RESILIENCE IN THE TSUNAMI-AFFECTED AREA: A CASE STUDY ON SOCIAL CAPITAL AND REBUILDING FISHERIES IN ACEH – INDONESIA

Master thesis in International Fisheries Management
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By

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Cover picture:

Showing a fisher in the fishers' barracks with his traditional net in the coastal village of Alue Naga, Banda Aceh district, NAD province. The picture was taken during the fieldwork in August 2006.

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Abbreviations and Acronyms

ABK	Anak Buah Kapal *Vessel's Crews*
ADB	Asian Development Bank
B	Billion
Bappeda	Badan Perencanaan Pembangunan Daerah *Local Agency for Development Planning*
Bappenas	Badan Perencanaan Pembangunan Nasional *National Agency for Development Planning*
BMPT	Badan Musyawarah Petani Tambak *The meeting organization for fish-farmers*
BPS	Badan Pusat Statistik *Agency for Statistics Center*
BRKP	Badan Riset Kelautan dan Perikanan *Agency for Marine and Fisheries Research-MMAF*
BRR	Badan Rehabilitasi dan Rekonstruksi *Agency for Rehabilitation and Reconstruction*
CHF	Community, Habitat, and Finance
CPUE	Catch per Unit Effort
DFW	Destructive Fishing Watch
DGCF	Directorate General of Capture Fisheries
DGCS	Directorate General of Controlling and Surveillance
DGA	Directorate General of Aquaculture
DOM	Daerah Operasi Militer *Military Operation Areas*
Etesp	Earthquakes and Tsunami Emergency Support Project
EU	European Union
FAO	Food and Agriculture Organization
GAM	Gerakan Aceh Merdeka *Movement for Aceh Freedom*
GDP	Gross Domestic Product
GT	Gross Ton
Ha.	Hectare
ICSF	International Collective in Support of Fishworkers
IDR	International Debt Relief
IEEZ	Indonesian Exclusive Economic Zone
IFM	International Fisheries Management
IMR	Institute for Marine Research (Bergen)
IRC	International Rescue Committee
IUU	Illegal, Unregulated and Unreported
km.	Kilometer
km^2	Kilometer square
KTP	Kartu Tanda Penduduk *Social Identity Card*
LBAP	Loka Budidaya Air Payau *Local Agency for the Brackish Water Aquaculture*
LIPI	Lembaga Ilmu Pengetahuan Indonesia *Indonesian Institute of Science*

M	Million
m	Meter
MCS	Monitoring Controlling and Surveillance
MDG	Millennium Development Goals
MMAF	Ministry of Marine Affairs and Fisheries
MPA	Marine Protected Areas
MSY	Maximum Sustainable Yield
NACA	Network of Aquaculture Centers in Asia-Pacific
NAD	Nanggroe Aceh Darussalam
NGO	Non-Governmental Organization
NZAID	New Zealand's Agency for International Development
Perda	Peraturan Daerah *Local Laws*
PFA	Provincial Fisheries Agency
Pusdatin	Pusat Data dan Informasi *Data and Information Centre-MMAF*
Rp.	Rupiah *Indonesian Currency*
RRWKM	Rehabilitasi dan Rekonstruksi Wilayah dan Kehidupan Masyarakat *Rehabilitation & Reconstruction for Areas & Communities*
TPI	Tempat Pendaratan Ikan *Fish Landing Ports*
US	United States
USAID	United States Agency for International Development
UU	Undang-undang *National Laws*
VMS	Vessel Monitoring System

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Resilience in the Tsunami-Affected Area: A Case Study on Social Capital and Rebuilding Fisheries in Aceh – Indonesia

