanization and expansion of urban area. The urban peripheries have now become the locus of job creation, especially in manufacturing plants and urban population growth. (Webster, 2002) Industrialization and job creation on the urban fringe and in the hinterland of cities in Southeast Asia reflect the shift of industry from the First to the Third World that has been facilitated by rapid improvements in the speed and cost of transport and communications. (Rimmer & Dick, 2009) The settlement pattern has

been made possible by a simple transportation revolution of improve the road and cheap intermediate transportation technology such as motorbike (McGee, 1991)

Desakota was defined as "the emergence of what appear to be new regions of extended urban activity surrounding the core cities of many countries of Asia" (Rimmer & Dick, 2009). The process of settlement transition involving the urbanization of the hinterland without massive in-migration was referred to by McGee (1989) as *kotadesasi* – kota in Bahasa Indonesia for town, desa for village and *si* to denote process.

Desa-kota areas have six main features:

a dense population engaged in the smallholder cultivation, commonly of wet rice;

an increase in non-agricultural activities;

a well-developed infrastructure of roads and canals;

a reservoir of cheap labor;

a highly integrated "transactive" environments in terms of movements of people and commodities; and

a state perception as being "invisible" or "grey" zones (McGee, 1991, pp.15-18)

2.4 Water Management

There are many ideas in water management but the popular idea in water management nowadays is integrated water management. This is a holistic approach that viewed water management in one interaction system. Mitchell (1990) proposed three categories in integrated water management as follow:

> *[...] First, it can imply the systematic consideration of the various dimensions of water: surface and groundwater, quantity and quality. The key aspect here is acceptance that water comprises an ecological system which is formed by a number of interdependent components. Each component (quantity and quality, surface and groundwater) may influence other components and therefore need to be managed with regard to its interrelationships. At this level of integration, attention for management is directed to joint consideration of such aspects as water supply, waste treatment and disposal and water quality.*
>
> *Second, integrated water management can imply that, while water is a system, it is also a component which interacts with other systems. In that respect, it directs us to address the interactions between water, land and the environment, recognizing that changes in any one may have consequence for the others.[...]*
>
> *A Third and even broader interpretation is to approach integrated water management with reference to the interrelationships between water*

and social and economic development. At this level, the approach is on the scale recommended by the Brundtland Commission, with its stress upon the relationship between environment and economy.[...] water is both an opportunity for and a barrier against, economic development, and to ascertain how to ensure that water is managed and used so that development may be sustained over the long term. [...] (Mitchell, 1990, pp. 1)

Vanpen Surarerks (1980) compared conflict in national irrigation systems and people's irrigation systems in northern Thailand. They has hypothesis that water conflicts in both types of irrigation systems created inefficiency, causing the underutilization of land in some areas, a reduction in farmer's production and income and many other social and economic problems. As the result, it largely support the hypothesis that in each of the national irrigation systems which had large irrigation works covering many different types of geographical features. It was easy for errors to occur in the planning and the construction of irrigation systems and difficulties to arise in the administration of water delivery systems. Moreover, the legislation which did not concern the local also created the difficulties. The authors concluded that the small irrigation project which administrated by the local provided more benefit to the community because the less complexity in management. The farmers could cooperate between each other to maintain the system.

Mollinga (2008) employed a political sociology approach and argue that water governance is a politically contested domain. While this approach may have something of value to social theory, it does not tell much about politics per se particularly the mechanisms that generate these conflicts, the alternative arrangements to resolve them and their implication for efficiency, equity and sustainability. Thus, the theoretical and practical significance of this research agenda for improving water governance is limited. Similarly, Hirsch (2006) argues that catchment governance, in this case in the Mekong, should be understood as "an area for negotiating more sustainable, equitable, and productive use and management of water at multiple scales." Others such as Kashyap (2004) referred to water governance in the context of climate change as "the ability to develop adaptive capacity."

Other scholars who study global water governance take a more behavioral approach. (Pahl-Wostl, Gupta, & Petry, 2008) define the term as the development and implementation of norms, principles, rules, incentives, informative tools, and infrastructure to promote a change in the behavior of actors at the global level in the area of water governance.

Head (2010) examines an Australian case-study, the urban water crisis in Southeast Queensland (SEQ), taking a policy governance perspective. The State government became increasingly alarmed by the deteriorating water supply outlook, and undertook a number of policy changes including substantial re-structuring of

urban water governance. The paper raises issues about the evidence base for decision-making, and for policy learning, where policy governance is shaped under conditions of uncertainty and crisis. The important topic in recent years has been water policy, in the context of water scarcity. There have been urgent new challenges for water policy, planning and delivery in many cities and regions around the world.

Corruption, lack of integrity, and unethical and dishonest conduct – whether originating from the private public or community sector – associated with weaknesses and failure in water governance are a critical generator of conflict tension and mistrust, resulting in the loss of large amount of finance destined for the sector. It manifests itself both as bureaucratic or petty corruption (involving the misuse of vast amount of public office extracts small bribes and favors) and as grand corruption (involving the misuse of vast amount of public sector funds by relatively small number of officials) and as state capture in the collusion between public and private actors where the private sector capture the state for private benefit (Shah & Schacter, 2004).

Rassameethes (2009) analyzed the Ban Limthong community, Nang Rong, Buri Ram social learning process in achieving sustainability in water resource management. The research also identified the social and cultural factors affecting the success of building a sustainable community water resource management system. The research explores the capability of the community to identify problems, locate water

resources, and use them efficiently and the potentiality to be reliant based on experiential learning of the community. Research findings revealed that strong leadership, community participation, the use of transmitted local wisdom, and collaboration and networking with stakeholders are factors contributing to the success of community water resource management.

Pattanasak, Kutintara, and Tangtham (2014) researched in the land using through water demand issue. They conducted in Pranburi Watershed. They found that the water demand in Praburi Watershed was decreased from 740.6 million cubic meters in 2002 to 737.6 million cubic meters in 2012 due to the decreasing of the agriculture area and the adjustment of crop species for drought (Pattanasak et al., 2014). The result revealed that farmers in Pranburi Watershed had risk of crop failures in dry season. Need to land use planning for agriculture with the water supply and make choices to manage water and land use management in the future.

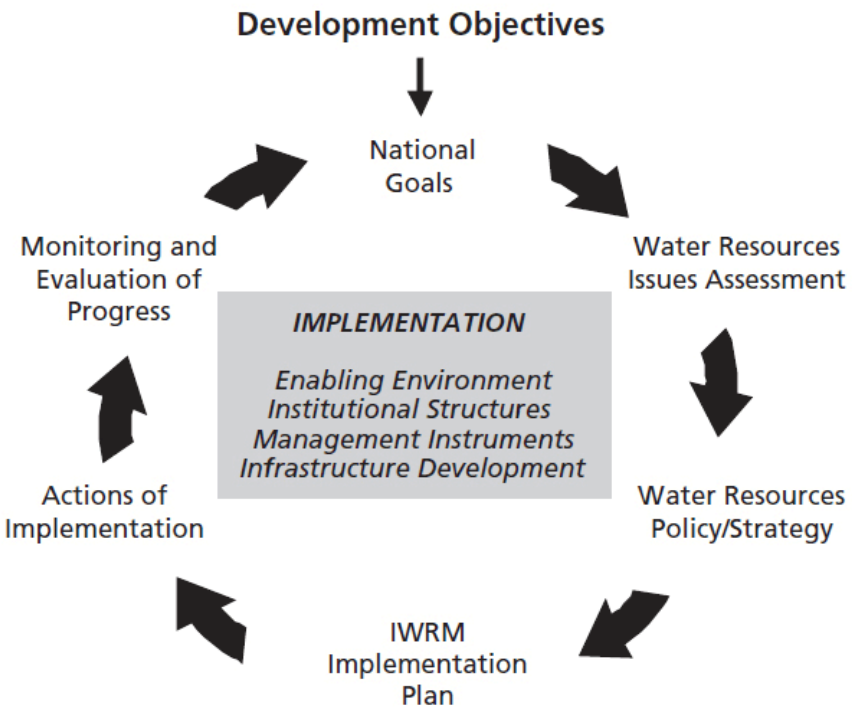
2.4.1 Integrated Water Resources Management (IWRM)

Integrated water resources management has been recently famous in new style of water management. The objective of IWRM approach is to bring the related water institution in managing and solving the water problem. UNEP gave information on IWRM as the following:

"*IWRM is an empirical concept which was built up from the on-the-ground experience of practitioners. Although many parts of the concept have*

been around for several decades - in fact since the first global water conference in Mar del Plata in 1977 - it was not until after Agenda 21 and the World Summit on Sustainable Development in 1992 in Rio that the concept was made the object of extensive discussions as to what it means in practice. The Global Water Partnership's definition of IWRM is widely accepted. It states: 'IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.'" (UNEP-DHI Centre for Water and Environment, 2009)

