

**COMMUNITY BASED DISASTER MANAGEMENT: THE CASE
STUDY OF FLOOD AND DROUGHT DISASTER**

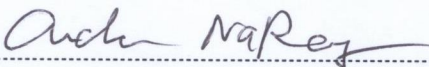
Pissamai Srinate


**A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Public Administration
School of Public Administration
National Institute of Development Administration
2017**

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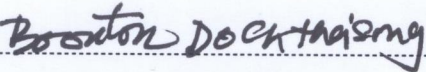
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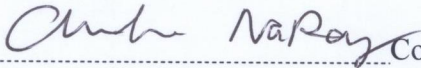
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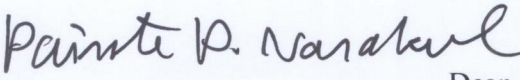
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ABSTRACT

Title of Dissertation	Community Based Disaster Management: The Case Study of Flood and Drought Disaster
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There are three objectives of this research “Community Based disaster management: The Case study of flood and drought disaster.” These objectives are 1) to investigate the disaster management of the community encountering flood and drought disasters before, during, and after the disaster, 2) to study and identify the community capitals being related to the disaster management capability of the community, 3) to study the necessary conditions determining the capacity of the disaster management of the community.

Qualitative research is employed aiming to study flood and drought disaster management and to identify community capitals related to community capacities to deal with the disasters. This research is conducted in four communities. The first two communities for flood disaster management are 1) the community of Bang Ta Phaen, Klongwau sub-district, Mueang Anghong district, Anghong Province, and 2) the community of Tha Bong Mung, Warinchamrap Municipality, Ubonratchathani Province. Others two communities for drought disaster management are 1) Limthong community, Nongbote subdistrict, Nangrong district, Buriram province, and 2) Nonyang community, E-lum sub-district, and Uthompornpisai district, Sisaket province. Regarding the criteria used to select the case study, the researcher considered community experienced disasters and located in risk areas for flood and drought. Data are collected from documented sources, in-depth interviews, focus group, and non-participation observations.

Research findings showed that the two communities of flood disaster management have similar disaster management. However, Bang Ta Phaen can manage flood disaster by self-management. After the flood, the community evaluated and reviewed to find new solutions to prevent and mitigate future flood. On the contrary, Tha Bong Mung collaborated with Warinchamrap municipality to cope with disasters. The result indicated that Ban Bang Ta Phean has more ability to acquire and utilize community capitals, including social capital, human capital, political capital, financial capital. These capitals enhanced community capacities to encounter flood disaster.

In a case of drought management, the study showed that the communities, Ban Nonyang and Ban Limthong differ in how they handle droughts. Government agencies at local and province level play a major role in the disaster management of the Nonyang community. Limthong community has successfully managed its water resources. Community capitals promoting the communities capacity to manage drought problems are human capital, social capital, political capital, financial capital, and physical capital. Additionally, the study indicates that the necessary factors in determining the community's capacity to cope with disasters are community self-management, active and leadership, collaborative action and teamwork, learning and experiences, community participation, monitoring and evaluation, internal and external networks.

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I am also deeply thankful to all my participants in the four communities for their help and transparency during my research. Their information has helped me complete this dissertation. I am hugely appreciative of Dr. Chayada with her team, Dr.Saowanee and her team, and “Nong Croz”, who spent their time and effort to translate my manuscript into English. Additionally, my sincere thanks goes to all staffs of the Doctor of Public Administration (DPA) Program, who always rendered assistance during my study.

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CHAPTER 1

INTRODUCTION

1.1 Statement of the Problems

A natural disaster is a hazard that affects people's security. During the past decade, there have been a greater number of natural disasters which have created enormous damage to life and property as well as economic, social and environmental systems. In 2011, 332 disasters happened which was just a few less than the 384 disasters between 2001 and 2010. However, the impact of the disasters in 2011 on humans and economics was greater than the disasters during 2001-2010. There were 30,773 casualties, and about 244.7 million people around the world were impacted. It was the world's highest record loss in terms of economics, at up to \$366.1 billion USD. The Philippines was the country encountering the highest number of disasters, which was 33 while Japan was the country that had the greatest impact on the economic system and number of people who died due to the earthquake and Tsunami. The value of the economic loss was \$210 million USD and the number of casualties was 15,840 people. Thailand was the second highest country in terms of impact from natural disasters from floods between August and December 2011. The loss was \$40 million USD and 813 people died (Guha-Sapir, Below, & Ponserr, 2012).

The impacts caused by natural disasters varied in different parts of the world. There were hurricanes in the USA and in other countries, the earthquake and tsunami in Japan, and flooding in Thailand, all of which indicated that disaster management was still required in terms of support and strength in preparedness, response, mitigation, and recovery where each step would have different problems and challenges resulting from the various impacts.

Moreover, the impacts also suggest that communities and people are more sensitive to natural disasters. In the past decade, about 3 billion people have been impacted, 750,000 people died, and over \$600 billion USD was lost (Birkmann,

2006). Such damage to life and property suggests that communities had insufficient preparedness to handle such natural disasters. Over the past decade, research on the resilience of disaster preparedness, as well as policy and risk reduction strategies from disasters has been conducted (Mayunga, 2007). In addition, the Hyogo Framework for Action 2005-2015 has been put into practice. The Hyogo Framework for Action aims to reinforce the readiness to encounter disasters both at the community and the country levels (Mayunga, 2007) by planning and reducing risks that may occur due to disasters. This concept is popular and has been extensively researched.

The characteristics of the development and change of the disaster is related to time, geography, the size, the period of time, the situation, the severity, information, knowledge, and the capability of the community and people in the particular area. Therefore, dealing with a disaster depends on the ability to make decisions and the management procedure of the community to handle and recover from the disaster. More importantly, a high level of uncertainty affects the role of organizations that help during and after the disaster as well as the immediate response to the circumstances, which increase the complexity of the decision making procedure. The uncertain characteristics and results of the disaster also decrease the ability for disaster management by the people and organizations in terms of delegation of authority, communication, and coordination between organizations (Paton & Jackson, 2002). The delay in decision making and management would have direct impacts on the community that encounters disaster events. Therefore, this research focuses on providing knowledge on community-based disaster management because disasters happen at a local level. On this point, the local community is the main actor as the immediate victim of the disaster, and it must respond to the particular disaster. The researcher is interested in studying flood and drought disaster management, community capitals, and the conditions that enable the community to have disaster management capabilities. The case studies for flood disaster management are Bang Ta Phaen community, Klongwua subdistrict, Mueng Anghong district, Anghong province, and Thabongmang community, Warinchamrap municipality, Warinchamrap district, in Ubon Ratchathani province. The case studies for drought disaster management are Limthong community, Nognbote subdistrict, Nangrong district,

Buriram province, and Nonyang community, E-lum subdistrict, Uthompornpisai district, in Sisaket province.

1.2 Research Questions

The study on community-based disaster management focuses on seeking answers for the research questions which are on how the community manages the disaster and what community capital and significant conditions enable the community to have the ability to handle disasters. The research questions are as follows.

1) What are the plans and management that the community encountering flood and drought disasters prepare before, during and after the disaster events?

2) What are the problems and obstacles to community disaster management?

3) What community capital is available? How does the available community capital i.e. social capital, human capital, financial capital, physical capital, and political capital relate to the ability to manage disasters in the community?

4) What support and assistance is there outside the community? Which organization (s) does it come from? How does this support or assistance increase the capability for disaster management by the community?

5) What are the significant conditions that would make or enhance the capability and readiness of the community to handle flood and drought disasters?

1.3 Research Objectives

1) To investigate the disaster management of the community encountering flood and drought disasters before, during, and after the disaster events.

2) To study and identify the community capitals being related to the disaster management capability of the community.

3) To study the necessary conditions determining the capacity of the disaster management of the community.

1.4 Significance of the Research

This study would provide answers on how the community manages or copes with flood and drought disasters, how existing capitals and assets in the community supports the capacities for disaster management, and what significant conditions would enable the community coping with a disaster to prepare, prevent, and recover from the disaster. Information and understanding about these topics will be presented as a model to build and reinforce the capability of the community in disaster management.

1.5 Scope of the Study and Research Area

1.5.1 Scope of the Study

In this study, the researcher focuses on flood and drought disaster management because both flood and drought disasters often happen in Thailand and the severity has been increasing. Consequently, they impact and damage the economy, society, the people and the country. The major issues of the study are the disaster management of the community before, during, and after the disaster events, the community capitals, and the significant conditions that enable the community to have the capability for disaster management.

1.5.2 Research Area

1) The case studies for flood disaster management are 1) Bang Ta Phaen community, Klongwua subdistrict, Muaeng Ang Thong district, in Ang Thong province, and 2) Tha Bong Mung community, Warinchamrap municipality, Warinchamrap district in Ubon Ratchathani province.

2) The case studies for drought disaster management are 1) Limthong community, Nongbote subdistrict, Nangrong district, in Buriram province, and 2) Nonyang community, E-lum subdistrict, and Uthompornpisai district in Sisaket province.

1.6 Definition of Terms

1) Disaster means the crisis events that create damage to the lives, property, resources, and the environment of a great number of people as well as impacting the existing economic and social structures of the community, where the community is unable to handle the events by themselves. The factors of risk, vulnerability, and capability in disaster management are involved and are important to make a difference to the severity level of the particular disaster events.

2) Flood disaster refers to hazards occurring as a result of flood condition or immediate flood as the result of heavy rain, or rain for a long period due to low pressure weather or tropical cyclones e. g. depression, tropical storm, typhoon, monsoon, or low pressure. Moreover, flood disaster also refers to a breaking dam that makes the water level increase until houses are flooded. The severity of the water flow causes damage to the lives and property of the people.

3) Drought disaster refers to a natural disaster as a result of the lack of rain; therefore, there is a long period of time in which there are shortages of water in particular areas. Drought also impacts the community.

4) Disaster management refers to the operation to prepare for, prevent and to decrease the impact, to provide assistance, to mitigate the effects of the disaster, and to assist in the recovery from disaster. The process can be classified into three stages – before the disaster, during the disaster, and after the disaster.

5) Community-based disaster management (CBDM) refers to the way to increase the capability of the community to be able to assess the vulnerability of humans, the disaster, development strategies and possible shortages of necessary resources to be utilized in prevention, mitigation, response, and recovery from the disaster.

6) Community capitals refer to valuable materials, the mentality of the people, which cannot be measured in money terms but includes things that are important to the livelihood of the people in the community. Community capital is classified into five categories-human capital, social capital, political capital, financial capital, and physical capital.

1.6 Benefits of the Study

1) Information on community disaster management for flood and drought disasters

2) The significant conditions that will affect the capability of the community disaster management are in three stages-before, during and after the disaster event.

3) The characteristics of the community capital that enhance the capability of the community to deal with a disaster.

4) Information obtained from the study can be presented as a model to build and to enhance the capacity of the community in the preparation, prevention, management, and recovery from disasters in the future.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

In this chapter, the researcher reviewed concepts, theories and research involving natural disaster management in order to develop the research conceptual framework.

2.1 Concepts, Theories, and Related Research

2.1.1 Disaster Management

Disaster is defined by the United Nations Office as "a serious disruption of the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope with using its own resources" (Khan, Vasilescu, & Khan, 2008).

A disaster is a result of the hazard, vulnerability, and insufficient capability or inappropriate risk reduction measures and occurs when a calamity affects vulnerable people and causes damage, loss, and chaos (Khan et al., 2008). Disaster as identified by Khan et al. is shown in figure 2.1 below.

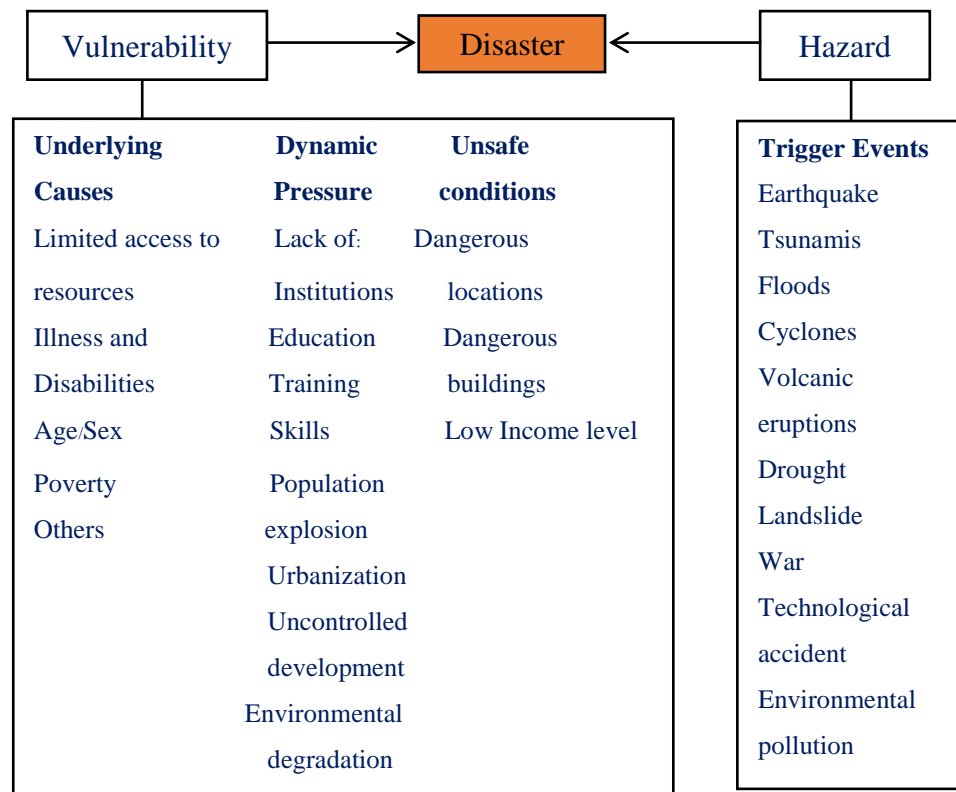


Figure 2.1 Elements of Disaster

Source: Khan et al., 2008, p. 44.

2.1.2 Elements of Disaster Management

The key elements of disaster management are hazard, vulnerability, capacity and risk.

1) Hazard

Hazard refers to conditions or circumstances that can cause harm, threat or damage to humans, property or the environment (Khan et al., 2008). There are two types of hazard -natural hazards and man-made hazards. Natural hazards are caused by natural phenomena i.g., cyclone, tsunami, earthquake, volcano eruption while man-made hazards can be caused by human carelessness, industry and energy, such as explosions, the release of toxic materials, severe contamination, war, etc.

2) Vulnerability

Vulnerability is a concept that derives from a study of natural hazards and poverty. In 1990, scholars on natural hazards focused on the vulnerability of individuals affected by environmental change, particularly climate change (Janssen &

Ostrom, 2006). Vulnerability represents a level of possibility that a community can be attacked or harmed without any adjustment ability by a force related to social and environmental changes (Adger, 2006). Vulnerability is, therefore, a factor affected by the complex interaction between people and social, political and physical environments in the context in which they live (Eakin, 2005).

Vulnerability is classified as physical and socio-economic (Khan et al., 2008). Physical vulnerability is a concept involving consideration on who and what can be harmed or damaged by natural disasters. The consideration is based on the physical condition of people and risk elements as well as the location and geography such as buildings, infrastructure and the technical endurance capacity of a building or structure. The socio-economic vulnerability refers to the level of impact from hazards or the ability to manage change which results from a natural hazard. (Eriksen, Brown, & Kelly, 2005). Thus, the consideration of people's vulnerability includes not only physical elements (Eriksen et al., 2005) but also economic and social conditions as well as social and political changes (Klepeis & Laris, 2006).

Adger (2006) remarked that previous studies on vulnerability focused on factors that caused a variety of pressures. Currently, the studies in this area have resulted in the science of preparedness. Its method and concept involves pressures and processes that lead to changes that emanate from the disaster area into the institutional and social aspects of the community.

3) Capacity

Khan et al. (2008) defined a capacity as a resource, method, or strength that makes a family and a community able to cope, endure, prepare, prevent, relieve or recover from a catastrophic disaster rapidly. UNDP (n.d., as cited in Khan et al., 2008) refers to the capacity as the ability of an individual, organization, unit and/or institutional system to function effectively and sustainably. In addition, an ability is seen as a combination of strength, attribution and resources within a community, society or organization that can be used to achieve the goal they have agreed on. Therefore, capability is classified into physical and socio-economic factors which cover physical resources and infrastructure, institutions, ability in social management as well as human resources, skill and common features, e.g. social relationships, leadership and management.

A community capacity development is a process by which people, organizations and society stimulate and develop self-capability systematically by increasing knowledge, skills, systems and institutions. Capacity development is a construction, maintenance, enhancement or expansion of a current capability. It involves learning and training. It is a continuous effort to develop institutions, political awareness, capital resources, technology systems and the environment, which support and expand social and cultural abilities. Capability development to decrease disaster risk is a pillar of disaster risk reduction of the Hyogo Framework Action 2005-2015 (UNDP, 2009).

4) Risk

A risk is a loss measurement of expected hazard in one area for a particular period of time. It is the probability of a dangerous event and loss from that event. The level of the probability depends on the type of hazard, the precariousness of the components affected, and the economic value of that component.

2.1.3 Disaster Management Cycle

A disaster management process in Kaklauskas, Amaratunga, and Haigh (2009) is a cycle classified into two phases of recovery: before a disaster, and after a disaster. The disaster cycle will reflect a continuing process—a planning by government, business and civil society agents to cope with a disaster and to reduce its impact; an operation during and immediately after the disaster, and recovery after the disaster. The significance of the concept is its ability to provide holistic disaster management. The disaster management cycle shows a relationship between disaster and development. An appropriate operation at every step of the cycle leads to preparedness, a good warning system, risk reduction or disaster prevention in the next phase of the cycle. The complete disaster management cycle includes policy formulation and planning to address the cause of the disaster or to mitigate the impact of it on people, property and infrastructure.

As shown in Figure 2.2, disaster management is divided into four phases. Each phase does not occur alone or in order. The phases are likely to overlap and the duration of each phase depends on the severity of the disaster.



Figure 2.2 Disaster Management Cycle

Source: Kaklauskas et al., 2009.

1) Mitigation

Disaster mitigation activities eliminate or reduce the probability of a disaster occurrence, or lessen the impact of an unavoidable disaster. Mitigation measures comprise building codes, disaster risk data analysis and adjustment, zoning and land use management, codes of security and building use, health care, and health education. Mitigation depends on the inclusion of appropriate measures in regional and national plans. The effectiveness of the mitigation depends on having information on hazards, emergency risk, and response measures. The duration of the mitigation and holistic management cycle involve policy formulation and plans to deal with the root causes of the disaster to lessen the impact on people, property and infrastructure.

2) Preparedness

A goal of an emergency hazard preparedness plan is the achievement of preparedness about the level of response in emergency circumstances through the empowerment plans of government, organizations and the community. These measures are logical methods of preparedness in managing disaster. In addition, they are reinforced by having a response mechanism and procedure in short-term and long-

term strategic development, and the construction of warning systems. Preparedness can be in the form of food storage, instruments, water, drugs and other necessities for use at the local or national level. In the preparedness phase, the government, organizations and people prepare a life-rescue plan, reduce loss to a minimum, and adjust the disaster response strategy. The preparedness measures include a preparedness plan, training/emergency plan practice, warning systems, emergency communications systems, practice and evacuation plan, the preparation of a resource list, contact numbers/emergency hazard personnel, agreement on help and information/education to people. Mitigation and preparedness rely on the inclusion of appropriate measures in the national and regional plans. Additionally, the effectiveness of preparedness is connected to having information about hazard, risk and response measures as well as the level of accessibility of NGOs and other public organizations.

3) Response

A goal of disaster response is rapidly providing help to save lives, enhance health and to give moral support to victims. The help can be limited and specific help, such as an immigrant transfer, non-permanent shelter and food in camps and disaster areas as well as infrastructure fixes. The focus of the response phase is on the needs of people until a sustainable problem solution is achieved. Humanitarian organizations will take the role at this stage of the cycle.

4) Recovery

Victims can perform activities aiming at the restoration of life and infrastructure. There are a lot of opportunities during the recovery to reinforce and increase prevention. On the other hand, there are also opportunities for risk reduction. Basically, this is a transformation from recovery to development. Recovery activities are done continually until all systems function normally or better. Recovery measures, both short-term and long-term, and the restoration of living systems is important by providing minimum operating standards, non-permanent shelters, public information, education on health and security, repairs, and the study of economic impacts. Information and service resources involve data collection about rebuilding and lesson records.

Natural disasters cannot be stopped, but their impact on people's lives and property can be reduced. The disaster management operation cycle can be divided into three phases: disaster mitigation, preparedness, prevention and impact reduction, and response and recovery (Federal Emergency Management Agency: FEMA, 2006; Tavida Kamolvej, 2011, pp. 53-63).

1) Before the hazard phase is a normal duration with no hazard. Each organization is prepared to prevent and reduce the impacts of a disaster, i.e., prepare people, assess risk, and access information and resources.

2) During a disaster, the hazard brings about loss of life and property. Management in this stage is response and mitigation to reduce the level and loss.

3) After the disaster, management involves damage assessment, and the rehabilitation of individuals, families and the community.

2.1.4 Community and Disaster Management

The response to a disaster requires a structure of control and command. It is a top-down and centralized approach. Such a centralized structure is likely to lack people and community collaboration. This results in failure in providing an appropriate response to community needs and wants. It causes unnecessary need for external resources (Pandy & Okasaki, 2008). The integration of a Community Based Disaster Management (CBDM) approach has been proposed. Such integration of bottom-up and top-down operations can help to overcome the many challenges and difficulties. Efficient bottom-up disaster management requires people's participation by analyzing factors affecting the community, community risk and vulnerability, and community capacity. Many scholars, for example, Marsh (2009), King (2007a), Nakagawa and Shaw (2004), Edgington (2010) stressed the significance community engagement in planning and disaster recovery. They viewed that a community has its own identity and possesses resources that can support disaster preparedness or lessen vulnerability (Smith & Boruff, 2013).

2.1.5 Community Participation

Disaster management using the Community Based Disaster Management (CBDM) approach is employed with the recognition that people are at more risk to

disaster. The development and disaster management tasks run by the community are based on their own intelligence. The operation is supported by local government. In fact, particularly in developing countries, disaster management is a response to disaster that are centralized by government (Collin, 2009, p. 181). In the Hyogo Framework for Action, the participation principle is important to promote community disaster preparedness. How to assess the level of participation involves Arnstein's (1969) and Pretty's (1995) community empowerment in preparedness; that is, the level of participation transferred from government authorities' control to people or citizens' control. This reflects that participation involves power and control (Cornwall, 2008).

From the CBD managers' point of view, learning through community participatory operations is not only disaster preparedness strategy building, but also an activity to empower marginalized people to be able to access new knowledge and to allow the voices of people in the community to be taken into account in the decision making process. For instance, community participation in risk assessment provides different views about information communication, and brings about risk reduction. Therefore, CBDM is a method that leads to local knowledge building, people empowerment, and enhances self-situation analysis. The expected results are specific ways to face problems acquired by analytical thinking and community operations.

2.1.6 Disaster Community Resilience

The concept of resilience was developed in the field of ecology. The word "resilience" was initially discussed by Holling (1973) (Schmidt & Garland 2012; Beatley 2009; Gunderson, 2000). Holling (1973) defined resilience as a continuing interaction within a system and a gauge to measure a system's ability to face changes and survive. Holling also pointed out that flexible ecology recognizes the importance of needs with many alternatives, in regional rather than local circumstances, and under conditions of context diversity. This was based on the assumptions of insufficient knowledge and future unpredictability. Thus, Holling's definition of resilience in ecology was flexibility and openness to changes (Holling, 1973).

Holling's (1973) definition shows the significant attribute of ecology which is flexibility to change, such as the ability to cope with changes and survive, having a

variety of strategies in making adjustments under diversity and ability in making decisions when faced with insufficient knowledge to manage (Schmidt & Garland 2012). Since then, the concept of preparedness to face disaster has been highlighted and widely accepted. It has been implemented in many areas such as psychology (Overstreet, 2011), health (Skirbekk, Middelthon, Hjortdahl, & Finset, 2011), education (Yonezawa, Jones, & Singer, 2011), management (Harwood, Humby, & Harwood, 2011), political science (Brooks, 2006) and natural disaster (Wilbanks, 2008).

The significance of the concept is that it allows a clearer understanding and manages a complicated system (Klein, Nicholls, & Thomalla, 2003; Walker & Salt, 2006). Timmerman (1981) initial implemented the concept in disaster management (Klein et al., 2003). He defined resilience as a gauge of the system or the system's ability to respond or recover from a dangerous event. Various other definitions of resilience in the area of hazard and disaster have been offered. However, there is no broadly accepted definition that is used by most researchers and practitioners (Mayunga, 2007).

Mayunga (2007) defined community disaster resilience as the capability or community competence in predicting, preparing, responding and recovering rapidly from the impact of the disaster. This means that not only the community was able to recover from the impact of the disaster, but also the community must have ability to learn, manage or adjust to live with the disaster. If a community has disaster resilience, it should be the least affected community and must have a rapid recovery process.

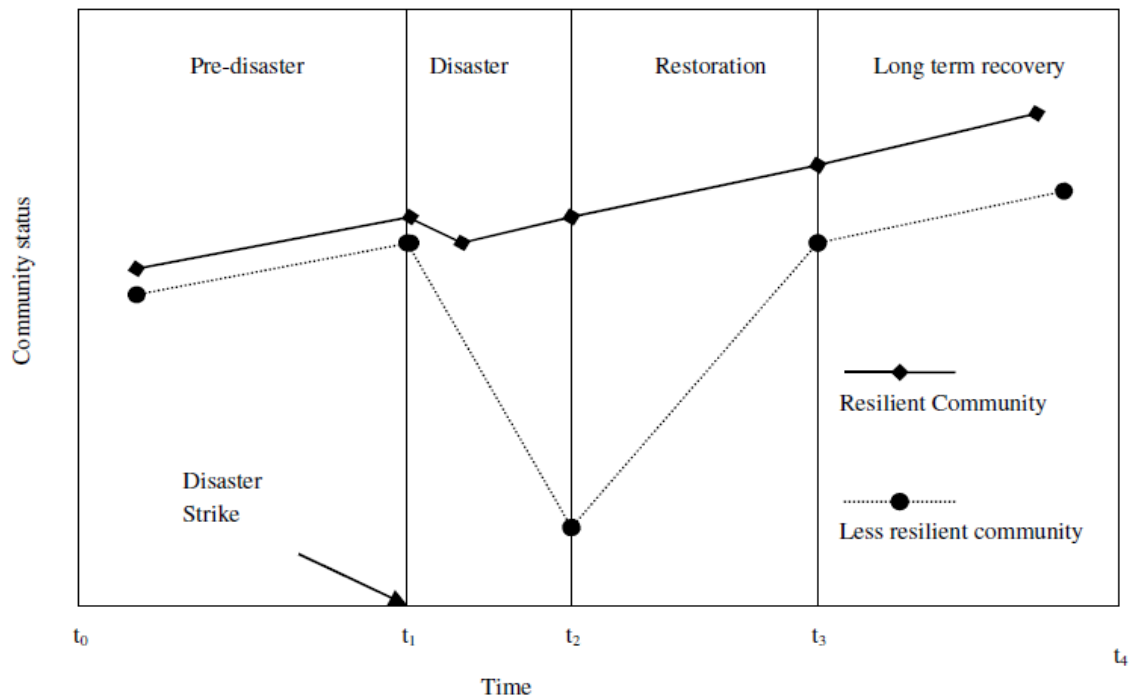


Figure 2.3 Model of Community Disaster Resilience

Source: Mayunga, 2007.

Mayunga (2007) stated that the directions of the two lines shows the duration of time of the four phases of disaster occurrence, that is, pre-disaster, disaster, restoration, and long term recovery. The figure shows that the more the community is prepared to face the disaster, the less they are affected. In contrast, the less the community prepared, the more they would be affected and the circumstances would be more changeable as well as longer in duration.

Longstaff, Armstrong, Perrin, Parker, and Hidek (2010) referred to resilience as the community's competence to endure and recover from chaos. Preparedness to respond to a disaster is a characteristic the community must possess. Good disaster resilience can help recovery from the disaster rapidly.

From the literature review, it is found that the concept of community disaster resilience can be considered from such factors as location, economic standing, and available resources (Longstaff et al, 2010; Farrel, 2012) as well as building engagement (Farrel, 2012). The community must possess both resources and the

ability to use self-management in order to perform essential tasks during or after the chaos (Longstaff et al., 2010). The process of community management differs according to the physical location. Hence, measures used in community disaster resilience are different depending on the context (Cutter, Barnes, Berry, Burton, Evans, Tate, & Webb, 2008).

Disaster resilience is viewed as a response to pressure and 1) is a guided theory to understanding the power of response to the pressure, and 2) is a preparedness strategy to prevent danger from unpredictable hazards and events that are difficult to prepare for (Magsino, 2009). Such response to pressure can occur at individual, organizational and community levels.

The promotion of community disaster resilience focuses on preparation to face the disaster. It is a paradigm shift to enhance the community with economic strength where community members can work together and use information in making decisions and in practice.

In reference to the above definitions and principles, disaster resilience clearly involves a process and reflects the ability to adjust rather than stability. Resilience, therefore, is a set of adjustment ability occurrences and continually changes to prevent loss. Communities that work well during a disaster should comprise healthy and kind, members and a good quality of life. They can adjust to enhance the community disaster resilience. Norris, Stevens, Pfefferbaum, Wyche, and Pfefferbaum (2008) suggested that developing the adjustment ability in promoting community disaster resilience results from the pressure endurance ability without the degradation of the community. This ability depends on the accessibility of the community's important resources, the speed of accessibility and its use of resources in preparation for, during, and after the chaos. Hence, community disaster resilience in the view of Norris et al. (2008) is an outcome resulting from the establishment and balancing of the following features:

- 1) Social capital refers to the networks in a community. It involves connections between organizations within the community, citizens' collaboration and support and perceptions about disaster response.

- 2) Community competence depends on the operations of the community, problem-solving skills, flexibility, creativity, respect among members in

the efficiency of people's collaboration and the belief that the community is empowered to be able to control resources.

3) Information and communication comprises possessing skills in communication and sufficient infrastructure, and having accurate, valid and reliable information resources.

4) The ability to reach a balanced level of social capital, community competences, and communications in building disaster resilience. These features enhance all community systems that operate during disaster events.

In addition, economic development includes the level and diversity of economic resources, and good governance in resource distribution. Justice in diversifying risks and vulnerabilities are also important to disaster resilience (Longstaff et al., 2010).

Consequently, resilient communities are those that have developed the maximum level of preparedness. They can cope with chaotic circumstance and are able to recover from the impact. Resilient communities are able to have a stronger position than before the disaster. Such communities are, for example, those with preparedness plans and good practices, building control appropriate for hazards and area risks, measures for business and individual financial relief, e.g., risk insurance.

2.1.7 Establishment of International and National Disaster Resilience

The literature review on community disaster resilience investigated operations in the disaster area nationally and internationally and revealed international, national and local works by many organizations in community disaster resilience as follows.

1) Operation by International Organizations

International organizations work along with the governments, businesses, NGOs and citizens. For example, the UN launched the United Nations' International Strategy for Disaster Reduction Plan. It is a practice under the Hyogo Framework for Action-a 10 year plan designed to assist every country to establish disaster resilience systems and to strengthen institutions. A manual with the responsibilities of each stake-holder is provided. The ProVention Consortium is another organization that works internationally. This international cooperation organization includes many organizations that have a common goal in dealing with

negative social, economic and environmental impacts of disasters in developing countries. The ProVention Consortium has prepared a manual about the characteristics of community disaster resilience, namely ProVention Consortium's characteristics of Disaster-resilient Community: A Guidance Note.

Apart from the above international organizations, there are a lot of organizations in many countries working on the establishment and enhancement of disaster resilience, e.g., Canada, Australia, the USA, etc.

2) Canada

The Canadian Centre for Community Renewal (CCCR) in Canada is an organization focusing on improving community economics. It operates a project, namely, the Community Resilience Project to introduce tools and techniques a community can use in self-empowerment to make change together. Initially, the project paid attention to social and economic development in rural communities in Canada and the USA. The project provides help in capability assessment, technical help and a community disaster resilience manual. In community development, the CCCR is interested in making an assessment of quality, and economic and leadership indicators (Colussi & Rowcliffe, 2000). Another organization in the country is the Resilience Research Centre which focuses more individual reactions to dangerous events.

3) Australia

In Australia, the organization that focuses on national disaster resilience is the Torrens Resilience Institute. The emphasis of community disaster resilience is in strengthening relationships between government, business and civil society to promote the efficiency of natural and manmade disaster responses. A goal of the organization is to give leaders of all sectors instruments to reduce threats to national security and to enhance knowledge appropriate to a crisis. The Torrens Resilience Institute plan (2009) focuses on management practice and lesson revision on organization disaster resilience in order to be skillful and effective in decision making and to make the country safe for all people. The Torrens Resilience Institute (2009) believes that community disaster resilience should have social capital, economic capital and human capital indicators. Consequently, the institute created indicators and score cards containing all 20 indicators to assess the preparedness of an

organization. They help to evaluate organization status, self-preparedness, and the strengthening needed in significant areas. In addition, the Australian government required the Torrens Institute to set international goals. The international cooperation with governments in Asia, islands in the Pacific, and Iraq aimed to build community strength and competence in disaster response with the creation of a long-term preparedness and the sustainability of partnerships in different sectors.

The Council of Australian Governments (COAG) approved the implementation of nationwide disaster resilience in December 2009. Based on the recognition of the importance of cooperation and national integration, Australia was powered to be able to prepare, resist and recover from disaster. The National Emergency Management Committee then developed a national strategy for disaster resilience. The COAG announced the practice on 13 February 2011. The objective of the strategy was as being a tool in the disaster management for the public sector at federal, state, regional and local levels. According to the strategy, business leaders, community and other sector leaders prioritized the area first in the Australian nationwide establishment of community disaster resilience. These leaders were aware that community disaster resilience was a common response by individuals, households, businesses and communities as well as governments at all levels. The strategy was the initial step in a long-term process to encourage sustainable behavior shift and long lasting partnerships for Australians.

4) The United State of America (USA)

In the USA, many organizations practiced the disaster resilience guidelines. In particular, in the United States, the Department of Homeland Security launched two projects involving disaster resilience run by the Science and Technology Directorate, Human Factors/Behavioral Sciences Division. The project priority was the response to terrorist relief acts and terrorist disasters. In one, the Community Resilience Project constructed tools for local authorities to warn people about bombs and explosion in the city and for appropriate management after the impact. In the other, the Enhancing Public Response and Community Resilience Project was a response project to hurricanes Catherina and Rita and to maximize the effectiveness of disaster management by the public and private sectors. The goals of the projects were using a 2-1-1 information system to build a foundation for

community preparedness by identifying local resources and to establish the social networking of community actors who would help in a disaster response (U.S. Department of Homeland Security, 2011a), and collect and publish operator teams in community disaster resilience from different sectors all over the country (U.S. Department of Homeland Security, 2011b). Apart from the work of the Department of Homeland Security, there were many universities working with the government, local organizations and agencies to achieve the goals of community disaster resilience, e.g., Carolina's Hazards and Vulnerability Research Institute (HVRI) of the University of South Carolina. It was a cooperative research with the Oak Ridge National Laboratory's Community and Regional Resilience Initiative (CARRI) (HVRI, 2011). The conceptual framework of the study included 4 traits of community disaster resilience: the ability to anticipate, to reduce vulnerabilities, disaster response and recovery (HVRI, 2011). The study focused on elements of preparedness, including social, economic, institutional, infrastructural, ecological, and community capital etc.

As seen above, community disaster resilience is attractive to and highlighted, by both international organizations and the governments of many countries as a significant tool in empowering community and other sectors to understand and have competence to respond to an ensuing disaster effectively.

2.1.8 Complex Adaptive Systems Theory

From variety of views and basic concepts in the mechanical world about organization, it is evident that that an organization is stable and various components are fixed. This idea has been replaced by the quantum world point of view which is full of relation, activation and change. An organization is surrounded by complexity (Moffat, 2003). Such complexity connects to non-linear interaction. Control is not centralized. Organizational adaption and change are collective (Moffat, 2003). Complex Adaptive Systems share some common traits, that is, parallelism, conditional action, modularity and adaptation (Sahin, 2009). Adaption and change are final steps of Complex Adaptive Systems because the involvement of learning leads to changes in the structure and goal (Holland, 2006).

Non-hierarchical relationships, for example, friendship, social contracts and accidental communications have direct effects on the effectiveness of Complex Adaptive Systems (Krachardt & Stern, 1988). Complexity is what an organization gets involve with both automatically and unavoidably (Axelrod & Cohen, 1999). However, connection between the concept of complex adaptive systems and the organization is a difficult-to-understand relationship in which Morel and Ramanujarn (1999) viewed the quantity of the relationship components is non-linear and there are many. This makes the study of Complex Adaptive Systems challenging.

Anderson (1999) studied Complex Adaptive Systems as an outcome of open theory that organization has an open feature. He was also aware of the significance of the non-linear relationship of both within and without components in order to increase communication channels as well as enhance adaption competence to suite the environment. Stacey (1995) named the relationship “strategic ties” because such relationship has both positive and negative reflections that help the organization maintain an equilibrium state. That is, the organization can survive a situation that has a damaging impact (Sahin, 2009).

In a system with complex adaptation, agents that are a major component of the Complexity Theory, interact with each other through perceptions, actions and social roles in the organization. The components of complexity components are as follows: 1) an interaction affects the thoughts and behavior of each agent and changes in an agent’s thoughts and behavior will make procedural principles of the organization change accordingly (Rouse, 2000); 2) self-organization of the system; 3) development process in the Complex Adaptation Systems will lead to changes in the environment and the system itself; and 4) according to Anderson (1999) and Vogelsang (2002), such development can make organization goal change if the behavior of most agents, the interactions, organizational cultures, internal processes, and goals are liable to change in accordance with changes in the environments.

Kiel (1997) asserted that crisis management agencies are activated within changing and inappropriate systems. Therefore, such organizations are complex systems by themselves because there are a lot of organizations engaging in the unconventional crisis management (Axelrod & Cohen, 1999). Irreducibility is an important component of the complex system (Overman, 1996). In crisis circumstances,

not only private agents, but also government, NGOs, international organizations, national organizations, regional organizations and local organizations all have important roles in the same environment to enhance preparedness, mitigation, rescue and recovery (Comfort, 1994). Each organization acts collaboratively. Such a grouping makes crisis management complicated.

Moreover, concepts about complex adaptive systems view organizations as a relationship network that has actions and interactions. Furthermore, the organizational view of chaos theory indicates the significance of phenomena in an organization in terms of turbulence, uncertainty, mechanisms, and unpredictable change.

2.1.9 Collaborative Emergency Management

Disaster and emergency management involves a lot of activities and stakeholders, including people, communities, locals, government agencies, private sectors, non-profit organizations, education institutions as well as many international organizations. Hence an emergency management system includes good partnerships that are based on collaboration, liaison and communication (Russel, 2009).