Abstract

The tsunami disaster in NAD province has affected and reduced significantly the social and ecological resilience of coastal communities. The 'huge aid' and large number of parties involved during fisheries rebuilding process are essential in supporting the rehabilitation of fisheries infrastructure and knowledge transfer in order to improve fishers and fish-farmers capacity in dealing with ecological feedback. This process is potential to present either the effective or the ineffective responses. The effectiveness is essential since the tsunami is seen as an opportunity for building resilient within coastal communities and better future of fisheries governance. However, tsunami occurred in the context of vulnerability and its impacts have caused the vulnerability, since the fisheries production assets wiped out by tsunami. The effective response is influenced by the ability of the disaster authorities and other parties involved providing a properly action and mechanisms that represents in the implemented policies. This ability also influenced by the previous experiences in designing the policy, as a mean to deal with social and ecological problems in the past. The response to this disaster has indicated to have potential to create vulnerability within survivors as well, which lower the ability to adapt to and cope with disasters. These, in the long-term goals, may promote less incentive to the resilient communities and preserve the status quo. The effectiveness can be achieved by understanding the diversity and coping strategies in the fisheries capture and aquaculture that mainly characterized by the livelihood strategies. On the other hand, understanding and strengthening the social capital of the individuals, households, fisher groups, and local institutions are essential, which enable to provide effective responses and adaptive capacity. These can be addressed through allowing the social learning framework to take place during rebuilding fisheries process. These frameworks also enable to provide feedback for the governance structure as an evaluation to ineffective response and as a tool to deal with the complexity of integrated intervention, including resource management after the tsunami.

Keywords: Tsunami, rebuilding fisheries, vulnerability, social capital, effective intervention, learning framework, resilience.

Chapter One

INTRODUCTION

1.1. Research background

On 26 December 2004, an earthquake and a tsunami struck the Nanggroe Aceh Darussalam (NAD) and North Sumatra provinces. This caused massive devastation and damage for many involved in the fisheries sector. In NAD province, about 10,3% of fishers and 1,4% of fish-farmers were died (World Bank 2006). Most of the fishers lost their boats and other equipments that were necessary for their livelihoods. Aquaculture, and particularly the small-scale fish-farmers, was severely disrupted, due to damage to their fishponds and other facilities. Traders were also severely incapacitated and suffered severe damage to their facilities and equipments. The fisheries sector will remain affected in the medium to long-term. The extent of damage to coastal, human and physical resources means that restoration and livelihood recovery is slow (ADB 2005). The impact of the tsunami was greatest on the poor. They are characterized by having the least access to resources and this weakens their ability to recover. Many have lost households and productive assets, and have few possibilities to earn an income and sustain a livelihood (Pomeroy *et al.* 2006).

This thesis will present and draw on the social capital and resilience perspective in the fisheries rebuilding process after the tsunami disaster. Mainly three points will be addressed in the focus of analysis. These are: i) the ability of fishers to adapt to and cope with disasters, based on social capital and coping strategies in the fisheries rebuilding process; ii) the effects of effective intervention and social capital connectedness on their coping strategies; iii) the potential of social capital, coping strategies and fisheries intervention to promote social-ecological resilience. These points will be discussed by incorporating the perspective of theory or concept, which contained some relevant issues. These are: i) social capital and vulnerability that affect community interaction and their linkages to the resources; ii) institutional responses in the complexity of rebuilding fisheries; and iii) institutional learning and its implications for the fisheries governance, and adaptive management process.

1.1.1. The vulnerability issues

Before the tsunami, the status of coastal communities in the developing countries can at best be described as fragile, due to a high dependence on severely depleted and overfished natural resources. Hence, they were already vulnerable to a change environment when the tsunami struck (Pomeroy *et al.* 2006).

Fauzi (2005) explained that the majority of traditional fishers in Indonesia are poor, earning on average US$10 per capita per month. According to millennium development goals (MDG), this is categorized as extreme poverty because less than US$ 1 per day. These traditional fishers are the groups that are most vulnerable to the poverty. Their livelihood system is embedded in the social structure of capture fisheries and marketing, which is dominated by small-scale fisheries. In many cases, this social structure has made them structurally poor and they are often challenged by the issues of; i) limited access to technology, education, information, and credit; ii) high dependence on fisheries resources; and iii) lack of skill in the diversification of livelihood. These sometimes are not seen as they are materially poor, but they are politically poor. It means that their social and cultural capital needs to be functioned effectively and competently in decision-making processes (Jentoft 2006). Thus, from these points, the poverty could not be solved by just concern on one issue, but needs to be solved comprehensively as a system (MMAF 2005; Kusnadi 2003; Fauzi 2005).