Figure 5 Stages in IWRM Planning and Implementation



2.4.2 Water Management Policy in Thailand

Article 79 in the Chapter on the Principle Policy of the State of the Thai Constitution of October 11, 1997, establishes a national water development policy by stating that *"the State shall promote and maintain public participation in conserving, maintaining and utilizing the environmental resources in such a balanced and sustainable way, including controlling and eliminating pollutants, which can cause damage to the health, or social well-being of its citizens."* Furthermore, Article 84 stipulates that the State shall carry out activities to provide water for agriculture uses in an equitable manner. Also, Article 87 stipulates further that *"it is the duty of the State to promote and maintain fair competition in providing public services and utilities which would benefit the general public." (Sukhsri, 1999)*

2.4.3 Water Management Policy Market in Thailand

This section will explain water management policy making during 1961 to 2016. It will be categorized in three periods which are from 1961 to1973, from 1974 to 1988 and from 1989 to 2016. The water management policy in Thailand was not decided by the government alone, but the water management policy is the interaction between demand and supply side of policy with regime, superstructure, and world capitalism system. (Thanapornpan, 2001)

i) Water Management Policy Market in 1961-1973

After changing from absolute monarchy to democracy in 1932, the democracy gave a space more to Thai citizen but in reality the power in policy decision was on the technocrat who owned the power over the knowledge. In this period, military government had controlled the policy decision. Other institution that can keep the power with it and was able to influence in water management was the Royal family. There were many royal initiative projects by the king such as hydropower dam. As we knew from National Economic and Social Development Plan, water resources management was in the hands of technocrats and bureaucrats. The policy enactment was bottom-down process and closed system that people did not know and cannot interfere in decision process. The policy focused on large scale projects rather than in small projects which were traditional approach by local people. In this period, Thai state wanted to unify people which were the different groups in various areas around Thailand. The policy making in water resources management was supply-side which was from the technocrats and the bureaucrats who received the knowledge in water management from the western. There was less participation from local to manage their area. From the domination by small power group, it led to two behaviors which were rent-seeking behavior and expansion of Thai bureaucracy. (Thanapornpan, 2001)

ii) Water Management Policy Market in 1974-1988

In this period, people understood more in democracy after the uprising on 14 October, 1973. Therefore, the policy decision was not dominated by small group of people. There were participation in policy making like directly requesting, requesting through the media and conglomeration. The policy making was not supply site but it was changed to demand site process. The demand site had more power in negotiation rather than before. During this period, the group that gained more power in negotiation was the capitalist due to the development of world capitalism system. In 1961-1973, the capitalist was in the patronage of the bureaucrat but it was changed in this period. The group that had less power in negotiation was farmer especially rice farmer.

iii) Water Management Policy Market in 1989-2016

In 1989 to present, people have more power in policy decision. There is people participation in water management policy from the Seventh National Economic and Social Development Plan especially in small scale. Political party produces the policy for grassroots which are the farmer because the majority of voter in Thailand came from Northeastern population. Moreover, there are many non-governmental organizations in requesting in water resources management policy especially after the great flood. The Sueb Nakasatien Foundation led by Sasin Chalermlarp demonstrated on campaign 'Stop Mae Wong Dam'. This is an example of social media power that can gather people in free space. Although the demand

site has power in policy decision, there are conflicts among the group as we saw in the drought period in which the water was planned for the urban and industrial area first.

CHAPTER III A CASE STUDY OF LANTAKFA SUB-DISTRICT

3.1 Introduction

The chapter will explore an overview of a case study in Lantakfa, Nakhon Chaisi, Nakhon Pathom. This chapter starts with the description of the general background of Lantakfa sub-district which comprised many aspects including geographical background, population size, occupation of people in Lantakfa community, water management in the area and government authorities that function in the area which are Royal Irrigation Department (RID) and Tambon Administration Organization (TAO). This chapter attempts to answer the research question: *Who are the key actors – individuals, institutions and social networks involved in the water management of peri-urban in Lantakfa sub-district?* It was important to know the background of the area before analyze the actions of people in Lantakfa community.

3.2 Overview of a Case Study of Lantakfa Sub-district

Previously, Latakfa sub-district was part of Ngiurai sub-district, Nakhon Chaisi, Nakhon Pathom. Later, the number of population is increasing in Ngiurai sub-district. Lantakfa was established for supporting the increase of population. In the past, Lantakfa was called Lantakpah because people travel by boat. One day, the boat was sunk in front of Latakfa Temple in Moo 4. The villager helped people bringthe clothes to dry in the temple area. Lantakfa was changed to Lantakpah since then.

Lantakfa sub-district covers in 19.20 sq. km. or 12,000 rai in Nakhon Chaisi district, Nakhon Pathom province. The area was a low land where there are plenty of water resources from Thachin River. Moreover, there are many canals that were dug in King Rama IV for supporting agriculture activities in the area. After Bowring Treaty, Salaya field also including Lantakfa was the place for cultivating exportation rice because of the fertile of land and water and the location that near the deep-sea port. Local people in Lantakfa earned a living by rice producing for a long time. There were 5,000 rai of rice field in the area.

3.2.1 Moo 1 Ban Klongjek

Ban Klongjek has a meaning 'the canal of Sino'. It was believed that the canal was dug by Chinese labor migrants for traveling and trading. In the past, Chinese migrants moved to the area near Mongkolpracharam Temple to Makleu Temple in Ban Klongjek village. People in this village are farmers including rice farmers, vegetable farmers and orchid farmers.

Territory

North: Bangkaewfa sub-district, East: Klongyong sub-district, West: Donfak sub-district, South: Ban Lumthaharn, Lantakfa sub-district

3.2.2 Moo 2 Ban Lumthaharn

Part of Ban Lumthaharn village is belonged to Klongluang Cooperative, Pathumthani. This area was allocated to the villager for agricultural field. This village

was called Ban Lumthaharn because this area was used to be the place for maneuvering in the past.

Territory

North: Ban Klongjek, Lantakfa sub-district and Donfak sub-district, East: Klongyong sub-district, West: Ban Lantakfa, Lantakfa sub-district, South: Mahasawat sub-district

3.2.3 Moo 3 Ban Lantakfa

First, this village was called Ban Nuewat because it is located in northern of the temple. Later, it was changed to Lantakpah in the reason as the name of sub-district. At present, it was changed to Lantakfa.

Territory

North: Donfak sub-district, East: Ban Lumthaharn, Lantakfa sub-district,

West: Wat Samrong sub-district, South: Ban Taiwat, Lantakfa sub-district

3.2.4 Moo 4 Ban Taiwat

Ban Lantakfa and Ban Taiwat was a low land area closed to Tachin River. Two villages share Lantakfa Temple as a center. Additionally, it was used by the community along the river. At present, Ban Taiwat has many kinds of agricultural activities such as shrimp farming, rice farming and pomelo farming. This village has many canals that linked with Tachin River. Every canal has its own water gate is controled by Royal Irrigation Department.

Territory

North: Ban Lantakfa, Lantakfa sub-distric,t East: Mahasawat sub-district,

West: Wat Samrong sub-district, South: Ban Bangkeng, Lantakfa sub-district

3.2.5 Moo 5 Ban Bangkeng

This village was called Ban Bangkeng because in the past, a number of crocodiles were found in this area. The villagers were scared of crocodiles. Moreover, this village has a shrine that was respected by the villager. This village was therefore called Bangkeng due to the feeling of people in the community.

Territory

North: Ban Taiwat, Lantakfa sub-district, East: Mahasawat sub-district,

West: Wat Samrong sub-district, South: Ngiurai sub-district

3.3 Population

Lantakfa sub-district combined with five village including Moo 1 Ban Klong Jek, Moo 2 Ban Lum Thaharn, Moo 3 Ban Lantakfa, Moo 4 Ban Taiwat and Moo 5 Ban Bangkeng. Ban Klong Jek has 173 households; 582 persons including 261 men and 321 women. Ban Lum Thaharn has 243 households; 915 persons including 449 men and 466 women. Ban Lantakfa has 349 households; 1,206 persons including 599 men and 607 women. Ban Taiwat has 307 households; 718 persons including 333 men and 385 women. The last village, Ban Bangkeng, has 1,690; 4,227 persons including 1,938 men and 2,289 women. From the table 3.1, Ban Bangkeng village has the highest number of population because there are two developed housing projects in this village, namely, Pruksa Village 4 and 8.

Table 1 Population Size of Lantakfa Sub-district

Name of Village	**Area(Rai)**	**Households**	**Male**	**Female**	**Total**
Moo 1 Ban Klong Jek	2,300	173	261	321	582
Moo 2 Ban Lum Thaharn	2,100	243	449	466	915
Moo 3 Ban Lantakfa	4,000	349	599	607	1,206
Moo 4 Ban Taiwat	1,600	307	333	385	718
Moo 5 Ban Bangkeng	2,000	1,690	1,938	2,289	4,227
Total	12,000	2,762	3,580	4,068	7,648

Source: Lantakfa District Administration Organization

The important canal in Lantakfa sub-district is Yong Canal (Klong Yong). This canal was in the Sonntornphu's poem in King Rama III era (1824 – 1851). The settlement was along the canal. The paddy field was next to the house. In King Rama IV and King Rama V era, there was a land revolution due to the new canals. At the same time, irrigation system for agriculture was developed.