Bardach (1998) defined collaboration as an activity engagement by two or more sectors with the aim to promote public value through working together rather than working alone, including how to communicate to people, and how to transfer information to organizations; a coordination derived from different principles that each individual and organization created, overlapped and/or separated, without coordination. Collaboration involves effectiveness. Therefore, participatory action is on common behavior and culture.

Drabek (2007) stated that the essence of emergency management is coordination. Dynes (2000) pointed out that a role model in disaster management is a model concerning community competency in managing disaster through collaboration, construction and liaison, using community based resources in solving disaster problems, which results in realistic and effective problem-solving. Trim (2004) supported the idea by summarizing that activities in disaster management should integrate different sectors, including state officials, soldiers, policemen, NGOs and international businesses to develop guidance and initiatives in disaster prevention and resolution. Emergencies that are complicated and increasing in number around

the world forced governments to have appropriate action plans and new models to manage different partners. Integration and partnership building with every stakeholder throughout the disaster would make collaboration and liaison across organizations easier (Russel, 2009). This would lead to risk reduction, preparedness, and disaster response and recovery activities. In addition to physical and regulation structure at every level of a state, establishing relationships between individuals is importance to make the system function during at a disaster.

In sum, a key concept in the literatures on disaster management is the need for counting, collecting and building partnerships between stakeholders throughout the disaster since it will encourage collaboration and liaison across organizations, Drabek (2007), Wachtendorf (2001), and Dykstra (2003) highlighted the necessity for collaboration, coordination and participatory action between organizations in disaster management systems.

Disaster professionals perceive and accept the principles of efficient coordination and participatory action in disaster management. However, it is difficult in practice to make institutional change in promoting such principles in disaster management systems. Quarantelli (1988) studied lessons from disasters and indicated that it is difficult for organizations to change for better disaster preparedness and such changes were found to rarely occur. This was because a change requires intense commitment, in particular political will, and a shared vision (Donahue & Tuohy, 2006).

2.1.10 Information and Communication

Important issues for an organization in an emergency are communication and coordination (Haddown & Bullock, 2006). Communication is a process with which an organization transfers information through a channel to other parts of the organization or to other organizations in the network. Efficient information flows across the boundaries of the organizations and is important to organizational competence to cope effectively with the circumstances in a changeable disaster environment (Kapucu, 2006). Emergencies cause high uncertainty so it is necessary for the timely exchange of accurate information.

Seeger (2006) concluded the traits of best practices for communication in an emergency. They were 1) efficient risk and emergency communication must be a part

of the decision making process and must be a continuing and integrating process, 2) having pre-event planning, 3) building partnerships with the public, 4) listening to people's anxiety and understanding the receivers, 5) being frank, clear and candid, 6) collaborating and coordinating with reliable sources of information, 7) responding to media and other accessible sectors 8) communicating with sympathy, concern and understanding, 9) accepting the uncertainty and ambiguity, and 10) creating messages of self-efficacy.

Other studies support the above traits of communication during an emergency, for example, Kapucu (2006) studied communication in the case of 11 September 2001. The analysis framework developed from communication in an emergency and social capital was used to investigate relationships with government, private and non-profit organizations. The results indicated that strengthening communication system with other organizations before a disaster was important to having appropriate communication in coordinating with effective organization during the disaster (Kapucu, 2006).

Spence, Lachlan, and Griffin (2007) conducted a comparative study in preparedness for crisis, information seeking styles, and the media use of different races after Hurricane Katrina by surveying 935 immigrant samples in many parts of the USA. The factors studied were population features, age, sex, nationality and income as well as crisis preparation and information sources. The results revealed that different population features had different levels of crisis preparation and different information styles. The results also showed that it was necessary to create messages encouraging disaster preparedness, particularly to minority groups.

2.2 Revision of Community Resilience Frameworks

Literature about the development of concepts on hazards and disasters indicate the obvious paradigm shift from risk assessment to vulnerability analysis and establishing community resilience (Mayunga, 2007; 2009; Ainuddin & Routry, 2012). Such a paradigm shift began after the earthquake in Kobe, Japan, in 2005. The Hyogo Framework of Action was established as the world operation framework in disaster risk reduction which aimed at enhancing the community resilience in risk

communities (UNISDR, 2009). The framework sought the integration of supports and effective disaster reduction into the policy and sustainable development plans (Stanganelli, 2008). The components of community resilience to disaster components include mitigation, planning, and recovery. Even though scholars think that community resilience is necessary, there are challenging issues for researchers and policy makers, that is, in community resilience assessment. There are no indicators or a standardized measurement framework. However, from the literature review, there are models and frameworks that many scholars created in order to study and assess community resilience. For instance,

The sustainable and resilient community framework proposed by Tobin (1999) was based on the thought that sustainability and resilience could be assessed. The framework included three theoretical models to enhance community resilience and to evaluate community resilience to a volcano disaster. The practical definition was based on the concepts of sustainability and community resilience. The theoretical models were the mitigation model, the recovery model and the structural cognitive model. Each model included a list of indicators to be analyzed: sectors with competence, leadership and politics, long term commitment, structural change, physical location, age, health, income, gender, social network, attitude factors, re-accumulation of capital, government policies, short term recovery, and long term preparedness. The model was used to make assessment at the community level. Tobin (1999) showed that planning to make a sustainable and resilient community had to include a community master plan and a relief aid plan as well as risk and disaster reduction, and after disaster planning that enhanced both short term recovery and long term rehabilitation. Moreover, a consideration of the cognitive factors and structures affecting the plan in enhancing sustainability and making a resilient community was a must. Tobin (1999) summarized that all three models have relationships and take major roles in making a community immune and sustainable under disaster conditions.

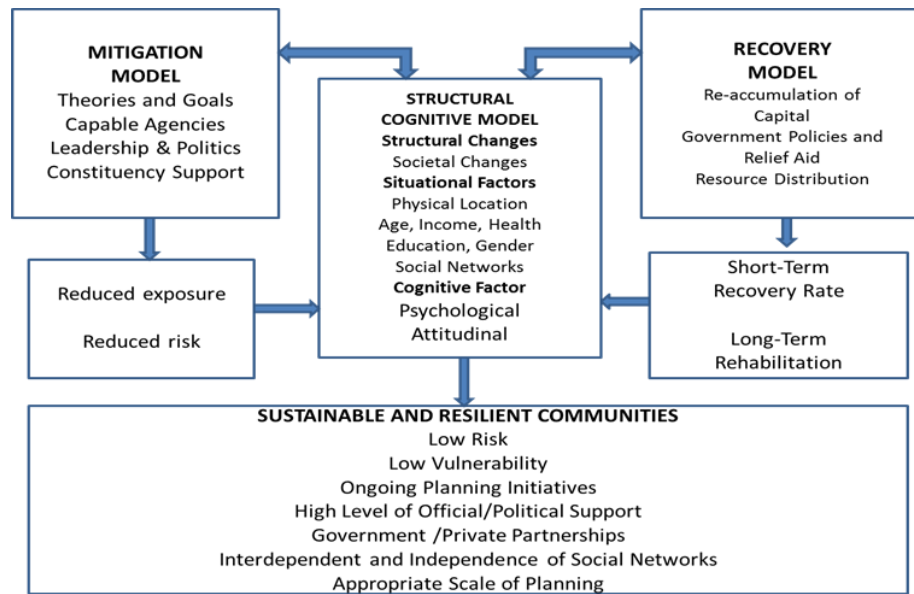


Figure 2.4 Model in Sustainable and Resilient Community Framework

Source: Tobin, 1999.

2.2.1 Sustainable Livelihood Framework

The sustainable livelihood framework derives from a development by Chambers and Conway (1992). At present sustainable livelihood frameworks are practiced by development agencies, NGOs, and the government sector (Glavovic, Scheyvens, & Overton, 2002). The concept of sustainable livelihood, therefore, is one of the foci of research. The United Kingdom Department for International Development (DFID) has provided aid in implementing the concept in many countries, particularly in poor developing countries (Mayunga, 2009), with the aim to reduce disaster risk and poverty in rural communities.

The sustainable livelihood framework includes such major components as vulnerability, livelihood assets, transforming structures and processes, livelihood strategies, and outcomes.

A vulnerability context refers to an environment might have factors that affect people's livelihood, e.g., damages, trends and seasonality. In the context of sustainable livelihood framework, sustainability is connected to people's competence in management and recovery from damages (DFID, 1999).

Sustainable livelihoods framework

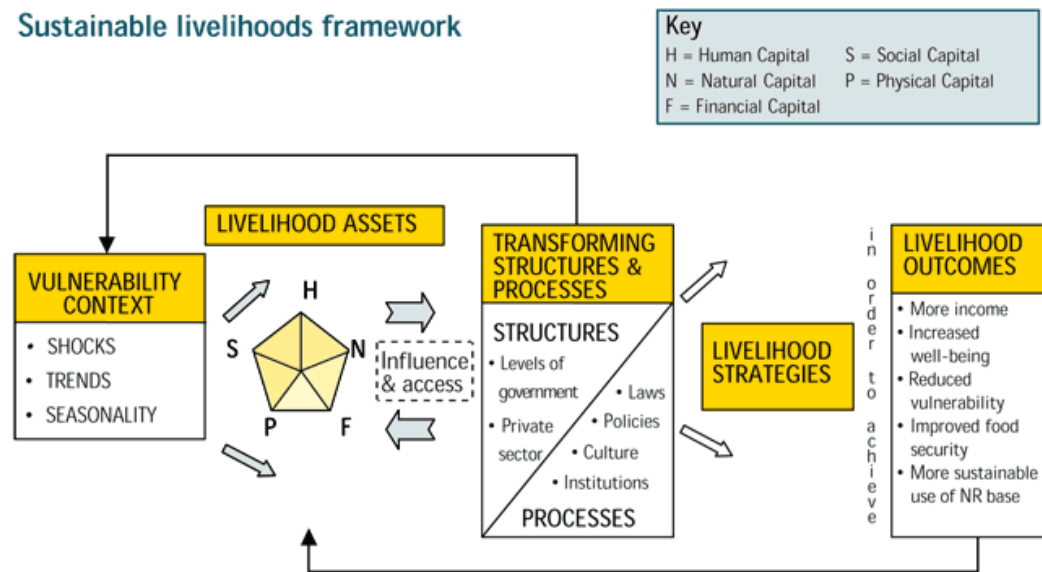


Figure 2.5 Sustainable Livelihoods Framework

Source: DFID, 1999.

The livelihood assets shown in the pentagonal model are key to the sustainable livelihoods framework. The five types of capital include human capital, social capital, natural capital, physical capital, and economic capital. The framework is based on all the five types of capital which are important in building disaster resilience (Mayunga, 2009).

2.2.2 The Disaster Resilience of a Place Model (DROP)

The Disaster Resilience of a Place Model (DROP) was a model developed by Cutter et al. (2008) who recognized that even though some studies had tried to assess many dimensions of community resilience they did not come to a consensus in terms of the factors or standardized indicators that could be used to measure the community resilience. Cutter et al., therefore, presented the DROP model based on significant assumptions: 1) the model for a natural disaster could be implemented in an emergency circumstance such as terrorist/technological threat or a gradual circumstance such as drought; 2) the DROP model focuses on resilience at the community level; 3) a major focus of the DROP model was the social resilience of places. The natural, social and environment factors—buildings and systems were

inseparably connected. Thus the DROP (resilience) was seen as a condition or one that has since occurred or had pre-occurred; 4) DROP was a model to be used as a base. The external factors, i.e., government policies and regulations, influence community resilience accordingly.

The indicators presented in this framework included wetland acreage, erosion rates, percentage of impervious surface, biodiversity, the number of coastal defense structures, demographic characteristics (age, occupation, race group), social networks and social ties, social bonds, religion, religious organizations, employment, distribution of wealth, engagement in a risk reduction project, a mitigation plan, emergency threat service, construction standards and zoning, emergency threat response, plan and communication during the emergency threat, continuity of the action plan, essential infrastructure, transportation network, residential housing stock and age, building businesses and trade. Cutter et al. (2008) developed the framework and introduced the above indicators that derive from the revision of models involving community resilience, vulnerability and related limitations. The models could be applied at national and local levels. Other than this theoretical model, Cutter, Burton, and Emrich (2010) presented indicators that had been measured nationally, for example, the of the population with college education, the percentage of the population without high school certificates, the percentage of the non-elderly population, the percentage of the car owning population, the percentage of the telephone owning population, the percentage of the non-English- secondary-language population, percentage of the population with disability or mental illness, the percentage of house owners, the percentage with employment, the percentage of the unemployed population, the number of doctors per 10,000 population, and the percentage of the population included in the mitigation plan.

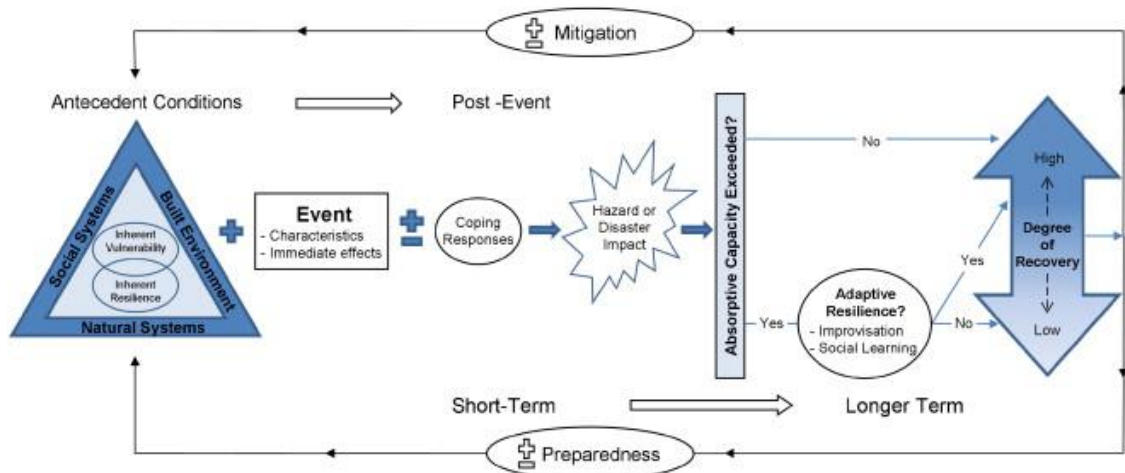


Figure 2.6 The Disaster Resilience of a Place Model (DROP)

Source: Cutter et al., 2008.

2.2.3 Stress Resistance and Resilience Overtime Framework

Norris et al. (2008) developed a framework involving stress resistance and resilience overtime. They stated that resistance occurs when resources are plentiful. An immediate resistance could occur and there would be no disruption in a function. However, in a severe hazard, the resistance could be greater and there would be malfunctions after the disaster. Resilience occurs when there are plentiful resources. Mitigation would also be rapid as an adjustment to the changed environment. In contrast, vulnerability is more obvious when resources are insufficient. Delay in stress resistance or resilience results in malfunction. The greater the problem, the greater is the need for resources for stress resistance or resilience. Norris et al. introduced indicators underlying this framework, including responsible media, skills and infrastructure, trusted sources of information, community actions, flexibility and creativity, collective efficiency empowerment, political partnership, sense of community, organizational linkage and competition, social and informal ties, perceived (expected) social support, received (enacted) social support, fairness of risk and vulnerability to hazards, the level and diversity of economic resources, and equity in resource distribution. This theoretical framework was proposed for community level measurement. Ainuddin and Routray (2012) criticized the indicators Norris et al.

presented as general indicators as it was necessary to narrow them down to measurable factors.

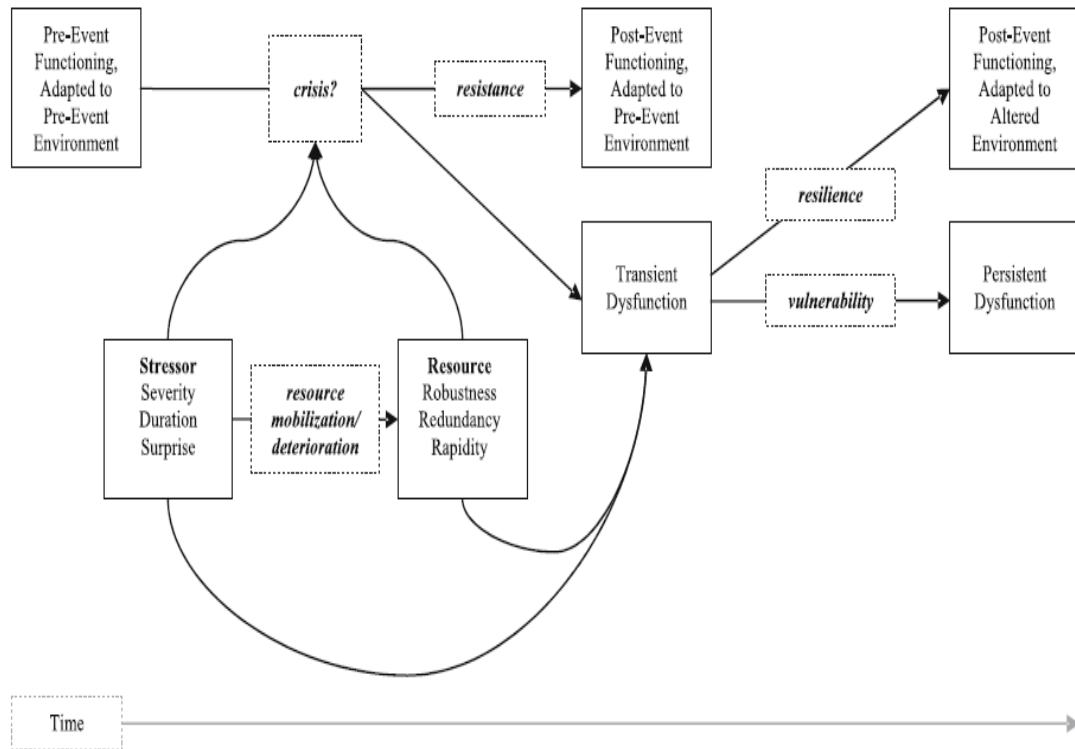


Figure 2.7 Model of Stress Resistance and Resilience Overtime

Source: Norris et al., 2008.

2.2.4 Community Disaster Resilience Framework

Kulig, Edge, and Joyce (2008) viewed community resilience as a process investigating 1) community experience such as the sense of community and kinship in the community; 2) sense of community; 3) having participatory action by the community, leadership with vision, change management competence, competence to cope with task division and having a process for community problem-solving. The following components were utilized in the framework: available to cope with disasters, getting along, social networks, availability to cope with change, leadership, community problem solving, community togetherness, mentality outlook, and outside influences such as health status, economic downturn, and new ideas.

Mayunga (2007) proposed a community resilience framework. The framework is based on five types of capital: social capital, economic capital, human capital, physical capital and natural capital. The indicators included in this framework were trust, norms, community networks, income, savings, investments, educational level, health status, skills, information, knowledge, housing, public facilities, business, resources stocks, land and water, ecosystems.

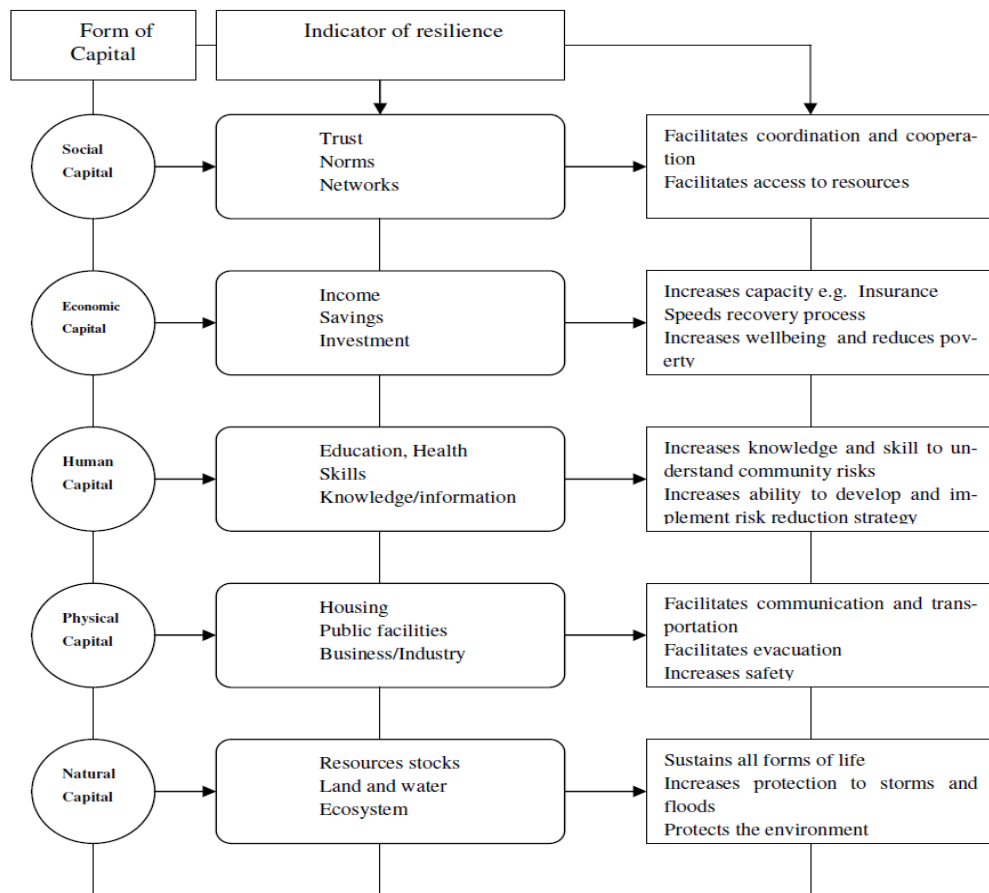


Figure 2.8 Conceptual Framework on the Relationship between Capital Domains and Community Disaster Resilience

Source: Mayunga, 2007.

Bruneau et al. (2003) developed a framework to measure community resilience to earthquakes. The framework comprised an assessment of community resilience competence, i.e., reduced failure probabilities, reduced consequences from

failures, and reduced time to recover. In addition, the Bruneau et al. framework contains quantitative measurement of physical and social systems by considering the qualifications of robustness, rapidity, redundancy and resourcefulness. There is also an integration of such assessments of community resilience in four dimensions: technical, organizational, social and economic.

Stewart, Kolluru, and Smith (2009) developed a framework to improve community resilience during a disaster through partnership work. The framework treated community resilience as the dependent variable which was affected by the relationship between the government and private sectors and the strength of the supply chain and infrastructure/important resources in the community. Stewart et al. found that the systems were dependent each other, for instance, economic and social networks had great influence on community competence in adaptation and response to a disaster. To build economic and social preparedness, every level of the government must be aware and establish public-private relationships. This could encourage greater competence in disaster management during the response and rehabilitation phases.

USAID (2007) developed a framework to assess coastal community resilience. The framework focused on the strengths and weaknesses, and the gaps in the resilience indicated by the collaboration of the community, the government sector, NGOs, the public sector, and other stakeholders. The USAID (2007) framework focused on the method of assessment of coastal community resilience as the first step in the determination of the risk reduction operation, accelerated rehabilitation and change acceptance.

Ainuddin and Routray (2012) proposed a community resilience framework for an earthquake risk area derived from a research database at the community level. Ainuddin & Routray applied some traits from the frameworks of Cutter et al. (2008), Norris et al. (2008), and Tobin (1999). The framework comprised 4 traits: potential impacts, vulnerability, risk perception and awareness, and resilience. The vulnerability traits included measuring factors such as physical, social, economic, and institutional factors. Risk perception and awareness involved such factors as age, gender, income level, education level, house type, evacuation plan, emergency shelters in an urban community. The resilience factors were social factors such as education level, age, health insurance, social capital; economic factors included

habitat, employment, income sources-single or several; physical factors, were habitat, age of the house, location; institution factors-mitigation, awareness building, municipality service, home type, evacuation plan, emergency shelters in an urban community. These traits resulted in building community resilience.

2.2.5 The Community-based Disaster Risk Management (CBDRM) Framework

CBDRM framework was developed by the Asian Disaster Preparedness Center aiming at risk reduction and encouraging community competence in disaster risk management. The process of the CBDRM framework has two major foci to permit a clearer understanding about the measures to reduce risk at the local level and for community accountability at every stage of the project-planning, plan implementation, people-oriented decision making and practice.

Paton and Johnston (2001) introduced a framework for the volcano disaster context. They viewed the different traits and perceptions of a community as well as developing a model able to connect the disaster impact and the community, culture, geographic factors and time in the resilience model. The factors used in this framework were perceived community impact, problem focused coping, and sense of community.

From the review of the framework, with both the theory proposed and the implemented framework in a disaster area, the implementation of resilience in education which Nelson, Adger, and Brown (2007) saw as a systemic framework with a panoramic view, is useful for the analysis of the adaptation process and indication policy measures used in the context of climate change.

2.3 Research Conceptual Framework

The concept framework is based on the investigation and review of related studies together with related conceptual frameworks about preparedness in the management of a community in disaster circumstances. Such an approach could be implemented as a basic conceptual development contributing to flood and drought management in Thai community contexts. The main concepts are presented below:

1) Disaster management in the community is advised under the concepts proposed by FEMA (2006) and Tavidia Kamolvej (2011, pp. 53-63) covering three main phases including: pre-disaster, during-disaster and post-disaster. Moreover, each phase is considered in tandem with the management cycle identified by Khan, Vasilescu, and Khan (2008) as 1) mitigation, 2) preparedness, 3) responses and 4) recovery.

Pre-disaster: this phase consists of a number of activities such as 1) the mitigation activity which is considered to be in conjunction with community mitigation activities such as disaster preparedness planning, updating information concerning elders, disabilities and children in communities, 2) preparedness which covers training activities, long-term and short-term strategy development, educating and creating warning systems. Moreover, under preparedness intention, there would also be the aim to collect food, equipment, water, medicine and all essential items to be used during the disaster event. And, various activities would be taken into account to minimize disastrous consequences such as rescue planning in order to reduce the consequences and to improve the disaster response as well as warning systems, communication systems, evacuation training, resource listing, emergency contact information, agreement on disaster relief and educating people in the community about disaster information.

During-disaster: sufficient attempts are made to respond to a natural disaster such as providing immediate assistance and helping disaster victims. Moreover, assistance could cover numerous activities including: evacuation, temporary shelters, food, and basic infrastructure repair. The focal point is to meet the basic needs of people in communities.

Post-disaster events are also known as the 'recovery' process which means the rehabilitation of lives and infrastructure after the disruptive events. All activities regarding this process are run continuously until the situation is restored and revitalized. The recovery processes include both short and long term plans in tandem with the aims to offer a revitalized life, temporary dwellings, public information on a disaster, education on health and safety as well as repairing processes.

The study on community-based disaster management would enhance understanding on 'how to respond and to deal with a natural disaster in each phase'.

2) To draw upon the assessment of community capacity is considered based on the resources or community assets such as social capital and community livelihood assets (e.g. human capital, financial capacity, natural capital, physical capital and political capital). In addition, the community assets enhance the capacity to respond the basic needs of people in the communities. Also, having various types of assets minimizes the immediate vulnerability caused by a natural disaster and would enhance the capacity to resist disastrous events and make adjustments during the havoc. This capacity adjustment is fostered from the accessibility and utilization of the aforesaid assets to deal with unforeseen events (Frankenberger, Sutter, Teshome, Aberra, Tefera, Tefera, Taffesse, & Ejigsemahu, 2007). However, if the community is vulnerable and has insufficient assets, it could lead to the various management constraints. This demonstrates that to investigate and to identify community assets would enable the assessment of community assets.

The details of the community livelihood assets are as follows:

(1) Human Capital

Human capital is the innate capacity transferred and cultivated by working the population to enhance productive working through ‘capital contributing to sustainable economic productivity (Smith et al, 2001). Human capital also refers to the education, knowledge and collected skills from education, training and experience. In addition, human capital covers the working populations’ health- connoting that unhealthy people would not be able to harness the other types of capital (Smith et al., 2001). Also, experience regarding natural disasters was seen as a type of capital that enhanced the management capacity, self-adjustment and recovery from disastrous events. The previous stated capital includes: the knowledge and skills of people with a close connection to the disaster, and the history concerning the disaster and its risks. It was also assured that the community itself could establish community resilience and that human capital was one of the factors influencing the aforementioned ‘resilience’. As a matter of fact, the vital factor to improve and to engender ‘sustainability’ is to gain sufficient numbers of skilled workers. It is evident that the more human capital there is in community, the greater the sustainable resilience. Accordingly, the study on human capital at the community level would reflect the levels of accessibility, skills, workforce knowledge, as well as physical and

mental health. This shows that human capital at the community level is a focal point to generate other innovations. The method to evaluate the level of human capital was driven by the study on population characteristics, economic and social factors as well as the accessibility on social services (Frankenberger et al., 2013).

(2) Social Capital

Social capital is seen as one of the focal components—playing a role as community assets. This study focuses mainly on social capital since its characteristics reflect the community's capacity for disaster management such as collective action, collaboration and self-organization (Frankenberger et al., 2013).

Social capital could be examined through the quantity and quality of social resources such as the networks, membership in groups, social relations and the accessibility to bigger institutions in society. According to Frankenberger et al., (2013), social capital has a broader definition than political capital since it merges informal social processes covering several levels such as the individual level, the household level and the community level. Moreover, social capital is considered as an influential factor that attaches and bonds people in society together as well as enhancing collaborative practices including social structures, social trust, social norms, and social networking (Green & Haines, 2012). Putnam (1996) defined the concept of social capital as the characteristics of social organization such as networks, norms and social trust which lead to more effective collaboration. In the context of the community preparedness process for disaster, social capital represents the quantity and quality of collaborative practices in society. Taking the case of community connection as an example, it encourages people in the community to utilize social resources and increases the possibility of mutual problem solving by people in the community (Green & Haines, 2012). Aside from this, social capital is viewed as the source of collaborative and effective working-being assessed by the number of the following organizations: non-profit organizations, religious volunteer associations, participation in elections, newspaper readers, and the recreation and sports associations in the community. Without doubt, social capital could be assessed through a wide range of activities such as participation in public activities, meetings, formal and informal associations for people as well as their beliefs.

A number of studies conducted by Aldrich (2012), Wilson (2012), Magis, (2010), Elliot, Haney, and Sams (2010) posited the levels of social capital implementation as the main component in considering community capacities. Aldrich (2012) added conceptual frameworks to evaluate the influence of social capital on community capacities. In addition, the levels were grouped distinctively under the mutual connections: bonding social capital, bridging social capital and linking social capital. Moreover, Aldrich also employed this aforesaid framework to consider the influence of social capital on community resilience and also pointed out that the community level needs to be altered in several aspects such as institutions, behaviors, and the challenges to old attitudes.

Bonding social capital is an internal relationship between community members.

Bridging social capital is one of the social capital forms which connect community members or in-groups with other group members. Furthermore, bridging social capital is perceived as inter-connected relations-beyond geological boundaries and languages. Moreover, inter-connected relations could also bring community members closer together with other external resources and the wider economic and social boundaries. Additionally, Hughey and Bell (2012) viewed resources and community individuals during the disaster as vital factors. However, it is not necessary that the resources must solely be from the internal community. Hence, mutual agreement between communities would contribute to faster resource integration and this would provide a more immediate response. Furthermore, the previously mentioned agreement could raise the level of resources of institutions and enhance the holistic potential and response capacity.

Linking social capital means the trusted social networks between individuals and groups interacting beyond the formal institutional boundaries in society. The connected networks are significant to the economic development and community capacity since it provides accessibility to resources and information via the networks in the community and between communities (Aldrich, 2012). The characteristics of linking social capital are seen as the vertical relationships between networks.

(3) Political Capital

Political Capital includes the power relationship, accessibility and the influence of political systems as well as the local and higher levels of management (Tango International, 2003). Hence, political capital is seen as the bridge connecting people in a community to power and also represents a contribution in terms of resource accessibility, power and influence toward the achieved goals. Furthermore, at the local level of political capital, it is considered as the determiner of the participatory practices of the community under policy planning and implementation. So, political capital would contribute to the accessibility of the community to influential institutions and processes-factors causing the overlapping movement and differences in terms of power in and between communities (Pasteur, 2011; Ritchie, & Gill, 2010). The measurement of political capital in a community could be made by judging the effectiveness of local government in responding to essential and community urgent needs. Moreover, the participation in voting by both females and disabled people as well as the crucial roles in leading politics and decision making, reflects 'how decisions are made in a community' and 'how external resources are brought into the community (Jacobs, 2011). As a result of this, political capital is considerably linked to the establishment of power structure in the community, and this power is found in individuals, groups and institutions. Insufficient political capital might halt any projects in the community. Notwithstanding, the accessibility of the community to political capital would open a window to other new opportunities.

(4) Financial Capital

Financial Capital refers to the financial resources used by families and communities to achieve economic and social goals. This consists of cash and other liquid resources such as savings, income, credits, and pensions (Tango International, 2006). The advantages of financial capital in the preparedness for disaster are: to increase the capacity and sustainability of individuals, parties and communities in the response to a natural disaster and in the recovery processes as well as to reduce numerous vulnerabilities such as buying house-repair insurance. Another important factor is financial capital, which is one of the focal factors for community resilience (Mayunga, 2007). This includes the capacity of families to reach financial credits, which was related to the preparation of households and its capacity to utilize

preventive practices along with its accessibility and reliability. In addition, one of the indicators of community capacity is concerned with the formal financial credit institutions and the financial institutions of the community itself. Apart from these issues, financial capital also plays a crucial role in enhancing the community's capacity for financial services and community small firm support regardless of the economic and social problems (Pasteur, 2011). So, the study on financial capital at the community level demonstrates community patterns and the tendency for formal employment as well as adding to financial support received from external sources such as government and/or civil society (Tango International, 2006).

(5) Physical Capital

Physical capital consists of infrastructure including transportation, shelters, energy, communication and water systems, health facilities and markets. It is beneficial to the community in promoting effective work especially during the evacuation—the facilities play a crucial role as there need to be sufficient resources and support during the disaster. Generally, a lack of physical infrastructure or facilities might lead to some negative effects which negatively affect the sustainability of the community in disaster management. Moreover, physical capital also refers to the productive equipment and other related materials that enhance the safety and living conditions in the community (Ritchie & Gill, 2010; Mayunga, 2007). The study of physical capital could shed light on the infrastructure systems and the basic services in the community, which could answer the questions on the capacity to survive and recover from a natural disaster (Longstaff et al., 2010; Pasteur, 2011). In fact, the community itself could not harness those resources directly. Instead, the community could be influenced by other approaches such as being responsible for relevant maintenance and utilization payments. The influence of physical capital on community capacity could be assessed by the infrastructure of some vital facets such as education, health, safety and the economy. Moreover, accessibility for every community member together with the mechanical conservation of physical capital should also be taken into account (Frankenberger, Mueller, Spangler, & Alexander, 2013).

3) The community capacity to deal with disaster would be under three key capacities: 1) the absorptive capacity—the capacity to minimize the effects of

disaster consequences under the preventive practices and appropriate strategies to deal with the permanent effects, 2) the adaptive capacity-the process to figure out the ways regarding the strategies of people's ways of life-through information and the active choices under mutual understanding toward the changes of living conditions and 3) the transformative capacity-the mechanical management, policies/rules and regulations concerning the infrastructure, community networks and formal and informal social protection mechanisms (Béné, Wood, Newsham, & Davies, 2012; Frankenberger et al., 2013). This would engender a suitable environment for system alteration.

The stated capacities show the connections at various levels. The components of community competence are the ones manifesting the community potential for learning about the risks and collaborative working with resilience to deal with any problems (Norris et al., 2008). Moreover, other significant capacities for the community to deal with the disaster are to obtain reliable information and to acquire problem solving skills.

According to Norris et al. (2008), community competence is related to collective action and decision making. Moreover, the ability to assemble the essential resources and services from both internal and external sources is one of the indicators of community competence (O'Rourke, 2009; Arup, 2010; Pasteur, 2011; IFCR, 2012). Additionally, as the community learns risk reduction and community adjustment, it indicates that the community gains community resilience which is related to resilience characteristics including: 1) adaptive capacity (Longstaff, 2010; Matzenberger, 2013), 2) the capacity to identify and respond to the urgent needs of the community and achievement under time limitations (Resourcefulness) (Longstaff et al., 2010), 3) the capacity for self-management (ADPC, 2006; Arup, 2010) and connecting to other external support and 3) learning-which is derived from undergoing the disaster in the community (ADPC, 2006; Arup, 2010; Bahadur, 2010). This would lead to the improvement and development of disaster preparedness in the future. The community seems to be at risk when there is a lack of disaster management and community recovery after the disaster.

CHAPTER 3

RESEARCH METHODOLOGY

The study on community based disaster management :the case study of flood and drought disaster employed qualitative methods to explore the disaster management, community capitals, and also the necessary conditions determining the capacity of the communities encountering flood and drought disasters. In chapter 3, the main contents include research design and research methodology, and the details of each topic as follows.

3.1 Research Design

To achieve the research objectives, the researcher employed a qualitative research methodology to study community disaster procedure management, and a case study method was selected to study communities encountering flood and drought. The case study is considered as an appropriate method which the researcher employs to gain insight into a particular research problem for which there is no explicit structure. Therefore, it is necessary to study the elements of the problem as well as to study the interaction with the disaster circumstances to provide greater accuracy (Yin, 1993, 2003; Comfort, 1999). Using the case study method will enable the researcher to obtain the details of the data providers' perspectives by utilizing various sources (Tellis, 1997a), and a theoretical framework. A primary theoretical framework is important for an employment of the case study method. The study framework is the research guideline and it will be completed when the research has been done. The analysis of the case study, which conforms to the theoretical framework and the research objectives from the perspective of change and complexity in the study of a disaster management system, also highlights the appropriateness of the case study method.

3.1.1 Validity and Reliability

The case study method must possess both external and internal validity as well as the reliability of data from various sources as it can create trust in terms of its theoretical validity (Yin, 1994). This research employed official data, documentary analysis, interview, professional report, and data from field observation. The data from various sources enable the researcher to guarantee the validity of this study. On the other hand, problems that may affect the internal validity may occur during the assessment of the impact of change from the data structure and organization involved with a flood disaster management system. To avoid such problems, the researcher employed an assessment on the research framework which covers the entire research.

External validity is a general summary such as the questions on whether the findings of this research will be employed in other studies, or will be able to be employed with other studies for only a particular period of time or in a particular area. Whenever these questions are raised, it will impact the external validity Yin (1994) provided answers to extensive criticism on the employment of the case study as the findings can be used by assessing the difference between statistical and analytical summaries. Yin (2003) insisted that the existing theories are utilized as models to compare the empirical results of the case study in the analysis. Therefore, external validity may result from the theoretical relationships and the summary. The conceptual framework and the theoretical background create trust towards the external validity of this study. In addition, the certainty of the research procedures and the primary stage of preparation for the research create trust towards the research itself, the research questions, the assumptions, the source of data, the data collection, and the data analysis. The techniques used in data analysis in this research have been developed to guarantee the validity of the research.

3.1.2 Unit of Analysis and Unit of Observations

The unit of analysis in this study is the community. It is necessary to employ a case study as the unit of observation. The selection the unit of analysis considers the pre-questions of this study (Yin, 2003). The unit of analysis is not the persons or groups of people, but the system of action that has been brought into this study (Tellis, 1997b). The community is the common feature for persons and groups of

people and the people act as the components of the community and adjust themselves to the changes in the environment (Argyris & Schon, 1996). Each decision maker is one of the components of the community and he is the representative of the particular community.