After the tsunami, fisheries assets and livelihood facilities have mostly been wiped out. This has made coastal communities more vulnerable. The responses to this disaster have the potential to overcome the context of vulnerability, which existed before and after the tsunami (status quo). However, the outcome of disaster responses is also vulnerable to be ineffective and may exacerbate the vulnerability.

1.1.2. The fisheries rebuilding process

The rehabilitation process in the tsunami-affected area of Aceh-Indonesia, including the fisheries sector, has been in place for two years. During that time, some issues have arisen. These are: i) the proliferation of boats has given incentives to create excess capacity; ii) the concerns are focused more on short-term programs, rather than long-term resilience and sustainability; iii) less attention is paid to address the root cause of vulnerability; iv) the risk of simplistic thinking, which is dominated by easy and ill-considered options in the fisheries

management (Pomeroy *et al.* 2006; ICSF 2006b). The other issue is the high dependence on outsiders and conflict of interests between parties hoping to gain from fishing assistances.

1.1.3. The lessons learned

The poverty alleviation in Rama-Nicaragua communities was receiving large international donor sympathetic, and the things soon return after most have left the area (Jentoft 2006). In the tsunami-affected area of Aceh-Indonesia, many organizations that have made large contributions of aid to help the rehabilitation process, will soon be leaving the area as well. In this case, the intervention without an effectiveness and sustainability will lead to exacerbating the situations and may have no substantially improvement. Thus, the effective intervention is essential to deal with the poverty and vulnerability issues.

Both cases indicated that vulnerability is connected to food security and sustainability. Food security is an issue of high priority for the coastal poor, and fish has traditionally been their main source of diet and income. In Aceh, the survivors were struggling to sustain a livelihood through their coping strategies. They may also vulnerable to insecurity of food and income due to the potential of intervention to be ineffective. Both cases need to involve social, cultural and legal dimensions. They need help to rebuild their communities and secure resource rights. They also require assistance in revitalizing their culture and strengthening their formal competence (Jentoft 2006). After the tsunami, fishers are now vulnerable to poverty because all livelihood facilities and other resource productions were lost or damaged.

The workshop on post-tsunami rehabilitation of fishing communities in Chennai-India has identified and analyzed the main issues that need to be addressed in the evaluation process. These include proliferation of boats and a lack of alternative livelihoods (ICSF 2006a). These issues indicated that the rehabilitation process is incentive to the vulnerability of fisheries resources and livelihood. Thus, learning from experience is essential to provide a proper mechanism that improves the quality of this process. This learning process as Pomeroy *et al.* (2006) has argued, should be the main concern of rehabilitation process after the tsunami. It encompasses the *framework* for understanding coastal people's diversity and sources of vulnerability, *a process* for designing interventions, and *a focus* on long-term challenges of building resilience and sustainability.

1.1.4. Disaster and opportunity: a demand of social and ecological resilience

The heavily destroyed fisheries sector was not only seen as a disaster, but also as an opportunity for building a resilient community and to shift to a new structure of fisheries governance. The resilience, in both social and ecological manifestations is an important aspect of the sustainability of development and resource utilizations (Adger 2000). These would require a learning process and an adaptive capacity. Olsson *et al.* (2004) has presented the benefits from the development of adaptive management. These, allow local groups to self organize, learn, actively adapt to and shape change with social networks that connect institutions and organizations across levels and scales and that facilitate information flows.

Adger *et al.* (2005) emphasized the demand of social and ecological resilience through a broader approach of governance system. It is argued that resilient social and ecological systems incorporate diverse mechanisms for living with, and learning from, change and unexpected shocks. According to Wastl (2007), a well-informed governance structure can be achieved through social learning. This includes assessing and reducing vulnerability that is essential for building social and ecological resilience. Social and ecological vulnerability to disasters and outcomes of any particular extreme event are influenced by the buildup or erosion of resilience both before and after disasters. Disaster management then requires multilevel governance systems that can enhance the capacity to cope with uncertainty and surprise, through mobilizing diverse sources of resilience and re-evaluate the constraints (Adger *et al.* 2005). Thus, vulnerability to disaster needs to be approached from broader perspective, which enables governance systems to absorb the incentives for resilience and to release the obstacles that may exacerbate vulnerability.