In conclusion, Lantakfa was emerged and developed under the economic development for rice exportation in Central region. The irrigation system was developed before the development in Rangsit canal. At present, the main income of the local people is still from agriculture sector. Moo 1 and Moo 2 village are paddy field. Moo 3 village is half paddy field and half household because part of the land (about 300 rai) was bought by Salaya Garden Company in 1997 for developed

housing project. After 1997, there was the outsider came in Lantakfa community. For Moo 4 and Moo 5 village, there are two developed housing projects which are Pruksa 4 and 8 which constructed in 1992. These housing projects have population about 1,500 households (4,300 persons). People in developed housing project came from outside of Lantakfa community who need to reside in the area near the city. Most people in the housing project work in urban Bangkok. Furthermore, there are industry factories in Moo 4 and Moo 5 village.

Moo 4 and Moo 5 area are still the location of factories. Most of factories were registered as warehouse for tax avoidance. There are food factory, agro-chemistry, furniture assembly factory, etc. Moo 5 village is transforming to urban areas because it contained both factories and developed housing project. Moreover, Moo 5 village was not controlled for agriculture purpose.

3.4 Seasonal Timeline

This section will address the physical of water related to season that led to conflicts in Lantakfa sub-district. Thailand normally has three seasons - hot, rainy and cool season - in a year in every region, excepting for Southern part which has only two seasons: hot and rainy season. The cold season is generally from November to February. The hot season is from February to May. The last is rainy season which is from May to October.

In southern part of Tachin River, there was an intrusion of saline water especially in dry season. In 2016, drought affects too much on the quantity of water

in the river while saline water intrusion has a great impact on the plantation. Therefore, the government has a policy in water management in drought period by permanently closed the water gate along Tachin River in order to collect water for pushing the saline water that intruded in Tachin River. The quality of water in public canals in Lantakfa sub-district was in bad condition because the water in canals cannot freely flow when the water gates were closed. Therefore, the situation of water management conflict in Lantakfa sub-district is quite severe in dry season. In rainy season, the conflict will be mitigated because the quality of water gets better by the rain. Season is one effective factors related to water management conflict.

3.5 Diversity of Land Used

In Lantakfa sub-district, people earn their living by both from agriculture and non-agriculture product. Most of population in Lantakfa sub-district earns their living by agriculture production, especially rice farming. Rice farming covered more than 5,000 rai in Lantakfa sub-district. The second is orchard such as guava, rose apple, pomelo, jackfruit and mango, and vegetable garden such as citrus, water mimosa and morning glory. The third is orchid farm and flower garden which covered 1,000 rai. The fourth is fishery which is prawn farming and fish farming.

This phenomenon is the same in Rangsit Field, Rachaniwan, Porntip, and Sripen (2000) found that there was a dramatic increase in the proportion of land area devoted to non-agriculture use and farm lands were also transformed from the

paddy field to orchard and vegetable farm. It was parallel with the development of transportation system. Due to the short distance from the center, fruit and vegetable has a large market which is the suburb of Bangkok.

Table 2 Occupations in Lantakfa Sub-district (Total)

Occupation	**Percentage**
Farmer	19.3
Public Officer	12.1
Public Private Employee	1.3
Private Company Employee	7.5
Freelance	36.0
Self-Employed	6.3
Merchandiser	8.7
Housekeeper	7.0
Others	1.8

Source: Tambon Preparing Project

Table 3 Occupations in Latakfa Sub-district (Villages Classify)

Occupation	**Moo 1**	**Moo 2**	**Moo 3**	**Moo 4**	**Moo 5**
Farmer	53.4	56.3	31.6	38.8	2.2
Public Officer	3.4	2.1	8.8	4.1	17.1
Public Private Employee	2.3	0.7	0	2.5	1.4
Private Company Employee	5.7	0	2.1	0.8	11.6
Freelance	15.9	34.5	40.4	31.4	11.2
Self-Employed	5.7	0	14	4.1	7.6

Merchandiser	8.0	4.2	4.1	9.9	10.5
Housekeeper	3.4	2.1	8	8.3	8.9
Others	2.3	0	3	0	2.4

Source: Tambon Preparing Project

3.5.1 Rice Farming

From the previous information, rice farming is traditional livelihood for Lantakfa people to earn a living. Most of the area is rice farming due to the advantage of fertile land all year. Lantakfa's location is appropriate for agriculture because of the short distance from Tachin River and the basic provided irrigation system.

In general, rice is grown in two main cropping seasons in Thailand, which is comprised of the major crop of rice, the second crop of rice and some area can growing three times per year. The major crop is grown from May to October in rainy season and the second crop is the irrigated rice that grows in the dry season from November to April.

Figure 6 Rice Field

With the benefit from the location, Lantakfa rice farmers sometimes are able to grow rice three times per year. The water is a crucial resource for rice farmers. It is an important area for rice production including organic and non-organic rice. For organic rice farming, there is Banchanote-Klongyong Lantakfa Community Cooperative in which members are gathered to produce organic rice.

Rice field covered more than 60 percent of Lantakfa sub-district. The rice field used water from Tachin River that water was delivered through canal and sub-canal. In the past, there is no conflict in water usage because Salaya Field was considered to be a fertile area all year and people in community are all rice farmers. In the drought period in 2016, rice farmer received a great impact in lacking of water and polluted water in the public canals.

3.5.2 Lotus Farming

Lotus farming in Lantakfa sub-district is developed from rice farming. Due to low profit from rice farming, some rice farmer shifted the rice field to lotus farm. Lotus was sold for paying respect to Buddha all year. In one lotus field, there are two separated sides. When one side was harvest, the other is growing. Lotus yields a high productive all year. Lotus is one kind of plants that used significant amount of water. The lotus field has to be located near canal for water. Lotus grows in fresh water. In Lantakfa sub-district, however, the lotus farmer faced the problem of pollution water in public canal. Pollution water is caused to low production.

Figure 7 Lotus Farming

3.5.3 Prawn Farming

Prawn farming was located in Moo 4 Ban Taiwat and Moo 5 Ban Bangkeng where are close to Tachin River. Previously, the prawn farmers used to be rice farmers before changing their rice field into shrimp pond. The main reason that they changed to prawn farming is that the profit from prawn is significant higher than rice. Therefore, the rice farmers who are able to invest in prawn farming will changed their rice field to prawn pond.

In the prawn farming production process, saline water delivered by the truck will be put into the pond for baby prawn in one or two month. After that, the saline water will be diluted to brackish water. The brackish will spread to nearest area around shrimp pond.

In recently year, prawn farming was rapidly increasing in Lantakfa sub-district especially after Thailand great flood in 2011. Increasing in number of prawn farming,

the condition of water in public canal along the prawn farming is not in good condition for growing plant. Moreover, the untreated water from shrimp farm affected the rice field and other types of farming like fruit orchard. But there is no direct policy in area zoning in Lantakfa sub-district. The government still ignored the impact on water resource and allowed the farmers to do prawn farming. Normally, shrimp farming requires water treatment before discharging to the public canal. From observation, there is no water treatment plant in shrimp farming. The vital reason why there is no water treatment plant is the increasing cost of production. Therefore, externalities affected other kinds of farming in the community.

3.5.4 Developed Housing Project

The situation in Lantakfa is coincided with Salaya sub-district on the problem of waste discharges from developed housing projects. In Salaya area, developed housing projects wanted to drainage the disposal without treatment to public canal, but it was not allowed by municipality. It led to the conflict between the former residents and the new comers likewise in Lantakfa. In Lantakfa sub-district, there are two developed housing project which are Pruksa 4 and Pruksa 8. Waste water from developed housing village was drained to public canal and affected the farmer. The juristic of developed housing villages have to discuss with representative from Lantakfa community member to deal with the problem.

This kind of problem was normally found in peri-urban area. Sajor and Ongsakul (2007) reported that many housing development projects were catered to

middle- and high-income groups, whose members commonly work in white collar jobs in the inner core city of Bangkok. In Rangsit field, the rice farmers found the same problem in diversity of water using group especially waste water from industry factories and household. While Lantakfa rice farming faced the waste water problem from new types of agricultural activities.

Figure 8 Developed Housing Project

3.5.5 Industrial Factories

There are a few factories in in Lantakfa sub-district. The factories in Lantakfa is supported the industry in Omnoi and Omyai area. There is a bicycle assembly factory in Moo 2. The bicycle assembly factory uses less water in the production process. According to interview the people around the factory, the community did not get any impact from the factory as follow:

"The bicycle assembly factory does not use water that much. It is environmentally friendly and the factory owner has a plan for waste water

treatment before draining to the public canals." (Nantha Prasarnwong, June 2016)

Most factories in Lantakfa were located in Moo 5 village because it was not the controlled area for only agriculture activities. The factories in Lantakfa sub-district were not the main actors in water degradation.