3.2 Research Methodology for Case Study

3.2.1 Selection of Case Study

The study of community disaster management for flood and drought is a case study about the capital of the community, which enables each community to manage the natural disaster that has impacts on the community's lifestyle and livelihood. In regard to the criteria used to select the case study, the researcher considered community which had experienced disasters and were located in risk areas for flood and drought.

3.2.1.1 The Case Study of Flood Disaster Management

For the case study of communities encountering floods, the researcher selected communities which had experienced and were impacted by floods in 2011, where there was community disaster management in places that had experienced floods and are likely to experience flooding in the future. There are two selected communities for this study. One of them has full self-disaster management, which is the Ban Bang Ta Phaen community in Khlongwua sub-district in Mueng Ang Thong district in Ang Thong province. The other has partial self-disaster management, which is Tha Bong Mung community in the municipality of Warinchamrap in Warinchamrab district in Ubon Ratchathani province, located alongside the Moon River. The content details and basic information on the mentioned communities are provided as follows.

1) Ban Bang Ta Phaen community, Khlongwua sub-district, Mueng Ang Thong district, Ang Thong province

(1) General Information on the Community

Ban Bang Ta Phaen is one of five communities in Khlongwua sub-district, Mueng Ang Thong district, Ang Thong province and is located 7 kilometers away from the city. It is located on the west of the Chao Praya River. The north territory is adjacent to Ban Bangthong, Khlongwua sub-district,

and the south territory is adjacent to Ban Bangtathong, Champalor sub-district, the west territory is adjacent to Khlong Bang Ta Phaen (Bang Ta Phaen canal) and Ban Hae sub-district, and the east territory is adjacent to Ban Khlongwua, Khlongwua sub-district.

In regard to the settlement of people in Ban Bang Ta Phaen, Khlongwua sub-district, based on the information from the data provider, revealed that the early group of people immigrated to this area because they found the lowland was a plentiful area appropriate for farming. So villagers have farms and raise animals for their living. People raise cows and buffalo as tools for farming, and they take the cows and buffalo to drink and wash in the canal. Consequently, the path has collapsed and the canal has become a big water course. Later, people made it into a canal that connects to the Chao Phraya River. This canal has plenty of water throughout the year and therefore more people have moved in. People in the community live their lives like relatives and help each other. The rich area gave the people strength and security in their occupations so they named the community “Bang Ta Phaen”.



Figure 3.1 Map of Ban Bang Ta Phaen

Source: Thaitambon, n.d.

The size of the community is 1,099 Rai. The geography is lowland (flat) in the center which is rich and suitable for agriculture. Bang Ta Phaen canal is the main stream that flows through the community and it can provide water to the people throughout the year. People can farm rice twice a year or even three times in some years if there is plenty of water. They also use the water for both short and long-term plantation, vegetables, flowers, and fruits orchards.

(2) Economic and Social Situation

The population size of Ban Bang Ta Phaen is 511 people in 127 households (Civil Registration Database as of 31 October 2014). In the past, rice farming was the main occupation of the people. The cultivation area is about 80% of the entire area. The additional occupations are livestock or raising animals, processing agricultural products, and bamboo basketwork. Currently, people are changing the area that is used for rice farming to plant vegetables, fruits orchards, and other things.

In regard to the social situation, the relationships between the people in the community are close, like relatives or extended family. Fathers, mothers, and children live together in the same family or household and some families also have senior relatives living with them or sometimes relatives from other places may stay with them. They build houses close to each other in the same area.

Recently, gathering to help at the harvest time is rarely seen compared to the past in contrast to special occasions, ceremonies, or funeral ceremonies because people get paid. The situation has changed in terms of lifestyle and culture. However, people in the community have discussed this topic many times in order to bring back the previous situation in the community. In regard to the current situation of the community, people are kind and help each other, share with each other, and people are allowed to walk into neighbor's houses to take vegetables to eat but not for sale.

(3) General Data on Community Resources

(3.1) The infrastructure of the community in Bang Ta Phaen community is as follows: 1) One wire broadcasting tower, 2) Community learning center, 3) Community water supply-there are a group of users and a management committee, 4) Ten artesian wells (ground water), 5) Nine community

stores/shops, 6) Sports fields, 7) Community drinking water system-it was established in 2013 by SML fund

(3.2) Groups/Organizations/Source of Funds 1) Water Hyacinth Basketry Group, 2) Banana Leaf Cutting Group, 3) Mixed Agriculture Group, 4) Water Supply Users Group, 5) Savings Fund for Production (Sub-district level), 6) One-Baht Daily Savings Group, 7) Village Fund, 8) Mae Khong Phandin Fund (or Mother of the Land Fund), 9) Community Welfare Fund (Sub-district level)

(4) Flood Disaster Situation and Experience

(4.1) Floods before 2011

As the community is located close to the Bang Ta Phaen canal, which is a branch of Chao Phraya River, and its location is part of the central Chao Phraya river lowland (flat), which must support or handle the great floods from the north, the community experiences flood annually. The floods flow into the fields and some parts of the community itself. The major floods that the community experienced were in 1975, 1978, 1983, 1988, 1995, 2006, and 2011.

In 2006, the community encountered the most critical flood with a high level of impact. It was different from the other times in the past as the flood went into the fields and went over the river bank into the community area. It was a sudden flood and the community was unable to prepare itself to handle this situation. Later, it was found that the people in the community did not trust the information on the flood situation because there had not been any critical flooding in the community for over 20 years. Moreover, some of the people in the community had never experienced such flooding; therefore, they ignored the flood warnings as they believed that the roads were built with high level banks so they were thought to be able to protect the community from floods.

Furthermore, without any preparation to handle the crisis, management was separated into local administration units according to their responsibilities. Consequently, people waited for assistance from the persons whom they had selected to work in this organization instead of managing or handling the flood situation by themselves.

(4.2) Flood Situation in 2011

For the major flood in 2011 in Ang Thong province, there were 7 districts impacted by this situation, which is the entire area. For the Bang Ta Phaen community, the impact was less than in 2006. The flood level in 2011 was only 1 meter high while it was over 1.5 meters in 2006 as the Bang Chomsri water gate in Singburi province was broken. Consequently, the great flood flowed into Singburi and Lopburi cities and less water flowed into Ang Thong province. The people were also better prepared for this situation.

2) Tha Bong Mung community, Warinchamrap municipality, Warinchamrap district, Ubon Ratchathani province

(1) General Information of the Community

Tha Bong Mung community is under the responsibility of Warinchamrap municipality, Warinchamrap district in Ubon Ratchathani province. Warinchamrap municipality is located about two kilometers away from Mueng district. There are 28 communities under Warinchamrap municipality's responsibility, and half of them or 14 communities, are located on the Moon River bank and its branches, such as the Koodpeng and Kood Sri Mungkhla (Kood Plakhao) branches, which are Haad Suansuk, Haad Suansuk1, Haad Suanya, Tha Korpai, Kood Plakhao, Lublae, Kooyang, Warintraram Temple, Koodpeng Moo6, Koodpeng Moo16, Katekaew, Dee Ngarm, Tha Bong Mung, and the Don Ngew communities. These 14 communities are impacted by floods every year.

Tha Bong Mung community is 96 Rai in size and is divided into 90 Rai for housing, 1 Rai for plantation, and 5 Rai for grassland or animal farms. The north territory is adjacent to the Moon River, the south territory is adjacent to Bor Bambad road in the Katekaew community, the east is bordered by Sri Nagarin bridge road, and the west is bordered by the Dee Ngarm community. The geography of Tha Bong Mung is flat land close to the Moon River with natural water sources, which are Boong Ngaow, and Nong Kudjong.

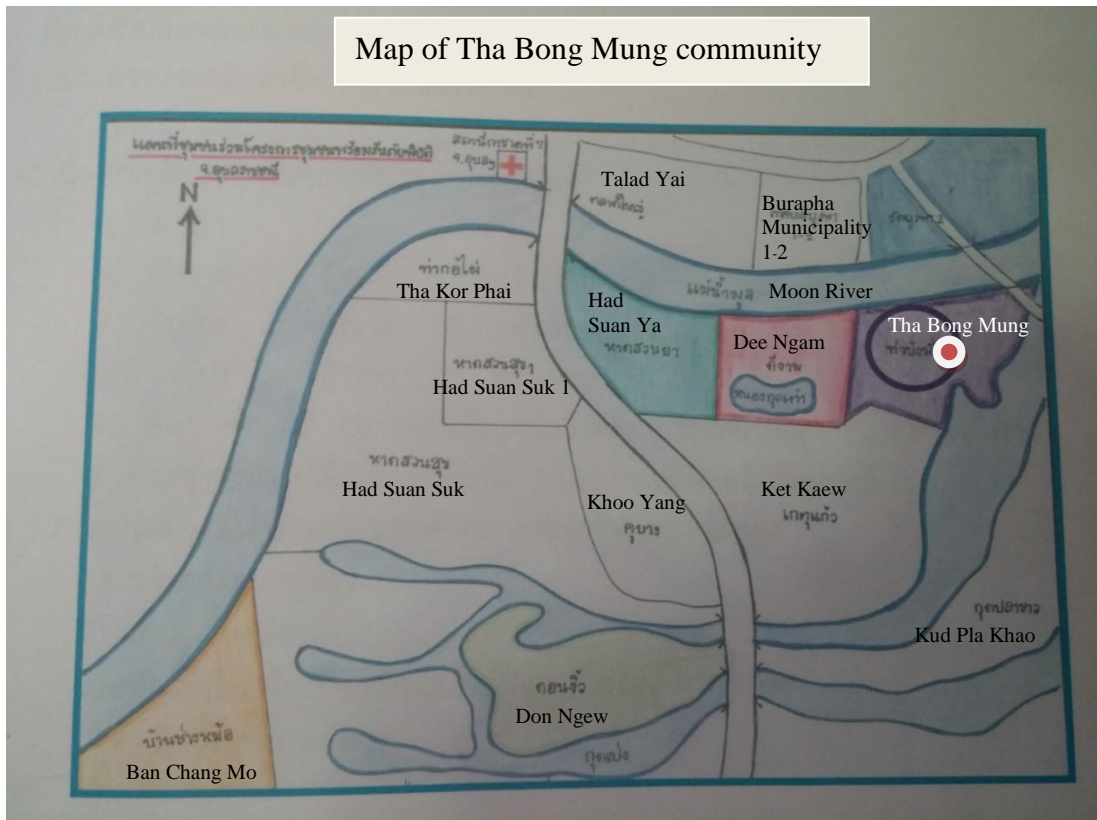


Figure 3.2 Map of Tha Bong Mung Community, Warinchamrap Municipality in Ubon Ratchathani Province

The first group of 4-5 families, led by Mr. Mee Mahawong, settled in this community 140 years ago. They moved from Bantaekao, Ban Suekok, Ubon Ratchathani. Previously, Tha Bong Mung was called as Tha Bakmung after the Bakmung Tree or *Carallia brachiata* and the name was later changed to Tha Bong Mung.

(2) Economic and Social Situation

The total population in Tha Bong Mung is 987 people with 410 males, and 577 females in 203 households. All of them are Buddhist (100%).

The majority of people in the community are meat sellers. They butcher the cows which were inherited from their ancestors. Their occupations can be categorized into the following: selling meat 51 households, butchering cows 56 households, fisherman 23 households, and other occupations, for example working for

wages, building contractors, housekeepers, and unemployed, 73 households. The average income for each household is 50,000 Baht per year.

(3) General Data on Community Resources

(3.1) General Infrastructure, 1) Wire broadcasting tower, 2) Multi-purpose building, 3) Primary School, 4) Senawong Temple, 5) Provincial Waterworks System, 6) Embankment 7) Natural water sources – Bung Ngao, Kanjong, and Moon River, 8) Two floodways flowing into the Moon River covering 70% of all households

(3.2) Group / Organization/Source of Funds 1) The Once Million Baht Village Fund managed by a committee selected from members in the community, b) Housewife's Group –this no longer exists as there were no continuous activities or supporting funds

(4) Disaster Situation of the Community

Tha Bong Mung community is located in a high risk flood area. In the past, floods in the community lasted about 1-2 weeks but no longer than a month. The water flows from the Moon River to Khong River. Recently, there have been floods in the areas near the river banks both in the Mueang district and the Warinchamrap district which lasted longer than in the past, sometime for up to 4 months. The flood history records are as follows:

1978-The entire community was flooded for 4 months, and the water level was up to the second floor of the building

2000-The flood level covered only half of the first floor of the house, so people could stay on the second floor of the buildings

2001- The flood level covered only half of the first floor of the house, so people could stay on the second floor. It lasted for about 2 months

2002-Floods covered entire the community for 4 months and the water level was up to 12 meters in height. Flooding happened twice in this year. The second time, the water level covered the wastewater treatment clarifier, so, there was an offensive smell after the flood

2003-Floods covered the first floor of the houses located in the lowland area for 2 months and damaged about 60% of the houses.

bank can be summarized as follows. 1) Caused by nature e.g. in 2011, Thailand especially the north east part were impacted by many tropical storms such as Hai Ma, Nok Ten, Hai Tang, Naysard, Nal Gaie, etc. as well as the monsoon. Therefore, there was heavy rain and this caused a great accumulation of water. Moreover, Mueng and Warinchamrap districts are the river mouth area which is impacted by the water flows from the upper Moon River and the Chi River as well as sub-branches which all flow into a common point and later flow into the Moon river in Phiboon Mungsahan district and the Mae Khong rivers. 2) Water sources around the community e.g. Boong Ngao, as well as the natural water sources, are full of unwanted flora and are never cleaned. 3) Caused by city development because there is land development and changes in the utilization of the land in this area which was previously used for farming, fishing, and as monkey-cheeks supporting the water flow from the Moon River. Recently, these areas were covered by soil and a by-pass, a university, commercial buildings, a shopping center, and other constructions were built, as well as the second Moon river bridge between the Meung and Warinchamrap districts, which is the Somdech Phra Srinagarindra Boromarajajonani Bridge. Moreover, the roads and other new constructions were built close to the water routes and the drains. Furthermore, constructing a new drainage system or expanding the existing one cannot be implemented or is difficult to implement because of the new buildings and other constructions. The area around the canal and Moon River bank is also privately owned.

(5.2) Flood Impact

There are many impacts of flooding near the community such as impacts on life and health e.g. athlete's foot, skin diseases, Leptospirosis, etc. Moreover, due to the long duration of floods, people must live their lives under these conditions with polluted water, trash, offensive smells, mosquitos, people get stressed regarding income, and people worrying about their property when they have to leave their flooded homes. Some houses are not in good condition or are not strong, and some of them are single-storey houses, or double-storey houses with basements. Therefore, when floods occur, people's lives change. During the flood, houses and other property are damaged i.e. floor tiles are cracked and broken, and doors and windows expand and break. People have no money to fix them. There are

also impacts on people's occupations. People have no income during the flood because they have no place to work. People have to travel by boat, but most people do not have their own boats, so they must travel by passenger boats and they have to pay for it. There are also impacts on basic infrastructure and public places which are damaged, for example, temples, schools, roads, etc. In regard to the impact on society, children must temporarily stop schooling due to the flood and some children who have to travel to study in other places cannot travel out of the community. Monks are unable to go out to ask for alms as usual.



Figure 3.4 Map Displaying the Risk Zones for Floods in Tha Bong Mung Community

3.2.1.2 The Case Study of Drought Disaster Management

For the case study on a drought disaster community, the researcher set the criteria to select a community that has experienced water shortage problems both for household consumption and farming activities. In this study, the researcher selected two communities which are 1) the community which successfully solved

drought problems-Limthong community, Nangrong district, Buriram province. This community has tried to find a method and equipment to handle the water shortage in the community, 2) a community which was unable to solve these problems, which is Nonyang community, E-lum sub-district, Uthumpornpisai district in Sisaket province.

1) Limthong Community, Nongbote Sub-district, Nangrong District, Buriram Province

(1) General Information of the Community

Limthong is one of 14 villages under the Nongbote Subdistrict Administration Organization, Nangrong, Buriram which is located 69 kilometers to the north west of Buriram city . The north territory is adjacent to Sakham Village, the south is adjacent to Kokpluang Village, the east is adjacent to Chumsaeng Village, and the west is adjacent to Nongthonglim Village and Thaihong Village.

The first group of people who moved and settled down in this area was Mr. Ape Luesuebphan, Mr. Plai and Mrs. Tem Nanechumsaeng who originated from Khorat. Later, Mon people, Cambodians, and Laotians immigrated from Surin and Sisaket provinces; therefore, the population has increased. Limthong community separated from Nongthonglim village in 1 June 1984 and was renamed Limthong village because the villagers wanted to have a similar name to Nongthonglim village.

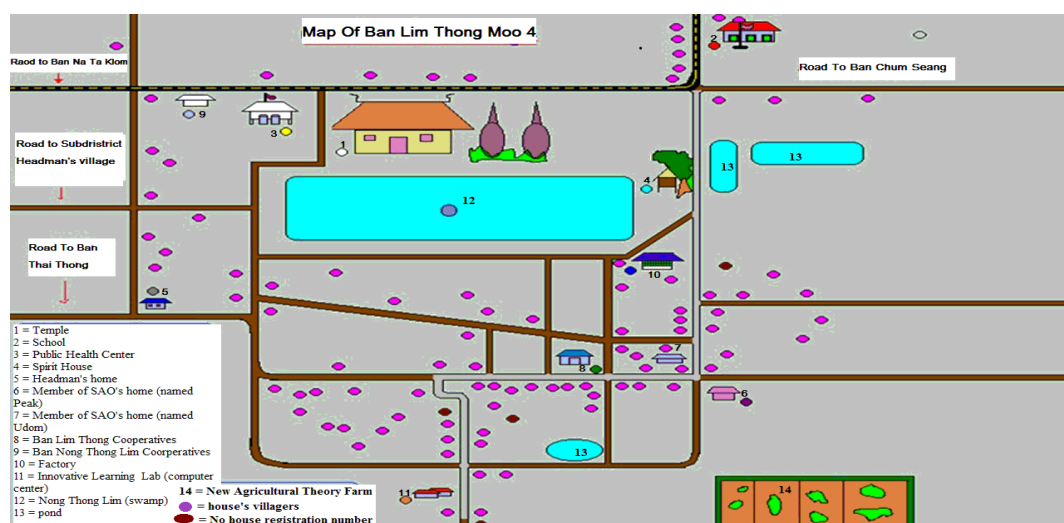


Figure 3.5 Map of Limthong Community

(2) Economic and Social Situation

The population size is 515 people with 253 males and 262 females. There are 126 households. The major occupation of the people in the community is farming-rice farming, fields and orchards (general plantation), and working for wages. Within the community, 103 households do farming, 7 households are government officers, 4 households are sellers, and 12 households work for wages.

(3) General Data on Community Resources

(3.1) General Infrastructure 1) Wire broadcasting tower, 2) Computer Center-there are 15 computers, 3) Multi-purpose building, 4) Water Supply System from surface water, 5) Water sources-canal, 58 locations of monkey-cheek water storage, Nongthonglim natural swamp

(3.2) Groups/Organizations/Sources of Funds 1) The Once Million Baht Village Fund, 2) Water Supply Fund, 3) Seedling Fund, 4) Community Store Fund, 5) Community Savings Group-Minimum saving is 20 Baht per month, 6) Housewife Fund, 7) Housewife fund-name has changed from Rice Bank, 8) Tractor and people who work to plow hiring group-welfare management for members provided, 9) Community Rice Mill-completed in 2016

The principle of fund management is that all funds are set to help members; therefore, the annual interest charge is only 1% and all funds must be managed by the funds of each group.

(3.3) Drought Situation

Limthong community is one of the lowland areas in Buriram which is slightly higher than the other communities. The spot is in Nongbote area. Its location is a slope with sandy soil; therefore, water cannot be stored. Consequently, the community encounters drought. This problem has been happening for over 50 years and people usually say “Buriram Tum Num Kin” (or people in Buriram must make the water to drink by themselves) because most of the people in Buriram have insufficient water for consumption and farming and it is difficult to find sources of water in the summer. Flooding also happens in the rainy season.

The big Thonglim swamp is a public water source which people commonly utilize for their personal purposes i.e. bathing and washing.

2) Nonyang Community, E-lum Subdistrict, Uthumpornpisai District, Sisaket Province

(1) General Information about the Community

Nonyang community Moo 3 is located in E-Lum subdistrict, Uthumpornpisai district, Sisaket province where is 12 kilometers away from Uthumpornpisai district and 27 kilometers away from Sisaket province. The north territory is adjacent to Koklam subdistrict, Uthumpornpisai district, Buriram, the west is adjacent to Kokklangnoi village, E-Lum subdistrict, the east is adjacent to Chik village, E-Lum subdistrict, and the south is adjacent to Nondoo village of E-Lum subdistrict, Uthumpornpisai, Sisaket. The village, Nonyang, was named after its location, which is highland that is full of Yang or Garjan.

Nonyang village is flat land surrounded by fields. The soil is a combination of clay and sandy soil. The community is located 10 kilometers away from Moon River, the major river of Sisaket province.

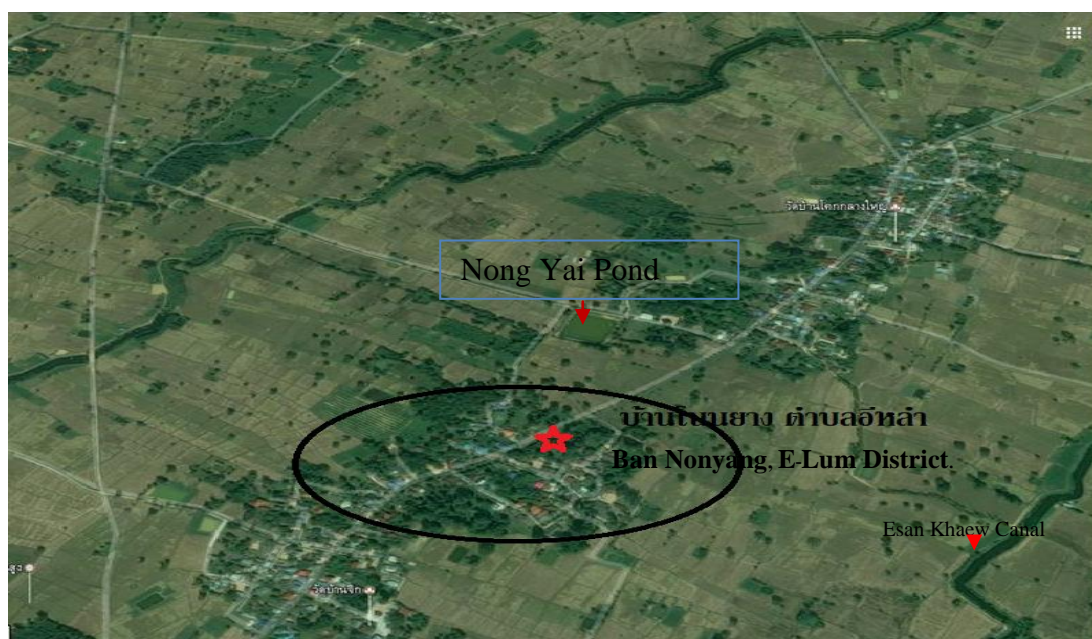


Figure 3.6 Map of Ban Nonyang

(2) Economic and Social Situation

Nonyang is a small community with 45 households, the data are based on its registration system, but in reality only 38 households were found. The population size is 196 people with 93 females and 103 males. The major occupation of the people is government officers and farming is the additional occupation. There are 37 households doing farming or 84% of all households. The farming includes rice farming, growing chilis, and raising cows. Moreover, from February to March, people in the community have additional seasonal jobs pinching off the chili stems.

The government data of Thailand reported the incomes and expenses of the Nonyang community in 2014. The total income was 13,987,860 Baht -8,716,660 Baht from their major occupations, 1,900,000 Baht from other minor occupations, 1,830,000 from farming activities, and 1,541,200 was the income from minor or additional jobs. The household average income was 310,840 Baht per year. Regarding expenses, the highest expenses of the community was consumption expenses which was 2,126,000 Baht, expenses related to debts was 1,941,200, and the cost of production as about 1,934,000 Baht.

Referring to senior sharing, in the past, people in Nonyang community relied on and helped each other, but when the society changed, the people in the community acquired higher level of education and had supporting children who completed the highest levels of education in order to work in the government sector or to be government officers. Therefore, people had to work to earn money to cover daily expenses and support their childrens' education. Consequently, people had to move out and seek jobs in other places and some families move out and never returned. Some people still live in the community, but they must work hard e.g. working for wages upon hiring, and construction work; therefore, they have less time to do social activities or interact with other people in the community, and consequently, the relationships between people in the community have changed. Though the interaction between people in the community is less due to their hard jobs, wherever there are ceremonies, funeral, weddings, or ordination, people are always ready and happy to get together for these particular activities. The decrease in interaction between people is because of the economic situation of each household.

(3) General Data on Community Resources

(3.1) General Infrastructure 1) Wire broadcasting tower, 2) Organic Fertilizer Plant, 3) Silk Worm Menageries, 4) Water Supply System from underground water, 5) Multi-purpose building, 6) Nonyang Temple, 7) Public water sources-there are 3 places, 2 of them have no water in the summer and the other one is 9-rai.

The community received supporting funds from E-Lum Subdistrict Administration Organization in 2015 to dig to store water for the community. Moreover, there is the E-sarn Kheow canal which is a kilometer away from the community. The Subdistrict Administration Organization provides funds to remove blockages and garbage from the canal every year to provide flowing water for farming activities. In some years, people do rice farming out of season; therefore, there is insufficient water to support this activity.

(3.2) Group/Organization/Source of Funds

(1) The One Million Baht Village Fund

The One Million Baht Village Fund is provided in accordance with government policy. It is a circulated fund for members to borrow and 3% interest is collected per year. In the first stage, members are allowed to borrow not more than 20,000 Baht. If the member would like to borrow over 20,000 baht, their property is used to guarantee the loan together with two guarantors. There were 20 people who borrowed money from the fund at first and funds still remain available. Recently, all households borrowed money from the fund and in some households, more than one family member borrowed from the fund.

Later, there was a problem of fund management. The member did not return the money to the fund. There was one household where the family members loaned 50,000 Baht each; therefore, the fund was unable to close the account and make a fund summary. The community leader said that this community is the community with the biggest fund problems in the province.

(2) Savings Group (or Sajja Savings Group)

The savings group allows member to save their money in a loan form, at 500 Baht per loan. The value of the stock in the loan is from 10 baht upwards. Members must save the money on a monthly basis. The minimum

requirement for saving is 10 baht and the maximum is 1,000 baht. At the end of the year, the loan committee will let members borrow this money and the members must pay a 3% interest rate charge per year. The interested members must submit a loan proposal. The major loaners are farmers who spend the money on farming activities e.g. plowing fields, raising silk worms, or buying farming production equipment.

The rule or agreement for loans is that members must return the money on a monthly basis. It does not have to be exactly even amounts every month but the committee will consider the ability of the borrower to return the money. This group of borrowers is allowed to borrow small amounts. If members are unable to return the money, they are allowed to borrow five times the amount. For example if borrower always returns 10 baht every month, the committee will allow a loan of 4,000 baht.

(3) The Village Development Fund is a group of stores in the community. Members raise funds to establish a fund to buy products which are then sold to people in the community. Recently, there was outstanding money of about 10,000 baht. This fund stopped operating because members did not buy products from the stores in the community but from retail stores in the city where they get lower prices. The community leader as the head of the fund who is responsible for opening the shop did not open the shop because nobody bought products from the store. On the other hand, the members also said that they did not buy products because the shop was not open. Therefore, people buy products from other shops in nearby villages. Additionally, regarding the outstanding money-10,000 baht, members are worried about how they can manage it. The community leader accepted that it was spent on various purposes and if the members would like their money returned, it can also be returned to them.

(4) Cow Raising Group

The cow raising group consists of 7-9 members. Recently, the village headman became the group leader and the group obtains supporting funds from E-Lum Subdistrict Administration Organization (E-Lum SAO) where 100,000 baht is provided for each village. Each member is allowed to borrow 10,000 baht to buy a cow and has to return 2,000 baht per year E-Lum SAO for 5 years. Members must pay interest to the group of 100 baht and it will be collected as a

fund for the community. Every five years, when all members have returned all of the money, the group will close the account and re-loan it. It will be distributed to the new members. The applications of the new qualified members will be considered according to their needs. Group members will buy breeding livestock and when they have babies they can sell them to earn money.

Recently, the group had a problem about its management where the members do not believe the figure for accumulated interest. All members asked about this and checked it with the group leader.

(5) Silk Texture Group

As the people in Nonyang have wisdom and knowledge about silk, they collaborate on silk texture. Members borrow money from the Sajja Savings Group as the production fund. Recently, there were only three households as members because no successors. The people who know about silk are old and they cannot continue this activity.

(6) Organic Fertilizer Production Group

This group raises funds from group members. They help to produce organic fertilizer and share it with people in the community. Later, the government sector, Sub-district Administration Organization, district, and province found out about this group and gave support. Also, the government has a campaign to support community enterprises; therefore, the group obtained a supporting fund to supply equipment and materials. The group is open for members from the entire subdistrict. Producing organic fertilizer requires funds to purchase materials and employee to produce it before it is distributed to the members.

The group also has problems because the major fund is from the government and the products are only distributed to members but are not for sale. Consequently, whenever there are no funds, production cannot be processed.

3.2.2 Data Collection

1) Data Sources

The data sources for this study are as follows:

(1) Data received from official document reviews i.e. professional reports, data folders, and news analysis. In addition, the researcher collected data from the official websites of the related departments or organizations on disaster management.

(2) Data received from field observations in the study area

(3) Data received from semi-structured interviews from key participants which are the community leaders, representatives of the community, seniors of the community, administrator/officers of the Subdistrict Administration Organization of the particular area which encounters disasters, heads of agencies/officers of the departments of the government related to disasters both from center and regional government e.g. Disaster Prevention and Mitigation Office at provincial and regional levels, the Red Cross Office of the province, emergency units, agencies at the provincial level, the Provincial Health Office, and other related agencies.

(4) Key Informants and the number of key informants come from the case study of the community, and agencies involved with disaster management in the study areas. See details in Table 3.1

Table 3.1 Outline of Key Informants

Community	Primary actors	Number (Person)	Other actors	Number (Person)
1. Flood Disaster				
1) Bang Ta Phaen Community, Klongwau district, Anghong	Community leaders both official and unofficial, representatives of community organizations or groups	10-15	1. Administrator/officer of Subdistrict Administration Organization 2. Chief of department/ staff or officer of the state agency in the study area	5

Table 3.1 (Continued)

Community	Primary actors	Number (Person)	Other actors	Number (Person)
2) Tha Bong Mung Community, Warinchamrap Municipality, Ubon Ratchathani	Community leaders both official and unofficial, representatives of community organizations or groups	10-15	1. Administrator/officer of Subdistrict Administration Organization 2. Chief of department/ staff or officer of the state agency in the study are	5
2. Drought Disaster 1) Limthong Community, Nongbote subdistrict, Nangrong, Buriram	Community leaders both official and unofficial, representatives of community organizations or groups	10-15	1. Administrator/officer of Subdistrict Administration Organization 2. Chief of department/ staff or officer of the state agency in the study are	5
2) Nongyang Community, E-Lum subdistrict, Uthumpornpisai, Sisaket	Community leaders both official and unofficial, representatives of community organizations or groups	10-15	1. Administrator/officer of Subdistrict Administration Organization 2. Chief of department/ staff or officer of the state agency in the study area	5

3.2.3 Data Collection Methods

1) In-depth Interview

The researcher accessed to the study area to interview the main actors of the community such as official and unofficial leaders, administrators and officers involved in the local administration organization, and representatives of state agencies both from the central and regional units, and representatives of the private and public sectors who play important roles in the operation in the disaster areas.

2) Focus group-This method was employed with the group of community leaders, community members of the community fund, preparation, and management when encountering a disaster as well as recovery from the disaster. Moreover, the topics on accessibility and the utilization of existing resources of the community and raising resources outside the community have also been discussed.

3) Observation without participation

3.2.4 Data Collection Tools

For the data collection to answer the research objectives, the researcher focused on the following:

1) The community includes the environment, the population, the history, the society, the customs, economics, and politics.

2) Community capital or resources include social capital, human capital, financial capital, physical capital, and political capital.

3) Networking within and with other communities.

4) Networking with other communities, local organizations, government agencies, NGOs, and other organizations.

5) The role and ability of the community to handle disaster and disaster management.

6) Accessibility to support from government agencies, NGOs, and other organizations.

7) Problems and obstacles to community disaster management.

Examples of the questions for key informants of the community are presented in Table 3.2. The questions asked when interviewing administrator/officers of the local administration organization are presented in Table 3.3, and the questions for other organizations are displayed in Table 3.3

Table 3.2 Examples of the Questions to Interview the Primary Actors of the Community

Issues to Study	Questions
1. Community Context	<p>1.1 What is the history of the community? When was it established? How has the community expanded? Does it have an immigrant population?</p> <p>1.2 What are the important events in the community? Please describe in detail. How do the mentioned events impact the livelihoods and occupations of the population?</p> <p>1.3 How is the physical environment of the community, its location, and territories? In what areas are the natural resources of the community?</p> <p>1.4 What are the important places and basic infrastructure? Are there any problems?</p> <p>1.5 How is the relationship of the people within the community?</p> <p style="padding-left: 40px;">1.5.1 Which degree of the family relationship that people in the community have among each other?</p> <p style="padding-left: 40px;">1.5.2 What type of relationships do people have in the community? What are the restraints in people's minds?</p> <p style="padding-left: 40px;">1.5.3 Do people in the community experience conflict? If so, how do they solve such conflicts?</p>

Table 3.2 (Continued)

Issues to Study	Questions
	1.6 What is the population size, the number of households and the population structures (gender, age, and disabled)?
	1.7 What is the educational background of the majority of people in the community and how has it changed?
	1.8 What are the occupations of the people in the community?
	1.8.1 What are the major and minor occupations?
	1.8.2 Have the occupations changed from the past and how hve they changed or developed?
	1.8.3 What is the output/production of the community? Are there any groups who do extra jobs to earn extra income? What are they?
	1.8.4 Do the occupations relate to each other and how?
	1.9 Where is the meeting point of the people in the community? When do they meet up or on what occasions do people meet each other? Where can people gather together and what activities do people do when they meet up?
	1.10 What is the experience on development jobs including government, private, and people sectors?
	1.10.1 What is the background and objective of the activity?
	1.10.2 What is the target group?

Table 3.2 (Continued)

Issues to Study	Questions
	<p>1.10.3 What are the activities and how have they been processed? What are the results?</p> <p>1.11 How is the local administration organization? In the community, are there any political groups, stake hold or conflict?</p>
2. Social Capital	<p>2.1 Trust/Reliability between people</p> <p>2.1.1 Trust between people and support for each other of the people in the community</p> <p>1) Do people in the community trust each other? Please provide examples.</p> <p>2) How is your relationship you're your neighbors?</p> <p>3) With what and how do people in the community help each other?</p> <p>4) Can you ask for help from a neighbor? If so, what do you ask for help for, and how do they help you?</p> <p>2.1.2 When a neighbor or other people ask you for help, how did you respond to that request?</p> <p>2.1.3 When there are activities in the community, do people participate?</p> <p>2.1.4 Who takes care of people, pets or animals when you have to temporarily leave your home? Can you leave your children, pets, or animal to your neighbor?</p> <p>2.1.5 Reliability towards taking care of property (not cash) e.g. house, car, motorbike, etc., If you or your neighbor must travel to</p>

Table 3.2 (Continued)

Issues to Study	Questions
	<p>other places, can you leave your property with your neighbor or other people? Or if your neighbor borrows your aforementioned property, what do you consider before you lend it to them?</p> <p>2.1.6 Reliability towards taking care of cash</p> <ol style="list-style-type: none"> 1) Do you trust your neighbor to take care of cash on your behalf? 2) Is there any fundraising for particular activities in your community? If so, how do you trust the particular person or neighbor who is responsible for that particular activity? <p>2.1.7 Are there any official rules or regulations for common living in the community?</p> <ol style="list-style-type: none"> 1) What are the official rules or regulations? 2) Who set the official rules or regulations? 3) How people respond to the set/agreed rules or regulations? 4) What are the common practices towards the set/agreed rules or regulations?

Table 3.2 (Continued)

Issues to Study	Questions
3. Networking within the community and inter-community	<p data-bbox="783 456 1410 546">3.1 Groups/ Organizations within the community</p> <p data-bbox="783 568 1410 824">3.1.1 What are the groups/ organizations/or associations in the community? (Please identify both official and unofficial names and the type of the groups/organization/ or association)</p> <p data-bbox="783 846 1410 987">1) What is the background, objective or goal of the group/organization/ or association?</p> <p data-bbox="783 1010 1410 1265">2) Who was the founder of the group/organization/ or association? (Government agency, donation through government agency, NGO, community leader, people in the community are the originators)</p> <p data-bbox="783 1288 1410 1429">3) Who is the leader and who plays an important role? How are leaders selected? (Election, appointment, or inheritance)</p> <p data-bbox="783 1451 1410 1756">4) Who are the members of the group/organization/ or association? What is the relationship between the people in the group/organization/ or association, and other organizations outside the community? And what is the relationship?</p> <p data-bbox="783 1778 1410 1964">5) Where do members meet? How are decisions made by the members? How was the group/ organization/ or association established?</p>

Table 3.2 (Continued)

Issues to Study	Questions
	3.1.2 Which group or organization in the community plays an important role to develop the standard of living of the people?
	3.1.3 Which group or organization has the most important role both in ordinary situations and during a disaster?
	3.1.4 Which group or organization can people easily access?
	3.2 Relationship /networking of the people within the community
	3.2.1 Relatives system
	1) Are the majority of the people in the community locals? (Born in the community, ancestors settled down and lived in the community) What is the level of relationship between people in the community?
	2) In the community, what are the names of the famous/big families? What are these people's roles and how do they influence the community?
	3) How do people help relatives (both in ordinary situations and during disasters)?
	3.2.2 Friends and neighbors
	1) How close is the relationship between neighbors in the community?
	2) Do most of the people in the community know each other? and how do they

Table 3.2 (Continued)

Issues to Study	Questions
<p>4. Networking with other communities, local agencies, government agencies, NGOs, and other agencies</p>	<p>know each other? How often do people interact with each other?</p> <p>3) How do people offer help to others (neighbors and people in the community)?</p> <p>4) What is the style of relationship of neighbors in the community? How does it impact the assistance given during a disaster?</p> <p>4.1 Community</p> <p>4.1.1 Does your community conduct field trips or exchange knowledge related to development or disaster management with other communities? If yes, what was the result?</p> <p>4.1.2 Are there other communities that visit your community? If yes, what are the groups and how is the activity conducted?</p> <p>4.1.3 What events/topics does your community and neighboring communities collaborate about? How do they collaborate? (Before, during, and after a disaster)</p> <p>4.2 Government and private agency, NGOs</p> <p>4.2.1 In the past, what were the external agencies that cooperated with the community? What are the patterns and content of their work? How do they work?</p> <p>4.2.2 What is the relationship of the community with external institutes, and other related government agencies?</p>

Table 3.2 (Continued)

Issues to Study	Questions
	<p>4.2.3 Did the Subdistrict Administration Organization (SAO), government agency at district and provincial level, NGOs, private agencies, civil sector, etc. provide support before, during, and after a disaster? How Do they provide support? Who has the important role in coordinating with the agencies? How do they manage a disaster in the community?</p>
<p>5. Human Capital</p>	<p>5.1 Leader</p> <p>5.1.1 Who are the former and current official and unofficial leaders? What do they do for the community? How did they become the leader? How do people select the leader?</p> <p>5.2 Leader</p> <p>5.2.1 Who are the former and current official and unofficial leaders? What do they do for the community? How did they become the leader? How do people select the leader?</p> <p>5.2.2 What is the relationship of the community leader, or head of the organization with the people in the community? What are the roles and abilities of the community leader to connect people in the community and outside the community to solve problems? How do they achieve this?</p> <p>5.3 What are the skills, abilities, and community wisdom? Who has these skills, abilities, or wisdom?</p> <p>5.4 Do the people in the community have ability and knowledge about disaster</p>

Table 3.2 (Continued)

Issues to Study	Questions
	5.5 management? From whom did they learn these skills?
	5.6 Experience on solutions and collaboration in the community
	5.5.1 Within the last year, on which topic has your community tried to solve problem on community development? How did you operate and who played the important role?
	5.5.2 Do you think everyone in the community is able to access public services equally or not? What are the problems or obstacles to this accessibility?
	5.5.3 Has the community tried to develop its service quality? How did it do this? Who or which group of the community plays an important role in finding a solution? How do you receive responses from the Subdistrict Administration Organization, other organizations, or other members in the community? What are the problems or obstacles to its operation? What is the result of the operation?
	5.5.4 What are the unsuccessful projects or activities on a quality of life development of the community? Why were the projects unsuccessful? How did you solve the problems?