The ability for adaptation or the characteristics of coping strategies are essential in the context of disaster as an opportunity. As Adger (2003) explained, the opportunity could be seen as an adaptation in a dynamic social process that enables societies to adapt and act collectively. The emerging perspectives on collective action and social capital explained the nature of adaptive capacity and normative prescriptions of adaptation policies. Specifically, social capital is increasingly understood within economics to have public and private elements, both of which are based on trust, reputation, and reciprocal action.

1.2. Research questions

The long-term resilience to natural disasters has to be increased both in the social and ecological dimensions. This requires a long-term intervention (ICSF 2006a). However, the rehabilitation process has to deal with great challenges due to massive reductions on social and ecological functions. Coastal communities have to deal with uncertainty now, after the fishing infrastructures and livelihood facilities mostly wiped out by the tsunami. Many vibrant organizations came to provide help and assistance quickly and noticeably with their 'huge aid'. At the same time, the disaster management has the potential to provide ineffective interventions due to the massive of destructions, large number parties involved, and the influences of the previously experiences or policies. These are potential to exacerbate the vulnerability and may leads to ineffectiveness in building resilient coastal communities.

Rehabilitation of coastal livelihood after the tsunami needs to look beyond a return to the status quo and to address the root causes to vulnerability of coastal communities. It needs the effective process to build a framework to develop social and ecological resilience that enables the communities to deal with vulnerability, to cope with future threats and to exploit opportunities. This approach need to be adopted and should take into account their diversity, particularly in livelihood strategies (Pomeroy *et al.* 2006). Livelihood is the major social situation that can be used in the process of identifying the adaptation mechanisms or coping strategies of the survivors. The ability to participate or to access and to provide the fishing assistances are characterized by the social capital, coping strategies and intervention effectiveness. The ability to provide learning processes and effective responses may give an incentive for the resilient coastal communities (Adger 2003; Wostl 2007). Thus, in order to investigate the respective issues, this research is then emphasizing on the particular research questions, such as:

(i) What are the factors that determine people's ability to cope with disasters?
(ii) How effective are the institutional in building resilience after the tsunami?
(iii) How can the fisheries rebuilding processes promote social and ecological resilience?

1.3. Hypothesis

After the tsunami, people have had to deal with livelihood issues and to rely a great deal on outside assistance to improve their fisheries. All have different abilities to adapt to and cope with disasters, depending on the particular social, economic, environmental and political reality (ICSF 2006b). Social capital, knowledge, institutional coping strategies, and

interventions are the important indicators that influence the effectiveness of disaster management. Social learning is also essential in the promoting social and ecological resilience (Olsson *et al.* 2004; Folke *et al.* 2003, Adger 2003). Thus, the trends of the research questions' answers can be formulated into the hypotheses, such as:

(i) Social capital and knowledge are essential for the coping strategies to function as a means to recover from the disaster;

(ii) The institutional responses that are characterized by the interactions between the disaster authorities, other parties involved, and coastal communities are potentially ineffective due to a lack of effective intervention during recovery process.

(iii) The fisheries rebuilding process has the potential to lower the incentive for building on the long-term solution of social and ecological resilience. Its concerns merely tend to focus on reconstructing physical resources and the short-term program (Pomeroy *et al.* 2006).

1.4. The main of applied theories

The concept or theory of social capital and social structure are applied in the analysis of the ability to adapt to and to cope with disaster, and the effectiveness of the responses during rehabilitation process. These, together with the theory of social-ecological resilience are applied to analyze the incentives for building social and ecological resilience in the tsunami-affected area.

1.5. Research objectives

From the lessons learned, the mistakes of the past rehabilitation process should be avoided through addressing *a framework, a process,* and *a focus,* which are essential for long-term challenge of building resilience and sustainability (Pomeroy *et al.* 2006). If the tsunami disaster is seen as an opportunity, these lessons learned are essential for better resource management. The rehabilitation process needs to be addressed as the essential starting point to provide better approach in the complexity of resource management. The subject of lessons learned is required to shape the rehabilitation process and may give incentives for establishing the transition phase properly. Thus, this research concerns the analysis of the extent of rehabilitation process that may contribute for resilient coastal communities. Specifically, this research aims to: i) observe the social capital and institutional responses to disaster; ii) study the incentives for building social and ecological resilience.