Figure 9 Industry Factory in Lantakfa

3.5.6 Others

In Lantakfa sub-district, there are other types of farming which are rose garden, orchid garden, vegetable garden, fruit orchard, etc. Orchid farms in Moo1 and Moo 2 village moved from Nongkham and Taweewattana, Bangkok to Lantakfa sub-strict. Quality of water is essential factors in some types of farming likewise orchid garden. These kinds covered less than ten percent of all area but the profit is very high. Orchid and pomelo also are exportation goods from Lantakfa area. Therefore, the government authorities quite care on these types of farming.

3.6 Water Management: From the Past to Present

In the past, King Rama IV has an idea to dig a canal for pilgrimage at Phra Pathom Chedi in Nakhon Pathom. Two canals was dug which are Chedi Bucha and Mahasawat. After digging canals, the area along the canal was given to royalty. Then, the rice farmer rented the area for agriculture from royalty. Canal was dug for transportation purposes. Later, the land along the canal was used as rice production field. Salaya field was an important area for rice exportation after Bowring Treaty. The villagers were able to manage water by themselves. No need for government authorities in water management. In the past, water gate was made of wood. The villagers were able to manage the water gate by themselves. In contrast, nowadays the water gate was made of concrete and managed by the government authority, RID. In the drought period in 2016, the water quality in the canal was low. Many villagers suspect that water pollution came from prawn farming. White prawn or *Litopenaeus Vannamei* is popular in Lantakfa sub-district due to the high productive and low cost from short- term farming. White prawn was introduced instead of black tiger prawn. White prawn is related to big agricultural company in Thailand. Charoen Pokphand group (CP) is the big company that sells white prawn baby, chemical, feed and related product for white prawn farming, and it also buys the white prawn adult from the farmer. White prawn is important for Thai economy as exportation goods. Therefore, it is quite hard for farmers to blame on prawn farmers.

In the past, there was no competition in water distribution and quantity, but it is different in present. The conflict occurred due to the quantity and quality of water. The farmers in Lantakfa sub-district still use water in the canal for their rice field and orchard, while the new users, factories and housing development project use the same canal as waste water discharging. It has an impact on water that was polluted and inappropriate for agriculture use.

3.6.1 Industrialization: Prawn as Exportation Goods

The increasing demand for shrimps in world markets has encouraged many developing countries to enter into the shrimp farming industry. The markets for Thailand's shrimp like Japan and the US now also consume white shrimp so this kind of shrimp has also widely hatched in many area especially in Central region where is not far from the sea.

> *"It is clear that it is more profitable to hatch white shrimp than black tiger. In Thailand, the country's farmers now hatch white shrimp for the 7th generation (beginning the white shrimp hatchery in 2001), free from diseases. In 2006, Thailand exported 400,000 tonnes of white shrimp, 98% of total output." (The Fish Site News Desk, 2007)*

By 1987, black tiger prawns were spreading quickly along the coast in Thailand. The high demand for prawn in overseas markets also changed traditional farming from peasant farmers to prawn farmers likewise in Lantakfa, Nakhon Chaisi,

Nakhon Pathom. Thai rice farmers converted their rice fields to prawn ponds. With the difference in profit, rice farmers only made 18,000 baht per rai a year while prawn farming yield a profit around 500,000 to 700,000 baht per rai a year. It encouraged rice farmers who have capital to convert their land to prawn farming. Later, white pacific shrimp was introduced instead of black tiger prawn because of its short duration in harvesting and low cost in investment.

The process of prawn production is related to a large firm in agro business like CP. CP is one of the biggest animal feed producer, fertilizer, and also prawn exporter. The company gained considerable profit from their prawn business. In Lantakfa sub-district, prawn farming sharply rose in a few years ago. From the interviewing the key informant, prawn farming was increasing to 10 percent of all area of Lantakfa sub-district. Most of the prawn farms were located in Moo 4 Ban Taiwat where is relatively closed to Tachin River.

The water from shrimp farming has an impact on the close area which is rice farming, fruit orchard, vegetable garden, orchid garden and so on. In process of prawn production, prawn feed and excrement, is sometimes combined with antibiotics and fertilizer contaminated in water. Furthermore, prawn farming needs saline water in the production process. The saline water might disperse to the area around the prawn pond. No one, however, can blame on shrimp farmer because they always claim that the water was already treated before discharge to public canal. Moreover, white pacific prawn is important exportation goods for driving Thai economy. Despite

the environmental degradation, particularly the fact that water pollution has a great impact on other types of farming, there is no clear policy on prawn farming in fresh water area.

3.6.2 Peri-urbanization

Urbanization has impact on the fringe area. Lantakfa can be considered as the area supported Bangkok urban because it is food production area for feeding to urban life. Moreover, Lantakfa supports urban by serving as a residential housing area for white collar workers who work in center of Bangkok.

Woltjer (2014) claimed that there are three major attributes of peri-urban: peri-urban space (the spatial expression of peri-urban development), peri-urban life (the functional appearance of land uses, activities and peri-urban innovation) and peri-urban change (a casual and temporal perspective featuring flows and drivers of change). In this case study of Lantakfa, this area is located in the fringe of Bangkok. In space aspect, Lantakfa is the area that rural meet urban. In this area a combination of various features including agricultural and non-agricultural activities can be found. In peri-urban life aspect, the livelihood of Lantakfa villager was changed along the changing of the area. There is a blur line between urban and rural life and an increasing in non-agricultural water user in peri-urban area. Peri-urban area like Lantakfa sub-district function as centers of industrialization, regional economic development and middle to high-income housing development. A clear consequence is that the process of “land conversion” from rural land to urbanland

uses occurs rapidly, extensively, and largely uncontrolled (Woltjer, 2014). In peri-urban change aspect, it was unarguable that Lantakfa was influenced by development. The development in urban area has a great impact on the fringe area like Lantakfa. The force of globalization and economic drive changed this area to more diverse and complex. Many industrial factories relocated to peri-urban area due to the lower production cost and the availability of large land plot. The paddy field was changed to shrimp pond for exportation. Therefore, one problem area in peri-urban SEA which should take into consideration is the conflict laden situation arising from mixed land use and irrigation water use (Sajor & Ongsakul, 2007).

3.6.3 From Farmer to Entrepreneur

The development of rice farming in Thailand has shifted from subsistence farming to commercial farming (Titapiwatanakun & Titapiwatanakun, 2012). During the last two decades, rice farmers have been depending more on purchased inputs such as seeds, fertilizers, and labor and farming services (land preparation and harvesting). Sattayanurak (2015) said that Thai farmers are transforming to entrepreneur society. Rice farmers are only a manger who manages in every process of production. The same as in Lantakfa rice farmer, none of them cultivated rice by themselves anymore. The rice farmers are able to use a service since land preparation until harvesting. When the livelihood of people in Lantakfa was changed, farmers transform themselves to entrepreneur. What they concerned is profit so water is one

of important natural resource in agriculture activities. Conflicts in water management were raised among the different groups of water users from the use of land for multiple purposes.

3.7 Water Management Institution

3.7.1 Royal Irrigation Department (RID)

Thailand water resource management began in the reign of King Chulalongkorn. The Canals Department was established in 1902 by the initiative of his majesty. The department was responsible for canals maintenance to prevent the shallowness and canals excavation in the suitable area for transportation and storage for agriculture. As we knew, Thailand was agriculture-based. The important export good after Bowring Treaty was rice. Rice is the plant which condiderably depends on water. In order to have a good productive of rice, the water management department was established to serve this purpose. Mr. Yehoman vander Heide, a Dutch expert on irrigation, was hired to study and undertake the irrigation project planning in Thailand. Later he was appointed as the first Director General of the Canals Department of Thailand. The initiative of dam construction across the Chao Phraya River in Chai Nat Province was proposed in this period. In the reign of King Rama VI, the Barrages Department was established instead of the Canal Department in 1914.

The Barrages Department has begun the development of irrigation works for cultivation purpose. The department received the technical principle from the western countries. At that time, Mr. R.C.R.Wilson, an English engineer as the Director General of the Barrages Department proposed the South Pasak Irrigation Project by constructing a large scale barrage across the Pasak River. The first barrage of Thailand, Rama VI Barrage, was constructed in accordance with modern civil engineering principles. It is located at Tha Luang Sub-district, Tha Rua District, Phra Nakhon Si Ayutthaya.

At the local level, RID is responsible for taking care of rivers and main canals including Tachin River, Mahasawat Canal and Yong Canal. Sub-canals in Lantakfa sub-distict are under TAO administration. The main duty of RID is to maintain and monitoring the irrigation system especially the project in downstream because of limited of water. The project in the upstream normally has less governance because the abundance of water so it is not necessarily to manage the water resource. Therefore, the downstream of irrigation project is a significant factor that calls for water management.