Table 3.2 (Continued)

Issues to Study	Questions
6. Financial Capital	<p data-bbox="794 456 1394 546">6.1 What are the sources of income for people in the community?</p> <p data-bbox="794 568 1385 658">6.2 Where do the four main livelihood factors come from?</p> <p data-bbox="794 680 1406 1099">6.3 What are the local resources and production factors in the community? (e.g. forest, land, water sources, transportation, fund and source of funds, etc.) How is the accessibility to these resources? How can people access them and who controls the production factors? Who has an important role in controlling the benefits?</p> <p data-bbox="794 1122 1374 1211">6.4 What are the rules or criteria on resource allocation or utilization as well as exchange?</p>
7. Natural Capital	<p data-bbox="794 1227 1410 1317">7.1 What is the size and the number of natural resources (forest, land, water sources, etc.)?</p> <p data-bbox="794 1339 1410 1541">7.2 How important are the natural resources in the self-assistance of the community? How are people occupied? How has it changed from the past?</p> <p data-bbox="794 1563 1410 1697">7.3 Who can access and utilize the natural resources? Do all people in the community have equal access?</p> <p data-bbox="794 1720 1410 1921">7.4 Are there rules or criteria to control accessibility and utilization benefit of the natural resources? How and who control the rules or criteria?</p>

Table 3.2 (Continued)

Issues to Study	Questions
	7.5 Are there any problems about accessibility and the utilization of the benefits of natural resources? (Before, during, and after the disaster)
8. Physical Capital	<p>8.1 What are the important places and basic infrastructure in the community? Where are these places located? i.e. schools, kid's development center, learning centers, etc.</p> <p>8.1.1 Public health center</p> <p>8.1.2 Main roads and minor roads in the community, and roads connecting to other communities</p> <p>8.1.3 Main channels of transportation for the people in the community</p> <p>8.1.4 Markets, shops, and business service centers</p> <p>8.1.5 Temples or religious institutes</p> <p>8.1.6 Culture related areas and relaxation for the people in the community</p> <p>8.1.7 Water sources</p> <p>8.1.8 Irrigation system</p> <p>8.1.9 Embankment (dam)</p> <p>8.1.10 Public areas (land)</p> <p>8.1.11 Other physical capital</p> <p>8.2 How do people access and utilize the benefits of the basic infrastructure? Are there any controls on accessibility and the utilization of the basic infrastructure? Who has the controlling role?</p>

Table 3.2 (Continued)

Issues to Study	Questions
9. Political Capital	<p data-bbox="794 461 1321 656">Are there any problems in accessing and utilizing benefits? If yes, what are the problems? (Before, during and after the disaster)</p> <p data-bbox="794 678 1415 981">9.1 Are there any common decisions about the activities of the community? Who plays an important role in decision making? What is the role of the community leader? Do people in the community participate in decision making? How do they participate?</p> <p data-bbox="794 1003 1415 1137">9.2 Where are the public stages of the community? Who has an important role on the public stage?</p> <p data-bbox="794 1160 1415 1249">9.3 What is the attitude towards government officers and politicians?</p> <p data-bbox="794 1272 1415 1462">9.4 In the past, were there any governmental agencies working with people? What work did they do for them and how did people get involved in the activity?</p> <p data-bbox="794 1485 1415 1619">9.5 Are there any conflicts between people and government? What are they? (Claim and strike)</p>
10. Experience on Disasters and the Management of the Community	<p data-bbox="794 1641 1415 1986">10.1 How often does your community encounter disasters? What are the disasters you have experienced? What are the causes of the disasters? How severe and what is the duration of the particular disasters? How did it impact the community? Did it change the community? How did it change?</p>

Table 3.2 (Continued)

Issues to Study	Questions
	<p>10.2 How often does your community encounter disasters? What are the disasters you have experienced? What are the causes of the disasters? How severe and what is the duration of the particular disasters? How did it impact the community? Did it change the community? How did it change?</p>
	<p>10.3 Does the community have a committee on disaster management? (if yes, please continue with the following questions)</p>
	<p>10.3.1 Who are the members? What are the responsibilities of the disaster management committee?</p>
	<p>10.3.2 When was the disaster management committee established? Who was the founder?</p>
	<p>10.3.3 Has the disaster management committee been trained about disaster management? What were the training topics? What organization conducted the training?</p>
	<p>10.3.4 Do you think the disaster management committee has accomplished their goals or not?</p>
	<p>10.3.5 Does the work of the disaster management contribute benefits to the community and people?</p>
	<p>10.4 Which group of people in your community has important roles in disaster management? What role does that particular group have? Have people in the community participated? How did they participate?</p>

Table 3.2 (Continued)

Issues to Study	Questions
11. Disaster Management and Problem and Obstacles	<p data-bbox="794 459 1410 488">11.1 Before the disaster event</p> <p data-bbox="794 510 1410 645">11.1.1 Does your community have disaster prevention plans? If yes, what are they?</p> <p data-bbox="794 667 1410 902">11.1.2 How does the community prepare for disaster management? i.e. warning systems, human preparation, infrastructure, livelihood factors such as food, water, etc. communication and providing information.</p> <p data-bbox="794 925 1410 1317">11.1.3 Through which channels of communication does the community obtain information e.g. warning on disaster events, level of water, etc.? (Radio, TV, mobile phone, internet, report, through people, wire broadcast tower, from whom and which organization?) What are the problems in obtaining that particular information?</p> <p data-bbox="794 1339 1410 1368">11.2 During the disaster events</p> <p data-bbox="794 1391 1410 1514">11.2.1 How does the community handle the disaster? Did they follow the plan they have?</p> <p data-bbox="794 1536 1410 1966">11.2.2 How do people help each other during the disaster (food, drink, water, places to sleep, immigration, etc.)? Is there any prioritization for the assistance offered? Is the assistance offered adequate? If not, who or which organization coordinates with other communities or external organizations for assistance? Who plays an important role on this matter?</p>

Table 3.2 (Continued)

Issues to Study	Questions
	<p>11.3 After the disaster events</p> <p>11.3.1 How did the community recover from disasters? How long did it take for such recovery?</p> <p>11.3.2 Did the community encounter problems on accessibility to resources (funds, loans, etc.) for your community recovery? What are the problems?</p> <p>11.3.3 What are the problems of the community disaster management (pre-disaster, during, and after the disaster events)?</p>
<p>12. Accessibility to Support and Assistance from Organizations Outside the Community</p>	<p>12.1 Before, during, and after the disaster events, did the community obtain support and assistance from organizations outside the community? E.g. Sub-district Administration Organization, municipality, organizations at district, provincial level, other communities etc. What was the assistance, from whom or which organization?</p> <p>12.2 How did the community access that particular assistance? (the community demanded it or by organizational contact through a group or network of the community or the community contacts other communities or organizations outside the community for help). What is the community process that particular assistance? Who plays an important role?</p>

Table 3.2 (Continued)

Issues to Study	Questions
13. Lessons Learned from the Disaster Management of the Community	12.3 Overall, did the community obtain the support/assistance as planned or not? What were the problems in accessing the support or assistance from organizations outside the community?
	12.4 What are your suggestions about the role of providing support or assistance by the related organization outside the community in order to enable the community to handle disaster events more effectively?
	13.1 Does the community have meetings to review lessons or experience from the past to determine preventive action or to reduce the risk of potential disasters in the future? How do they do this?
	13.2 What did the community learn? How has the community developed? How did the organization outside the community respond to the community?
	13.3 How do the internal and external factors influence the ability for disaster management by the community? What was the result?

Table 3.3 Examples of Interview Questions for Other Organizations

Issue to Study	Questions
Support or Assistance	<ol style="list-style-type: none"> <li data-bbox="826 448 1410 683">1. Does your organization play an important role in the disaster management of the community? If yes, what did you do for the community? (Pre-disaster, during, or after disaster events) <li data-bbox="826 694 1410 840">2. Does your organization have strategic plans, policy on disaster management? If yes, what are the significant elements? <li data-bbox="826 851 1410 940">3. How did your organization serve the community? <li data-bbox="826 952 1410 1187">4. Which group of people did your organization provided services for? How did people in the disaster area access the services you provided? How did you know about the needs of the community? <li data-bbox="826 1198 1410 1388">5. How or through what channels did you advertise your organization's information? (Media, internet, email, website, to whom or to which organization) <li data-bbox="826 1400 1410 1545">6. In cases where the main communication system encounters problems, do you have alternative plans for your services? <li data-bbox="826 1556 1410 1747">7. Did external factors influence the operation of your organization? (Political issues, economics, etc.) What were they and how did the affect the result? <li data-bbox="826 1758 1410 1848">8. Do you have any information that would benefit this study? If yes, what are they?

3.2.5 Data Validation

The researcher utilized the following procedures to check data validity and reliability.

1) Validity-the researcher checked the validity of the data by designing interview questions which were presented to the research advisor committee to check the relationship between the questions and its objectives prior to actual implementation with the interview and focus groups. After that, data collection and report writing took place accordingly with the research title “Disaster Management by Community-Case study on Flood and Drought Disasters”. This was then proposed to the dissertation committee.

2) Reliability-to ensure the reliability for this research, the researcher has done the following procedures.

3) Gathering data from multiple sources of evidence for example documentary research, facts, academic papers, interview and focus groups with key stakeholders including community leaders, groups of people in the community, and officers of state agencies.

4) Making a database and classifying data by taking the gathered data from multiple sources of evidence into groups as per the details below in order to determine the similarities and differences in disaster management of the selected communities for cases of both flood and drought disaster management.

(1) Database of the key stakeholders classified by community

(2) Database of the interviews classified by type of disaster for each community including questions and answers obtained from interviews, key stakeholders, and the dates, times, and locations of particular interviews.

(3) Data were validated by employing a triangulation technique. The researcher validated the data throughout the qualitative research by implementation of 1) checking the triangulation theory in regard to the development process of the conceptual framework, and in research tool design to collect data, 2) investigator triangulation by comparing the similarities and differences of the data obtained from data collection in different periods, and 3) data validation-the researcher collected data from multiple sources of evidence which are 1) different evidence e.g. data obtained from documentary research, interview, and observation, 2)

interviewing key stakeholders from different groups in the community, local agencies and selected communities, and 3) employment of multiple methods in data collection i.e. in-depth interview, focus group, and documentary research. These multiple sources of evidence enable the researcher to validate and classify data prior to presenting the data to the selected target group for opinions and suggestion to improve the data. After that, the researcher continued the analysis process and presented the data by utilizing various interpretation methods.

3.2.6 Data Analysis and Interpretation

After the researcher had collected and studied data from various sources, which were documentary research, reports, interviews, focus group, and observations in the four selected communities as case studies, the researcher categorized the data in order to check its validity for further analysis. In this research, the researcher employed content analysis, and correlation analysis by analyzing the gathered data to answer the research questions and to meet the research objectives. The results were presented by employing interpretation methods for the topics below.

1) Analysis of the flood disaster management at: 1) Bang Ta Phaen community, Klongwua sub-district, Angthong province, 2) Tha Bong Mung, Warinchamrap municipality, Ubon Ratchathani province, and 3) comparison of the flood disaster management in the Bang Ta Phaen and Tha Bong Mung communities.

2) Analysis of drought disaster management of 1) Limthong community, Nongbote sub-district, Nangrong, Buriram province, 2) Nonyang community, E-Lum sub-district, Uthumpornpisai, Sisaket province, and 3) the comparison of drought disaster management in the Limthong and Nonyang communities.

3) Analysis of community capitals that related to the capacity of community to cope with natural disasters-protection preparation, response, and recovery from the disaster by comparing the existing resources of each community. Moreover, methods for acquiring and utilizing resources for both flood and drought management were analyzed.

4) Analysis of the necessary conditions determining or enabling the community to have the ability for flood and drought disaster management by analysis of the major actors at the community level.

CHAPTER 4

COMMUNITY DISASTER MANAGEMENT ANALYSIS

This chapter presents the case study of the community disaster management on flood and drought disaster of the four communities including two communities on flood disaster management and the other two communities on drought disaster management. The following topics are the analysis results derived from interview, focus group, and the variety sources of the secondary data.

4.1 Flood Disaster Management

4.1.1 Bang Ta Phaen Community, Klongwua Sub-District, Mueng District, Anghong Province

In 2011, there was a crisis and extensive flood disaster at Bang Ta Phaen community. It affected to the people's livelihood, and the properties were damaged. The flood covered the entire Anghong province especially in Bang Ta Phaen community. The interview and focus group discovered that the leader of the community and the people had a well-preparation on disaster management for before, during, and after the disaster events. The group of people who provided information regarding this disaster event viewed that the impact from the flood disaster in 2011 was less than in 2006. The reason that the community could manage and reduce the impact of the flood disaster this time because the leader viewed that flood is a natural event and it is the problem which cannot be escaped. Besides, the community is located in the south area of the region therefore when the water flows from the north as well as all the seven districts in Anghong has been assigned as the monkey-cheek area as the bunker of the flood before it flows further to Bangkok and its neighboring provinces which is important in terms of economics. So the location and almost of the farming area of the community would encounter with flood every year. The villagers especially the old generation are familiarized and are able to adjust themselves to be with flood.

Therefore, the background on flood disaster management of the community depicts that in the past when the rainy season comes people will prepare firework, charcoal, rice, etc. to handle with flood. They would rely on themselves as much as they can. Foods for example vegetables and fish, they would flow with the water, to this point, the people are happy with the flood and they could adjust their livelihood during the flood as ordinary. According to the important leader of the community's point of view, Pranee Chanthaworn, flood is not a problem to the community and wait for the assistance from the government agency or external organization. Pranee also added her perspective on flood disaster as shown below.

In the past, flood occurs every year but it does not flood every recently. In the old day, during March and April, we prepare the firework and make charcoal. When it comes closer to July and August, we will prepare rice, we use a mortar. We will prepare efficient stuff that can be used for the entire year. Even the flood covers all area but we prepare those things and when the water comes the vegetables, fish, lotus stems, and morning glory will flow with the water. We can live our life in that conditions. We do not wait for other helps. In contrast, people today always wait for assistance. When flood occurs, people will wait for the disaster relief package and there will be topic to discuss among them about the package – why this sub-district get less than the others, where have the Chief Executive of the Sub-district Administration Organization been? But we learn the flood lesson from our ancestor, there were many big flood disaster events, we thought that why we cannot do it, we must live with it, must be happy with the flood or the water, because if we cannot live with it we would die (Pranee Chanthaworn, Angthong, personal communication, September 29, 2014).

After the flood disaster in 2006, the community leader had discussed and evaluated the flood disaster event every year. The flood disaster management of the community, the community set the Disaster Prevention and Mitigation community of Bang ta Phaen community consists of divisions-prevention and preparation division, monitoring and wanting division, public relation division, immigration division,

disaster victim support division, safety and security division, recovery division, treatment division, and coordinator or networking division. This committee uses the place of the water hyacinth basketry group as the center. The structure of the Disaster Prevention and Mitigation community of Bang Ta Phaen community is shown in Figure 4.1.

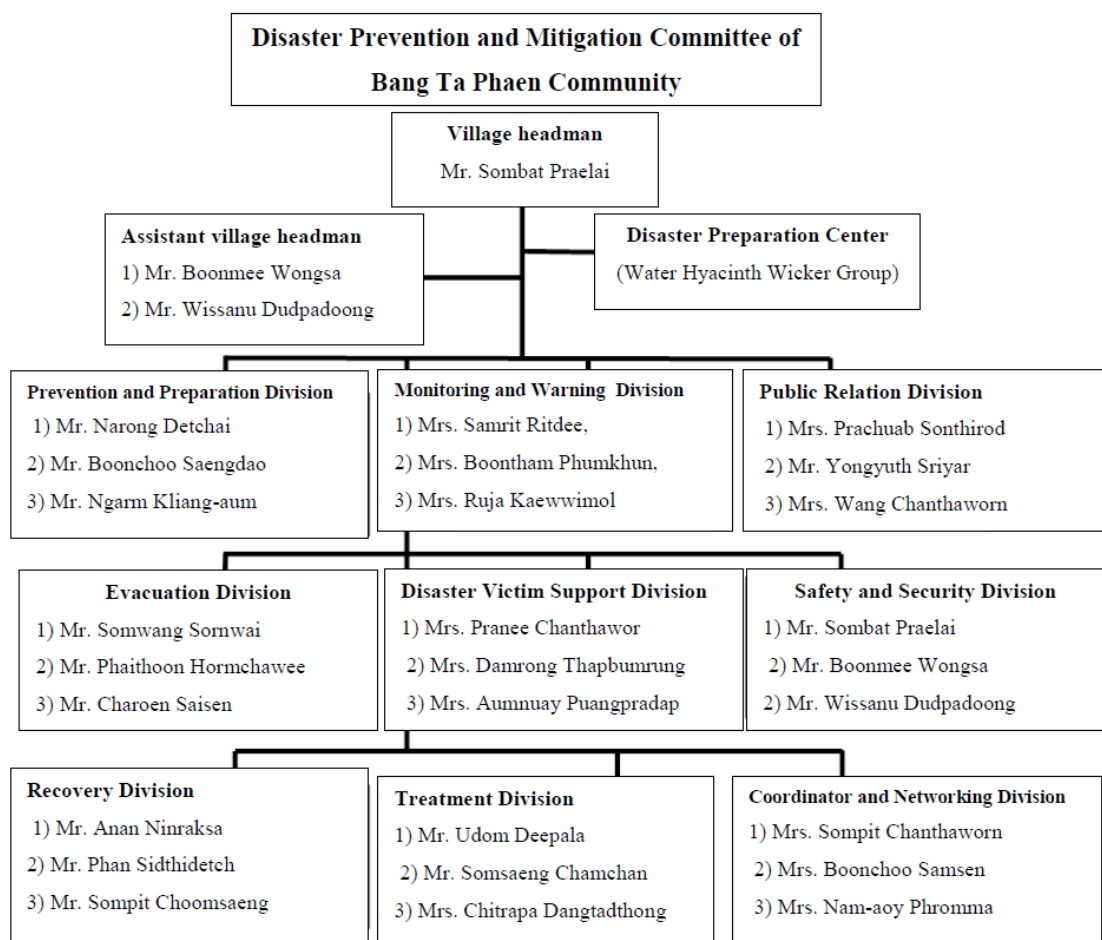


Figure 4.1 The Structure of the Disaster Prevention and Mitigation Community of Bang Ta Phaen Community

The information on the flood disaster management of Bang Ta Phaen community classified by the disaster event's periods which are before, during, and after the event reveals as follows.

4.1.1.1 Before Disaster Event

The flood disaster management at the before event period is a preparation to handle with the upcoming flood towards the community. The preparation is the following.

1) Prepare Committee/Volunteer

Based on the community leader's perspective on helping or relying on oneself as much as possible and an immediate support to be provided as to prevent a crisis damage as happened in 2006, the Disaster Prevention and Mitigation of Bang Ta Phaen had discussed and evaluated on the situation and to monitor on the current situation so that all divisions would be able to prepare to handle with the flood situation.

2) Prepare Location/Area

Preparation of the community, it is found that each family would manage their belongings in their house, keep things in the height. After finishing their own household management, people would also take care of the public area especially the learning center where is the coordination center and the place for people to stay during the flood. People would utilize the road area in front of the learning center as the temporary assembly point, they would put up the tents for the people in need.

We manage our house first. We know exactly that the water is coming but we don't know how much so that for safety we will keep the most necessary things that may be damaged from flood first. After that we will protect the public places i.e. government offices, public area for mutual utilization, etc. we take the lesson learnt from the flood in the year 2006 as our principle for public area management. The learning center and the major infrastructure are our priority because we must have water to utilize as well as we must prepare on worker for the division we set up. In case the immigration of the people is needed, they will stay here at the learning center. If there is not enough space, we will contact the district or the province to seek for the space for us. We will take care of ourselves first before asking for assistance from external organization if it is really required. (Group discussion, personal communication, September 28, 2014)

3) Prepare Information

The flood experience in 2006, the community has been extensively impacted. The community leader addressed that the problem comes from the information on flood situation the community received is only for the overall picture not an insight for a particular area. Additionally, people did not believe that the community would encounter with flood because it has not been flooded during the past decade. Therefore, the new generation has never experienced with flood in the community and they do not realize on this risk, they did not prepare to prevent from flood consequence of the crisis damage. The flood experience in 2006 makes people to emphasize more on information. They closely monitor on the flood situation every year when the rainy season comes and there is news on the flood situation. People would keep their properties in the height after 2006. The community found that the information from the media is not accurate because there was no flood in the community during 2009-2010 though the flood announcement had been made. Therefore, the community sought for information in the area by their eyes. They went to help the other communities where earlier experienced the flood. One of the members of the Sub-district Administration Organization (SAO) has described on the information approach as follows.

We will monitor year by year. In 2007, it was told that the water is coming then we will discuss about it. The natural flood is fine but we don't want the political flood. The natural flood would make few damages to our properties. We always move our properties during September and October, we don't wait for any announcement. If there is report on flood, we will prepare ourselves. We have been doing this until we get familiar with it but flood does not come during 2009-2010. But in 2011, we do not rely on the flood information unless we go to see the flood situation by our eyes. We go out and help the other communities that encountered with flood, as they are our network. We help each other, we act as the political organization but under the civil sector behalf. (A member of the SAO, Angthong, personal communication, October 12, 2014)

The way the volunteer go out to monitor the flood situation and help the other communities that earlier encountering with flood, we can see the flood situation and be able to predict on the risk to our community. These people would evaluation the situation and inform people in the community to prepare for the upcoming flood for example informing the people whose houses located on the flat land keeping their properties at the height. The people will know this communication by the wire broadcasting tower and word or mouth.

We help to spread out the flood information. We inform them that the flood is coming in our province. We will ask for volunteer to put the sand back in order to use as the bunker. If it is beyond the sand back bunker capability, we will go back and monitor the water situation day by day. (Focus group, 2014)

Flood information, we went to see with our eyes. We helped other villages, sub-districts where located on the river bank and we got the information to tell other people in our community. (Assistant to community leader, Angthong, personal communication, October 12, 2014)

4) Networking System/Coordination for Support

During the preparation period prior to the flood disaster, the community leaders will prepare on equipment to prevent and mitigate from the disaster. They will coordinate with related external organizations asking for helps such as with the Provincial Administration Organization (PAO) Angthong, Provincial Prevention and Mitigation Office requesting for the floating rooms, tents, and boats. These stuff would be prepared for the one-story household that must immigrant. “When the water comes, we will prepare the tent and toilet for the people who have to leave their houses and stay on the road. We will go to Mr.Tee (Chief Executive of PAO) and ask for these necessary things. (Pranee Chanthaworn, Angthong, personal communication, October 12, 2014)

5) Food and Necessary Items

Preparation on food and necessary items for utilization during flood event, it is found that preparation is done at the household level. Each household will prepare food, fish source, cooking oil, and vegetables. The community has

adapted after the flood in 2006. People plant vegetable in the pot for example chili, small eggplant, hot basil, sweet basil, etc. people called this plantation as “A nearby-house refrigerator”. Planting in the pot is portable, it can be moved anytime especially during the flood. About food and other necessary items, the Klongwua Community Assembly has managed the fund from the community welfare fund to supply for the food and necessary items and prepare as the disaster relief package to distribute to people during the flood. This is the primary aid and in case the assistance is delayed and does not cover. Pranee stated on the preparation as follows.

We must help ourselves first. When the water comes, we pack our stuff. We spent the money of the welfare fund on this activity about 5-6 thousand. We packed and distribute them all. (Pranee Chanthaworn, Anghong, personal communication, September 29, 2014)

4.1.1.2 During Disaster Event

Bang Ta Phaen community manages the following during the disaster event.

1) Mobilizing the Volunteer and Worker

The study discovered that during the flood volunteer and worker on disaster management of the community work according their responsibility. The disaster management committee will help people in the community based on their role and focus on the potential risk or sensitive groups i.e. the elder that live alone. A representative of the committee shared about the practice on helping people as follow. (personal communication, September 29, 2014)

When the water arrives at our community and we cannot handle it, we will help each other. We set up an urgent mitigation group. Assume that the elder lives alone in the house, we will help him/her on keeping properties. There are people stand-by at the group. The female members would help in doing lighter things but the male members would help on lifting the heavy properties or items. Volunteers, they are not only having ready to assist people, from the interview, but also setting up the guard to check the safety of the community

During the flood, when we have time we will visit houses by boat. We will help people lift the heavy things, we will monitor whether the farming tools or electronic appliances are sinked as it can be the cause of danger or accident. (Somwang, Angthong, personal communication, October 12, 2014)

During the disaster period, the community leaders not only help people in the community, they also gather people to be volunteers and the flood victim mitigation center in the province. The government agency and private agency set up the donation center. People will pack items and cook food to distribute to the people in need. Representatives from Bang Ta Phaen community also join these activities. The community leaders thought that helping other people in need in this situation is a good thing to do.

We have nothing to do during the flood, we go every day. We invite aunty Chuab, Wad, and Pai about 15 – 20 people. Whoever is free then they go. We have money to help but we help on doing activities that we can do instead. (Focus group, personal communication, October 17, 2014)

During the flood, we helped packing items donated by CP. Foods and cookers are provided, we just packed and distributed out to the people. That particular SAO may need 3,000 boxes, or 2,000 or 5,000 boxes, it depends on the number of people in need. We prepared thousand boxes a day. We gathered about 20 people from our community to help. Our community also obtained about 100 boxes of food even we did not request. People who wanted they can take it, but for the people who did not want it, they would give to the others who did not go to the center. We went to the center and packed items as we had nothing to do. We helped each other. (Pranee Chanthaworn, Angthong, personal communication, October 12, 2014)

2) Management on Disaster Relief Package/Food

The interview discovered that Bang Ta Phan community collaborated with other four communities in Klongwua sub-district on the disaster relief packages. The learning center of the community was utilized as the place to

manage and distribute the disaster relief packages. The external organizations would deliver the packages at the learning center.

During the flood we moved to here, on this road (the road in front of the learning center). It was not flood over here therefore, we use this center as the place to distribute packages. It did not flood here as I dig around. We took the water out from our basement for the whole day. We did it in 2011, therefore, we used here as the place to distribute packages for people as the road was flooded. People took the boat to pick up the packages here. We announced to the people to pick up for about five villages. There is another center at Moo 5, sometime people would go that center. (Pranee Chanthaworn, Anghong, personal communication, October 12, 2014)

The disaster relief package that has been distributed to the people in our community came from two parts including 1) from the support of the sub-district welfare fund that the community assembly of Klongwua district agreed to spend this money to supply food and necessary belongings for people in Klongwua district, the packages would be used as the primary aid for the people who are suffered from the flood and they would be distributed in case of the assistance from external organization has not yet arrived to the people in time or even in case of insufficient allocation from the province, district, or SAO and 2) the disaster relief packages from external organization which have been allocated by the province and the community obtained from the leader group who coordinated for this assistance from the organization in the province and from leaders' networks. The representatives who provided information also addressed that "people in the community would take care each other during the flood, contact the organization, seek for the disaster relief packages, or other items to give to other apart from tents and toilet" (Somwang, Anghong, personal communication, October 17, 2014)

The disaster relief packages obtained from the coordination of the community leader group, they have been taken to the disaster helping center and have been allocated according the number of households in Bang Ta Phaen community. The rest would be distributed to the other community in Klongwua

district. Assistant to the community leader (personal communication, October 12, 2014) added to this point as “we take care everyone even during the flood. The disaster relief packages that the community leader requested for the people, from many places, I could not remember the name, there are no names indicated on the packages, would have been taken here at the center. We allocated for example the community leader Pranee coordinated and received 300 set, we would keep only 150 set and the rest we would give to the other communities”.

In case the disaster relief packages or foods received are not enough for the entire households in Klongwua district, the committee of the whole five villages would manage to take turn or divided the stuff by the number of villages, then each village would prioritize to distribute to the people in need before the other group. “Sometime the distributed belongings are inadequate. We would give to those two villages first, we take turn if it could not be allocated to all at a time. If they give to us 360 packages, we divided and it would be about 70 sets for each village. So 70 sets for four villages but Keh’s village would get only 60 sets which was less than the others. There were people complained in front of the center that the packages are not cover all households as in some village there are 140 households but they received only 70 sets. We must distributed to the poor people as the priority as they are more in need that us”. (Pranee Chanthaworn, Angthong, personal communication, September 20, 2014)

When we helped to pack the food boxes which donated from CP, we brought back 100 boxes. We took turn in giving to the other villages, each village a day. Today we gave to Moo (village) 4, so Moo 5 and Moo 3 would not get the boxes. When we went to pack the food boxes, only people from Moo 1 came to help, there were only 2 people from Moo 2. When we got the food boxes we shared with others, we gave to Bo and he would distributed to the poor people behind the village by boat. We passed the rich houses, these people picked the food boxes. I don’t know why even we took the food boxes we did not keep it. (Focus group, personal communication, October 10, 2014)

At Bang Ta Phaen community, it is found that the people managed to distribute the disaster relief packages and food to the sensitive groups as priority such as the poor people, elders, or disability person. Mrs. Pranee, the member of the community leader group, shared that “we considered according to the need for example aunty Khai lives and must take care the disability person so we gave two sets as they could not help themselves as much. Some houses, there are five to six people in the family but we gave only one pack as they are able to go out and take the package or food by themselves.” Similar information that has been given by one of the participants in the focus group. “It is special as I have disable person in my house, I got two sets. The disable person would get one. My couple was sick at the time so he got one set and myself also got one.” (Focus group, personal communication, October 10, 2014)

3) Information and Public Relations System

In Bang Ta Phaen community, people know about the update on the flood through the wire broadcasting tower. The information would be about the flood situation which obtains from the province, district or SAO as well as the information on distribution of the disaster relief package, gathering people, etc.

4) Floating Toilet Management

Floating toilet management during the flood, the committee of Bang Ta Phaen would be responsible for it. They would clean it when it is full of capacity. The committee will also manage for all villages in the Klonwau sub-district as it is an agreement that the matter related to the floating toilet would be under the responsibility of the committee from Bang Ta Phaen community as they had requested from the Provincial Administration Organization and from the Disaster Prevention and Mitigation of the province as well as the management after the flood disaster event. The committee would return the floating toilets to the organization that they took them from. One of the committee members had provided opinion towards this topic as below.

When the toilet is full I must change it. It is my responsibility for all villages from Moo 1 to Moo 5 as they cannot do it. If we ignore this point, it would not good and we took the toilet ourselves we must take care of it as we are afraid

that the officers may complain if there is no good management on it. It would not be good without good management as the toilets are located on the road (the flood disaster center of the community). People travel by using this road. Without good management, if the flood comes next year we will not get the toilet to use.

Similar information from the interview of the volunteer of the community saying that “the toilets are portable and storable, if the flood comes next year we will have toilets to use. We gathered together, borrowed, and moved them here. We had never stop working and helping each other. If it is beyond our capability, we would ask for help from other community. (personal communication, October 10, 2014)

5) Coordination for Helps or Supports

During the flood, the community leader group took care of people in the community and discussed for solution. If it is beyond the capability of the people in the community, the leaders would coordinate with the external organization for help. One of the community leaders mentioned on this matter as follows.

If any house could take care of themselves, we would less focus that particular house than the others. We would focus on the houses on the flat land as it is more risky. We would help them. The welfare group would spend the welfare fund as the primary assistance. We coordinated in our community first and if we need something we would coordinate with the province led by auntie Pranee requesting for dried food and other food. People had more opportunity to meet up during the flood event but fewer when no flood as they have their own work to do. Unlike, when we encountered with flood, we would meet up more often as to seek for solution. We set the security shift during the flood. (Committee assembly, Anghong, personal communication, October 2, 2014)

4.1.1.3 After the Disaster Event

The study found that Bang Ta Phaen community has the following management plan after the disaster event.

1) Survey on Damages and Record the Evidences

After the flood, people checked for the damages on their own properties i.e. house, rice fields, or farming area, and took the photo to use as the evidence and sent to the community leader. The community leader gathered all evidences and submit to Bang Ta Phaen SAO for claiming compensation.

2) Cleaning and Recovery Houses and the Community

After the flood, but the water still remained at the lower level, people cleaned their houses as cleaning when the water still remained is easier than to do when the water has all gone as well as cleaning the public area. For some particular area or spot that the water sill remains, people used the farming pump to drain the water off. The pumps they used belong to the people in the community as waiting for the pumps or equipment supplied by the government organization may delay the cleaning activity because SAO must assist the entire area in sub-district. Therefore, it is the responsibility of the people in the community to manage by themselves first.

After the flood, we took care the community, we helped each other. People in the community helped each other first, in case it is beyond our ability, we would ask for helps from others. In this zone, there is no drain or the water way to let the water go, therefore, we used the pump that we use in our farming to drain the water off. We took care each other. The SAO said that they have the equipment but it is insufficient to let everyone borrow in the same time as SAO must take care everyone in the whole sub-district. (Somwang, personal communication, October 17, 2014)

3) Recovery on the Occupation

The majority of people are affected from the flood but different levels depending on the farming types as well as the recover duration. The participants who provided information addressed that rice farming would plan or schedule the rice famring to be harvested in September which is before the rainy season. Therefore, after the flood, the rice farmer could discuss on the new plantation which was different from the orchard famers that they were worried if they must plan

for the new plantation. One of the participants in focus group had addressed the following.

After the water has gone, we must recovery. The main thing we did is farming. If the plants died we grow the new one instead. If the plants still remain, we continue taking care them. But doing orchard takes longer duration until harvest can be done, therefore, when encountering with flooding we must count the first step again-restart the orchard process. We were hopeless as we must spend a great amount of capital, it's greater than rice farming. Therefore, the one who do orchard would be worried after the flood has gone as they must plan to recovery on the damaged part unlike the one who do rice farming as they could plan for the next farming or plantation. (Focus group, personal communication, October 10, 2014)

Similar information given by another participant who addressed that rice farming could return the outcome faster than orchard farming, it takes only four months and we can harvest. In the past, flood in 2006, the fruits in the orchard all died and it happened again in 2011. Some people give up because they are worried if the flood would come again in the future. (Focus group, personal communication, October 20, 2014)

Recovery on the occupation after the flood, according to the community's perspective, people thought that they must help each other before asking for any assistance from external organization. Even after the flood, the government sectors such the community development of the province, and agriculture office of the province, always come to help on mental recovery and provide supporting fund to purchase new seed, tree, banana tree, etc. for the community.

4) Discussion on flood disaster management of the community

Information from interview and focus group discovered that after the flood, people in Bang Ta Phaen community would discuss and summary on the flood disaster management of the community, problem, solution, and plan for the future. The community leader emphasized on participation of the people who were impacted from the flood to share on flood experience. Such problem found for

example no tent for the immigrant or insufficient drinking water. People would discuss in order to seek for solution to prevent and reduces the impact from the future flood. The community leader had reflected on this topic as follow.

We had meeting after the flood. We discussed on what happened and what we had to do with the people who had cow or buffalo, or people whose houses are located on the flat land which is lower than the water level, they must immigrate to stay on the road (the flood center of the community) but no tents for them. The fund from SML, we did not purchase the tents. I have told all the people whose houses were flooded to discuss on what they wanted to do with the SML fund. They must tell that they wanted the tent. Some people told that they wanted to make the drinking water for the community by using SML fund this year. People can drink the water, it's clean. People can take the water from the water automatic machine so the money received from the people would spend as the electricity fee and maintenance fee. So this year, we had only one tent and we had no idea if the SML fund would be supplied in the next year. The balance of the fund after spending on water machine we bought a tent, box, and farming tools. (Pranee Chanthaworn, Angthong, personal communication, September 20, 2014)

This year we prepared and supplied for the tent. Actually, in 2006, the community borrowed the fund from the involved organization. After that event, we purchased ourselves so that we can use in many purposes such as the religious ceremony or ordination ceremony. People helped on donating money to buy the tent combined with SML fund which was allocated for this purpose. (Focus group, personal communication, September 29, 2014)

People are not only discuss on the overall topics of the community, but the occupation groups also discussed on problem they experienced as well as solution to decrease the risk and damage from the flood. For example, a member of the mixed-farming group (personal communication, October 12, 014) had shared their experience from the discussion of the group as follow.

We always have discussion in our community, but we have variety of occupation and they have different opinion. For the rice farmer group planned to do new plantation and buy new seed unlike the orchard farmer group that

they still worry about the flood that may happen in the next year. We had plan on rice farming, monitored the flood, and adjusted the rice model. We must evaluation every year and harvest before the flood comes in September. Unlike, orchard farming that the new plantation required 5 years to get the production or outcome. Banana orchard could give faster return on outcome but sill depending on how much water they have.