3.7.2 Lantakfa Tambon Administration Organization

Lantakfa Tambon Administration Organization (TAO) located in Ban Taiwat (Moo 4) which is near Lantakfa temple. The concepts normally used for administering in local levels are deconcentration and decentralization. According to the interview

with the community member, less people participated in community meeting due to a number of reasons. First, the civil servants care for those who speak out, although they are not truly interested in. Second, the level of graduation degree is a barrier in discussion. Many villagers are shy when they can only discuss in informal language and no principle referring to. Third, people's voice from community is not reflected in policy-making. Therefore, it was wasted time to participate in community meeting. Most of those who participate are in the socio-political circles of the executives and council members. Planning and budgeting are not based on policy directions, but consist of merely compiling urgent projects. Likewise in Lantakfa sub-district, the pollution in public canals was not solved by local government organization instantly. Lantakfa Tambon Administration Organization has two main duties in sub-district administration level as follow:

TAO Law: Statutory Duties

(1) provide and maintain waterways and land routes;

(2) keep the roads, waterways, paths and public places clean, and also provide garbage and night soil services;

(3) prevent and stop communicable diseases;

(4) provide public disaster relief;

(5) promote education, religion and culture

(6) promote the development of women and children, the youth, the elderly and the handicapped;

(7) protect, look after and maintain natural resources and the environment;

(8) maintain art, customs, local knowledge and local culture; and

(9) perform other duties as assigned by the state.

TAO Law: Discretionary Duties

(1) provide water for consumption and agriculture;

(2) provide and upkeep power or lighting in other ways;

(3) provide and maintain drains;

(4) provide and upkeep places for meetings, sports, recreation and public parks;

(5) provide and promote farmer's groups and cooperative businesses;

(6) promote family industries;

(7) upkeep and promote occupations;

(8) protect, look after and maintain property that is domain public of state;

(9) seek benefits from property belonging to the Tambon Administrative Organization;

(10) provide markets, berths or docks for vessels and fording places;

(11) activities concerning commerce;

(12) tourism;

(13) town and country planning.

("Sub-district Councils and Sub-district Administrative Organizations ", 1995)

According to Decentralization Act (Section 3, Article 67 and 68), TAO has main duties in five aspects which are policy-making, administration, public service provision, personnel administration, and finance. In water management aspect, TAO is able to use its power both in statutory duties and discretionary duties to maintain the peace for society. In reality, the situation is TAO unable to handle the problem due to the complexity of the area.

At the local level, Lantakfa Tambon Administration Organization has duties in monitoring sub-canal in the area. Monitoring is defined as protection and maintenance of the quality of water in the canal. If someone discharges the pollution into sub-canal, Lantakfa Tambon Administration Organization has to due this problem. According to the interview with the council member, there is no clear boundary in TAO administration. In water issue, TAO has duties to monitoring the public sub-canals which linked to main canals that in responsibility of RID. Water as transboundary problem cannot be solved by a single institution.

3.8 Water Management Policy Failure

As mentioned earlier in communities' respond section, the existing institution cannot achievably manage the water management in Lantakfa sub-district. The

reasons why water management policy failed are lack of concentration by a water authority on non-agricultural activities like industrial sector and household more than agricultural sector, ineffective governance and corruption, and unclear policy goal. Therefore, in the process of policy designing, farmers were left behind the policy. Water gate permanently closed policy in downstream Tachin River was focused only on pushing saline water. The water management policy affected Lantakfa community very much especially people who depend on agriculture production.

The issues of ineffective governance and corruption, particularly among politicians and civil servants, have also been described as a major obstacle to proper water management policy implementation in Thailand. One of the major reasons for the ineffectiveness of governance is lack of coordination and trust among political representatives and government officials, and also the lack of cooperation among different government departments

There is unclear in this policy goal. It has been observed that most policies and plans are inefficient in water resource management. One of the main reasons for such a situation is the absence of reliable data for water using planning in Thailand. After Great Flood 2011 in Thailand, we experienced that water management was related to political power because the government will fear to lose the election in next time if flood happens in urban or economic zone. Therefore, it is better to keep

water in large dams at low level without concerned with drought period without concerned with further context.

The management of Royal Irrigation Department raised several concerned in Lantakfa area. Although the water management policy by RID was failure, the RID still has power over irrigation system in Thailand. The reason why RID is still powerful organization is governance structure. The power does not distribute to local authorities that close to local communities. Moreover, the power still concentrated in such an organization in order to easily manage because water is an important resource in driving economy. It is necessary to collect power in water management in one large organization.

3.9 Impact, Risks and Vulnerabilities from Water Management

It was clear that existing water management policy cannot solve the waste water problem in Lantakfa sub-district. There are three groups who were directly affected by waste water mismanagement in this area, i.e. rice farmers, lotus farmers and orchid growers. The common resource that three group shared together is fresh water. When shrimp farmer discharged waste water from shrimp pond, it has impact on fresh water in public canal especially when the irrigation gate was closed.

The rice farmer has impact on cost increasing in rice cultivation which came from fresh water pumping from distance area. Due to the low quality of water in the nearest canal, the rice farmer has to pump fresh water from other canal. This case is

as same as orchid farm. The orchid growers have to find the fresh water in nearest area to test, pump and deliver by truck for using in their orchid farm. There are increasing cost in production process that left on rice farmers and orchid farm.

The risks that rice farmer found were rice died and low productive which led to lost in production. This will lead to be in debt both formal and informal debt. As it was said in earlier, the rice farmer is vulnerabilities group in Lantakfa community because they have less power in negotiation, knowledge and money which is different from orchid farmer. Finally, the rice farmers will lost their land or change their livelihood.

3.10 Summary

In the past, most of activities in Lantakfa area were agriculture-based. The community members depended on agriculture production. This has, however, changed. At present, there was diversity in land use in Lantakfa sub-district. Development changed the interface of this area from rice production for exportation to mix function of land use. Industrialization was an important factor in area transformation especially in urban fringe.

The existing institutions of water management are Royal Irrigation Department and Tambon Administration Organization. The main duties of Royal Irrigation Department are to implement the national water policy, monitor and report the problem to nation level. The main canals including Mahasawat and Yong Canal and

Tachin River were in responsibility of RID. While the sub-canals in Lantakfa sub-district are under TAO. As transboundary problem, the existing institutions were unable to manage the problem because it is related to various institutions that were complex in administration.

CHAPTER IV Communities' Responds and Conflict Management

4.1 Introduction

This chapter will investigate the communities' responds in water management conflict and explore the conflict mechanism in Latakfa sub-district. The purpose of this chapter is to analyze actions of the stakeholders who involved in water management conflict and explain the mechanisms which mitigate the current conflict in Lantakfa sub-district in 2016. The analysis of the stakeholders will answer the research question*: What is the mechanism that manages water conflicts in Lantakfa sub-district?* and *What capacities do they have that will allow them to deal with water-related vulnerabilities?* After explaining the conflict in chapter III, we knew that there was diversity among the key actors involved in the water management in Lantakfa sub-district. Therefore, the analysis in this chapter will describe how the stakeholders managed the water conflict in Lantakfa sub-district. The chapter includes five sections which are water management conflicts in Lantakfa, communities' responds, conflict management, water conflicts analysis from a case study of Lantakfa and summary.

4.2 Conflict Mapping

To understand better conflict situation in Lantakfa sub-district, it is necessary to know the conflict map in the area. The conflict map will explain the relationship

among the water user groups in Lantakfa community including rice farmer, shrimp famer, lotus farmer, developed housing dweller, TAO and RID.