The flood disaster management of Bang Ta Phaen community can be summarized as shown in figure 4.2

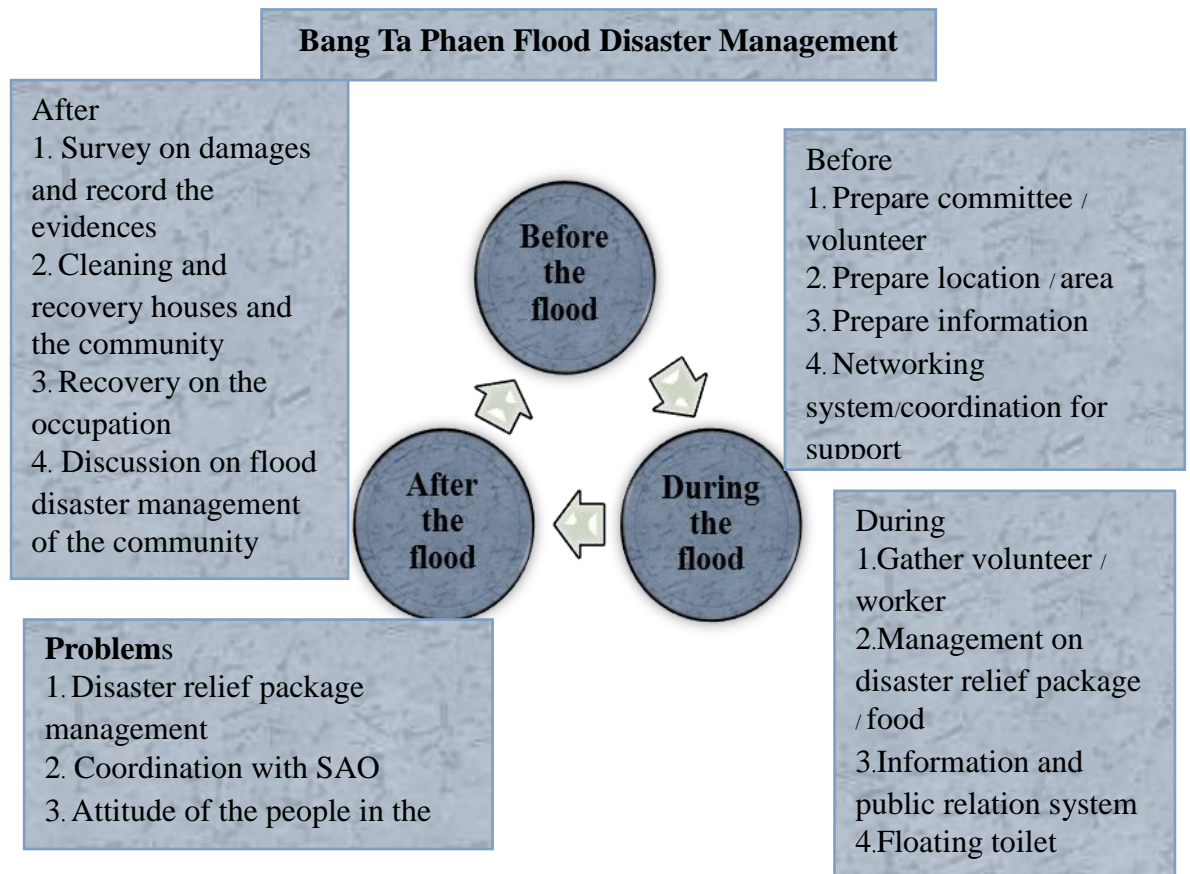


Figure 4.2 Flood Disaster Management of Bang Ta Phaen Community

4.1.2 Tha Bong Mung Community, Warinchamrap Municipality, Warinchamrap District, Ubon Ratchathani Province

The Warinchamrap municipality has a major role on being the center for disaster management and coordination with the community to prepare and better handle with the repetitively flood problem.

1) Before the Flood Event

(1) Preparation on Information

The information on flood situation came from many sources, from the municipality through the community leader, people checked by looking at the water level measurement pole and observed from the water level in Moon River, as well as from the coordination with other 13 community within the same municipality and the community on the Moon river bank in Warinchamrap district. People used the Line application on the smartphone as the tool and the channel on checking or monitoring on the flood situation. The participants in a focus group shared their experience that “we worked all together 14 communities, we passed on the information about the water level/situation from time to time. There were only Changmor and Thankonglek villages that we collaborated with the Red Cross Office, we observed the practice on disaster management.” (Focus group, personal communication, January 20, 2015)

The general information of the community will be used by the municipality on the disaster management plan both during and after the flood event. The local administration unit always has the database about the number of the population or household that are affected by the flood. Warinchamrap municipality would collaborate with the community in order to gather the most updated or current information about the number of population and household. Most of the expansion of the population in the community is in the form of extended family-there are more than one family in one household. It creates the problem on the disaster relief package and the compensation. Therefore, the municipality would request the extended family to process on and having their own house registration number in order to use for the compensation according to the official regulation.

(2) Preparation on Location/area

Preparation on location or area, after the people received the information or warning from the community leader about the flood situation that is

approaching to the community, each household would keep their properties at the height. For the household that need to immigrant, they would prepare only necessary items to use during staying at the flood center – the provided area. The community leader would coordinate with Warinchamrap municipality about the location for the immigrants. The community leader must report on the number of people and the necessary items the people need. The assembly point, as the flood center for immigrant, is the road behind the Department of Land Office of Warinchamrap next to DMart shopping center. The municipality had prepared the electricity and water. One of the participants in the focus group shared his experience that “the empty road that you see now is used as the assembly point or the temporary flood center, whoever completed their tent borrowing process, they would put up the tent in their desired area and for people who have no tent, they could use other materials such as wood to make the temporary shed.

(3) Preparation on Material/Equipment

The necessary equipment during the flood is the material to build the temporary immigrant center i.e. galvanized iron, bamboo, nail, etc. The community leader and committee would survey the need of the household and coordinate with the municipality to supply or prepare the required equipment for the people to borrow for the temporary immigrant flood center. Moreover, the municipality also prepared the portable toilet or mobile toilet for the people at the immigrant center.

(4) Networking System and Collaboration

At the preparation stage, the community leader would coordinate with related parties asking for assistance for example the Military District 22 or Saphasidhiprosong Military Camp requesting personnel to help people in moving the properties or belongings and to immigrant people or requesting for the vehicles for moving activity. In case, the community needs to ask for assistance for the organization that cannot be contacted by the community itself, the community leader would contact the Warinchamrab municipality office instead.

2) Management During the Disaster Event

When encountering with flood disaster, Tha Bong Mung community would do the followings.

(1) Management on Place to Stay and Migration

During the flood, about 70% of the entire households in Tha Bong Mung community must migrant to the immigrant center. Each household would responsible to themselves in preparing to move their belongings and pets or animals to the provided location or area. The community would borrow the vehicles from the municipality and the military camp for transferring. If the requested vehicles are delayed, people would use their individual car instead and ask their neighbor for helps or even some household may hire the people for this transferring activity. The criteria for decision making to move or migrant, people would observe from water measurement pole and the degree of the water flow. However, it is not a crisis situation, people would not migrant to the immigrant center because they are worried about their properties.

(2) Volunteer and Personnel

During the flood disaster event, the community committee and village health volunteer (VHV) had important role on monitoring the disaster situation, survey and evaluation on the risk, provide assistance in the flood area. These group of people would help people in moving their belongings to the immigrant center and coordinate with the municipality requesting for resources and other necessary things to support people during the flood and to reduce the impact from the flood. Moreover, people would set the security guard on based shift so that they would take turn in safety monitoring in the immigrant center and the community.

(3) Disaster Relief Package, Food, and Drinking Water

The Warinchamrab municipality is the center to manage the food, disaster relief package and to receive the donated things from many organizations. Allocation has done based on the household and population number database that have been done earlier or prior to the flood. There are two alternatives to allocate the donated things to the people. Firstly, to distribute according to the number of households where have been registered for the registration house number in the area. Secondly, to distribute according to the actual number of family and population who live in the area. Anyhow, selection on the allocation alternative depends on the number of donated things on hand. If there are plenty, the municipality would select the second alternative. On the other hand, if the donated thing are limited and are not

sufficient for all household, the municipality would select the first alternative by giving a coupon and let the people pick up by themselves at the center. In order to prevent misunderstanding, the municipality must inform and make understanding to all disaster victims of the community about the donated things. Likewise the participants of the focus group shared their experienced on the disaster relief package management of Warinchamrap municipality as below.

The municipality has the database and list of the population number. They classified into two options which are to distribute according to the actual households number and the population number, and to distribute according to the house registration number depending on how many of the donated things. If things are limited and do not cover for all people, the allocation would be based on house registration number but there must be information on this matter to let all people understand. If all household get the things or package, they would take the coupon and exchange at the center. People would be informed about this matter via the community leader. They work systematically and the information in the community is accurate. (Focus group, personal communication, January 21, 2015)

In case there are fewer of donated things and are unable to allocate under the two options (as mentioned above), the municipality must keep things with them. They cannot allocate to anyone even for the special group such as elders or disable person. Likewise, the people in the community would not receive anything because they don't want to have conflict within the community. One of the participants in the focus group mentioned that "if donated things are not plenty enough to distribute, allocation for one particular in need group will not applicable. We also would not receive because we are afraid having problem or conflict. We all should get such things."

The interview and focus group discovered that things that have been donated during the flood is adequate to the need as people themselves also prepared

the dried food prior to the flood. Therefore, people would take some part of the thing they have been donated to the monk at the temple.

Food and drinking water are supported by both government and private sectors. However, some of the participants addressed that something that have not been donated and insufficient. The municipality also prepared the drinking water spot inside the immigrant center.

(4) Transportation

Transportation during the flood, people used boat to travel in and out from the house and the immigrant center. Most of people have no boat, therefore they must use the public boat and pay the fee about 20-40 baht. If there are many passengers at a time, people may pay less or about 10 baht. Some people use the boat because they must go to work but most of the people travel between their houses and the immigrant center as they want to look after their houses and properties inside the house as they are worried about thief.

(5) Sanitation and Excretion Management

The interview and focus group revealed that people had problem on this topic even the municipality had already prepared the toilet at center but it is insufficient to the users number. People did not take care on cleanness or if the toilets are full of capacity, nobody informs the municipality to exchange or take them out. Some people went to use the toilets in the D-Mart shopping center instead. Some of the people still live in their houses but they cannot use the toilet at the house due to the flood. The public house unit distributed the black plastic bag to the people to put the garbage and sewage. However, it is found that some people did not use the give black plastic bag but they defecated into the water. Or people who used the given bag, they let the bags flow with the water, therefore, they got stuck at the tree or people's houses.

(6) Management on Occupation

During the flood, the income of people has decreased or someone may lost their occupation. Group of people who can continue working on their work or job are the people who own grocery shop as they could take goods to sell at the immigrant center but the income is decreased. People who sell meat, they could sell at the market of the Warinchamrap municipality. The government officer and employee

where their offices located at the location that were not impacted by the flood, this group would have no impact on income but they would have to spend more on traveling fee. On the other hand, it found that the group of unemployed people, they got the job during the flood such as work for wages i.e. transferring or moving people's belongings or properties. They could make money about 200-300 baht a day. Someone caught fish and sold, they could make money about 200-500 baht a day. Or for the people who have boat, they would transfer people to work or to visit the houses, etc. They could make money about 300-500 baht a day.

3) Management After the Disaster Event

After the water has gone until the car can travel on the road, people who stayed at the temporary immigrant center would return to their houses, check for damages, clean, fix, and transfer their belongings from the center to the house. After finishing everything on their individual house, people would help on cleaning the public area or places such as the multipurpose building, temple, school, and to remove the temporary immigrant center and return the borrowed materials and equipment to the municipality in order to reuse in the following year.

4.1.2.1 Problem or Obstacle in Disaster Management

1) Insufficient space problem due to limited free space – area with no flooding to allocate for the immigrant. Therefore, there were 14 communities and about 3,121 households were impacted. Due to the limited space, people snatched the free space under the first come first serve basis.

2) Monitoring and warning system is ineffective. No record from the water measurement pole so that people would not know the actual water level. High water level made people unable to see the water measurement pole. Also, the responsible leaders did not realize on the importance of the warning system.

3) The household and population data on people who are impacted from the flood the municipality and the community have on hand are not aligned. Therefore, some list are missing and they did not get the disaster relief package. The assistance or support during the flood situation is insufficient and uncovering.

4) Most of the households have no individual boat, therefore they must spend more on traveling fee during the flood situation. It increased the expense.

5) Shortage of food to feed the cow and buffalo. It is difficult to find food for animals as the entire area of the community was flooded.

Summary of the Flood Disaster Management of Tha Bong Mung Community is shown in figure 4.3

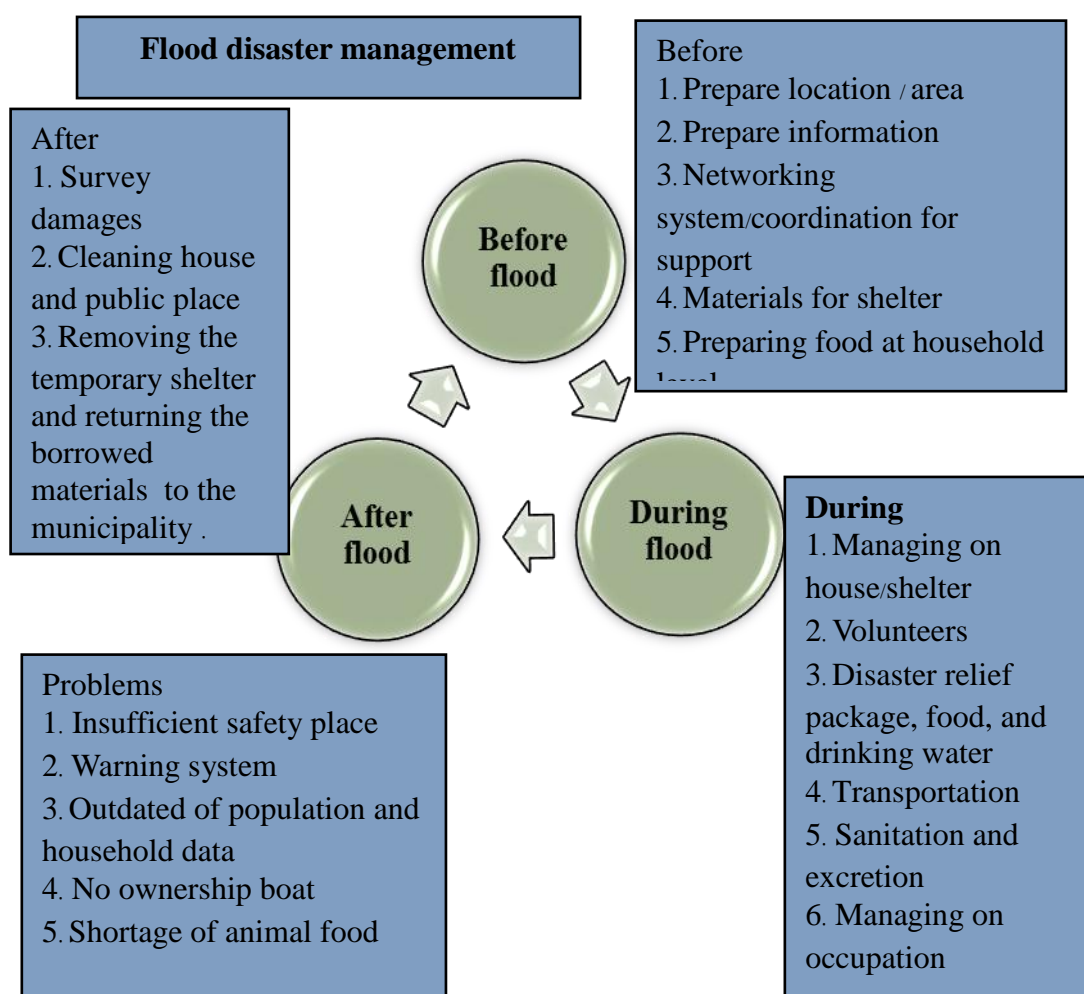


Figure 4.3 Flood Disaster Management of Tha Bong Mung Community

4.1.3 Comparative Analysis the Case Study on the Flood Disaster Management

The results from the studies on the flood disaster management of the two communities would compare the issues including the general information of the community, the pattern of disaster management of the community, and the primary actor on the disaster management of the community as follows.

4.1.3.1 General Information about the Community

The selected case studied on the flood disaster management which are Bang Ta Phaen community, Angthong and Tha Bong Mung, Ubon Ratchathani, both communities has similarities in terms of the location which is the lowland river mouth on the river bank and must support the water from the north part of the river (the beginning point the water flow to the river mouth). However, it is found that the location of the two communities are different in terms geography. Bang Ta Phaen located on the small branches canal of the Chao Praya River and are surrounded by the farming areas. The seven districts of Angthong are assigned as the monkey-cheek to support the water flowing from the north of the country to prevent the water flow into the economic areas which is Bangkok. The flood more covers the fields or farming area than people's houses. While Tha Bong Mung community located on the Moon River bank-the end of the main river of the north eastern surrounded by the urban area where is being developed from the monkey-cheek to be the commercial area and residences. The flood pattern is likely over the river bank bunker to community area of Warinchamrap and Mueng districts and later flows into the people's houses. Flood happens more frequent at Tha Bong Mung community with high water level as well as more lasting water in the community therefore, damages and impacts towards people's livelihoods are more during the flood. However, after the flood, the community could recovery and fix the house and are able to return to the ordinary. While the impact of Bang Ta Phaen where mostly impacted to the farming area such as rice farm, fruit orchard, etc. the community must take longer duration in recovery the occupation of the people.

4.1.3.2 Community Disaster Management

The results on the disaster management studies revealed that flood disaster is the problem to explicitly see areas and impacts. Flood would impact the

urban area and livelihood during the flood disaster event. The flood disaster management of both Tha Bong Mung and Bang Ta Phaen communities are shown as follows.

1) Management before the disaster event found that both communities have the following similarities.

(1) Preparation on the information about the flood situation. Bang Ta Phaen community would monitor from media and government agency in the area as well as observe the real situation by helping other community where encountering flood earlier. While Tha Bong Mung community monitors information from the government agency in the area and use of social media which is the Line application on the smartphone. Additionally, there is data gathering on number of population and household in the community in order to inform the municipality to utilize on the disaster relief package management or on other types of assistance.

(2) Preparation on location/area/or residence for immigrant-two communities had prepared on keeping belongings or properties at height particularly for the households located on the lowland area or the one that need migration in place. The number of households that required migration in Bang Ta Phaen is less than Tha Bong Mung community. Most of the households in Tha Bong Mung community must move to stay at the mitigation center. Bang Ta Phaen community could decide on the location to set up the mitigation center by themselves unlike Tha Bong Mung community that the Warinchamrap municipality would decide the location for them.

(3) Preparation on material or equipment – the studies found that Tha Bong Mung community had surveyed the need of the people on material or equipment required for building the mitigation center and informed the Warinchamrab municipality to supply for them. While Bang Ta Phaen community utilized only the tent to set up the mitigation center.

(4) Preparation on food and necessary items – households in Bangt Ta Phaen community had prepared food and necessary items to spend during the flood situation. The community leader had coordinated with the community assembly to allocate the fund and supply the dried food and other necessary items in

order to make the disaster relief package and distribute to the people. While the preparation of Tha Bong Mung community had prepared only at the household level which was the preparation on the dried food to spend during the flood.

(5) Coordination for support or assistance-Bangtapan community has coordinated with the organization at the provincial level which are the SAO and the Mitigation Office of Angthong requesting for the floating or portable toilet. While Tha Bong Mung community has coordinated with the municipality and the Military District 22 requesting for the assistance on moving or transferring people from their residences the mitigation center. The provision on the toilet or black plastic bag to put on the trash or sewerage (shit) are under the responsibility of the municipality and the local health center.

(6) Preparation on volunteer and personnel-only at Bang Ta Phaen community where has explicit management roles according to the structure of the Disaster Prevention and Mitigation Committee of the community.

2) Management during the disaster event-both Tha Bong Mung and Bang Ta Phaen communities had similarities in terms of disaster management as follows.

(1) Disaster relief package management-Bang Ta Phaen community managed by the community leader. He was responsible on allocation and distribution to the people. The disable people were the first priority to receive the package. While Tha Bong Mung community, the municipality was the responsible party in distribution the package to the people according to the database of the community i.e. number of household and number of population. The assistance and disaster relief package allocation and distribution would be managed on the adequate and coverage to the number of people or household basis. Therefore, if there is insufficient packages to be allocated, people would not accept to prevent conflict that might happen within the community.

(2) Portable toilet and sanitation concerns management-Bang Ta Phaen, the committee in this community was the main responsible group to manage on requesting for the toilet to use during the flood, not only for Bang Ta Phaen but also in other communities within the same sub-district. Tha Bong Mung, the municipality was responsible to provide the temporary toilet for the people at the

mitigation center. And the local health unit in the community was responsible for distribution the black plastic bag to the people who still lived in their houses. However, it was found that there was no proper management system after use as the people disposed and left the bag onto the flowing water during the flood.

The differences on the disaster management during the disaster event or during the flood of Bang Ta Phaen and Tha Bong Mung communities are as follows.

(1) Temporary mitigation center and migration management- Tha Bong Mung community, people in this community evaluated the situation by observing the water flow if it was at the crisis situation then people would move out to stay at the mitigation center and people helped each other for migration or some family may hire someone on transferring or moving. Management within the migration center, the households that need to be moved to the mitigation center had prepared and borrowed the necessary materials or equipment from the municipality, reserved the area, and constructed the camp site prior to the flood. On the other hand, Bang Ta Phaen community, most of the people were able to stay in their households. Only the minor group of people that need to be moved to the mitigation center where located on the road in front of the leaning center of the community therefore, the management would be held within the community; people helped each other on moving or transferring belongings or even move the properties to be kept at the height.

(2) Transportation management during the flood- Tha Bong Mung, boat was the main vehicle utilized during the flood. People traveled by boat from the house to the officer or traveled back and forth from their houses and the mitigation center. Hence, most households have no individual boat therefore, they must use the public boat consequence of an increasing on travel expense.

(3) Management on occupation- Tha Bong Mung, majority of people work for wages (work upon hiring) therefore, they lost their job during the flood, however they could spend this time to make money for example someone was hired to move properties, someone caught fish and sell to other people, and someone used the boat and carried people around, etc. On the other hand, Ban Ta Phaen community, there was a management on volunteer and personnel which was different

from Tha Bong Mung community. The volunteer had been prepared to promptly assist households that need helps and people also set up the shift for safety and security purposes. People took turn in monitoring safety of the community. People who were not assigned any particular role, especially females, would gather together and helped on preparing food and the disaster relief packages at the mitigation center in the province. People in the community were informed to pick up the package or other news or necessary information from the community or announcement via the wire broadcasting tower.

3) Management after the flood event-both Tha Bong Mung and Bang Ta Phaen communities have common management for example once the water level decreased at the level that people could transport around, people would return to their houses and check for damages occurred as well as to record or take photo as the evidence in order to use under claiming process with the involved government organization. Moreover, people cleaned the houses and move the belongings or properties from the mitigation center to their own residences. After that they gathered and helped each other on cleaning the public area i.e. temple, school, the mitigation center, etc. and returned the borrowed material or equipment to the municipality.

Regarding the occupation recovery, as the majority of the people in Bang Ta Phaen are farmers, they were affected from the flood. After the flood, rice farming group would discussed on the next or new plantation unlike the orchard farming group i.e. fruits orchard (banana), flower orchard, etc., as this group had greater impact from the flood, they spent longer duration in recover. The studies revealed that this group may need over one year to harvest their production. Moreover, the explicit difference of Bang Ta Phaen community is the review on the flood disaster management of the community in order to make a better plan for the future. For example, there was the proposal on purchasing tents to utilize and support for households that need to migrate from their residences and to allocate the SML fund to produce drinking water to prevent the shortage of drinking water during the flood.

Table 4.1 Comparison on Flood Disaster Management of Bang Ta Phaen and Tha Bong Mung Communities

Period of the Flood Disaster Management	Bang Ta Phaen Community	Tha Bong Mung Community
Before flood disaster event	<ol style="list-style-type: none"> 1. Preparation on volunteer and personnel where role of responsibilities are classified according to the structure of the disaster management committee 2. Preparation on information or necessary data i.e. number of population and household and news related to the flood situation 3. Preparation on location to set up the mitigation center which the community can make decision by their own 4. Preparation on food and necessary items to spend during the flood for the household and community 5. Coordinate for support or assistance from external organizations i.e. Provincial Administration Organization, Disaster 	<ol style="list-style-type: none"> 1. The community committee and the Village Health Volunteer (VHV) are the main responsible group to ensure the promptness of the people to handle with the flood 2. Preparation on database to support the disaster management i.e. number of population, household, and update news on flood situation 3. Preparation on location to set up the mitigation center, the Warinchamarap municipality would assign the location for setting up the center 4. Preparation on food and necessary items to spend during the flood for the household 5. Coordination for support or assistance on provision of the material or

Table 4.1 (Continued)

Period of the Flood Disaster Management	Bang Ta Phaen Community	Tha Bong Mung Community
	Prevention and Mitigation Office of the province, etc. requesting for tents, floating or portable toilet, etc.	equipment for the temporary mitigation center construction
During the flood disaster event	1. Disaster relief package /food management done by community 2. Inform news or flood situation through the use of wire broadcasting tower 3. Volunteer and personnel mobilization 4. Toilet and sanitation management 5.Coordination for assistance and support from external organization	1. Disaster relief package / food/ drinking water / done by municipality 2. Residence/ migration management 3.Volunteer and personnel mobilization 4.Transportation 5. Sanitation management 6.Occupation management
After the flood disaster event	1.Check damages occurred and record the evidence 2.Cleaning and recover the household and community 3. Recovery on occupation 4. Review the disaster experience	1.Check damages occurred and record the evidence 2. Cleaning the household and the public area 3. Unbuilt mitigation center and return material and equipment

Table 4.1 (Continued)

Period of the Flood Disaster Management	Bang Ta Phaen Community	Tha Bong Mung Community
Problem or obstacle on flood disaster management	1. Disaster relief package management 2. Coordination with the local administration organization 3. Attitude of the people in the community	1. Mitigation center has limited space – inadequate area to support immigrant 2. Monitoring and warning systems are ineffective 3. Data of the number of population and household between community and municipality are not aligned 4. Traveling during the flood as most household have no individual boat 5. Food shortage for feeding animals

4.2 Drought Disaster Management

Drought disaster refers to the condition where water shortage has been happening in a particular area for a long duration and affects the community (Tavida Kamonvej, 2011). Most of drought occurs due to rain shortage, and delayed rain in the rainy season from June to July. Most areas that have direct impact from drought disaster are in the north eastern area. Drought disaster in Thailand usually impacts farming activities as a consequence of water shortage such as growing plants, lower quantity and quality of production as well as selling prices. Therefore, it affects farmers who often migrate to work outside the community. In addition, the quality of life of the people also decreases, and people compete with each other for water as they have inadequate water for household and farming activities.

In the study of drought disaster in Thailand, a framework for risk management in public disasters has been employed which classifies its management into three stages; the pre-disaster period, during the disaster, and after the disaster. The researcher employed the framework as the guideline to present the results of this study.

4.2.1 Drought Disaster Management in the Limthong Community, Nongbote Sub-District, Nangrong District, Burirum Province

Before 2005, the Limthong community encountered the water shortages both for household consumption and farming activities. Both documentary research and group discussions revealed that people solved the water shortage problems for both household consumption and farming activities by mainly depending on government policy. The community leader would send a formal letter seeking assistance from organizations such as the Subdistrict Administration Organization (SAO), district, or province. The Department of Rural Development (DRD) distributed big cement water jars to the people to store rain water to use during the summer season. The DRD also supported the fund to build cement tanks in the community. Moreover, the Department of Groundwater Resources also assessed the need to build an artesian well. During the summer season, the government and military sectors took water to the people for household use. Additionally, a water supply tower and an artesian well were constructed in the community. These solutions seem to mitigate the impact of the problem that people encounter in the summer season.

In regard to water shortage solutions for farming activities, it was found that there are many organizations that took the problem into account. Organizations provided funds to construct the basic infrastructure for example the construction of the Salao reservoir, ponds in the farming fields, roads, the Green E-Sarn canal, etc. The main organizations that play important roles are the Department of Irrigation who constructed the reservoir to store water from the Lummas (Lum Plaimat) watercourse, which is the main watercourse flowing through Nongbote sub-district and is located on the flat land below the Limthong community. The Lum Plaimat reservoir cannot store much water but allows water to flow through the community while the old watercourse is not in good condition and is unable to store water to use throughout the

summer. Regarding the opinion of the data providers, the projects that originated from government organizations are water shortage solutions for the community where the decision of these organizations were made without taking any people's opinion into account. They did not let people explain the problems or the community needs. Therefore, such projects were unable to solve the problem or meet community needs. People also did not have any accountability or ownership of the constructions made by government organizations and they were overlooked. However, people still need rain water for their farming in the 3,700 rai as there are no reservoirs or canals. Rice farmers have to take the risk on delayed-rain and water storage during the summer every year.

The impacts of the drought problem that people encounter is having inadequate rice to consume throughout the year; losses and debts as people borrowed money as the capital in farming but rice production was less than 200 liters (1 unit = 20 liters, data given as 10 units) per rai. Moreover, people could not grow any plants for household consumption as there was not enough water. One of the participants in the group discussion shared their experience of this problem stating that "in the old days, we could not grow any plants because if we grew plants, we would not have enough water to drink or use in our households so we had to seek items in the forest or buy the things that we wanted". Therefore, water shortage causes increases in the cost of living and it increased people's debts. Moreover, another impact of the drought problem was that people left the community to work and left their children with their grandparents, who are old. One of the water management committee members stated the following:

I live in Burirum. I moved here in 1989. The condition of the environment here is that in general, drought is natural. After harvest, we go to work outside the community, work for wages e.g. construction, cutting sugar cane, etc. We do everything, wherever there are jobs. There are only children and elders in the community. Some of them do not want to work outside the community so they work at home. (Uncle Mao, Buriram, personal communication, August 29, 2016)

Apart from the delayed-rain and water shortage in the summer, during the raining season from September to October the community encounters sudden floods. However, this flood moves quickly to the lower land because the landscape of Limthong village is a slope made of sandy soil, and the community has no way to store water. Therefore, water shortage is still a problem for the community. Figure 4.4 shows the differences in the farming areas in the summer and the rainy season.



Figure 4.4 Drought and Flood Situations in Nongbote Sub-District, Nangrong District, Buriram Province

4.2.1.1 Development of a Framework for Community Drought Management

The interviews and group discussions revealed that ideas about solutions to the community drought problem were first presented in 2004-2005 because the community encountered a drought crisis. The community leader, Mrs. Sanit Thipnangrong or Na (aunty) Noi, stated that in the past, people in the community had the opportunity to learn and develop many things such as learning

about farming, growing corn, feeding fish, making fertilizer, household accounting, planning for farming, learning about new technology, etc. Moreover, many problems of the community have been solved but they were short term solutions. Yet, there is still the question “why do people still have problems regarding debts, occupations, and income and problems with the quality of life have not yet been resolved. To solve problems about occupation, the priority is to have water but where can we get it? As I remembered in the old days during grandfather or grandmother’s days, this community had no water.” (Aunty Noi, Buriram, personal communication, September 29, 2016)

Later, Na Noi took her questions to discuss with other community leaders and they made a mutual decision to resolve the water shortage problems of the community. The resolution procedure of the Limthong community was as follows:

4.2.1.2 The Drought Management by the Communities of Ban Limthong

The communities discussed and summarized major problems affecting their living which was the shortage of water for household consumption and for their agriculture. The information about water sources and its state of problems were shown in table 4.2.

Table 4.2 Information about Water Sources for Community Consumption, Water for Agriculture and State of Problems

Sources of Water supply	Details	The state of Problem
1. Lum Plai mat	1. Lum Plaimat was situated about 3 k.m. south of Ban Lim Thong. 2. In B.E. 2000, the rural development agency dredged the 430 meter overflow with 49,257 cubic meter storage capacity.	1. Baan Lim Thong is located on the higher level above the Lum Plaimat. It was difficult to pull the water for agriculture. 2. The Watergate was lower than the agricultural area. The villagers had relatively little benefit.

Table 4.2 (Continued)

Sources of Water supply	Details	The state of Problem
	<p>3. The average annual volume of natural stream flow was 487.65 million cubic meter, 254.98 million cubic meter (52.3 per cent of the average annual water volume) during rainy season (May-October) and 232.67 million cubic meter (47.7 per cent of the average annual water volume) during dry season.</p>	<p>3. The pump must be used to pull water from the Lum Plaimat. It was a waste of oil, and the drought crisis may lead to conflicts over water among people.</p> <p>4. In dry season, the level water in the Lum Plaimat was too shallow to accessible. In flood season, water in the Lumplaimas had overflowed and flooded the paddy area. There was no water storage area for the shortage or excess water duration.</p>
2. Irrigation canals	<p>1. The ditches were 3-5 meter width and 1.5 meter deep. There were 3 ditches, for instance:</p> <p>2. The first ditch is about 6-7 km. on the way from Tung Sa Duang to Kham village.</p> <p>3. The second one is located between Bung Ta Sing to the road to Chumsang-Lim Thong.</p> <p>4. The third one is about 6-7 km on the way from Baan Sa Lao to Baan Nong Ta Kian</p>	<p>1. They could storage water over a month. Then, it was dried after the harvesting season.</p> <p>2. The canal lines were deteriorated.</p> <p>3. There were no connection or water distribution systems.</p> <p>4. The canals were shallow and there were a lot of sediments.</p>

Table 4.2 (Continued)

Sources of Water supply	Details	The state of Problem
3. Ban Sa Lao Dike	<ol style="list-style-type: none"> 1. It was built by the Royal Irrigation Department in 2001. 2. The reservoir covered 43,200 square meters with 4 meter deep and 216,000 cubic meter storage capacity. 3. The beneficial areas were 1,350 rai. 	<ol style="list-style-type: none"> 1. The 3,800 rais of the agricultural areas in the communities on Baan Lim Thong side were benefited quite little because the reservoir and watergate was built inappropriately. In additions, the communities were located on the higher level of the reservoir. 2. The ridge of the dike was steep. The villagers faced difficulty in pumping the water and wasted a lot of oil. 3. It was lack of maintenance and attendance.
4. Nong Thong Lim swamp	<ol style="list-style-type: none"> 1. The swamp is covered 42,000 square meters, about 3 meter depth, 126,000 million cubic meter storage capacity. 2. People in the communities has used for consumption since ancient time. 3. It is located by the Nong Thong Lim temple. There was water all year round. 	<ol style="list-style-type: none"> 1. It was shallow caused a lot of sediments. There was no dredging and the water was turbid. 2. The weeds such as water hyacinth, incense burner grass, and thatched were plentiful. 3. On the west, there was erosion on the edge of the pond. 4. Some parts of its bank were damaged from careless water pumping.

Table 4.2 (Continued)

Sources of Water supply	Details	The state of Problem
5. Groundwater well	<p>1. There were 10 wells, 6 handling wells-1 could not work and 4 electrical pumping wells-1 was located in front of Auntly Noi's house, 1 was beside to the school, and 2 in Nong Thong Lim temple.</p> <p>2. The wells were about 40-70 meter depth.</p> <p>3. The water was clear and available all the year.</p>	<p>1. The water supply was insufficient to all household in the village. So the household was divided into groups using water from wells nearby them.</p> <p>2. The water from this wells could not be used for consumption because there was no water quality testing.</p>
6. The village water system	<p>1. The village water system was constructed by Department of Mineral Resource to pump groundwater up to a high tower. The high tower water supply system was constructed by the Department of Mineral Resources in 1996, mainly for the consumption.</p> <p>2. The water tank was 25 meter tall-using pumping system to store water in the high tower and employing the gravity to distribute the water to each household.</p>	<p>1. The water was turbid and sometimes was rusty. There was no water quality testing.</p> <p>2. The height of the water storage tower cost a lot of oil expenses for the water distribution to households.</p> <p>3. The water distribution was insufficient for need of people in the 2 villages, taking turn using water—Baan Thong Lim turn during 6.00 a.m. to 6 p.m. and Baan Lim Thong during 6 p.m. to 6 a.m.</p>

Table 4.2 (Continued)

Sources of Water supply	Details	The state of Problem
7. Rain	1. The total rainfalls since the beginning of the year in Nangrong district, Burirum province compared between 2005-2007 were: 1,121.80 mm. in the year B.E. 2548; 1,145.90 mm. in 2006; 1,370.70 mm. in 2007.	1. There was no rainfall during June to August every year and during rainy season water from the west of the village flooded the agricultural areas every year. 2. Rainwater storage tanks of each household were less and rarely cleaned. 3. Volume of rainwater storage were less and not available throughout the dry season.

Source: The Hydro and Agro Informatics Institute, 2008.

According to the shortage of water supply for consumption and agriculture, the communities followed the below methods to deal with the problems.

1) Management of Community Water Consumption

In Ban Limthong, one of water-related problems was water for household consumption. A previous community water system was constructed by the Department of Mineral Resources to pump groundwater to the 25 meter-high tower and forward it for households of Baan Limthong and Baan Thong Lim. It was situated in Nong Lim Thong temple since 1996. The problem of the community water system was a little volume of the groundwater that was not sufficient for household in the 2 communities. Also, the use of electric pump was very costly. The water was not of good quality. It was cloudy and contained a lot of sediment. Moreover, Baan Limthong and Baan Thong Lim took turns using the water. The duration of the rotation was as follows.

In Baan Nong Thong Lim, 80 households could use water from 6 a.m. to 6 p.m. and 60 households in Baan Limhong could use from 6 p.m. to 6 a.m. in the evening. This caused a heavy work load of the electric pump. In addition, the water did not meet the needs of the communities. In case there was a special occasion in one of households i.e., wedding ceremony, ordination ceremony, or a funeral, the others were sacrificed to the household with enough water.

From the community meetings on the scarcity of water supply in 2005, the communities tried to be self-reliant in coping with the problem. To have sufficient information for making choices to overcome the problem of water for consumption the community leaders started to survey the water needs of all 230 households in Nong Thong Lim and Baan Lim Thong. Based on the data, they summarized the problems and investigated the water management by learning about other types of water systems. The community leaders were supervised by the Phutthaisong CBIRD center, expertise in constructing different types of community water systems to many villages in the Phutthaisong district. These community leaders were active learning from other experiences including Sa Bua village, Phuthaisong district, Burirum and Baan Prathay, Prathay district, Nakornratchasima province. Both villages had constructed the tank farm water supply system. The communities got useful knowledge to develop their ideas.

However, after the field trips and leaders of Baan Lim Thong discussed, and also they had analysis on the needs and appropriateness of their geography agreed that the Phuthaisong water supply system did not suit their needs and the geographical area of their community as the problems of the ground water. The Hydro and Agro Informatics Institute-HAII (2008) which had surveyed water resources and created the design with the communities suggested that rebuilding the community water system they could use the water from Nong Thong Lim swamp, where households traditionally shared. Therefore, the new community water system used the raw water from Non Thong Lim. The following plan and design were done accordingly.

The Tank Farm was a 3 meter high and contained in 9 tanks. The system included filter systems (3 tanks) and clear water storage (6 tanks). The alum and chlorine filter system was connected to the former irrigation supply system in order to distribute to every household.

After summarizing their operation, the community proposed the project for consulting the engineers of the Phutthaisong CBIRD center. The Coca Cola foundation (Thailand) saw the community project and provided a support of 250,000 baht for the community water system as it suited their goal in providing supports to the villagers who had their own ways to overcome the problem and water management.