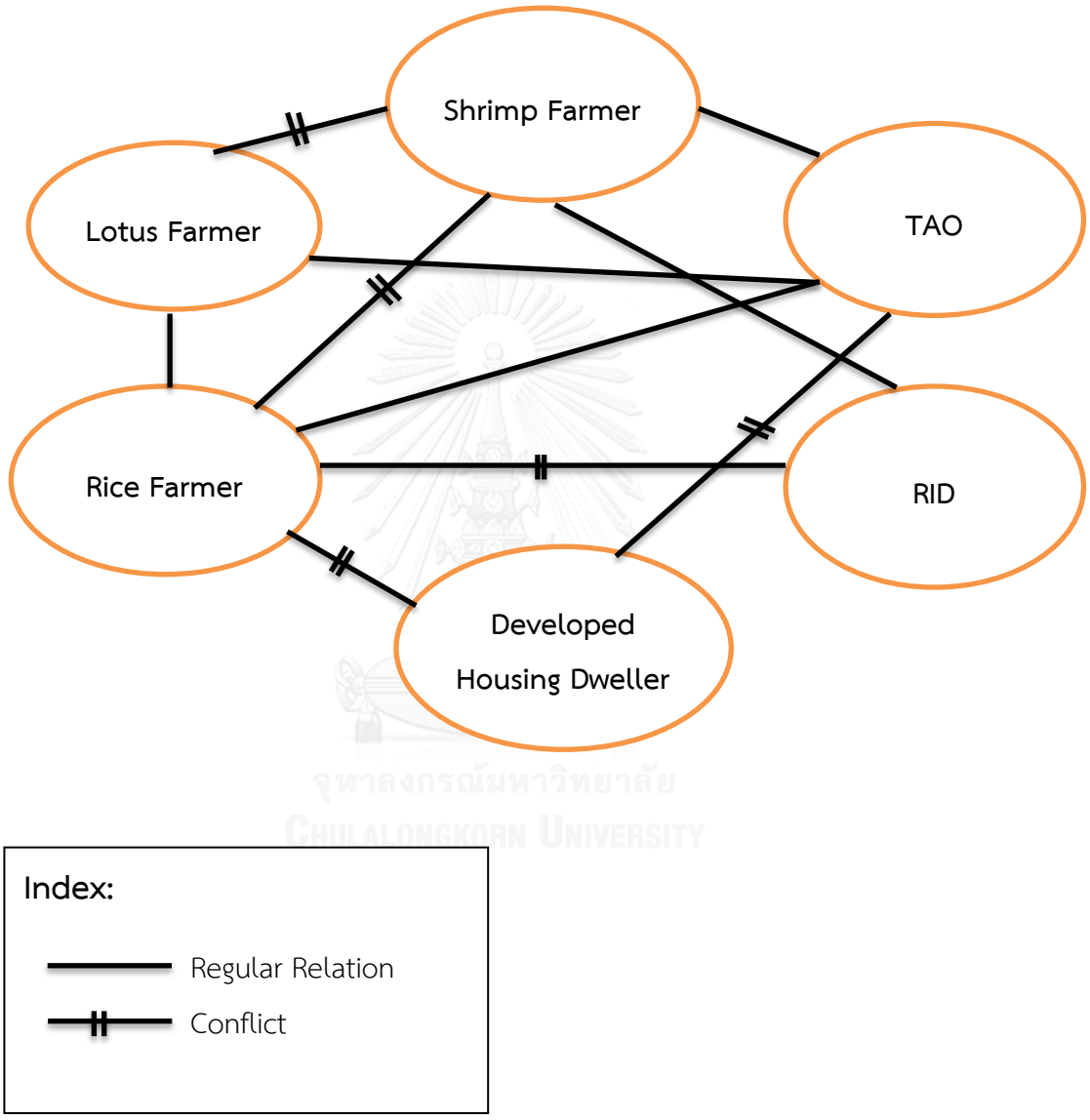


Figure 10 Conflict Mapping of Water Management Conflict in Lantakfa Sub-district

According to conflict map, there are six parties in Lantakfa's water conflict. The conflicts occur from the diversity of water using types. Rice farmers and lotus

farmers have a conflict over water quality with shrimp farmers. Rice farmers also have a conflict with developed housing dwellers because rice farmers get directly impact from household sewage. TAO also has a conflict with developed housing project because of waste water management from housing project. According to the water management policy from RID, rice farmers have conflict over policy with RID. The specific detail of conflicts between the different water using groups will be explained in the next section.

4.3 Water Management Conflicts in Lantakfa Sub-district

Conflict is a phenomenon that normally occurs among various groups of people involved in natural resource management, especially in the management of common resource. Water is a significant resource in life. Conflicts occur among various groups of water users in Lantakfa area from many reasons: lacking of water especially in dry season and contaminating water in public canal. Conflict is on the issue of water management because water was considered as an important resource in every aspects of our daily life. Especially among the agricultural activities, the conflict was raised over the distribution and quality of water. In chapter III, it is reported that Lantakfa sub-district has a unique characteristic as peri-urban space that urban and rural meet. With the different types of farming, conflict was laden among these groups. Water management conflicts is a consequence of the mixed use of land that shared the same common water resource.

Figure 11 Mix of Land Use in Lantakfa

Figure 12 Samrong Canal on 24 May, 2016

Figure 13 Samrong Canal on 10 June, 2016

4.3.1 Conflict between Rice Farmer and Shrimp Farmer

The conflict occurred between rice farmer and shrimp farmer in Lantakfa community. It could be said that this kinds of conflict is quite severe conflict because it is the same type as agricultural activities, but the characteristic of water using is different. Rice farming uses fresh water that supplied from Tachin River while shrimp farming uses both fresh water from the same river and also saline water from the sea. The conflict is more severe in dry season that water is scarcity resource. The conflict is worse when RID was decided to close the water gate along Tachin River. RID had to close water gates due to the intrusion of salinity water and it requires a significant amount of fresh water from the dams to push the salinity water that will affect the agriculture field in southern of Tachin River including Sampran District. The neighboring farmer's plant close to shrimp pond died.

There is finding about the effect of combined shrimp and rice farming on water and soil quality in Bangladesh that continued storage of saltwater in shrimp ponds alters the chemical properties of the soil which is unsuitable for agricultural production, and it might be a difficult task to switchback to traditional agriculture in future with these high saline soils resulted from shrimp farming (Chowdhury, Khairun, Salequzzaman, & Rahman, 2011). This is why the rice farming afraid of soil degradation in the future.

It can be summarized that shrimp farming using saline water have long-term effect of soil salinization, but in case study of Lantakfa sub-district, there is no clear

scientific evidence which proved that the pollution in public canal caused from shrimp farming. The rice farmer still blamed on shrimp farmers, but the shrimp farmers denied the accusation. The shrimp farming told that the water from shrimp pond was treated before discharging to the canal.

4.3.2 Conflict between Farmers and RID

The conflict between the rice farmers and Royal Irrigation Department is complicated. The conflict occurred due to the water management policy that implemented in this area. The water management policy that affected many rice farmers was the disallowance to open the water gate in dry season. Therefore, the rice farmer cannot grow rice because lack of water. Moreover, the water in canal was not flowing so waste water from shrimp pond could not dilute and drain to the river. It has an impact on quality of water in public canal.

At present, the water gates were made of concrete and locked by RID officers. According to the key informants, we found that a few people who have water gate keys are prawn farmers. Some prawn farmers have a connection in Royal Irrigation Department.

> *"In the past, we managed water gates which made of wood by ourselves…The government agency made it hard for people to design and manage water resource in our area…They will safe only a person who had a power, not farmer."*

In summarize, local people are able to manage water by themselves in the past, but nowadays they have no participation in water management. The water management policy was decided in top-down approach which is not good for community. The people in Lantakfa community should have opportunities to participate in water allocation and water management.

4.3.3 Conflict between Farmers and Developed Housing Project

In Lantakfa sub-district, there are two developed housing projects which are Pruka 4 and Pruksa 8. It is hard to access the information from developed housing project because the lifestyle of the housing project members which is different from farmers who always stay and work in Lantakfa area.

> *"First, it has severe conflicts between the old resident and the new resident in developed housing project. The developer of housing project did not want to talk with the local community. TAO has to go for negotiation and explain sub-district level laws that related to sewage discharge... TAO did not allow draining the household waste water to public canal without treatment."*

Finally, the conflicts among farmers and the new residences in housing project is mitigated by local participation in solving polluted water together via the mediate like TAO.

According to Thonglor Thamyong, Moo 1 TAO member interview, there is conflict between the housing projects and farmer as following:

"The juristic office of these housing projects wanted to transfer the sewage treatment plants to Lantakfa Tambon Adminstration Organization (TAO), but TAO cannot accept this offer. The water pump was out of order so TAO will not take this responsibility. Right now, it is on the process of negotiation while the sewage from the housing projects still discharges to the canal which degraded the water quality in the canal."

The study has found that the local government authorities like TAO has direct duties on maintain peace in society, but they concerned less on their duties. TAO members always think that they did not have enough power to manage the conflict. Therefore, the conflict is still continuing in the community.

4.4 Communities' Responds

Water is an important issue that related to many water using groups in Lantakfa community including rice farmers, prawn farmers, lotus farmers, housing projects and government authorities. In this part, the communities' responds will be presented. In the world undergoing climate change, high levels of past and current water extraction will likely remain the principal contributor to reduced flows in major freshwater ecosystems (Grafton, Pittock, & Davis, 2012), yet we need not face a water crisis if limited water resources are wisely managed (Lenton & Muller, 2009). With the issue of water management, the study tried to clarify the stakeholders' responds

which are rice farmer responds, shrimp farmer responds, developed housing project responds, TAO responds and RID responds.

4.4.1 Rice Farmer Responds

In the previous chapter, it explained that Lantakfa community mostly based on agriculture activities. Rice farming can be classified into two types including organic and non-organic rice farming. Water is an important resource for both types of rice farming. Furthermore, quality of water is important key for organic rice farming. According to observation in Banchanote-Klongyong Lantakfa Community Cooperative, the organic rice farmers got less impact from shrimp farming because the location of organic rice farming is in Moo 2. Normally, white shrimp was raised in the area of Moo 4 and Moo 5 village. Therefore, the rice farmers who receive direct impacts from shrimp farming will be the rice farmers in Moo 4 and Moo 5 village. The advantage of Moo 4 and Moo5 village location is that they are located closer to Tachin River.

When the existing mechanism does not function, the farmers who got impacts had to seek an extra channel to directly contact with the high level government authorities. The rice farmer gathered their name to give a proposal to chief district officer to demand for water problem resolution. The chief district officer told them to negotiate by themselves. This means that the existing institution like district administration cannot perform its duty.

The rice farmers demanded that the government authorities solve water using conflicts by holding the meeting among the different groups of water users including

rice farmers, shrimp farmers and other kinds of farmers in Lantakfa area, and the government authorities including provincial agriculture officer, agricultural academic and provincial governor. Some rice farmers did not trust the TAO president because the TAO president has only power without substantial knowledge on water quality issue. Therefore, the resolution of the problem proposed by the rice farmers who got impacts from different kinds of water using is to bring the academic who can provide the fact on water quality testing in the meeting so the negotiation will be fair for every side.

4.4.2 Shrimp Farmer Responds

Although shrimp farmers was blamed on discharge the waste water to public canal and brackish water when they bail out water for catching the shrimp. The shrimp farmers still assert that the water has no impact on the fresh water in canal because the water is already treated in the plant before draining to the canal.

The shrimp farmers solved the problem of pollution water in the canal close to shrimp pond by opening the water gate for drain the waste water to the river. If they did not open the water gate, the water in the canal will be polluted. It will be evident for the rice farmer. Later, the conflict will be more severe among the shrimp farmers and other types of farming.

In summarize, the shrimp farmers wanted to avoid the conflict. Therefore, they had to find their own ways to manage the waste water. From Lantakfa community interview, they said that the shrimp farmers always deny that the existing

of the problem. Although they were in the same community but when they had to meet each other in festival or community meeting, the topic was changing or avoiding.

4.4.3 Developed Housing Members Responds

Normally, people who live in housing project will be middle class. People in housing project have power and connection over farmer. Pruksa 4 and 8 housing projects had treated sewage before discharge to public canal. In reality, people who reside in Pruksa 4 and 8 housing projects did not know anything about their sewage. Only the juristic officers knew and managed the sewage problem. The members of housing project are people from outside the community. They have less relationship with the old residences group. People who reside in housing project frequently work in urban Bangkok.

Therefore, it could summarize that developed housing members did not knew so much about the waste water problem. Furthermore, most of them thought that the project developer had to take the responsibilities in this issue. Finally, the problem will be solved by housing project representative and TAO.

4.4.4 Tambon Administration Organization Responds

In case of pollution water in public canal, Lantakfa District Administration Organization has been trying to solve the problem by giving a proposition to open the water gate to drain waste water to Tachin River. This method will mitigate the

problem in short term. In long term, however, the problem of brackish water from white prawn farming contaminated in public canal will not be solved.

TAO has duties as listen the community complains and reported it to provincial level. The process in solving the problem at hand was very slowly. Moreover, TAO felt that they had less power in punishing the pollution producer. In the case of developed housing projects, TAO cannot do further than wait. TAO members also thought that this was not their responsibilities because they did not have the knowledge on water management. The higher level like Pollution Control Department (PCD) was in charge of this responsibility.

4.4.5 Royal Irrigation Department Responds

According to Nakhon Pathom Royal Irrigaton Project director, he suggested that there were many existing water related committee, but the conflict in Lantakfa was a new problem that did not have any committee take action on this issue. First, he agreed to establish the committee for critical water issues which included provincial governor, RID representative, TAO member and Pollution Control Department (PCD), Ministry of Natural Resources and Environment. Second, waste water in canal that was under RID responsibilities came from the area that was not under RID responsibilities. Therefore, it was better to take action by local government like TAO before leaving the problem on RID. The committee will appoint when the problem occurred. It was not a permanent committee.

In aspect of policy implementation, the policy of water management was design by the RID meeting not from a single section. Therefore, the decision on every irrigation project was linked to director-general of Royal Irrigation Department. Especially for critical area, the head of irrigation projects has to directly report to director-general of Royal Irrigation Department.

From key informants interviewed, it was found out that the water gate who was a water gate key bearer in Lantakfa area was covert to open the water gates at night time. The director responds as the following:

> *"The water gate key bearers in every region are RID permanent employee that lived in the area of water gate. There is no clear evidence to punish the key bearer, although the RID knew these facts. If the action is not caused the following big problem, there will be no report to the higher level. Moreover, there is no person who keeps an eye on the water gates. "*

According to the answer from the director, the study found out that RID has no proposition at the origin of problem and did not want to take the responsibilities in manage the conflict among the water using group.

4.5 Conflict Management

4.5.1 Water Conflicts Analysis from a Case Study of Lantakfa

All conflicts in Lantakfa sub-district in water aspect are in the stage of latent conflict. There are no overt conflicts among the group. The most important reason is

there is no clearly evidence that waste water in public canal is caused by waste water from prawn farming. There is no evidence due to the government authorities who have a duty on pollution control have not functioned. The local people said that there were government authorities came to test the quality of water, but they knew only the process of water collecting. The people did not know the result of the water quality testing from the authorities. Therefore, they cannot blame on shrimp farmers. The rice farmers still doubt what caused the low quality water in public canal.

The conflict is more sever especially in 2015-2016 because the national water shortage is driven by climate change and also inefficient services to distribute water resource in each area. First, the water conflicts occurred in 2016 for the first time so the stakeholders did not prepare a plan t for conflict resolution. Second, there was no clear evidence that the pollution of water came from shrimp farming. The existing institutions like Pollution Control Department and Industry Work Department did not pay attention on the problem. Therefore, the farmers who got the impact have no evidence and the shrimp farmers were suspected. Third, the other reason why a conflict among the different kinds of water using was in the latent stage is because of brotherhood. There were the relationship among the relatives and friends in the community so they did not want to have a dispute with each other. These mechanisms are not permanent mechanisms. The government authorities must

concern the water problem to find the appropriate solution for the next round of conflict.

4.5.2 Conflict Mechanisms

According to key informants interviewed, the water conflict in Lantakfa area did not break out because the community members tried to balance their concern for satisfying their personal needs and interests with their concern for satisfying the needs and interests of others in the same community. From communities' respond section, it was clearly that all of water using group tried to compromise among each other. Although the shrimp farmers did not stop draining the waste water from shrimp production to the public canal and build a water treatment plant, they still tried to solve the problem of pollution water by using their power to open the water gate at night time. There was no clear evidence that they paid the bribe to the RID officer or not. If the water in the canal did not flow, the water conflict will break out in the community.

It is hard to eliminate conflicts completely since there are so interacting dynamic factors in natural resource management; ideally then, conflicts need to be resolved or managed (Caldwell, 2001) In the future, water stress and the inability of institutions to adapt to stress stir uncertainty and may constitute a factor to conflict (Ohlsson, 1998). The conflict will be more severe in the next year because the current mechanisms were not permanent. There will be the new comers in Latakfa community in the future caused from the expansion of urban area.

Due to the people in community including rice farmers, shrimp farmers, lotus farmers, orchid farmers and orchard owners is the old residences in Lantakfa community, the relationship among these groups is relative and friends. The existing mechanism which help solving the water problem in 2016 is informal mechanisms likewise kinship mechanism and friendship mechanism. These existing mechanisms that mitigate the problems are as following:

i) Seeking Extra Channel to Contact the Government Authority for Solving the Problem

The crucial mechanisms that mitigate the conflict among rice farmers and shrimp farmer is seeking extra channel to contact the government authorities. According the rice farmer interviewed the rice farmers who have less power among the water user groups tried so much to find the special method in negotiating with RID. There are the same method that was applied by both rice farmers and shrimp farmers. For the rice farmers, there were two main methods which are directly contact the high commissioner in ministry, and gathered people's signature to give a proposal through TAO. For shrimp farmers, they seek the connection for opening the water gate to flow the water in the canal. The flowing of water in the canal will eliminate the cause of bad quality of water in public canal.

First, the rice farmers will directly contact the acquaintance who has a position in Ministry of Agriculture and Cooperative to demand for water management plan. The proposition which the farmer demanded is to open the water gates for

water flowing in order to dilute and drain the polluted water. The other attempt is to gather people's signature to propose a proposition through TAO.

Second, the shrimp farmers also seek the connection for open the water gate too. The flowing of water in the canal will eliminate the cause of bad quality of water in public canal so it will be the advantage not only the other types of farmers but also the shrimp farmers. In shrimp production, fresh water was important factors the same as saline water.

In reality, a few people in Lantakfa community who received the key from RID officer by paying bribe for the water gate key bearers. The person who has a key will open the water gate at night time. Therefore, nobody knows this action. RID office at the local level cannot open the gate due to the water management policy except in the critical situation. If the RID officer opens the water gate, the soldier will come to guard the water gate likewise in Chainart. No one can solve this problem anymore. It was collaboration between the RID officers and someone in the community. The water in public canal is important for any types of farming since rice farming to shrimp farming.

ii) Stakeholders Concern among Different Water Using Groups

As mentioned earlier, with the relative and friend relationship, the conflict did not break out. Stakeholders concern is a compromise way among the water using groups. As previous section claimed that water scarcity brings the water conflict more severe, the rice farmers said that they avoid the conflict by concerning

the others water users. If they saw that someone in the community pump the water to the field, they would not pump the water in the same day. It automatically knew that when your turn was. This mechanism mitigates the conflict among the different water using group.

iii) Delayed Growing Rice

The rice farmer responded to the conflict by delayed growing rice which normally grows in May or June, 2016. They had to wait the rain to minimize the problem. They had to adapt themselves to the current situation. The rice farmer had to wait until the quality of water was improved.