The community water system was constructed in July 2006 by villagers from both communities with the monks in the Nong Thong Lim temple. They built the tanks and dug the pipelines connecting to the irrigation supply system in the temple. At present the tank farm water system has a capacity to distribute the water to all household and all the day. The villagers established a water supply fund and managed it by themselves, without local administrative organization. The water user account was created and collected 6 baht per unit for fee of the water use in order to be the fund for the system maintenance. There were staffs in charge of clearing sediments from the tanks. Also there was the board of water system committee to manage sufficiently the water distribution to households. In addition, the committee could allocate the income from the water bills to support other public activities in the community as one of the leaders told about the community water system fund as follows.

The villagers have self-managed the community water system fund. Unlike other communities, we did not allow the SAO to manage the fund. We collected the fee of use water and spent some money on fixing/replacing the defective equipment. It was sometimes spent on the community development tasks. We managed them by ourselves and did not expect the annual budget for SAO like other communities. (Teacher Pum, Buriram, personal communication, August 22, 2016)

The collaborative action of villagers in the community made them not only be able to deal with the problem of water for household consumption but also learn the major lessons from being self-reliance, e.g., villagers were developed-having system thinking, collaborative action and enhancing community participation. In

addition, villagers started to cope with a problem by themselves, did not wait for any sectors to help and support. The community had learning and confidence to make change to the communities in other issues.

2) Agricultural Water Management

Concept of water management for agricultural use aimed to solve problems of career of people in the community. It started with the query, “where was the water from”. Ms. Sanit discussed the issue with other community members as she believed that if there was water the community would overcome the career and life problems. In routing meetings the community leaders discussed the community problems. Late of the year 2005, the community faced severe drought. The leaders discussed the disaster and realized that most of the SAO budgets were mainly for the development of infrastructure and road construction. One of the leaders initiatively demanded the action to solve the drought. Mr. Wang Taweechad recalled that “back then this community did not think about working on water resource management because we preferred building routes. It was because the community main road was dirt, plenty of holes and bumpy. Thus, we needed the road for a more convenient transportation. One day Aunty Noi wanted to work on the water and started talking with 3 villagers-asking how we could do to solve the water problems” (personal communication, August 22, 2016). Then the topic was discussed in the community forum to encourage the recognition of the common problem. There were 5-6 people who had the common interest. Together they planned to cope with water for agriculture use. The process of the community problem-solving was below.

(1) Collecting Data and Seeking Water Resources

The community thought that to solve the problem they should begin with viewing the problem in the area-to learn about our own area by surveying and looking for answers to the inquire about accessible water resources, water storage area, how to access it. The leader team did walking survey the water way and learned from elder people in the community that there was an ancient water way. They explored, collected data and drew maps of the water ways and resources. Meanwhile, Dr. Royon Chitradon from the Hydro and Agro Informatics Institute or the Hydro Institute who was conducting the community ICT center and training the youths in reading the GPS coordinates and utility of satellite imagery saw people in the

community discussed the water issue and their intention to deal with it. He decided to be a consultant and introduced such new technology as the high quality satellite imagery map “IKONOS” in the survey and the GPS coordinate reading in the surveys. The community spent 8 months-4-5 explorations during dry and rainy season. A member of the water committees told about her experience in the exploration as follows.

Initially, we walked and collected data without any map or GPS. We looked for the water resources that we could access. We explored it on the way to Chumsang sub-district where there was a vast water reservoir. The community thought that we would dig a ditch for the water flow down to our community. After the walk, each day we shared the data and informed Dr. Royon. He then introduced the explorers the map. The second walking we plotted the coordinates, point by point we plotted everyone’s paddy field we passed by. We reported the plotted coordinates to the Hydro Institute. The coordinates provided us the height and the inaccessible water. However, we did need the water. We thought stubbornly that it could be if we dug deeper. At that time we were facing the draught for both consumption and use. For drinking water, the school was more in need. (A member of the water committee, Buriram, personal communication, August 28, 2016)



Figure 4.5 The Survey and Data Collection on the Community Water Resources.

(2) Planning and budget to Solve the Drought Problem of Community

The community has set up a community water management committee and took surveyed data to write project for proposing the budget of agency. Starting from proposing the project to Nong Bote Sub-district Administration Organization and the royal Irrigation Department but both agencies have no budget, so community leader decided to do research to get more detailed information to propose to the Water Resources Region 5 which reported on finding solutions to water shortages in the community. There is area information, Water Requirements Information and solutions based on the way people think. The community required to manage as follows: 1) The project of digging Canal, distance 3.6 km from Lam Mas. 2) Find additional reservoirs as The Monkey Cheek 3) Improve the effectiveness of canal, Pipes, and dam. 4) Make a contribution to the management of community water resources to be concrete and strong.

One of the community leaders told about the community research that " doing research for the community know that in the districts of Nangrong and Nong bhoth have rain but the community does not have water enough because there is

no water storage. Thus, we came to talk that if we dig a canal, the community must have a monkey cheeks to collect water. So we have the royal initiative to use". (personal communication, August 22, 2016)

Digging the canal to bring water to the community must pass through the villagers' fields. So Community leaders asked for land donations. In addition to dig the canal then donate to monkey cheek also. The Monkey Cheek Community is funded by the Coca-Cola Foundation. Donated land is 14 rai, can spread seven monkey cheek ponds. The principle in managing monkey cheek ponds is also owned by the land owner but water is common resources for members of the community. One of the community leaders recalled about donating land to dig a canal and making that monkey cheeks.

It was difficult to ask for land because the lands' owner reject to donate but we try to discuss the benefit will be in the future. If you donate not only you will get merit but also you will get water to for agricultural use. So They agree with that but below the conditions as a can of long bean seed (200 bath) after that we submitted the research to Department of Water Resources at Korat , they said they will help but please go back and submit to Buriram again. (Aunt Noi, Buriram, personal communication, August 20, 2016)

Community representatives brought the project to the Royal Irrigation office at Buriram province which supported budget from the CEO Governor. Dig the canal from Lum Plaimat for distance 3.6 kilometres. The community has been using the period from data collection until the project has been approved for a total of 2 years. A Community leader told on an experience in proposing for budget from government agencies that "if we propose a project and not follow it, then we will not get it because the government agencies often changes, so we make 2 rounds, 3 rounds to follow up the project. The government officer told that there was not our project. Then we went to the governor, he said if the community is sure, he will return the project with showing a blueprint project and said that there is only the project of Nongkham. We opened page 3 of the blueprint, we found our community pictures and told that this is our project, so the governor

consent and return the project to dig canal 3.6 km. (Uncle Mao, Buriram, personal communication, August 22, 2016)

A project of community planning and community involvement was completed in May 2007. The output was 3.637 km in length, average depth of 3 meters. There are villagers who can benefit from the canal digging project, villagers from both Ban Lim Thong and neighboring villages. Covering 3,800 rai, totaling 1,036 households in 3 subdistricts, 11 villages such as Choomsang subdistrict: Ban Sela and Ban Choomsang, Nongboth subdistrict: Ban Kogpluang, Ban Limthong, Ban Nongthonglim, Ban Nonsrisook, Ban Thaithong and Ban Srakham and Thungsangthong subdistrict: Ban Nongmama, Ban Nongkong and Ban Nongbua. The seven monkey cheek pools were excavated in May 2007 and completed in June 2007. The monkey cheek pools covered 14 rais can increase the volume of water 43 percent, which has arable land that can be used up to 500 rais of land area.

(3) Community Water Management;

Community projects are completed during the rainy season and the flood season. Community faced the problem that is the canal of the community became a canal for flood. That is when the water is full of canals, it will flow out and then flow back to the canal dam because the canal has no water barrier. Overflowing and flowing back to the original, instead of flowing into the agricultural area of the community of Limthong. Thus, the community water management committee then reviewed the lessons and solved the problems by putting pipes into the agricultural area of the villagers. And do dam in the canal at intervals to catch water as community called “Monkey cheek in the canal”. The community water management committee told about their lesson as follows.

At first, the canal did not have water barrier water, canal full of water, but the canal received water from the top and received rainwater for 10 percent. Remainder flowed back to the original. Then the water from the community flowed to another. A year later, when we know the problem, called the main board to discuss. The board is the owner of the field that is adjacent to the canal. Why the Seven Monkey cheek owner’s select the lands’ owner to the committee because the lands’ owners know the entrance of water and the

headman of a village or village headman as advisor and working group 15 people come to talk, how to solve and plan together. (personal communication, August 22, 2016)

Currently, the canal of the community can keep water full. The area of 25 rais and 121,000 cubic meters of water. The canal is a reservoir for the dry season for planting crops and the area for keeping water in flood season in the west of Ban Khok Phong, which helps to alleviate the flood problem.

The community water committee has worked together to plan and implement the water canal. Digging The Monkey Cheek is the conceptual of Water storage network. In the first year of 2007, the community has made seven excavation funds, a large monkey pool to add water storage with canal, Villagers call these pools "monkey mother" funded by the Coca-Cola Foundation of Thailand and landowners donate land to use as a public water source. The community has ideas and planned to allocate space and take care of the water resources of the community that is Agriculture around the pool and prepare garden for vetiver grass and tree, used for planting around the canal to seize the bank of the river bank not to collapse, reduce evaporation of water and increase the moisture in the ground.

Data from the interviews and group discussions revealed that the community's monkey mother pool could extract excess water from canals to remote area by depending on coil canal to be the connector to keep in pond that called "Monkey child". The foundation of Witeswattana supported the budget in 2008, to excavate 10 monkey children ponds, and sub-monkey children ponds send the water to the farm as far as possible.

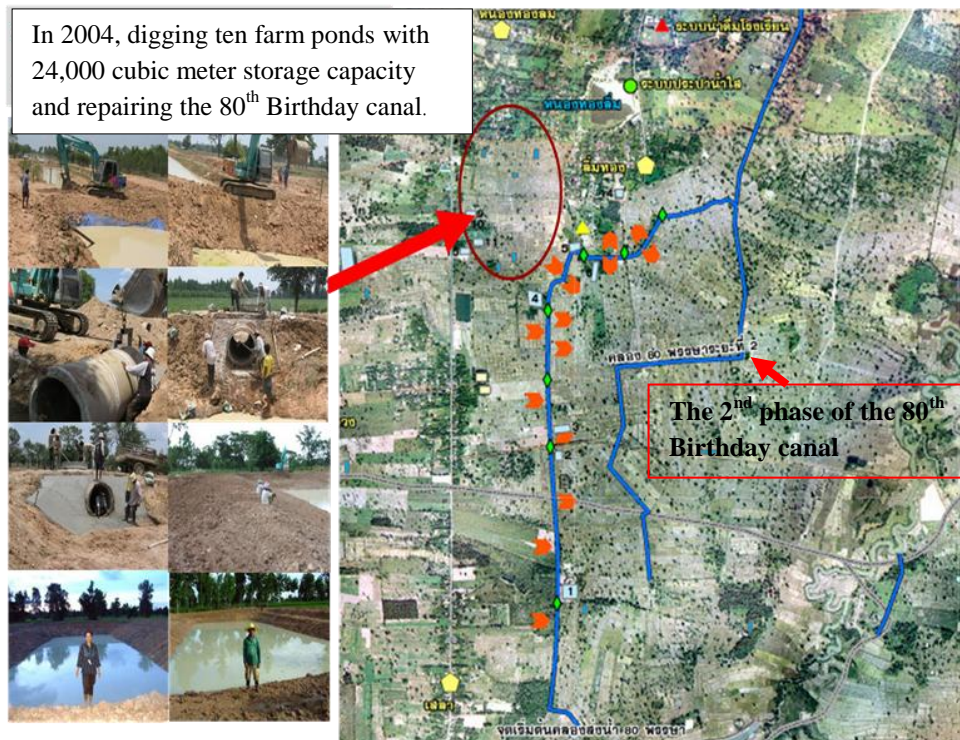


Figure 4.6 Map of the Farm Pond, Called "Look Ling"

(4) The Effects of Water Management to Solve the Drought Problem of the Community.

The efforts of the community leaders to resolve the water problem of the community have resulted in the following major changes.

1. Limthong community and the near-by community have been able to resolve the drought and flood problems since 2007. There was inadequate water for household consumption and farming.

2. The community leaders and people in the Limthong community rotate crop planting throughout the year. Therefore, people have more income and there were 31 workers returning from outside the community who worked on the farms.

3. The community leader has transmitted knowledge and conducted learning processes for members such as for household accounting, planning for farming, accounting for planting etc. The study discovered the following: "When water management was implemented, the biggest change was in water availability.

Previously, when rice growing finished, the drought came, but now we have plenty of water to use throughout the year. Even though we had water, we were unable to use it throughout the year. Therefore, when we grew rice, it died. Now we grew vegetables. In the past, we bought vegetables. For me, I make a plan every year to determine in which month I can grow rice. I make it like a calendar. At the beginning, there were officers who gathered data and provided capital fund. Young people also made a calendar to learn the appropriate period to grow rice in June to December, and grow cucumber as it can be grown throughout the year. We note down the income we receive each week. The calendar tells us which month we will run out of money or capital; therefore, we would find vegetables to grow instead in order to earn money every week. In the past, I had no plan like this. I could not see the future; I could only see the cause of the loss as the income was less than the expenses. Once I found out about planning, feeding pigs, and gained knowledge about water, my life became better”.

4. People expanded the ponds in their farming areas, and made sub-canal to distribute the water from the “Maeling monkey-cheek” to distant areas.

5. Apart from learning about planning for farming, people learned about fund management to construct the “Lookling Pond” or individual ponds in their own farming area. The fund management is done by the community. The community worked with the Sub-district Administration Organization to check the pond models both for the monkey-cheek and Lookling (baby monkey) prior to proposing the fund for construction.

6. In 2011, the community expanded its network to three other sub-districts as shown in Figure 4.7. In 2016, the water management network covered six sub-districts. Having participated in the water resource management network of Limthong community, the near-by communities who encountered drought problems asked for recommendations and guidelines about possible solutions. Therefore, the Limthong community also became a mentor for other communities.

the Sub-district Administration Organization in E-lum. If it is beyond the capacity of the district, it will co-ordinate with the Uthumphon Phisai district and Sisaket for assistance and support. The problem solving approach of government agencies, both local and regional, are implemented under a central policy. In addition, the agencies involved in solving problems in the area were as follows:

1) The pre-disaster period

In preparing for drought, in the case of Ban Non Yang, it was found the agency collected data before the dry season. The province is organized through the district authorities and local authorities. The Provincial Administration Organization, the Subdistrict Administrative Organization visited the community to conduct a survey of the problems and needs of the community. For example, in 2014, Sisaket Province explored the water storage tanks of the community. In addition, the Department of Groundwater Resources explored the need to drill the ground every year. After the survey, the headman proposed a plan to the agency to drill to obtain groundwater.

2) During the disaster

Management during the drought it was found that for water consumption from March to May, the informants in both the interviews and group discussions thought that the community could handle and solve the problems. Community leaders conducted surveys and reported problems to the relevant agencies and coordinated with local authorities so that the local authorities could coordinate with the concerned agencies to assist the community. These agencies; E-lum Sub-district Administration Organization (SAO), Uthumphon Phisai Provincial Office of Prevention and Mitigation could provide immediate assistance and access to the community particularly the 53th Mobile Development Unit, Office of Supreme Commander, under the responsibility of Srisaket Province as the unit is located near the community. The community leader has stated the following

If our community really lacks water, we have agencies to help us like the Internal Security Operations Command. They have no way of leaving us, and are ready to help when we request it. We contacted them by sending an official letter explaining our needs. We have enough water for drinking and use in the

drought season because all households have their own rain storage tanks. (A community leader, Srisaket, personal communication, February 9, 2015)

The data from the group discussion showed that during the dry season in 2014, moving development Unit 53 cooperated with E-lum Subdistrict Administration Organization to distribute 5,000 liters of water to distribute to people in the community. In cases where rain ceased during the farming season, which causes drought, the District Disaster Prevention and Mitigation Department will provide information in the form of a letter of practice and situation information.

3) After the Disaster

In cases where the rain ceases causing rice dehydration and death, the community leaders survey the affected people and report the data to the Sub-district Administration Organization, District and province, respectively, to obtain compensation from the government. For the prevention of water shortage, it was found that the community as a village community, proposed a dredging plan for the community's public pool to reserve water as a community water supply. The community proposed the project to be included in the 3-year development plan of, which was approved for operation in 2015.

The community has proposed a dredging plan for the community's public pool to reserve water for community water supply. The community has proposed the project to be included in the 3-year development plan of E-lum Sub-district Administration Organization, which was approved for operation in 2015

4.2.3 Comparison of Drought Management in Ban Limthong and Ban Nonyang Communities

The findings show that prior to 2005 the two communities utilized the same drought management method, following the policies and the drought prevention project of government agencies in the pre-, during and post-disaster periods. The main agencies responsible for drought relief provision include the Royal Irrigation Department, the Department of Groundwater Resources, the Department of Disaster Prevention and Mitigation, and other local administrative organizations.

Since 2005 Ban Nonyang community has still responded on the drought management method of the government agencies. In the pre-drought period, the

provincial agencies ordered the community leaders to survey the problems and needs of the community for, for example, household water vessels and report them to the relevant agencies. During times of droughts, agencies from the Department of Disaster Prevention and Mitigation, local administrative organizations and the Military Development Unit distribute water by water trucks to mitigate water scarcity in the community. If the community is faced with a shortage of water for household use and consumption, the leader will seek assistance from the local agencies to respond to the immediate needs of the community members.

On the contrary, the drought management method used by Ban Limthong community, Buriram province, it is found, has undergone a change since 2005. When reflecting on and brainstorming how to improve the quality of life of their community members, the leaders began to see the connection between wellbeing, droughts and water shortages. They became aware of the impacts of a shortage of water for consumption and household and agricultural use. They also realized that their wellbeing could be improved if they found a solution to water scarcity. Therefore, they began to survey and collect data regarding the water resources problems and sought a water source. They analyzed the data and planned on how to solve the problems. As a result of this, the community was able to find a solution to a shortage of water for agricultural use, household use, and consumption. Their success also lies in the fact that they received support from outside sources from both government and private sectors. Because of its capacity to manage its water resources, Limthong community has water for use and consumption all year round. In addition, the community has expanded its water management network to more than 42 communities, covering six sub-districts. This method is different from that used by Ban Nonyang community. The leaders and informants of Ban Nonyang community do not perceive droughts affecting their community as severe. For them, droughts are seasonal, and the community could seek assistance from the relevant agencies when faced with water shortages in the drought period.

Table 4.3 Comparison of Drought Management in Ban Limthong and Ban Nonyang Communities

Drought Mangagement	Ban Limthong prior to 2005	Ban Nonyang
1. Pre-drought	<p>1) Provided information about drought situations and unusual rainfall patterns from government agencies.</p> <p>2) Surveyed the needs for, for example, rainwater harvesting containers; the Department of Groundwater Resources surveyed the needs for groundwater.</p> <p>3) Distributed rainwater harvesting containers such as vessels or cement tanks.</p>	<p>1) Provided information about drought situations and unusual rainfall patterns from government agencies.</p> <p>2) Surveyed the needs for, for example, rainwater harvesting containers; the Department of Groundwater Resources surveyed the needs for groundwater.</p> <p>3) Distributed rainwater harvesting containers such as vessels or cement tanks.</p>
2. During Drought	<p>1) The leaders wrote to the relevant agencies such as the Provincial Administrative Organization and the Mobile Development Unit 54 for water distribution.</p>	<p>1) The leader surveyed the problems and reported to the Subdistrict Administrative Organization.</p> <p>2) The leader wrote to seek assistance from the Mobile Development Unit 53.</p>
3. Post-drought/drought prevention and mitigation	<p>1) Surveyed and built the water supply system using the water tower in 1996; drilled boreholes</p> <p>2) Built the Sela community reservoir.</p>	<p>1) Surveyed and compensated for agricultural damages.</p> <p>2) Conducted a survey of the problems of the community. In 2014, the community meeting had the resolution to write a</p>

Table 4.3 (Continued)

Drought Mangagement	Ban Limthong prior to 2005	Ban Nonyang
Drought management by community	3) Dug a canal for water distribution. 4) Built the Lammat reservoir. 5) Dug farm ponds.. 1) Aware of problems related to droughts and quality of life in the community; discussed problems related to water scarcity. 2) Gathered information to find water sources; make a water map. 3) Made plans to solve the problems related to water for household use, consumption, and agricultural use. 4) Made study trips and designed a solution to shortages of water for use; created a community-based water supply system.	project proposal to build a community reservoir as a source of raw water for tap water production. The project was incorporated into the three- year-plan of the Elam Sub- district Administrative Organization.

Table 4.3 (Continued)

Drought Management	Ban Limthong since 2005	Ban Nonyang
4. Drought management by community	5) Solved the problems related to water for agricultural use; wrote and presented a proposal for the excavation for canals and farm ponds to relevant agencies. 6) Made agricultural production plans using new theories and formed a collective group. Managed water use and supply and expanded network.	

4.3 Community Capitals and Ability on Disaster Management

In studying flood management in two communities and drought management in two communities, the research finds that all the four communities have different community capitals: human capital, social capital, political capital, financial capital, and natural capital. As a result, they use different disaster management methods. This part of the research focuses on the analysis of each type of community capitals by looking at their forms and how the communities under study utilize them to cope with disasters.

Flood and drought management capacity is examined by considering the preparedness of the communities in preventing and mitigating the effects of floods. In other words, the research looks at how the communities estimate the chance of a disaster event, prepare for it, respond to and manage it to ensure minimal effects, and recover from it. With regards to the analysis of community capitals in relation to the

disaster management capacity, the research looks at the capitals or resources the communities have, the acquisition of or access to the capitals and the use of the capitals in disaster management in the pre-, during and post-disaster periods.

It is found that community capitals are related to the flood management capacity of Bang Ta Phaen and Tha Bong Mung communities and the drought management capacity of Ban Limthong and Ban Nonyang communities. The types of community capitals used are as follows:

- **4.3.1 Human Capital**

Human capital refers to education, knowledge, and skills possessed by individuals. It is a factor that influences human productivity. It includes education, training, and experience (Tango International, 2006). In this case, it means disaster related experience that enables a community to manage, adapt, and recover from disasters. It also includes skills and knowledge about disasters, history of disasters and disaster risks, and an awareness of disaster risks.

1) Flood Management Cases

From the interviews and discussion groups, it is found that the features of human capital that are related to the flood management capacity of Bang Ta Phaen and Tha Bong Mung communities are as follows:

(1) Community members have experience working together to solve problems. In the case of Bang Ta Phaen community, the leaders have worked together since 1996. This collective work started when they founded a security watch group for the prevention of thief.

The second experience is that Bang Ta Phaen community has experienced many floods. The community was severely affected by the 2006 flood because it was not prepared for it and did not have an effective disaster warning system. The community leaders and members, therefore, learned from this experience and made an adjustment to their disaster preparedness and response. In times of flooding, the community prepared, prevented, and minimized the effects of floods. For example, a disaster management group was set up. When informed of floods situations in their area, the residents of the community moved their belongings to high ground and prevented their houses and community buildings from flooding. The

community had a flood monitoring and warning group. In 2011, the community changed its method of accessing information about floods situations. They began by looking for empirical clues in their area: 1) the watch and warning group observed the mass of water in the Bang Ta Phaen canal and went to check the level of water at the Chao Phraya River, and 2) they volunteered at other flood-affected areas to estimate the change of flooding in their community. Another type of human capital found in Bang Ta Phaen community is the water hyacinth wickerwork wisdom. This form of capital is related to the community's financial capital. The wickerwork is an O-TOP product of Bang Ta Phaen community and Ang Thong province. It provides income for many households. Part of the income is allocated for community welfare. The community spends the money on aid packages to be distributed to people who are affected by flooding.

(2) The community leaders and members are aware of the importance of public participation and social bonding. The leaders in particular realize that working for the common good is a matter of volunteering and public spiritedness. It is neither about money nor a particular individual. Therefore, they try to be a role model for the community. As one of the leaders said:

Money does not matter. Knowing how much money they are going to make does not matter here. If there is an activity, everyone just goes. The community has been taught this way. It does not matter where you are from- be it Ang Thong or other provinces. When you are here at Klong Wua subdistrict, you got to be public spirited, doing community work at least 2 hours per day. In one month, you can spend just 2 days doing some activities. We do not it every day, but we are public spirited. Let us say if you work for 1 hour per day you give a service of 30 hours. We do community work for 3 days. That is how we tell other people. You do not need to do it every day. In one month, you waste only 1 day. At least you can work for 1 day to make the community strong. (Somwang, Angthong, personal communication, October 12, 2014)

With respect to Tha Bong Mung community, human capital includes local knowledge on disaster management and experience in flood responses and management, and support from outside organizations that aims to enhance the community's capacity to mitigate and manage disasters. For example, the Provincial Red Cross Chapter of Ubon Ratchathani organized a training workshop for disaster preparedness and the use and maintenance of Red Cross tents. Ubon Ratchathani University coordinated with the community in running practical research on disaster management. Agencies from the Department of Disaster Prevention and Mitigation held a workshop for disaster preparedness knowledge. These supports enabled the community to better prepare for and respond to floods.

2) Cases of Drought-Affected Communities

Important features of human capital in Ban Limthong community are as follows:

(1) Self learning and development of the leaders: It started with Mrs. Sanit Thipnangrong or Aunt Noi. In late 1999, Aunt Noi and other women initiated an occupation group for housewives. They attended workshops organized by the Community-Based Integrated Rural Development Center (C-BIRD) at Nangrong, Buriram province where they learned how to do vegetable farming. They then knew about the Suksapat Foundation, which was doing development work in Buriram areas. Aunt Noi had the opportunity to study constructionism, which promotes that learning and problem solving skills can be acquired through practice. She also learned about agricultural production such as corn farming, fish farming, and fertilizer production. As a result of this, she made an effort to pay off her debts by keeping a household account, writing a diary, making a fish farming plan, doing vegetable farming and making a debt payoff plan. She said that learning about all these things is "the beginning of self-reliance." Moreover, with the donated computers from the Thaicom Foundation, the community learning center is operated by computers and the Internet. This allows Aunt Noi, some other community members, and young people to increase their learning potential by using the Paint program for drawing a community map. In addition, the community uses the knowledge about computer software as a tool by which to records their income and expenditure and make a household account and the community shop account. The data are kept in an accounting software program. It is

also found that when they first wanted to solve the problems in the community, the leaders learned from and shared their experience with other communities that had success in solving the problems such as Samkha community, Lampang province. Samkha community has become a network of learning and a source of inspiration for Ban Limthong community when it comes to solving problems. Therefore, having the opportunity to constantly learn and develop themselves, the leaders became more and more confident. Aunt Noi began to take on a leader role by thinking about how to solve the problems in the community even though she previously liked to think of herself as a person with low self-esteem:

Before that I saw myself as worthless, having nothing to contribute to society because I thought that I had no knowledge. I thought I was just too old, and it would be difficult to learn anything new like other people. Later on I had a chance to learn and realized that my old way of thinking just shut myself off from learning about life. But now I know that it is never too late to learn. (Aunt Noi, Buriram, personal communication, September 29 2016)

The development of learning skills and human capital at the community not only make Aunt Noi, who introduced the concept of self-reliance to the community, become more confident in making a difference. It is also found that other leaders and members of the network contribute to the community's success in solving the problems because they learn by doing. As one representative of the community members reflected, "The leader role is not assigned to one particular person. Every member of the community can be a leader and can make a decision to become one. Every one of us can welcome and give a lecture to the guests who come to our community because we all do the work for our community such as water resource management and other stuff." (personal communication, August 20, 2016) The leaders gain knowledge by practice through working with computer software, making a household account and making a production plan. It is found that the leaders especially Aunt Noi has continuously passed on the knowledge to other members and young people.

(2) Awareness of the problems and effects of droughts and the connection between water scarcity, indebtedness, and quality of life of community members: The problems bring the leaders together. They discuss and brainstorm how to solve the problems and collect data. This makes the community see the problems more clearly, eventually leading to finding a successful solution to the problems.

(3) Water management and budget management knowledge: It is found that the community has knowledge on community-based water management.

(4) Knowledge about water: When they first formed their idea, the leaders wanted to solve the drought problems. It is found that a survey for water sources and knowledge about water from the elderly in their community and neighboring communities are important factors that prompt the survey group of the leaders to seek for water sources. They eventually know where ancient waterways are.

4.3.2 Social Capital

Putnam (1995) defines social capital as “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit”. The community’s disaster management capacity is determined by social capital such as coordination, collaboration, and self-organization. According to Frankenberger et al. (2013) the definition of social capital is broader than that of political capital because it includes informal social processes at several levels: individual, household, and community. Social capital is considered as glue that connects people. It engenders collective action (Green & Haines, 2012). In the context of disaster management, forms of social capital that are related to the community’s disaster management capacity include bonding social capital, bridging social capital, and linking social capital. Social capital allows people to use social resources inside and outside their community, increasing the possibility of collective action among stakeholder communities (Green & Haines, 2012).

1) Cases of Flood-Affected Communities

It is found that Bang Ta Phaen community has social capital in form of bonding social capital. Since most of the members are kin, they help one another in the non-disaster and disaster times. The main factor that fosters a close relationship among the members is the leaders’ ability to mobilize people and resources. For

example, they raise funds to buy sandbags for flood prevention. To provide assistance for its members, Bang Ta Phaen community sets up many occupation groups such as the water hyacinth wickerwork group, the mixed farming group, the banana leaf cutting group, the rice seeds group, the saving group and the community welfare group. Getting together as a group helps the community members gain more access to resources and assistance from government agencies.

With regards to the relationship between Bang Ta Phaen community and other neighboring communities within Klong Wua district and other districts, it is found that the Community Organization Council is the driving force that makes the five villages in Klong Wua district work together. Mrs. Pranee Chanthaworn serves as the president of the council. The council is a network that provides assistance for the 5 villages. Bang Ta Phaen community is connected with other communities and shares information through public spaces. The temples, for example, serve as a place for exchanging information. The Bang Ta Phaen Community Learning Center is used as a meeting place for the council. It is normally an activity arena for local and provincial use and as the disaster management coordination center of Klong Wua district in the disaster period.

In terms of its relationship with the agencies inside and outside the province, it is found that Bang Ta Phaen community has potential in mobilizing resources from outside agencies to strengthen its own potential. This is due to the potential of Mrs. Prani Chanthawon. While she is able to coordinate with and seek assistance from networks and agencies, other leaders work on taking care of the problems in the community.

With regards to social capital in Tha Bong Mung community, it is found that the community uses social capital in disaster management. Since the community is organized around kinship, the members help one another, for example by, moving belongings to high ground or evacuating people out of flooded areas. Moreover, the leaders can mobilize people to participate in community services. However, the community does not form any group where its members do activities together. It is found that the community used to have a women's weaving group, but it no longer exists because it did not continuously run activities, lacked capital, and had no market for its products. With regards to its relationship with other communities or networks,

it is found that Tha Bong Mung community is part of the disaster management network in Warinchamrap area, Muang district, Ubon Ratchathani province. The community exchanges information with other communities and provide resources to mitigate and reduce the effects of a disaster. With respect to social capital that links the community to other agencies and organizations inside and outside the province, it is found that Tha Bong Mung community is located in the area of the Warinchamrap municipality which is recognized by outside agencies. The community leaders are the village health volunteer group which is very strong and actively participates in public activities. As a result, organizations from outside the community provide assistance to mitigate and reduce the effects of a disaster. The Provincial Red Cross Chapter of Ubon Ratchathani, for example, organized the community safety and resilience project, enabling the community to plan and prepare for a disaster. It also gave 30 Red Cross tents and trained the participants on how to use and maintain them. The Community Organizations Development Institute (CODI) provided financial support to renovate the accommodations of low-income members. The Ubon Ratchathani Province Civil Society Foundation and the Local Development Institute support the establishment of the disaster management network and enhance the community's capacity to cope with disasters. Moreover, government agencies such as the Warinchamrap municipality, public health agencies, and agencies from the Department of Disaster Prevention and Mitigation provide assistance in forms of resources and public information that could help reduce the effects of a disaster for the community.

2) Community-Based Drought Management

It is found that the forms of social capital in Limthong community are as follows:

(1) Bonding social capital: the relationship between people in the community is based on kinship and people help one another. This is reflected by the participants who were interviewed and participated in discussion groups:

Most of the community members are from different places. But we do not exclude one another. We live like relatives who help one another.

We understand each other because we are open to talk. During a meeting, we can express our opinion, so everyone can be expressive.

In terms of community work, we ask everyone for help and we do not hire people. The money is spent for the common good. (Focus group, personal communication, September 29, 2016)

Moreover, social capital that enables the community to solve their problems and rely on each other is groups, organizations or networks of support. It is found that Ban Limthong community has a network of support which was initiated by the community itself.

1) Community shop: The Ban Limthong community shop originated from a study trip the community made to Bu Khi Lek community, which is successful in setting up a community shop. After the trip, the community held a meeting where they made the resolution to open a community shop. Initially, a single share was 100 baht, and a member could buy shares with a maximum value of 1,000 baht. The shop had 62 original members and raised 8,000 baht. It is found that the fund raised was not sufficient to operate the shop. The housewife committee, therefore, added money to the community shop fund so that it could continue its business. The housewife group did not want the money back. The Ban Limthong community shop was founded on March 1, 2001. In the first year of its operation, a villager's house was temporarily used as the store. At present the community has its own shop. The shop members are from Ban Limthong community and other neighboring communities. It is operated using the committee structure. The committee members inspect the store account on a daily basis. There is also the audit committee. Cashiers are stationed at the store. The shop annually distributes a surplus to the membership and sellers. The remainder is saved for community development projects or activities such as road repairs, Children's Day, donations to school and the elderly, and a community land purchase. The purchased land is now the site of a rice bank for people who need to borrow rice. After the surplus is allocated for the land purchase, the shop committee makes the remainder a community reserve fund. They change the management system and name the fund "community shop bank."

2) Community shop bank: The community shop bank was set up from the community shop. The committee changes the way the reserve fund is used as it

seeks to provide greater assistance to the community and other neighboring communities. The committee thinks that since the money comes from the villagers it should go back to them as much as possible. Therefore, to help the villagers in times of need, the committee gives loans to the villagers so that they can pay off their debts to creditors in the community or repay their loans to the Bank for Agriculture and Agricultural Cooperatives or the one-million-baht village Fund. One of the leaders reflected on this issue:

The villagers previously borrowed money from lenders outside the community to pay off their debts to other creditors without giving much thought to it. All they want is a loan that could cover up their immediate needs. They do not think about the drawbacks. That is, the interest rate from the lenders or the sources outside the village is very high. If you borrow a 10,000 baht loan from them, you have to pay 200 baht in interest. The villagers do not think about high interest rates. The shop committee is aware of this problem, so they set up the community shop bank to help the villagers so that they will not need to borrow loans from outside sources, which charge high interest rates. (A community leader, Buriram, personal communication, August 20, 2016)

Therefore, instead of seeking loans outside the community, the villagers could borrow from the community shop bank all year round. The fee for a 10,000 baht loan is 50 baht. The loan period is between 7-15 days. In addition to borrowing loans, the villagers can make a deposit to the bank on a savings or fixed-deposit account. The bank offers an annual interest rate up to 10%, which is higher than the government bank rates. This service provision is based on the idea that the deposits the villagers make to the bank are meant to help one another. Therefore, interest or service fees the bank charges from the borrowers should be returned to the community.

The bank not only returns the benefit to the membership in form of deposit interest but it also establishes a welfare fund. The bank pays for a hospital stay in the amount of 200 baht per year.

3) Husband fund: The husband fund originated from the rice bank with a change of name. The Ban Limthong community rice bank was initiated by Aunt Noi. She saw that there was not enough rice for the community all year round; as a result, the villagers borrowed rice from their neighbors at high interest rates. She then came up with the idea that “it would be nice to have rice for people in the community so that they would not have to borrow from other communities at high interest rates.” Aunt Noi consulted the village headman and committee to find a solution to the problem. She proposed the founding of a rice bank, which the leaders agreed. But where could they find the rice? Everyone expressed their opinions and finally they said that they should ask the community members to donate their rice. They did not say how much rice each household would have to donate. It was entirely up to them. Initially, they got approximately 100 bags of rice, which were stored at the community rice bank. The leaders told about the history of the rice bank that “before the rice bank came about, rice grains were piled on the land an old lady named Kliang donated to the bank. But when she passed away, the land was handed down to her sister who took the land back. Aunt Noi contacted the owner to buy the land, but she could not sell it. So Aunt Noi and the village headman bought a new land. Currently the bank is located on the land the group purchased with the donated money of 20,000 baht from the village fund and another 20,000 baht from the community shop. The community shop also paid for a land fill work in the amount of 21,340 baht.”

The rice bank opened for loan application in the middle of the year, and the committee will make an announcement through the village broadcast tower. Those who want to borrow will sign a loan agreement with a term of 1 year. When the time for loan repayment comes, the committee will also announce it through the broadcast tower. The rice bank has encountered difficulties in dealing with bad debts. The problem stems from many factors. For example, the committee is corrupt. The villagers do not repay their loan of rice because of droughts. When some villagers do not pay their loan back, it creates imitation behavior among the villagers. Nobody says anything about it. However, despite the problems facing the rice bank, the leaders and villagers believe that the advantages outweigh the disadvantages. This is because, according to one, “we help our members to have rice to eat without borrowing from somewhere else. Any problem that follows can be solved. For

example, if the committee members are corrupt and do not work transparently, we can replace them with a new set.” The rice bank changed its name to “husband group.” Due to such a lack of transparency, the committee set up the husband group using the money they made from selling rice in order to keep the group. At present the group offers only loans and those who are eligible for loans does not have to be a member of the group but must be a member of the community. The group is not quite successful in its administration because the work is assigned to 2 divisions, causing confusion in management.

4) Housewife group: The group was formed when the Community-Based Integrated Rural Development Center (C-BIRD) at Nangrong, Buriram province, donated 5,000 baht to the group to make an investment or run any activities as it wanted. They made an agreement that once the group made profits, it must return the original sum of money to the center. Therefore, after the group received the money and accepted the agreement, the president of the group summoned a meeting for the members to brainstorm what investments they should make with the donated money. After the members expressed their different opinions, a conclusion was reached. They were going to use the money as loans for people in the community. A committee was then set up. “The way the committee worked was like the way folks do things. There were not many regulations. Since the startup capital was only 5,000 baht, a member could borrow a loan with a maximum value of 2,000 baht per year. The group had to set the maximum loan limits because it wanted to give loans to as many people in need as possible. A borrower did not have to be a member of the group but must be a resident of the community.” A borrower must sign a loan agreement with the committee and the documents were kept with the housewife group. The housewife group also recorded details in the account book. The group annually gives loans on March 1 and the loan payment is due in February. In the first years of its operation, the borrowers must pay off their loans in one year at the annual interest rate of 12%.

5) Fund for the elderly: The fund originated from a study trip the leaders made to Sam Kha community in 2002. They shared experience with people there and saw how things were managed including the welfare Sam Kha community provided for the elderly. The Ban Limthong community leaders wanted the elderly,

the disabled, and the underprivileged in their own community to have such an opportunity. One of the leaders mentioned about the origins of the fund: “After the field trip the community discussed this matter during a meeting. We thought about whether or not we should do it and how. Everyone thought that we could do it but where to get money for this.” From this discussion, the villagers agreed to set up a robe offering fund, which raised a certain amount of money. Then they offered membership to the elderly. A member paid a lifetime fee of 20 baht. In the first year of its operation, there were 31 members. The Ban Limthong elderly group is run by a committee comprising members from and outside the community. It is based on the principle that the president must be a resident of the community and must not be a member of the community shop committee. The group provides financial support only to members who have a hospital stay in a one-time payment of 200 baht per year. The committee organizes the robe offering fundraising every year. The fund for the elderly also receives additional donations from individual residents.