4.6 Summary

From expanding of urban area in Lantakfa sub-district, the pattern of water using was changing along the development of the area. First, there are many patterns of water usage including types and quantity compared with the activities in the past. In the past, most activities in Lantakfa area were agricultural based activities, but the area was mixed with agriculture and non-agriculture activities which comprises white prawn farming, organic rice farming, developed housing project and industry factory.

Second, the existing institutions are unable to develop and change themselves to deal with the new complex problem. Water management is related to various groups of interests. The government authorities should be mediator among different groups of people, but they do not function to immediately solve the water

management problem. The conflict among the different interest group was occurred in Lantakfa area, but it was not severe conflict. In long term, the conflict will be severe and difficult to solve.

When the water gate was closed, water quality in the canal got worse because the shrimp farms continue draining waste water into the stilled water. The neighboring farmer's plant close to shrimp pond died. The water scarcity in Lantakfa did not mean that lack of water but the existing water is in low quality.

CHAPTER V Conclusion and Recommendations

5.1 Introduction

This thesis investigates on water management conflict in peri-urban area: a case study in Lantakfa, Nakhon Chaisi, Nakhon Pathom. The study aims to explain conflicts in water management in Lantakfa sub-district and to identify the roles of water management institution in the resolution of water conflict. This chapter is the last chapter in this study including two main parts which are conclusion and recommendation. In the conclusion part, it will be a summary of chapter III and chapter IV which answered the research questions in chapter I. In recommendation part, it will propose the recommendations to two groups which are government authorities and water users in Lantakfa.

5.2 Conclusion

5.2.1 Key Actors in Water Management Conflict in Lantakfa

Lantakfa, Nakhon Chaisi, Nakhon Pathom was the first pioneer field in producing rice for exportation after Bowring Treaty in 1855. In the past, Lantakfa community is agricultural-based society which most of people earned a living by rice farming. The paddy field in this area gained the benefit from the Thachin River. There are five villages in Lantakfa sub-district. The current population is around 7,500 persons. The total area is 19.2 sq. km. At present, this area is mixed of land use both

in agriculture and non-agriculture activities. It led to the problem among agricultural and non-agricultural water users. The wastewater came from household, industries and also from the agricultural field; prawn farming has great impacts on the plantation. The key actors in water management conflict were rice farmers, lotus farmers, shrimp farmers, developed housing dwellers, industry factories' owner, TAO and RID. The existing water management institutions had fewer roles in water conflict management. Therefore, the conflict was continuing in Lantakfa community.

Development has impact on local livelihood in Lantakfa sub-district. The expansion of urban area including developed housing projects and industrial factories in Lantakfa area is caused from industrialization. The recently shifting rice farming to shrimp farming after rice price was dropped and subsequently caused the contaminated water problem in public canal. The rice farmer changes their paddy field to shrimp pond because the price of white pacific shrimp is very high. The demand of shrimp was not from inside the country but also the outside country like USA and EU.

5.2.2 Causes of Water Management Conflict

First, the government had a water policy in the drought period in 2016 that to close the water gate for pushing the saline intrusion. Moreover, the water policy was more focused on industrial and services sector more than agriculture sector.

Second, there was an emerged of shrimp farms in Lantakfa area. The shrimp farm was increasing in a few years ago because of no rice support policy in military government like rice mortgage scheme or rice price guarantee scheme. As mentioned earlier, the shrimp farming used saline water in production process so the water discharged from the shrimp farm was polluted water that degraded the quality of water in public canal. The rice farmer was not sure to pump the drainage water from public canal to their field.

Third, the causes of water conflict management in Lantakfa came from diversity of land use. There are many different water using groups in Lantakfa area both agriculture and non-agriculture activities. Therefore, the water is common resources that could be degraded, one interest from using water might be degraded the quality of water for other. The conflict occurred among the different types of water using in such a peri-urban area.

5.2.3 Conflict Mechanism in Water Management

From the water conflict as mentioned before, there was no formal mechanism. Therefore, the actors in Lantakfa sub-district had to find their own method to minimize the impact from water conflict. Both rice farming and shrimp farming got the impact from the same water management policy so they had to seek extra channel too.

Although there was no formal mechanism, the conflict was not overt because of many reasons. First, the people in Lantakfa community had relative and friend relationship. Second, the water conflict was a new issue in the community. Third, there was no clear evidence to prove that waste water from shrimp pond caused the low production of rice. From three reasons, the existing conflict mechanisms were informal and not permanent. In long term, there will be increase in people from outside Lantakfa community came to live in Lantakafa area. The brotherhood

Due to the complex of the recent problem, the existing institutions do not function as it should be. Therefore, the water problems including water scarcity and waste water were not managed in appropriate way. The water scarcity in Latakfa did not mean that lack of water but the existing water is in low quality.The water conflict among the various water user groups will be more severe especially in drought period.

5.3 Theoretical Implications

First, Peri-urbanization theory addressed that the fringe area lacks of basic infrastructure, likewise water treatment system. Without the basic infrastructure, the conflicts occur among the different types of water users in peri-urban area. A case study of Lantakfa sub-district could be a sample of peri-urbanization theory.

Second, the stakeholders in water management conflict in Lantakfa have asymmetric power. The shrimp farmers have more power rather than rice farmers

and other types of farming. In contrast, social movement is tool for the rice farmers in conflict negotiation.

Third, Lantakfa sub-district is a fertile land that has a number of water all year round. The conflicts come from water management aspect because the situation of water scarcity in Lantakfa is not shortage of water, but it is about the quality of water and delivery method.

A case sudy of Lantakfa sub-district confirm the theory of peri-urbanization and water scarcity, but it address the new perspective in power theory that vulnerabilities groups gained their power through social movement.

5.4 Recommendation

5.3.1 To the Government Authorities

i) Decentralized water resource management authority

At present, the power in water management decision was in hand of Royal Irrigation Department which was lack of participation culture in state institutions. The better way to instantly respond the need of local people is decentralized water resource management authority by appointed the committee from various institutions.

ii) Implemented integrated water resource management

From the problem addressed in previous chapter, water management should be integrated system that including various institution in management system.

Integrated water resource management should be implemented in Thailand irrigation system.

The water management committee in the area of conflict will be appointed from three parties including different water using groups, local administration organization and specialists. Water using groups had to explain the characteristics of water using and their need in water quantity and quality. The specialists had duties to reveal the information about the fact of water quality in area straightforwardly. The local administration will be cooperation among specialists and different water using groups. The important duty was to mediate between the conflict groups and made a decision in the final stage.

5.3.2 To Water Users

The shrimp water should build the water treatment plant to treat water before discharged to public canal. According to observation, the study found out that shrimp farming drained the contaminated water to public canal so the water treatment plant will help improve the quality of water. This will reduce the impact of waste water in public canal. The same as shrimp farming, both industry factories and developed housing project should have the water treatment plant and maintain the treatment system in good condition.

5.4 Summary

The rapid development without planning caused environmental problem and conflict over common resources. Lantakfa sub-district as peri-urban space has variety

activities in water using both agriculture and non-agriculture activities in the same area. It leads to different demands which spark the conflict in Lantakfa sub-district. To prevent the conflict in future, the government should have policies that include people participation. If the conflict has already occurred, participation from stakeholders would have increased in policies decision. From a case study of Lantakafa sub-district, water management policies lacked of participation sparked the conflict in Lantakfa community. Therefore, urban planning is necessary in development because rapid development without direction caused many problems in society that quite complex at present. Development should be in sustainable approach. It is necessary to balance social, economic, and environmental objectives--or needs--when making decisions today.

The study argues that government water management organizations need to form the water management committee from various institutions –emphasizing on participation- in order to manage water resource in sustainable approach and solve the water conflict in critical area. Moreover, the government institutions at municipality level should have authorities in water management in their area.

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APPENDIX

Appendix A

Theme Question for Key informant Interview

Rice farmer

- Do you have any other source of income except from rice farming?
- How does the water policy at local/national level affect the rice farming?
- What is your strategy in negotiating in water management at the local administration level?

Lotus farmer

- What is the process of water in lotus farming?
- Do you satisfy with water management policy by the local and national government? And why?
- Is there any conflict in water distribution in your opinion?
- How do you negotiate with other stakeholder in water distribution?

Prawn farmer

- How did they become a prawn farmer?
- What are the factors that push them to be a prawn farmer?

- Where does the money for investment come from?
- What is the occupation before a prawn farmer?

Developed housing residents

- How does the project manage the waste water from household?
- Does the project have any plan in water treatment?

Tambon Administration Organization

- What is the current plan of water management policy in Lantakfa sub-district?
- What is the mechanism in water management conflict resolution?
- How does the District Administration Organization mediate among the different interest group?

Royal Thai Irrigation Department

- How do authorities respond to water problem in the area?
- How does water management policy be design? By who?

VITA

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