6) Satcha savings group or women’s group: The group receives deposits from and gives loans to its members. The members can get a loan only after they have been a member for 6 months. The group gives all loans in just one time. In approving loans, the committee looks at the total sum of money the group has and the number of borrowers. That is, the sum will be divided by the number of the borrowers. Therefore, the value of a loan given will vary, depending on the total amount of money the group has and the number of borrowers at a given time. The women’s group set the loan conditions that loans will be annually given in February and they are one-year loans. When the loan payment is due, the PR group will announce through the broadcast tower that “it is time to repay the loan. The borrowers must pay their loan back on time.” The Satcha savings group or women’s group comprises 9 committee members all of whom are residents of Ban Limthong community.

7) Village fund: The village fund was set up just like other village funds around the country. In 2001, following the government village fund policy, each of the villages and urban communities was allocated a fund in the amount of 1 million baht. The villages will manage the fund by themselves while the government set the interest rate at 3-12 % per year and will not allow a higher interest charge. Ban

Limthong community gives loans to the members under the conditions that the borrowers will make an investment in career development and they had to submit a project proposal. The committee works periodically like the cycle of loans. The committee tries to follow the government policy as strictly as possible. It does not record the loan details in an account book but keeps all the related documents. In the first year, the committee offered a loan of 700,000 baht at an annual interest rate of 12% in the first year of borrowing and 5% in the second year. The borrowers will have to pay the whole loan with interest in 1 year. It is found that the villagers do not like the village fund loan from because there is too much paper work. They have to write a project proposal. When the village fund first gave out loans, only 7-8 % of the total loans were given to those who want to invest in their occupation while the remaining 92% was used by the villagers to pay off the debts to other lenders or to buy appliances and facilities.

In addition to the groups that provides welfare and financial support, Ban Limthong community has other groups as follows:

The water supply fund is the fund established to manage water supply for use and consumption in the community. It is run by using service fees collected from the community. This is different from the way other communities manage water supply. They are under the supervision and support of Sub-district Administrative Organization. The committee stated that “unlike other communities, the village manage water supply by itself independently of the Sub-district Administrative Organization. This way the community will have its own savings and maintain the water supply system by itself. For example, if the equipment and components for the water supply system are broken, we buy new ones. We do not wait for the government budget like other communities” (Teacher Pum, Buriram, personal communication, September 29, 2016)

The tractor group provides tilling services for farms and agricultural areas. It provides welfare only to the membership. The members pay an annual fee of 100 baht.

With respect to the establishment of organizations considered as a form of social capital at Ban Limthong community, it is found that the initiatives for the above organizations-with the exception of the village fund – stems from the needs of the community to rely on and help themselves. The underlying principle of these organizations is to manage the community resources by and for themselves. As one of the leaders stressed this point that “to manage people and enhance their quality of life, every fund should be able to manage by itself and keep a reserve fund for itself.”

This is the management style when we first started. When we were faced with the 2004-2005 drought, we managed the water and drought problems by ourselves. We think about the benefit of the community first. This is always an important issue.” (Aunt Noi, Buriram, personal community, August 20, 2016)

Bridging social capital: with regards to its relationship with other communities, it is found that Ban Limthong has a close relationship with its neighbors, namely, Nong Thong Lim and Khok Pluang communities. These three communities were originally the same village. They share resources when they cope with droughts and floods. The leaders from the three communities work together because their agricultural areas and natural resources are located next to one another, including the public spaces such as the Plaimat waterways and the Thong Lim reservoir, which are raw water storage for tap water production. It is found that Limthong and Nong Thong Lim share the water supply system, being both being part of the water management network from the beginning.

In addition, the community water management committee members are representatives from neighboring communities who are the leaders initiating drought management methods and the landowner who donated their land for excavating a canal and catchment pond. The leaders work together to solve the drought and flood problems in 3 districts: Nong Bot, Chumsaeng, and Tung Saeng Thong. At present the community water management network has expanded to include 6 sub-districts in Nangrong district. Ban Limthong community is the village that initiated the network and serves as a mentor for the communities that seek to solve the drought problems.

The guideline and principle of setting up the committee for the community water management network comprising 15 members is to put emphasis on

public participation and a sense of ownership in what the communities have built. When there is a problem at work, they will think about a solution. The leaders mentioned about the role and background of the committee: “some of the committee members are the landowners living near the canal. They own the catchment pond. Why did we choose the villagers to be committee members? It is because they know the waterways. If the members are village headmen or heads of the Subdistrict Administrative Organization, we make them our advisors. And there are 15 members from the beginning. The committee members talk, discuss, and plan on where to lay the pipes, on whose farms the water should run off and where to build a dike. We turn some dikes into a weir. We transform our long canal into a catchment pond. This is the learning process of the committee members. They are strong. They go out to offer help even when it rains at one or two in the morning or when the pipes leak or where waterways are broken. In the old days, the government agencies came to help and they were gone. A few years pass by and the canal was clogged. Then they got the budget to dig it. They are not protective of the resources. But people here are. Why? Because they are the one who go out to survey the area. It comes from their need. That is why they feel like the owner who wants to protect and preserve the canal.”

Moreover, it is found that the network expands and extends its mission to neighboring communities. The leaders from Ban Limthong community are the consultant and mentor in giving guidance or writing proposals:

When a village wants to learn about water collection or water management, it will come and ask for suggestion with us. And if they want to dig a pond, we tell them to write a proposal to the Subdistrict Administrative Organization in their area. Once they finish the proposal, we will tell them about the standards of a pond, details on the appropriate depth and width of a pond. Sometimes we write a proposal for them. Writing a proposal for them has both advantage and disadvantages. If any village wants a proposal, they will have to come and talk with us. We will ask them to collect their data first. (Aunt Noi, Buriram, personal communication, August 20, 2016)

Those who come to consult us from other villages are not leaders but villagers. If they want a project, we will help them write a proposal. If they want a mentor, we will be one for them. (Teacher Pum, Buriram, personal communication, September 29, 2016)

In the case of Nonyang community, Sisaket province, it is found that the social relationship within the community has changed. In the past, people depended on and support each other. At present people are educated and they see the importance of sending their children out for education or civil servant work. They also struggle to make money to pay to cover up for their everyday life needs and their children's education fees. As result, some families move out of the community and never come back. Although some of them still live in the community, they work as wage laborers or construction workers outside the community. Consequently, they spend less time in the community. The social relationship in the community thus has altered. People have less interaction with one another. However, it is found that when there are merit-making activities, funerals, weddings, or ordination ceremonies, neighbors still help each other. This shows that when it comes to traditional events, the social relationship is still based on mutual help and support.

(1) In terms of in-community assistance, in Ban Nonyang community members form groups to help one another, but it is found that these groups are fraught with management issues because group members do not trust their respective leaders. In addition, some of these groups depend on government funding. When the funding runs out, they have to cease their activities. These groups are: 1) The Village Fund. The main problem is that members do not repay their loans. One household in particular has caused a major problem as all members of the household borrowed 50,000 baht but failed to repay the loans. This made the fund management team unable to close their accounts or clear the budget. A community leader observed that the fund is regarded as the most troublesome in the province. 2) A savings group. 3) The Village Development Fund. The fund's current balance is around 10,000 baht. The fund is now defunct because members do not buy from the fund-operated shop. The members currently have questions and concerns about the remaining balance as to what to do with it. A community leader has admitted to having spent the fund and

thought that it is not a large amount of money. The members can thus ask to have it distributed as shares to all members. 4) Cattle-raising group. This group consists of 7-9 members. The village head of Nonyang initiated it. He is currently the chairperson. The seed funding came from E-lum District Administrative Organization, which gave the group a loan for use in the purchase of cattle. The group gives out loans to its members with an annual interest of 100 baht. The interests are used as loans to other members. Each loan is on a 5-year term. Once a member repays his or her loan, the account will be closed. Then the group will ask for more loans from the SAO for new members. The current problem is that members have begun questioning about the accrued interests and demanded information from the chairperson. 5) The Silk-weaver group. The remaining members are around three households due to a lack of new generations of weavers, the original skilled weavers have grown old and not able to work. No one in their families wishes to carry on the tradition. 6) Organic fertilizer-producing group. After the group became moderately successful, it was sponsored by government agencies, which at the time had a policy promoting community enterprises. For this reason, the group was financially sponsored to purchase tools and equipment needed for the production of organic fertilizer. It grew bigger with members from other villages. It then became a district-level group. The problem now is that it relies mostly on government funding. The products have been distributed to members free of charge as they could not make sales. When the funding ran out, the group ceased production. What is left of the group is its building and fertilizer-making tools.

(2) In terms of networking with external agencies, the community is mainly connected with government agencies. Its activities and projects are based on government policy and planning.

4.3.3 Political Capital

Political capital consists of power relations, access and influence on political systems, be they administrative units at the local level or beyond (Tango International, 2006). Political capital connects community members with power, helps the community to gain access to resources and gives it power and influence, which in turn drives the community to success. At the community level, it determines community

members' patterns of participation. Thus, a community with political capital will gain access to influential processes and institutions, which can create power inequalities and diversity both within and between communities (Pasteur, 2011; Ritchie & Gill, 2011). In summary, political capital is related to the power structure in the community. Power itself resides in individuals, groups, or institutions. Political capital is related to the ability to manage disasters as it helps the community to gain access to resources needed in the prevention and reduction of disaster impacts.

1) Communities with Flood Problems

Based on the interviews and focus groups, in Bang Ta Phaen community, leaders including Mrs. Pranee Chanthaworn are strong and eloquent. They are able to persuade province-level decision makers to help the community. Mrs. Pranee, in particular, has played multiple roles at the provincial level. For instance, she is a chairperson of the Ang Thong Women's Role Development Fund. She is well-recognized and trusted by provincial agencies because of her records on successful community development. She is also the chairperson of the water-hyacinth weaving group, which produces 5-star quality woven products from water hyacinth for exporting to Japan. Bang Ta Phaen community leaders thus can access resources in alleviating flood impacts. For instance, they can manage to get floating restrooms and boats directly from either the Provincial Administrative Organization or the Office of Disaster Prevention and Relief.

In addition to having leaders who are skillful and competent in accessing resources necessary for the risk reduction and relief of disasters, community members themselves have shown their responsibility as citizens who support and strengthen Mrs. Pranee's leadership, earning her recognition by authorities at the district and provincial levels. As the leaders access and bring provincial aid to the community, the members take part in activities, distributing work equally in terms of expression of opinions, decision-making, and actual work delivery in the community. This is a result of encouragement and empowerment by the leaders and leading members, general members become socially responsibly and participatory in community activities. Leading members think that community participation must not depend on position or status, regard everyone as equal, and value everyone's opinion. This approach successfully rally for participation and engagement in solving community problems.

Don't be obsessed with title and power. You can't see yourself as the village head, with a lot of power, and regard others as lower than you. You need to see everyone as equal before you can rally for their support. In working, we need to brainstorm, take note of good and bad points. Everyone has a right to suggest ideas. But we need to make a pool of ideas and sort them by issue. Then we can choose feasible ones" (Somwang, Angthong, personal communication, October 17, 2014).

With respect to political capital, Tha Bong Mung community leaders and leading members enthusiastically participate in activities and recognize the importance of pre-disaster preparatory measures. It has thus gained the attention of government and private organizations, which later jointly manage disaster-related activities with the community. In addition to local government agencies responsible for the area, other agencies also work with the community. The Ubon Ratchathani Red Cross Chapter, together with the community, sets up a plan to prevent and reduce disaster risks. It also has donated 50 tents. Ubon Ratchathani University has conducted participatory research. The Prachasangkhom Foundation, Ubonratchathani province and Local Development Institute (LDI) have held capacity-building activities in the communities since 2013. They have encouraged the community to make a disaster contingency plan and set up a disaster relief fund. These arrival and support by these organizations has empowered the community and helped it access disaster prevention and relief resources.

2) Communities with Drought Problems

With respect to Ban Limthong community's political capital, it grew out of human capital development. Leading members have learned and developed their confidence and determination in solving problems related to the lack of water supply, debt, and quality of life of those living in the community. The findings show that the community initiated the attempt to solve the problems by surveying problems and needs of the community, analyzed them and planned for solutions on the basis of community research. This made the members become aware of the problems and their real needs. There were thus confident in expressing themselves during discussions of issues, needs, and solutions. They finally put together a proposal asking for financial

support from government agencies including Nong Bot Administrative Organization, the Department of Irrigation, and the Department of Water Resources (Region 5) in Nakhon Ratchasima province and eventually received funding.

The community used data we collected to write a proposal to the SAO and the Irrigation Department. Both had no budget for us. Our leaders came back and talked to staff from the Water Resources. They suggested that we do research to produce more data and turn it over to the Department of Water Resources (Region 5) in Nakhon Ratchasima. (Teacher Pum, Buriram, personal communication, September 29, 2016)

So [we] submitted the research to the director of the Department of Water Resources in Korat, who said he wanted to help our community because he saw how determined we were. He told us to come back to submit our work to Royal Irrigation in Buriram province. At the time there was a 2-million baht CEO-style governor budget, which wouldn't be available until 2007. The community then followed up on that. We wouldn't know where it would have ended up if we hadn't followed up on our submitted proposal. (Aunt Noi, Buriram, personal communication, August 25, 2016)

From when they started to work on their problems, the community has learned and solved problems based on research data. Thus, they were able to access budgetary sources and decision-making processes of the government agencies at the local and provincial levels. The findings demonstrate that leading community members in Ban Limthong collect information on problems and needs of community members on a regular basis. They use this information to make plans and budget proposals, which they submit to government agencies for financial support. The following excerpt is taken from an interview with a member of the village water management committee, which aims to effectively solve problems using a data-driven approach:

We collect data every year or every day in order to see where the problems are for us to tackle. The committee will help with this. We wait for government budgets but in the meantime we collect data ahead of time for planning the projects and budgets. We plan, for example, to dig a well or canal with calculated measurements. We wrote everything down for them and send them our estimated budget. We tell them what the budget is. We make it clear because we survey every year. We calculate the budgets. Having big or small budgets depend on the agencies. Our job is to collect data and design our project. For the SAO, just so it can consider what to have and approve the project blueprints. If the SAO can support us, it will take our proposal and consider it. If the SAO says it doesn't have a budget, our committee will look somewhere else. We rent a vehicle to do that. We need to rely on ourselves. Can't wait around for help from others. If we wait for their help, it won't be exactly what we want. But if we manage things ourselves, we can respond to our needs-what we want to do. (Aunt Noi, Buriram, personal communication, September 29, 2016)

In addition to being able to access budgetary sources, the community has succeeded in solving water issues and received an award at the district level for its accomplishment in water resource management. The community is recognized and has gained attention by government agencies at the national level. Official visits to the community water management network are done through the community committee. This shows that this community is important in the eye of external government agencies. Thus, that the community members stepped up to try to solve their problems based on members' cooperation, self-reliance, strong determination and perseverance became a power to negotiate with the government's institutional powers. Normally, government agencies have full authority and power to solve community problems and play a leading role in doing so. However, the community members still think that government agencies have not fully supported the community. This can be seen in interview and focus group findings:

We finished the canal and won the second prize at the national level. Then people became more interested in water resource management. Our village competed again and won at the national level. The province then helped us by giving us budgets and sometimes projects. But if our people are not around, they are not very interested to help. (A member of water resource network committee, Buriram, personal communication, August 20, 2016)

Any government agencies wanting to visit the village will contact us directly, not through any other agency. They can contact us-- the community committee directly. Then we will announce the name of the agency and village it wants to visit. Many agencies don't think we will succeed. And we ourselves never want to ask them for help. Instead of being happy for our achievement in managing water problems, the SAO does not support us. (Waeng Taveechad, Buriram, personal communication, September 29, 2016)

As for Nonyang community, the community only plays a role on the receiving end of the policy. When the community is faced with problems or want to develop water sources, the community leaders will contact authorities either by providing supporting information or submitting official requests to such agencies as the Elum District Administrative Organization, the District Office, and Provincial Office.

4.3.4 Financial Capital

Financial capital refers to financial resources that households and communities use to achieve their economic and social goals. This includes cash and such renewable resources as savings, income, credit, and pension (Tango International, 2006). The benefit of financial capital in the time of disaster is that it helps to increase the capacity and potential of individuals, groups, and communities in reducing the impact of the disaster and recovering from it. It also helps to reduce vulnerability in some ways, for example, by purchasing insurance or repairing homes. Financial capital is then a determining factor in community disaster resilience (Mayunga, 2007). For instance, households' ability to access credit is related to their self-preparation for the disaster. The ability to use preventive measures, access to financial institutions, credit,

formal savings, and community financial organizations, and government budgets are forms of financial capital.

1) Communities with Flood Problems

In the case of Bang Ta Phaen, the most of the financial capital that the community uses in flood prevention and relief, preparation, flood management, and recovering comes from each household's personal funds earned from work in and outside the community such as rice farming, vegetable growing, decorative plant and flower gardening, and water-hyacinth woven products. Furthermore, the community has a community welfare fund, which is used to purchase foods and necessary items for the relief packages for residents of Klong Wua sub-district. Financial sources from government agencies include SML funds for the 2014 fiscal year. The community used these funds to set up a drinking water processing system. The members regard this as vital to the well-being of community members because the supply of clean drinking water is needed both in normal time and time of disaster. Some of the funds have been used to buy tents for use during floods when households have to relocate to a safe place. In addition to this, funds come from the Community Organizations Development Institute (CODI), which supports the work of community members in setting up disaster-related maps including those showing river-flowing patterns and hand-made ones, and for use in the community welfare fund. There are also government funds for use in rehabilitation. These funds come from the provincial commerce office, the provincial agriculture and cooperatives office both in cash and non-cash assistance.

In Tha Bong Mung, financial capital which the community can access and employ in disaster-related activities is smaller than that of Bang Ta Phaen community. The major source of financial support for this community is each household's income. The amount of financial compensation from government agencies is small, which is based the rules and regulations regarding compensation for disaster victims. This is not sufficient for the repair or improvement of residences in order to minimize the risk and impact of floods. Poorer households with insufficient income to improve their residences have received help from the Institute, which has begun to build strong and safe homes for 20 low-income families.

2) Communities with Drought Problems

In terms of drought management, financial capital plays an important role in solving problems related to water shortage and changing the living quality of the community members in Ban Limthong. Financial capital which the community possesses and have access to is divided into 3 levels: household, community, and community network.

Financial capital at the household level is related to human capital development and the investment of basic infrastructure or physical capital building in the form of the community water supply system. This has enabled the community to have income year round since the time the drought problems were solved. The community now has a sufficient supply for water for use all year. It has since continued to develop itself. Leading community members recall the changes in the community and themselves as follows:

Now we grow vegetables. Villagers used to buy them before. I myself have an annual plan. [It shows] in what months we harvest rice, in what months we plant rice. I make a calendar with time divided into periods. In the beginning, officials came to collect data on investment cash. Youths also made calendars for the sake of learning. In April. We grow rice in June-December and grow cucumbers. There's income per week, which we note down in the calendar. We can grow cucumber all year. We check to see which month we're out of income, just so we can grow vegetables to earn weekly income. It doesn't matter if we make as much as we set as the goal. At least we make money every week and earn income for the family. I never had a plan like this before. I didn't see the future. I could only complain why we only lost profit. The income was less than the expenses. Then I learned about making plans, pig farming, water management. My life got better. Someone taught Aunt Noi and also taught the members. Taught younger kids to plan. Prosperity followed. When you have water, then you have fish. This is when you have water, everything follows. Treasures are buried in the ground. We don't need to look anywhere else. Just growing vegetables helps us make money. Life was like a torture before. But when I did what I'm doing now, life is good. People who

went to Bangkok have come back and started planning like I do, because we teach everyone how to do it. (Uncle Mao, Buriram, personal communication, October 10, 2016)

Table 4.4 shows changes in income of farming households who participate in the farming group using a new farming approach. It compares data from before and after the solutions to water shortage in farming activities. The community has adopted water management and the new farming approach since 2007. The table shows a steady increase in household income. It also shows that since 2011 there has been an increase in the numbers of households participating in water management and the new farming approach over the years.

Table 4.4 Annual Household Income

Annual household income (baht)			2010	2011	2012	2013	2014	2015		
	Past	2007	(water management + new theory farming)	(water management + new theory farming)	(water management + new theory farming)	(water management + new theory farming)	(water management + new theory farming)	(water management + new theory farming)		
Income	103,000	1,544,764	2,227,354	2,081,654	4,201,354	9,547,916	30,116,715	32,294,280	35,912,968	37,919,880
-Rice	103,000	417,850	621,060	973,630	924,370	3,455,335	15,857,461	17,592,480	16,681,990	17,693,410
-Traditional farming	-	917,271	640,500	50,220	1,307,800	4,832,877	13,260,100	11,207,500	15,630,700	14,639,100
-New farming approach	-	209,643	965,794	1,057,804	1,969,184	1,259,704	999,154	3,494,300	3,600,278	5,587,370
Expenditure	114,000	693,496	1,067,451		1,637,817	3,583,643	9,386,423	11,266,770	12,074,820	12,257,828
Net income	11,000	851,268	1,159,903	1,131,313	2,563,537	5,964,273	20,730,292	21,027,510	23,838,148	25,662,052
Average/household	-	56,751	77,327	75,421	170,902	114,698	175,680	145,017.31	148,988.43	118,258.30
Data sources	15 households	15 households	15 households	15 households	15 households	52 households	118 households	145 households	160 households	217 households

Source: Ban Limthong Community Water Resource Management Network, 2016.

In terms of community financial capital, Ban Limthong community has financial organizations formed according to government policy. These include the Village Fund and locally formed groups. The purpose was to provide financial assistance to community members. Both group members and non-members who reside in Ban Limthong can easily access funding sources. These groups are, for example, the Housewives' Group, the Head-of-Households' Group, the Community Bank Shop, the Elderly Fund, and the Village Fund.

The community has also used financial capital to build basic facilities needed to solve the water scarcity issues. To do this the community accessed financial sources by their own initiative. They started from surveying problems and needs and used the data to support their plan and proposal for funding. Coupled with this, their perseverance and determination has helped them to access funding. These funding sources are as follows:

- 1) Financial support from the Coca-Cola Company. This was used in the development and maintenance of the community tap water system and the construction of a sediment trap for Thonglim Lake.

- 2) Government-sponsored budgets come from different agencies. There was funding from the Department of Irrigation and the CEO-style Buriram Governor budget. This support was used in the construction of the 3.6-kilometer long 80th Royal Birthday irrigation canal from Lam Plaimat stream. The other source was from the Buriram Office of Natural Resources and Environment for use in the community's water management. There was so funding from a District Administrative Organization.

- 3) The Hydro and Agro Informatics Institute has provided financial assistance to the community as well. In 2008, it sponsored an excavation of 7 water detention ponds (adjacent to the irrigation canal). In 2009, it supported an excavation of 2 water detention ponds. Between 2010 and 2011 it sponsored the construction of the Water Road (a type of man-made waterway) and water flow guiding barriers. In 2011 it built 5 water detention ponds in Ban Kokpluang village and Ban Nonsi village. In 2012 it built 1 water detention pond. In 2013 the institute and Uthokphat Foundation Under the Royal Patronage co-sponsored a construction of 4 water detention ponds.

4) Between 2013 and 2014 Uthokphat Foundation supported 15 members of the group applying the new farming approach.

5) Nongbote Sub-district Administrative Organization built a 100-meter long Water Road.

6) The Department of Rural Highway built a 375-meter long Water Road.

Interview and focus-group findings show that the community water resource management committee could access the funding sources above and managed to secure funding to solve water problems because the community is determined and perseverant. Members are confident in expressing their needs, which are supported by real data based on their problems and needs. It can be seen that the projects sponsored by the sources in Items 1-4 above were nominated and managed by the community. The budgets were directly deposited to the community's accounts, bypassing local government agencies. This is because the community has learned rules and standards for the procurement system for water detention ponds and rice paddy ponds. The community thus has the ability to search for contractors and execute the procurement process by themselves. This costs less than normal government procurement processes. The community is therefore trusted by the authorities to manage budgets from both the government and private organizations.

Money for all projects will come directly to the committee, but the SAO is not happy with this. If we want a pond dug, we will help to take care of it, oversee the construction throughout the process. We can manage this. The prices are negotiable and lower. But when the government agencies do it, it costs about a hundred or two hundred thousand. The money is wasted. We work seriously. If they want us to check jobsites which will be visited by authorities, we will help to check them. We don't wait for anyone. We make decisions when we think we need to. The only thing we want is for no one to ask for a share of credit. The SAO will get about 500 meters of road made each year.(Uncle Waeng, Buriram, personal communication, September 29, 2016)

In Nonyang, the main source of financial capital is from households' income. The community cannot access funds or budgets for the solutions to its drought problems directly. The community only surveys the needs of its members and forward the survey results to related agencies such as the Department of Underground Water or local administration organizations.

4.3.5 Physical Capital

Physical capital refers to basic facilities, transportation, communication system, water supply for consumption and use, safe housing, etc. Physical capital helps the community operate efficiently especially during evacuation. Facilities are crucial in ensuring that the victims have resources and support during a disaster. A lack of basic infrastructure or facilities may negatively affect the community's ability to manage disasters. Research into physical capital helps to determine whether or not a community's basic facilities and basic services help it to survive and recover from disasters (Longstaff et al., 2010; Paster, 2011).

1) Communities with Flood Problems

The findings show that Bang Ta Phaen community has physical capital. Despite the fact it is located in a low-lying area with some parts of the community adjacent to Klong Bang Ta Phaen canal and thus risks being flooded every year, the community has basic infrastructure such as the main road running along the canal, which has been raised higher than the canal water levels. This helps the reduce flood impacts. The road works as a barrier stopping water from overflowing into the majority of the community. The majority of houses in the community are two-story and strong. This allows the victims to live on the second floor during floods. The community has a tap water system with a committee overseeing the management such as fee collection and maintenance of the system. It also has a coin-operated drinking water system, which allows the members to have clean drinking water and thus reduces the risk of water scarcity in the time of crisis. The community has a learning center, which is a safe zone for displaced flood victims. This serves as a command post for the management of relief packages and general management during floods. It is also used to host activities such as workshops for water hyacinth weaving for

children, adolescents, and housewives during floods in order to strengthen their skills, pass long folk wisdom, and reduce flood-related stress among community members.

Tha Bong Mung community has more limited physical capital than Bang Ta Phaen. That is, the community has, as its physical capital, ground surface water sources such as Nong Khanjong lake and Boong Ngaw lake, which are located in the middle of the community and connected with the Mun river. These water sources serve as a source for food and income in a normal time. However, when the monsoon season arrives, these water sources put the community at risk of flooding. The community common places such as the communal building, school, and temple are flooded and thus not accessible. It is also found that the community does not have enough safe zones for use as a temporary shelter. So far, the community is allowed to use private companies' undeveloped properties and public space on the shoulder of the public road nearby to set up a temporary shelter. The space used as shelter has been steadily shrinking because of changes in land use. However, Tha Bong Mung community has some forms of physical capital which help the community to prevent and reduce flood impacts. These include strong, 2-story homes with bathrooms on the second story. This setup allows the victims to stay in their homes during floods. The community also has a speaker tower, which spreads news and information quickly and clearly. Twenty percent of households own 4-wheeled vehicles, which they use to move neighbors' items and their own. About 40 percent of households have boats readily available for use. A community health center is located nearby. Transportation to the center is thus convenient. During floods, there are health service units available by the temporary shelter.

2) Community with Drought Problems

Ban Limthong community was able to solve water scarcity problems related to household consumption and agricultural purposes. It started from the development of human capital, which has led to the change and development of the community's economic and financial capital, social capital, and political capital. It can be said that the community and its neighboring communities have never faced drought problems again since 2007. This is because the community has developed the physical capital which gives the community a sufficient water supply and detention systems for agricultural use year round. The forms of physical capital include:

(1) Kaem Ling ponds (water detention ponds), which the community calls Bo Mae Ling. There are 61 of large-sized ponds and 100 small-sized ponds (Bo Luk Ling) in rice paddies.

(2) A system of large and small irrigation canals with a total length of 47.7 kilometers. The community can store water from this system for use in the dry season. The storage capacity is 852 million liters. Villagers in Ban Limthong and other villages of 2,221 households and 52,000 rai of cultivated land benefit from these water sources.

(3) The “Water Road” created by the community in order to direct water overflows to irrigation canals and down to water detention ponds. Farmers then can irrigate the water to use as needed. The original idea behind this project was that when they started digging irrigation canals, the community members found that they could not draw water runoffs that flooded roads into the canals. The stagnant flood water caused potholes and damaged the road. The members then came together to try to find a solution to the problem. They decided to slope down the surface of either shoulders of the road toward the midsection. They also raised the level of the roads, built a drainage system and catchment. The entire structure directed the some of the flood water to catchment fields and water detention ponds and some to a large communal water detention pond of 37 rai in size.

(4) The community learning center equipped with computers and the Internet (ICT Center). The center is situated on the property which was donated by Aunt Noi to serve the purpose of knowledge development for villagers. It also serves a hosting place for learning activities for children and adolescents. The community has hosted “Siblings-teaching-siblings” camps to train young community members to use computers and the Internet during the summer of every year.

The findings show that Nonyang community cannot solve water scarcity problems. It does not have sufficient physical capital to reduce drought-related risks. Nowadays, the community only has cement water jars and tanks in each household as well as in the temple. These containers are for consumption in the dry season. Despite the groundwater-based tap water system for households, the community does not have enough water for consumption in some years with few rainfalls or long rainless periods. Community members need help from local

government agencies. The solution that the community and E-lum District Administrative Organization have adopted was that the community held public hearings to survey problems and needs and reported the outcome to the organization. The SAO then order a dredging of Nong Yai pond to use water there was a reserve for the production of community tap water. In terms of water for agricultural purposes, the community is still faced with droughts from no rainfalls between July and August of almost every year. The community cannot farm in the dry season. The nearest water source-Klong Esan Khiao canal-is found to have become shallow and as a result fails to hold enough water for agricultural activities. Currently it is used for drinking by cattle grazing in the fields around it in the dry season. In general, local authorities ask the villagers to refrain from growing dry-season rice or plants requiring a large amount of water to grow. The findings show that the community's physical capital does not suffice to reduce the community's drought-related risks in the future.

In summary, Tables 4.5 and 4.6 conclude capitals in communities facing flood and drought problems as shown below.

Table 4.5 Community Capitals of Communities' Management of Flood Problems

Community Capital	Bang Ta Phaen Community	Tha Bong Mung Community
1. Human Capital	1) Experiences in cooperating in the community and facing disasters. 2) Local folk wisdom in water hyacinth weaving.	1) Local community wiscom in managing disasters. 2) Experiences in facing and managing floods.1
2. Social Capital	1) Relationships between community members. 2) Assistive groups and occupational groups: water hyacinth weaving group, mixed-farming group,	1) Family-based relationship. 2) Disaster management network in Warinchamrap and Ubon Ratchathani districts.

Table 4.5 (Continued)

Community Capital	Bang Ta Phaen Community	Tha Bong Mung Community
	banana leaves cutting groups, rice seed production group, savings group, community welfare group, the committee for the prevention and relief of disasters.	3) Partner with agencies and academic institutions: Ubon Ratchathani Red Cross, CODI, Prachasankhom Foundation and Ubon Ratchathani University.
3. Political Capital	3) Inter-community relationship” Council of civil organizations. 1) Community leaders with capacity in mobilizing human support and resources. 2) Community members’ participation.	1) Leaders and leading community members’ active awareness about disasters.
4. Financial Capital	1) Savings and renewable financial resources from work-generated income 2) Welfare fund. 3) State-funding sources such as the SML Fund.	1) Personal financial capital from income/work 2) Financial compensation from the government. 3) Funds from CODI and well-built homes
5. Physical Capital	1) Basic facilities such as roads, tap water, community drinking water. 2) Klong Wua district learning center.	1) Flood-preventing water barriers 2) Raised and remodeled homes to prevent floods. 3) Community in close proximity to temple-aid center.

Table 4.6 Community Capitals of Communities' Management of Drought Problems

Community Capital	Limthong Community	Nonyang Community
1. Human Capital	<p>1) Community leaders and leading community members equipped with knowledge about household accounting, debt management, production planning, computer and technology, map reading, and</p> <p>2) Awareness of drought problems and impacts.</p> <p>3) Water and related-budget management.</p> <p>4) Local wisdom in water-related matters.</p>	<p>1) Study trips (organic fertilizer producing group)</p> <p>2) Training on drought knowledge by Sisaket province's disaster prevention unit.</p>
2. Social Capital	<p>1) Family-like relationships and in-community assistance groups.</p> <p>2) Intra-community-turned-intercommunity water management network.</p> <p>3) Partner in network with government and private agencies at the local level and beyond.</p>	<p>1) Cooperation in traditional festivities.</p> <p>2) Partner in network with government agencies, with in-group trust issues regarding financial matters.</p>

Table 4.6 (Continued)

Community Capital	Limthong Community	Nonyang Community
3. Political Capital	1) Leaders and leading community members with enthusiasm and devotion to others. 2) Community members' participation in community matters.	1) Leaders efficient in liaising with agencies.
4. Financial Capital	1) Income from the new farming approach. 2) Community funds 3) Budgets from the government, the Department of Irrigation, and SAO. 4) Funds from private agencies (the Coca-Cola Thailand Foundation and Uthokphat Foundation) 5) Financial support from the Hydro and Agro Informatics Insitute (HAIL)	1) Income from agriculture and other livelihoods. 2) Village Fund. 3) Cattle raising group. 4) SAO 5) Provincial development budget.
5. Physical Capital	1) Irrigation canals of large and small sizes 2) Water detention ponds and rice paddy ponds. 3) Water Roads to collect water in flooding season.	1) Community tap water system. 2) Esan Khiao (Green Esan) canal 3) Nong Yai pond.

Table 4.6 (Continued)

Community Capital	Limthong Community	Nonyang Community
	4) Nong Thonglim lake for tap water.	4) Cement water jars in household and water tanks in temple.
	5) Clear tap water processed from surface water sources.	
	6) ICT Center	
	7) Water tanks and jars in households.	

4.4 The Necessary Factors in Determining the Community's Capacity to Manage Disaster

The factors determining the ability of the community in disaster management by utilization the data on the disaster management of the community regarding the factors or conditions that enable the community to handle or manage the disaster of the community mainly focuses on the management of the community.

Data from this study revealed that two communities were able to manage the disaster by themselves. Management means collaboration with external organizations in regard to the personnel resources to support the management of the community. The two mentioned communities are as follows.

1) Bang Ta Phaen community is the case study for flood disaster management. The study revealed that after the flood in 2006, which was the year that the community suffered great impacts as there was no preparation or a proper warning system, people learned and developed to be able to handle flood disasters. Later, when the rainy season or the flood came, people prepared by moving their belongings above the water level and protected their houses and the important public places in the community. However, there has been no flood since 2006. Therefore, the community leaders have reviewed the flood experience and established the Disaster Management Committee in order to assign roles or responsibilities particularly for people who are

responsible for monitoring and warning people about the upcoming disaster. The households located on the river bank are assigned to monitor the water level in order to promptly inform the water or flood situation. Additionally, the community changed the way to assess the flood situation in 2011 by offering help to other communities which encounter flood before their own community in order to monitor the water level and the effect of flood on the community. People prepared flood relief packages to help others in the community while the community leader coordinated with external organizations to request floating toilets or the equipment necessary to prepare or to construct the mitigation center. This mentioned preparation enabled the Bang Ta Phaen community to better handle the flood in 2011 and it also reduced the impact. Moreover, it was found that after the flood, the community reviewed the management problems to develop better management for the future. The above mentioned data showed that the Bang Ta Phaen community could manage the flood disaster by itself. To summarize, the following factors that enabled the community to be able to handle the flood disaster by themselves are presented.

(1) Community leader factor-in Bang Ta Phaen, the community leader encouraged the people and was a role model with his dedication and attention to the goal of making a strong community in which the people rely on themselves. Therefore, when people manage the disaster together, the community leader could mobilize leaders to find solutions as well as coordinate with other communities and external networks to support disaster management.

(2) Team-leader groups: they work as a team which could be seen from the establishment of the Disaster Management Committee where each division could perform their responsibilities well and can utilize their experience to achieve the goals of disaster management.

(3) Learning and experience in natural disaster management: the Bangtapan community has experience and has learned lessons from flood disasters particularly in 2006; therefore, the community learned about and developed working together to prepare themselves prior to the flood. Moreover, people learned and changed the planting periods. For example, for rice farming – people planned to grow rice and harvest it before the flood, and also changed to mixed-farming instead of growing only fruit in order to reduce the risk or loss from the flood. Additionally,

people want to live with the water happily so they plant vegetables in the pots as a so-called “near-by refrigerator” in order to use the vegetables for cooking during the flood. Furthermore, in 2006, there was a delay in assistance; therefore, the community managed the situation on their own. They arranged welfare for disaster management by using community welfare.

(4) Participation of the people in the community: flood is a problem for everyone in the community. Consequently, everyone was ready to help each other in flood disaster management like relatives. Also, there was preparation for pre-disaster, during the disaster, and after the disaster situations.

(5) Support from external networks and organizations is an important factor for the disaster management. In Bang Ta Phaen, it was found that the community leader was dedicated to helping the public; therefore, when the community encountered flood, external networks and organizations were quick in supporting the community, and the community was able to access the necessary resources for water management.

2) The Limthong community is the case study for drought disaster management. Previously, the community encountered water shortages both for household consumption and for farming activities. People stated that “when it rains, flooding occurs but when the rain is delayed, water shortages occur”. Currently, the community has water to utilize in households and for farming throughout the year. It also allows people who live in the community and near-by communities to work and earn income. There were over 61 monkey-cheek ponds and about 100 ponds were built in the fields or individual farming areas, and over 40 kilometers of canal have been built in order to store water during the rainy season to be used in the summer. The capacity of the ponds and canals to store water of over 852 million liters is beneficial to more than 2,200 households and in farming areas of about 52,000 Rai. Limthong community is the founder of the knowledge on this solution, and later transmitted this knowledge to the 42 villages in six near-by sub-districts which are Nongbote, Choomsaeng, Thungsaengthong, Nangrong, and Lumsaiyong. Therefore, the communities have water to use throughout the year, and the people have jobs and earn more income. The factors that enabled the Limthong community to be able to handle drought are as follows.

(1) Leadership: the community leader of Limthong community is committed to solving the problem of quality of life for the people and the need to rely on themselves. Such problems are water shortage, debts, and occupations that mainly require water resources. With a strong effort and self-development by the community leader, he could mobilize people in the community to participate in learning together.

(2) Teamwork: the community leader group was the group who started thinking and discussing solutions to the drought problem. This group worked closely with the community leader and divided the roles and responsibilities clearly to solve the problems that occur while working together. They also sought new knowledge and applied it in solutions.

(3) Learning and self-development: prior to the drought disaster management and other resolutions regarding the water problem of the Limthong community, it was found that the community leader and the leader group learned and developed themselves about household accounting and liability management; therefore, they could see the real problems. It became an inspiration to solve their problems. Furthermore, the leaders have been trained about new technology such as using computers, the internet, maps, and using GPS to solve the problems of the community. Moreover, the community has exchanged knowledge with the successful Samkha community. Additionally, the community also learned about learning by doing – the leaders learned about fund management and they were trusted by the fund owners from both the government and private sectors. They were also allowed to manage the fund on their own without going through the local unit in order to spend money on monkey-cheek ponds and swamps in the farming area. The community also investigated the working process of the government sector on canal construction.

(4) Participation by the people in the Limthong community is a factor that drives the people to solve the water shortage problem. The most important participation of the people is when the people sacrifice their part of the farming area to build a canal to let the water flow and to construct monkey-cheek ponds to store water in the fields. The principles of this construction is that the monkey-cheek pond is owned by the owner of the field or the land, but the water in the pond is for common usage. The pond owner must share the water with neighbors.

(5) The community continuously monitors and follows up on the activities. The water management committee of the Limthong community was

assigned an area of responsibility to monitor and follow up the performance and to solve the problem. Each of them would exchange knowledge on the problem with the other committee members and they helped each other with solutions.

(6) Network and external organization: the Limthong community successfully solved the drought problem because they received support from the network which provided assistance in the form of knowledge, technology, and funds. The networks are the Department of Irrigation, Buriram Provincial Office of Natural Resources and Environment, and Suksaphat Foundation who provided knowledge on household accounting, and planning for farming. Moreover, the Sea Bird Center (CBIRD) is a network that provides drinking water for the community; the Hydro and Agro Informatics Institute which provides knowledge about using satellite and GPS; the Thaicom Foundation provides computers and training on using computers and the internet; the Coca-Cola Foundation provides funds to construct monkey-cheek ponds and drinking water systems for the community, and the Thailand Sustainable Development Foundation provides funds to expand the network of ponds in the fields, etc.

The disaster management of the two communities which are Tha Bong Mung-flood disaster and Nonyang-drought disaster, mainly relied on the assistance or the management of local government organizations.

3) Tha Bong Mung: the resources and assistance management is under the responsibility of the Warinchamrap municipality with the collaboration of the community leader in providing a database or information for the people in the community such as the problems and needs of the people. As the community always encounters flood, people are experienced about preparation. In regard to pre-disaster management, people prepared by moving their belongings and property above the water level. During the disaster, people updated information on the flood situation and informed other people, and people helped each other to transfer their belongings and migrating to the mitigation center. Moreover, they also set security guards at the mitigation center on a shift basis. The municipality also provided information for people who were impacted by the situation, and they supplied equipment, food, drinking water and other needs. The following factors enabled Tha Bong Mung community to manage the flood disaster.

(1) Teamwork between the community leader and the municipality: the community leader coordinated with the community such as gathering data and updating the database for the people; therefore, the municipality provided appropriate assistance for the people.

(2) Learning and having experience about flood disaster management – Tha Bong Mung community is located in the flood risk area – it floods every year. It enables people to learn about flood and prepare themselves after receiving a warning. Moreover, the community has self-management and helps each other in the community. Furthermore, during the flood, people also prepared in terms of occupation or jobs such as catching and selling fish, and using boats to transfer people to earn money. After the flood, people fixed their house/residence and made it safe from the flood such as making the house higher or building toilets on the second story of the house, etc.

(3) Networking and external organizations: after the flood in 2011, Tha Bong Mung had a network to exchange knowledge and experience on flood management and resolution. Moreover, there are organizations such as Ubon Ratchathani Provincial Office of the Disaster Prevention and Mitigation, and the Red Cross Office Ubon Ratchathani which provided training on increasing the capability of the community, and making preparation plans. Ubon Ratchathani University in collaboration with the community also conducted a survey to evaluate the capabilities of the community. These external organizations enable the community to learn and review themselves and it help in preparations to handle disasters and reduce the impacts of the disaster.

4) Nonyang community-according to the leader and the leader group's perspective, drought is not a crisis problem for the community as the management of the government sector resolves water shortage problems and the delayed-rain problems of the community. Therefore the management of the community involves resolving problems according to the local government policy at the sub-district, district, and provincial levels. The community leader surveys the problems and the needs of the people and gives the data to the Sub-district Administration Organization (SAO) for further management. The capability of the community in terms of promptly handling water shortages in the summer is based on the community leader's ability to

approach local organizations and propose solutions to the problems in order to obtain assistance. For example, the community requested water to use and drink from the Mobil Development Unit (MDU) 53 and the SAO E-Lum. Therefore, the factors that enabled the community to handle drought problems involve the ability to coordinate with local organizations and SAO E-Lum. These two organizations manage the problem and the needs of the people e.g. accepting a plan to clean the public swamp of Nonyang community to store water to produce tap water for the people in cases where there is inadequate water in the community in a crisis situation.

In summary, the crucial factors in determining the community's capacity to manage disasters show in the table 4.7

Table 4.7 Crucial Factors in Determining the Capacity of Disaster Management of a Community

Community Flood Disaster Management		Community Drought Disaster Management	
Bang Ta Phaen	Tha Bong Munag	Limthong	Nonyang
Community Self-management	Partial Self-management	Community Self-management	Rely on government agency management
Active leaders and Community leadership	Teamwork and coordination between leaders and municipality officers	Active leaders and Community leadership	Community leaders can access and present their needs and problems to the authorities.
Collaborative action and teamwork-leaders working with community teams	Active leaders	Collaborative action and teamwork-leaders working with community teams	Leaders
Learning and experiences	Learning and experiences	Learning and experiences	-

Table 4.7 (Continued)

Community Flood Disaster Management		Community Drought Disaster Management	
Bang Ta Phaen	Tha Bong Munag	Limthong	Nonyang
Community participation	Community participation	Community participation	-
Monitoring and evaluation	-	Monitoring and evaluation	-
Internal and external networks	External networks	Internal and external networks	Government agencies

CHAPTER 5

SAMMARY AND RECOMMENDATIONS

This research on community based disaster management: The case study of flood and drought disaster comprises three objectives; 1) to investigate the disaster management of the community encountering flood and drought disasters before, during, and after the disaster, 2) to study and identify the community capitals being related to the disaster management capability of the community, 3) to study the necessary conditions determining the capacity of the disaster management of the community.

The researcher has employed qualitative research which focused on community-based disaster management for flood and drought and community capitals. This research was conducted in four communities; Two communities for flood disaster management are 1) Bang Ta Phaen community, Klongwua subdistrict, Muaeng Ang Thong district, in Ang Thong province, and 2) Tha Bong Mung community, Warinchamrap municipality, Warinchamrap district in Ubon Ratchathani province. Others two communities for drought disaster management are 1) Ban Limthong community, Nongbote subdistrict, Nangrong district, in Buriram province, and 2) Nonyang community, E-lum subdistrict, and Uthompornpisai district in Sisaket province. In regard to the criteria used to select the case study, the researcher considered community which had experienced disasters and were located in risk areas for flood and drought.

Research findings of the case have been synthesized through data collection from documents, including research on disaster management, community planning, etc., in-depth interviews, focus group, and non-participation observation. Details of the summary and recommendations related to this study are as follows.

5.1 Summary of Findings

Based on this research study of community-based disaster management in 2 communities facing floods and 2 communities facing drought, the findings are summarized in two aspects as follows:

5.1.1 Disaster Management by the Communities

5.1.1.1 Flood Management

According to the research on the communities managing floods, namely, Bang Ta Phaen community in Ang Thong province, and Tha Bong Mung community in Ubon Ratchathani province, it was found that both communities are similar in terms of location. That is, they are located on a riverbank of a flood plain downstream. These communities thus are essentially catchment areas of the water upstream the river. However, the communities differ in their geographical features. Bang Ta Phaen community sits on a flood plain on the bank of a tributary of the Chao Praya river surrounded by agricultural land. Floods in Bang Ta Phaen are typically caused by the overflows of the river into farming areas. They are thus confined to those farming areas rather than residential neighborhoods. Tha Bong Mung community, on the other hand, sits on the bank towards to mouth of the Mun river, the major river artery of the Northeast. Its surrounding areas are within the urban boundary, which is being urbanized with changes in patterns of land use. What used to be Kaem Ling areas (Detention basin) taking overflows from the Mun river have now become commercial zones and housing developments. Floods in the communities in Warinchamrap and Muang Ubon Ratchathani districts are thus from the river overflows into community residential areas. While Bang Ta Phaen floods affect villagers' livelihoods because their cultivated properties, such as rice paddies or orchards, are flooded. The community needs more time to rehabilitate their livelihoods.

The two communities differ in how they manage floods. The findings show that Bang Ta Phaen uses a self-reliant method by setting up a committee on the management and relief of public disasters as a mechanism to manage disasters. Community members divide their roles and responsibilities. Within the community,

they provide and manage resources needed in reducing risks and relieving the effects of the floods, such as flood-related information, aid packages, and floating restrooms. Tha Bong Mung community co-manages the floods with Warinchamrap municipality. The municipality provides necessary resources and manages the aid. At the community level, Tha Bong Mung community helps with the provision of temporary shelter and evacuation. In summary, Bang Tha Phaen and Tha Bong Mung community's involvement in flood management is divided into 3 stages: pre-, during-, and post-flood activities as follows:

1) In terms of pre-flood management, it was found that both communities share similarities in preparing themselves for the disasters in the following areas:

(1) With respect to the preparation of flood-related information, Bang Ta Phaen community follows news from both the media and local government agencies, checks empirical data from different sources, such as water levels in canals running through the community, water levels of the Chao Phraya river in Ang Thong, and visits to flooded areas to provide aid and collect useful flood-related information. Tha Bong Mung community obtains flood-related information from government agencies, measures the water levels in the Mun river from river level gauge pole located in the community, uses social media including the Line application to follow flood situations in communities already affected by upcoming floods, and surveys demographic and household information amongst those who live in the community and prepares the gathered data for the municipality for use in the management of aid packages and other forms of assistance.

(2) In terms of the preparation of shelter and evacuation zones, it was found that in both communities, each household prepares the move of items and belongings upstairs. Households in low-lying areas or those needing to evacuate prepare items for the evacuation. Most households in Tha Bong Mung community need to evacuate their residences. With respect to the preparation of shelter, Bang Ta Phaen community determines where the shelter will be while Tha Bong Mung community relies on Warinchamrap municipality to locate the shelter.

(3) With respect to the preparation of tools and equipment, a community committee and its chairperson surveys the types of tools and equipment

needed for the construction of temporary shelter and report the outcome of the survey to Warinchamrap municipality, which will provide the tools and equipment. In contrast, Bang Ta Phaen community uses tents as temporary shelter for evacuees.

(4) With regards to food, water, and necessities, it was found that households in Bang Ta Phaen prepare foods and necessities needed during the floods. At the community level, leaders provide aid packages for community members using the money from the welfare fund. Tha Bong Mung community prepares for the flood at the household level whereby each household collects dry goods and food ingredients for use during the flood. Water and aid packages are provided by the municipality at the shelter.

(5) In terms of coordination for support and relief, leaders of Bang Ta Phaen community contacts provincial agencies by themselves, asking for floating restrooms from the Ang Thong Provincial Administration Organization and the Disaster Prevention and Relief Office. Tha Bong Mung community contacts the municipality and the 22nd Military Circle for help in evacuation. Aid and management of other issues such as the provision of temporary restrooms, garbage bags for trash or human waste collection is provided by the municipality and local public health agencies.

(6) In terms of the preparation of staff and volunteers, it was found that Bang Ta Phaen community divides responsibilities among members of the community committee overseeing disaster prevention and relief. Tha Bong Mung community depends on the community committee in contacting and helping residents.

2) In terms of during-flood management, Bang Ta Phaen and Tha bong Mung communities organizes their management as follows:

(1) With respect to the management of aid packages, community leaders of Bang Ta Phaen takes full control of the management of the packages regardless of whether they are provided by local or provincial agencies, or by other communities in the network. The leaders distribute the aid packages to community members based on the severity of their needs. For instance, the disabled, elderly, and those with limited opportunity are prioritized. In case of Tha Bong Mung, the task of managing aid packages belongs to the municipality. The distribution of aid packages and other forms of assistance is based on the principle of equality and equal

distribution among all affected individuals or households. When there are not enough aid packages for all affected, the community refuses the packages altogether in order to avoid conflicts in the community.

(2) In terms of the management of restrooms and sanitation, Bang Ta Phaen community sets up a task force to take care of floating restrooms, which are provided by provincial agencies. There are volunteers to clean the restrooms in the community and other communities. In Tha Bong Mung community, temporary restrooms in the shelter area, which are provided by the municipality, lack staff to clean them. When the restrooms' septic tanks are full, no one is tasked with reporting it to the municipality or emptying them. Those who remain in their residences who cannot use the home bathrooms receive black plastic garbage bags to handle garbage and human waste, but there is no system to take care of the collected waste. Releasing the filled bags back to the flood water is common.

3) Bang Ta Phaen and Tha Bong Mung communities differ in how they manage disasters in the following ways:

(1) Tha Bong Mung community prepares their residences and evacuation in advance. When the waters start to flow into the community, its members closely monitor the situation and evaluate the risks by checking the water levels, the flow speeds, and the strength of the currents. When the waters reach a critical level, most households move out of their residences and stay in the shelter. Each family either relies on itself in moving or asking for help from the neighbors in moving large items. Some families hire laborers to help move their belongings. In terms of the management of their share of the shelter, households needing to stay there file a request with the municipality to borrow tools and equipment with which they use to reserve a space in the shelter and build their temporary camp.

In addition to this, Tha Bong Mung manages transportation. Since during the floods, boats are the major choice of transportation, the majority of the households do not own them. They need to depend on rental boats and have to shoulder the costs. In terms of occupation, the majority of those living in the community are wage earners. Floods make them lose their jobs. However, these people adjust themselves to this condition during the flood by turning to new jobs

such as offering a boat-rowing service for people, moving service for evacuees, and fishing.

(2) In Bang Ta Phaen, there are management teams, volunteers, and staff to handle flood-related situations. Community volunteers are immediately ready to help families in need of help. Patrol groups row boats around the community to ensure safety. During the floods, most people, especially women, are out of work. Community leaders mobilize volunteers to help fill aid packages or package food item at the command center for the assistance to disaster victims in the capital city of Ang Thong. In terms of relaying news or messages about the relief efforts, the community uses the community loudspeaker tower to pass along the messages, news, or asking members to pick up aid packages.

(3) In terms of post-flood management, Tha Bong Mung and Bang Ta Phaen communities share similar management methods. After the water has receded enough for people to be able to travel, the communities start surveying the magnitude of the losses to properties and residences and document them in order to later file for compensation according to the government's relevant regulations. There is cleaning of residences and public buildings. Tha Bong Mung community members begin to clean their residences and move items from the shelter back into their homes. Then, they join the cleaning of public buildings such as the temple, school, and shelter. Finally, they tear down the shelter and return tools and equipment to the municipality.

In terms of rehabilitation of livelihoods, in Bang Ta Phaen community, the majority of the residents are farmers and are affected by floods. Rice farmers discuss among themselves plans for rice farming for the next year. Other plant growers such as banana growers, fruit growers, flower growers are affected to a more serious degree. They need years to fully recover. They need to replant their trees or plants and need to wait more than one year before they can harvest the first crops. It was also found that after a disaster, Bang Ta Phaen community reviews a lesson learned from the management of the disaster at the community level. The community plans and prepares for future floods with such activities as allocating a budget for the purchase of tents for evacuees, a budget for an SML project to process drinkable water in order to prevent the lack of drinking water should there be another flood.

5.1.1.2 The Management of Droughts

Based on the research on the management of droughts in two communities, namely, Ban Limthong community, Nangrong district, in Buriram province, and Nonyang community, Uthompornpisai district in Sisaket province, it was found that both communities are located high ground, far away from the main rivers in their respective areas. Both communities are used for agricultural purposes. They sit outside irrigated areas and rely mainly on rainfalls for agricultural activities. In terms of geographical differences, Ban Limthong sits on a slope where the nearest natural waterway, Lam Plaimat, sits lower than the community. So, the water flows down to lower communities. In dry season, the community is affected by regular droughts and lacks water for agricultural activities, which are the main livelihoods of the villagers. They also lack water for consumption. The community is thus affected to a more serious degree than Ban Nonyang community, which is affected during a prolonged period between rainfalls and insufficient water supply in the dry season. The research has shown that Ban Nonyang community members do not rely on income from agriculture alone because the majority of them work as government officials. Droughts thus affect Ban Limthong community more seriously; community leaders at Ban Limthong thus step up and try to make a difference in solving problems related to droughts that affect their community.

In terms of social context, it was found that the case studies share similarities. Members of both communities treated one another like family members. They rely on one another to a great degree. But in terms of interactions between community leaders and members, it was found that they mainly interact to discuss community problems. Community members meet and discuss problems both formally and informally in order to find options to solve the problems. In Ban Nongyang community, members interact less. They only come together for cultural activities or formal meetings.

In terms of the management of droughts in Ban Limthong community in Buriram province and Ban Nonyang in Si Saket province, it was found that the communities differ in how they handle droughts. At present, Ban Nonyang contacts the local Elam Subdistrict Administrative Organization for immediate relief when there is no water for consumption. This was exactly what Ban Limthong community

used before 2006 whereby provincial agencies ordered local community leaders to survey problems and needs of community members and relay the results to relevant agencies. For instance, after a survey of the number of household water jars during the dry season, the provincial disaster prevention and relief office, the Provincial Administrative Organization, the Subdistrict Administrative Organization, and development soldiers would deliver water by trucks to the community as a response to the requests by the community members. Community leaders needed to write an official letter through local agencies or directly to responsible agencies whose help they sought. After a dry-season drought, relevant agencies such as the Subdistrict Administrative organization, the Irrigation Department, the Department of Groundwater Resources and the Department of Agricultural Promotion surveyed the needs for water for consumption or for agriculture. The community itself held a public meeting to present its proposal for water resources development for relevant agencies' consideration for the inclusion of the proposal in their respective plan and budget allocation. Nonyang community had received a budget to dredge a public water source to reserve water for the construction of community tap water project in order to prevent water scarcity in the future. However, in Ban Limthong community towards the end of 2006, community leaders were able to see a link between droughts, villagers' debt problems, and their living quality. They met and discussed the lack of water for consumption and agriculture. The community then surveyed and collected information on these problems, looked for a water source for the community, went on study trips to visit communities succeeding in solving problems by themselves, and applied solutions from what they have learned in the community. They built and improved the community tap water system in order to address the issue of insufficient water for consumption. They also dug canals to catch rainwater during the rainy season and channel it to a catchment pond for use in the dry season. They set up rules for using water and band together to farm with a new method. They shared how to make household budget books, growing plans. Nowadays, the community is able to manage water resulting in enough water for consumption and agriculture for the entire year. They managed to expand the water management network starting from 1 community to communities in 6 subdistricts. Ban Limthong community is able to manage droughts because community members realized the problems and impacts of

droughts on their community. They thus genuinely would like to solve the problems. In Nonyang community, on the other hand, informants think that the drought problems are not serious, and that the community can ask for help from responsible agencies when they need to.

The findings from this research on the management of floods and droughts show that Bang Ta Phaen and Tha Bong Mung communities used pre-, during-, and post-flood management methods compliant with the regulations by the Federal Emergency Management Agency, 2006; Tavida Kamolvej, 2011, pp. 58-63; Chaiyuth Chinnarasri, Sujja Bunjongsiri, Bumpen Keowaan, & Palirat Kandee, 2015, p. 332) which classify disaster management into 3 stages. In the management by Bang Ta Phaen, the main stakeholders in the management and decision making in the 3 stages are community leaders, leading community members, and members, all of whom take part in the process. The leaders in Bang Ta Phaen are able to mobilize resources both from inside and outside the community for use in the pre-, during-, and post-flood management. The community also reviews lessons learned from the floods and other problems every year in order to find approaches and methods of solving problems and preventing future problems. This suggests that the community has learned and adjusted itself in order to minimize the negative impact. This approach is consistent with the model of community disaster resilience proposed by Mayunga (2007), which argues that communities need to manage long-term rehabilitation in addition to the 3-stage management approach. In Tha Bong Mung community, the community collaborates with the Warinchamrap municipality in managing flood problems. The community committee and public health volunteers (PHV) liaise with staff from the municipality in order to manage and solve problems. The community can solve some of the problems by itself, such as the preparation of households before the floods, the flood watch, and the moving of items away from water. During the flood, community members move items and evacuate the households and stay in the shelter. They manage transportation and livelihoods. In the post-flood management stage, they move items back to their residences and clean and improve residences as well as ready them for future floods. In terms of resources mobilization and decision making with respect to the management of resources in the pre-, during-, and post-flood stages, it was found that the role belongs to Warinchamrap municipality. The

community only acts as a support in order to help the municipality best respond to the community's needs. Leading members of the community survey problems and needs of its members and create a database on households, population size, risk groups, and vulnerable groups and update the database in order for all community members to receive services and help which efficiently responds to their needs.

In terms of drought management, it was found that Nonyang community divides the management into 3 stages, similar to the flood management. Ban Limthong community successfully manages drought problems. In addition to the fact that its management process has 3 stages, it is also consistent with the regulations for the disaster management scheme prescribed by the government sector in Thailand. It is also found that Ban Limthong community has long-term rehabilitation plan and drought management, which is consistent with the model of community disaster resilience (Mayunga, 2007). In this model, disaster management is divided into 4 stages: pre-disaster, during-disaster, rehabilitation, and long-term community rehabilitation. According to this model, not only do communities facing disasters have to be able to ready themselves, handle the disaster and recover from it, but they also have to be able to learn and adjust themselves in order to minimize the impacts. In case of Ban Limthong community, the community is able to recover from being drought-stricken, lacking water for consumption and agriculture to being a community with sufficient water supply year round. It has become a model for water management and expands the network of communities successfully fighting against drought by themselves.

The findings of this research show that floods are an unavoidable natural disaster, especially when affected communities are located in risk-prone areas. The impacts tend to be serious, acute, and cause direct damage to the communities. Communities in which community members are aware of the risk, ready themselves for the prevention and relief of flood impacts can better alleviate or reduce the problems. Droughts affect members in communities, especially in terms of economy. Examples of the impacts include the lack of income, debt, labor migration. These impacts slowly take shape. The community members may not be aware of them as drought impacts. For this reason, communities may not realize the problems and risks associated with droughts. The case study of Ban Limthong shows that for

communities to succeed in managing and solving drought problems, members' capacity must be developed. They also need to learn to have analytic thinking and become aware of the droughts and their impacts, which later affect their living condition and lead to debt. It is apparent that a solution to water scarcity based on the government's approach does not suffice to solve drought-related problems in communities. Ban Limthong community has adopted its own approach and has become successful. This leads to community water management and a network of water management communities of 42 villages in 6 subdistricts.

5.1.2 Community Capitals and their Relationship with Community

Disaster Management

5.1.2.1 Flood Management

Bang Ta Phaen and Tha Bong Mung both have community capitals which related to the ability to manage disasters. They are social capital, human capital, political capital, financial capital, and physical capital. Both communities have applied these capitals, which help them to handle and reduce the risks from the disasters. However, overall, Bang Ta Phaen community better prepares itself and responds to floods than does Tha Bong Mung community. That is, back in 2011, Bang Ta Phaen community was able to manage the flood that year. It foresaw the upcoming problems, readied its members when the disaster struck and responded to the community needs. The community was thus affected to a lesser degree than it had been in previous floods. It also recovered from the flood impacts swiftly. This shows that the community has the ability to rely on itself in managing floods. This ability comes from the community learning and self-adjustment. It also has the absorptive capacity, which it uses to gain knowledge outside the community and apply it in the preparation to prevent and reduce the flood impacts. Bang Ta Phaen has suffered several floods. It sits on a detention basin for waters from the northern part of the country. The community has the adaptive capacity as can be seen in several examples. It has tried different data collection methods for flood risks. It began with following news from government agencies or media such as radio or TV. This allows community members to see problems in accessing accurate data, which help them plan to handle the flood quickly. Leading community members thus decided to

change ways in which they search for accurate and reliable information. They started from helping communities affected by floods and used the information gathered there to help them analyze and estimate the flood risks. In terms of adjustments to livelihoods, it was found that rice farmers changed their farming schedules in order to harvest rice before the overflows flood the rice paddies in September. Fruit growers changed from growing only fruits to growing a mix of crops in order to reduce the impacts of the floods. This is because orchards affected by floods require several years of recovering before crops can be produced again. The approach used by this community is thus consistent with the characteristics of communities able to manage disasters based on the views of Norris et al. (2008) and Longstaff (2005).

In terms of the transformative capacity in order to decrease flood risks and impacts. According to Bènè et al. (2013) and Frankenberger et al. (2013), transformative capacity in disaster management is a change in administrative mechanisms, fundamental facilities, networking, and mechanisms for social protection both officially and unofficially. It was found that Bang Ta Phaen community made changes to the community in order to reduce the risk in many areas including the appointment of the committee for the prevention and relief of public disasters after the community was flooded in 2006 and the adoption of this committee in the management of the flood in 2011 both before, during, and after the flood. In terms of fundamental facilities, the community changes the surroundings to prevent and reduce flood impacts. At the household level, plots where new homes are to be build are filled with dirt to create high ground. Existing houses are also heightened. At the community level, roads are built on a level higher than the banks of Bang Ta Phaen canal. The roads thus act like a dam preventing overflows into the majority of the community land. Reviews of lessons learned help the community to realize problems of not having enough drinking water during floods. The community members thus decided together to use the budget for the SML project to set up community drinking water processing system. This helps the community to have enough clean water in times with or without disasters. In terms of the development of a network, Bang Ta Phaen and 4 other communities in Khong Wua subdistrict use the council of community organization as a mechanism to steer efforts in preventing and solving problems. With respect to social protection, Bang Ta Phaen community

consistently reviews problems and operations every year in order to address problems occurring in the community. On the agenda are issues related to narcotic drugs, the elderly, occupational development of community members, and the community welfare system. The community develops its own system of solving problems using internal mechanisms. The study has shown that community members work together continuously; they link and mobilize human resources to work on or address community problems. Execution of work is thus easy when the community is faced with problems or critical situations.

The findings in the case of Tha Bong Mung show that the community is able to manage itself at the household level. That is, members prepare for the floods by moving belongings to higher ground or move them to the shelter designated by Warinchamrap municipality. They repair and clean homes and the community after the flood. In terms of management and decision making on other issues such as the handling of aid packages, food, and drinking water is in the hands of the municipality. Leading community members' roles are to survey demographic data, number of households, vulnerable groups such as the elderly, the disabled, and children, in order to create a database for the management and assistance to flood victims. When the two communities are compared in terms of their ability manage the floods, it was found that Bang Ta Phaen succeeded in dealing with flood problems. The community plays a key role in dealing and making decisions in the floods. It has preparation plans, a disaster warning system, strategies for accessing accurate information, and access to resources necessary for the relief and reduction of flood impacts. It also has a systematic approach to management during the floods. The findings suggest that Bang Ta Phaen has more community capitals than does Ta Bong Mung community. For this reason, the former community manages floods based on community efforts better than does Ta Bong Mung community. Community capitals which Bang Ta Phaen community has are as follows. The first type is human capital, which consists of experiences related to disasters, experiences from working together to solve community problems such as the appointment of community safety squad in 1996 in order to solve thefts in the community, and local wisdom of community members including knowledge on weaving, which generates income for the community. The second type is social capital, which is based on the family-oriented relationship

among members in which they help one another and form occupation groups including the water hyacinth weaving group and the mixed-crop farming group, which cooperate in the community and with other communities. Members also cooperate with other communities through the Council of Community Organizations in Klong Wua. Family-oriented relationship, occupational groups, and the Council play an important role in helping the community manage and solve flood and other problems. This is consistent with Preecha Piyachandra study (2011, pp. 25-26) which has found that a factor in helping communities manage critical problems are ones with social capital whereby community members are caring, treat one another as if they were relatives, and have local wisdom that assists them to deal with different problems. In addition to social capital, which connects people in and outside the community, it is found that Bang Ta Phaen community is a member of a network of agencies at the provincial and national levels, which mobilize resources to assist the community when disasters strike. The third type of political capital. The findings show that Bang Ta Phaen community has political capital. Having a strong leader who is well accepted by the community and beyond enables the community to mobilize human and other resources from both within and outside the community to prepare and promptly respond to disasters. Coupled with this, cooperation and participation from leading community members and ordinary members in exchanging ideas in solving problems and identifying resources needed enables the community to access necessary resources for the management of the disasters. This is consistent with Nipapan Jensantikul study (2015, pp. 88-89), which discovers that communities with potential and readiness for self-preparation and prevention of disasters because of member participation in identifying resources hold discussions to exchange ideas. This allows the community to access resources with its own power and potential through a network of strong, well-accepted leadership. The fourth type is financial capital. This is a supporting factor, which can be used for preparing and relieving disaster impacts (Preecha Piyachandra, 2011, p. 26). In Bang Ta Phaen, the water hyacinth weaving group creates income. A portion of this income goes into the community welfare fund. The money from this fund is spent on food and necessities which go into the aid packages distributed during floods. Furthermore, the community also decide together to use the SML budget to set up a drinking water processing

system just so the community has a supply of clean drinking water on a regular basis and during disasters.

5.1.2.2 Drought Management

The findings show that Ban Limthong and Ban Nonyang communities have community capitals or resources. They are, namely, human capital, social capital, political capital, financial capital, and physical capital. These capitals enable the community to manage droughts. Ban Nonyang community follows the government-prescribed approach to solving drought problems, which is adopted by local agencies including Elam Subdistrict Organization and provincial-level agencies. For example, before the dry season there is a survey of water containers, a survey of the needs for groundwater wells by the Department of Groundwater Resources. During the dry season, government agencies deliver water to communities by truck. Or, communities write a formal letter asking for assistance if they are short of drinking water during a drought. These approaches are for immediate relief. They cannot help reduce risks in the long run. In contrast, Ban Limthong community solves the issues of the lack of water for consumption and agriculture, turns barren land saturated with water. The community has dredged streams, ponds, canals, lakes and created man-made reservoirs to hold water for use in the dry season. Community members can farm year round and grow vegetables that generate income for the community. Such success shows that the community can manage droughts effectively. It has the absorptive capacity. The knowledge learned from outside the community itself includes the learning process based on constructionism, by farming, keeping household budget books, occupational planning, debt-solution planning, and learning to use computer programs and the Internet. The learning of the above processes has helped leading community members develop their potential and gain confidence in participating in leadership in attempts to solve problems. As a result, the community gained the adaptive capacity. This was through self-criticism and analytic thinking, which leads to awareness of the link between occupational problems, debt, and living quality and water scarcity. Community leaders discussed problems and further discussed them in public forums. They finally understood them fully. The leaders then planned to solve the issues themselves on the premise that they must not wait for anyone's help. They started by depending on themselves. Everybody realized that

thinking alone was not enough. They had to start acting upon the ideas and looking for a water source. They started by surveying using a research process depending on local wisdom and knowledge in science and technology. They applied the knowledge in planning, writing a funding proposal to government agencies in order to sponsor community-based projects. Such community cooperation shows that the community has learned about risks it is faced with. The members have made choices and cooperated with one another creatively and flexibly in order to solve community problems. This is consistent with Norris et al. (2008). The search of information on water sources is consistent with indicators put forth by Longstaff (2005), which constitute communities' ability to locate reliable and accurate information.

With respect to transformative capacity, Ban Limthong community reduces drought risk and impacts in a way that is consistent with Béné et al. (2012), Frankenberger et al. (2013). This shows that the community transformative capacity is a change in administrative mechanisms, fundamental facilities, networking, and mechanisms for social protection both officially and unofficially. The findings show that Ban Limthong community has changed in many ways. First, the community has set up a water management committee consisting of leading community members and land owners. They act as a mechanism for water management because the community regards them as those who deal with problems directly. Community leaders such as village heads and the mayor of the District Administrative Organization serve as advisors. Second, the community has improved and built fundamental facilities to address water scarcity issues including the improvement of the tap water system, the clear tap water program, and the digging of canals to catch excess water, secondary canals, detention ponds, farm ponds, and other waterways. Third, it has expanded the water management network from 1 community to 42 communities in 6 districts. Fourth, community members have formed a group to help one another financially. Community work is done with no money involved because they want the members to be socially responsible and develop a sense of shared ownership.

Ban Limthong community's ability to manage and tackle drought problems successfully shows that it has community capitals, which help the community survive disasters and adjust to changes. They also helps the community access necessary resources and employ them in responding to disasters. Ban

Limthong community has more community capitals than Ban Nonyang community. First, in terms of human capital, in Ban Limthong community the elderly have knowledge about water. Leading community members have learned through constructionism. They have learned many things including how to keep household budget books, debt management, production planning, the use of computer programs and the Internet, map reading, water management, study visits to successful communities, and budget management. In terms of social capital, community members treat one another like family members. They set up groups to provide financial aid to members in the forms of a community shop, rice bank, housewife group, savings group, community-level network. The community is also in a network of agencies which provide financial support and other forms of help in dealing with droughts. In terms of political capital, community leaders and leading members have learned and developed themselves continuously. They are able to assess their problems and risks. Community members are self-reliant and depend on information in addressing problems. The community is thus confident in proposing solutions to problems based on its members' participation. As a result, the community can access aid from government agencies and funding sources from both the government and private sector. In addition, its success has earned the community national recognition. Fourth, in terms of financial capital, money is a key factor in managing disasters. Ban Limthong community provides financial aid to members. Funding in water management comes from the Coca-Cola Foundation of Thailand, Uthokphat Foundation, the Hydro and Agro Informatics Institute (2005), and funds from the government sector including the irrigation department, the local Subdistrict Administrative Organization, and funding at the household level comes from the fact that the increased income comes from successful water management. Fifth, in terms of physical capital, Ban Limthong community's physical capital includes the community tap water system, irrigation canals, secondary canals to rice paddies, detention ponds, paddy ponds and so forth. These fundamental facilities enable the community to solve water scarcity issues.

5.1.3 Crucial Factors in Determining the Community's Capacity to Manage Disasters

The findings show that factors that help two case study communities succeed in managing disasters by themselves by integrating resources and external assistance as in Bang Ta Phaen (for flood management) and Ban Limthong (for drought management) are as follows:

1) With respect to community leadership, Bang Ta Phaen leaders encourage members and act as role model for them in giving back to the community, being persistent in working towards to goal of making the community strong and self-reliant. When the community members come together to manage disasters, the leaders can mobilize them to join the problem solving process. The leaders can also liaise with other networks inside and outside the community in order to gain their support. Likewise, Ban Limthong leaders are determined and persistent in trying to reach their goal of seeking solutions to problems affecting the living condition of community members in terms of the scarcity of drinking water, household debt, and occupational problems due to the dependence on water. They too have tried to improve themselves. Their determination helps them to gain support by community members and access key resources in drought management including knowledge, technology, financial capital, and support from external organizations.

2) With respect to teamwork, leading community members in Bang Ta Phaen work as a team. This can be seen in the task force on the public disaster prevention and relief. Each unit in the task force works efficiently. They coordinate among themselves in order for the community to achieve the goal of handling the disaster. Likewise, Ban Limthong leading community members were the first group to discuss problems in the community. They divide the roles and duties in tackling problems arising from work. They continue to search for knowledge, absorb and apply it in solving community problems.

3) With respect to the learning and awareness of risks, Bang Ta Phaen community is experienced in facing and dealing with several floods. The community members have learned, changed their thinking, and adjusted the way they work together. They have learned to prepare for the incoming floods, set up a benefit system for disaster impacts in their community welfare fund. In Ban Limthong

community, members have learned and developed themselves as can be seen in their knowledge in household budget books, production planning, debt management. In addition to this, their leaders have learned to use computers, maps, and GPS tools, which the community has later successfully applied in their water scarcity problems.

4) With respect to participation by community members, disaster problems are shared by the entire community of Bang Ta Phaen. Community members are willingly to work together in managing floods in pre-, during-, and post-flood stages. In Ban Limthong, key participatory activities are the farmers' donation of part of rice paddies to turn into canals or detention ponds to contain water or distribute water to neighboring paddies.

5) In terms of support from networks and external agencies, which are an important external factor, it was found that Bang Ta Phaen community leaders are selfless and hard-working in community business. Also the community is strong and successful in developing many areas. When faced with floods, it easily garners help from external agencies. The community is thus able to access necessary resources in flood management. Ban Limthong community is supported in terms of knowledge, technology, and funding from external sources. It thus is successful in solving drought-related problems.

6) In terms of continuous evaluation, the findings show the Bang Ta Phaen and Ban Limthong community members often discussed problems and seek solutions together. They also constantly evaluate the outcome of the solutions.

In Tha Bong Mung (flood management) and Ban Nonyang (drought management) communities, their management of disasters relies mainly on the management of local government agencies. Factors assisting these communities to manage disasters are summarized as follows:

1) In terms of teamwork, there is close coordination between community leaders and the municipality. This results in the success in distributing the aid to all residents in the community.

2) With respect to learning and experience in flood management, Tha Bong Mung community has always been considered a disaster-prone area. The community thus has learned about floods. Members ready themselves after a flood warning. They also take care of themselves and help one another during the flood.

3) In terms of networks and external agencies, Tha Bong Mung community is part of a network of communities which share experiences in the flood management. Other agencies provide workshops and trainings in order to increase the community's capacity in identifying lessons learned and contingency planning.

This research also suggests that in the drought-affected Ban Nonyang community, the leaders and leading members still believe that droughts are not a serious problem. Community-level management is thus for immediate, temporary relief based on policy of relevant local government agencies. In terms the community capacity when faced with droughts in the dry season, it can be said that community leaders are able to access and report problems to local agencies, which then provide aid. The factor assisting the community in solving drought problems is the Elam Subdistrict Administrative Organization, which can acknowledge and deal with the problems based on the community's needs.

5.2 Recommendations

5.2.1 Recommendations for Communities

1) The findings show that communities able to manage disasters both in the case of floods and droughts are communities that can manage themselves, realize disaster risks and impacts, rely on themselves to deal with disasters, and integrate their own sense of being a community in order to tackle problems based on existing resources. When communities begin to rely on themselves and become strong, they will be equipped with the power to help them mobilize help and support in terms of resources for the government and private sectors.

2) The findings from the case studies on the management of floods and droughts show that communities successful in managing disasters do not use money as the starting point or main factor to mobilize human resources and participation.

3) The findings from the case studies on drought management show that Ban Limthong community adopts the community research approach to exploring water sources and use the information to plan for ways of solving problems, to prepare a proposal to the irrigation department asking for a budget. Data collection is a necessary procedure for communities wishing to solve their problems. Not only

does it provide the communities with empirical evidence to support the salutation to their problems and needs, it also help community members become aware of their member identity and realize what the real needs of their respective community are.

4) Communities should develop new generations of leading community members to build upon and continue the learning process and carry on the task of community development. In Bang Ta Phaen community, members rely on only one leader in liaising with the network and accessing external resources.

5.2.2 Recommendations for Government and Other Agencies

1) The development and assistance by government or other agencies should prioritize human resources development.

2) More power should be given to communities in making decision making in disaster management. Likewise, communities should be given the power to allocate necessary resources.

3) Increasing community capacity should be given to community leaders in the form of power and capacity development in terms of disaster management of both floods and droughts.

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