1.6 Research design

1.6.1. Sampling data

Prior to fieldwork, the studies of research topic and fieldwork site, and questionnaire design have been done under supervisor's guidance. During fieldwork, sampling data was conducted by using purposely-sampling method, which means that data were not collecting randomly but purposely in identifying particular social situations by using in-depth interviews. The process of collecting data was flexible and enabled the number of respondents to be expanded, which is necessary if variation of issue or additional information is needed.

1.6.2. Research setting

The fieldwork was conducted over three-month duration in Indonesia. Interviews and observations were conducted in the two districts: Aceh Besar and Banda Aceh. In July 2006, the time was used to collect data and information, and to study the relevant documents, which were located in Jakarta. In August 2006, the time was spent in the fieldwork site, gathering primary data through interviews and observations. Data was also obtained from the local disaster authorities and organisations. During September 2006, the data assembled was evaluated and additional relevant data was collected from relevant people and organisations in Jakarta.

1.7. The outlines of thesis

Chapter one provides the background to the research and methodological aspects. The background is made of the views of the vulnerability context and the constraints that took place during rehabilitation process. Through this, the lessons learned can be addressed and assessed with the objective to learn the framework for long-term challenges on building social and ecological resilience. The methodological aspects contain the information on how the fieldwork was conducted using in-depth interviews and participatory observation methods, and the process of collecting data. It also provides the scope of the research, which is represented by research questions, hypothesis and research objectives. The short views of the applied main concepts or theory are also provided. These include social capital, social structure, and social-ecological resilience theories.

Chapter two provides background information of the research site, which is divided into general and specific conditions. It is categorized into geographical, ecological, historical and cultural, social, economic and legal aspects. Each is specifically related to the fisheries

condition in Indonesia and Aceh. Particular information is provided concerning the condition of fisheries after the tsunami.

Chapter three provides the explanation on how the research was conducted. It consists of two main activities, namely fieldwork preparation and the process of fieldwork. The former is the information about how the fieldwork was prepared. The latter is about how the fieldwork was conducted, including the challenges during the process that could affect the validity and reliability of data.

Chapter four contains briefly the perspective of theory or concept applied as a basis for building the analysis and conclusion part. It encompasses the social capital and social structure that are involved in the adaptation and the coping strategies of the coastal communities. These, together with the vulnerability, social learning, adaptive capacity, governance and resilience building theories, are applied in the analysis, in the context of rehabilitation process.

Chapter five provides a descriptive categorization of the empirical data. It encompasses the role of individuals, households, fisher's groups, local indigenous institutions in ecological adaptation and their interaction with the disaster authorities and other parties involved. The existing of social capital, social structure, and the disaster management have shaped their roles and interaction. In particular, the data presented the role of *palong*, as a representation of fishers groups and *panglima laot* as a local indigenous group.

Chapter six provides the analysis of data and the application of theories, both of which will contribute for building the conclusion part. The content of the chapter is about the interconnectedness between the role of the coastal communities and the disaster management during rehabilitation process. The former is about the coping strategies of individuals, households, fisher's groups, and local indigenous institution in terms of livelihood and ecological adaptations. These are represented by social capital and local knowledge. The latter is about the interaction between coastal communities and disaster authorities and other parties involved, which are represented by the effectiveness of policies or approaches. These processes are essential as a basis in analysing the process of building social and ecological resilience in the tsunami-affected area.

Chapter seven provides the conclusion of the research. It covers a discussion of the factors that determine ability of people to cope with disasters, the challenges of the interactions between stakeholders, and the incentives that enable the building of social-ecological resilience during the rehabilitation process.

An appendix showing the sample of questionnaires is included at the end of the thesis.

Chapter Two

BACKGROUND INFORMATION

2.1. Geographical and demographical conditions

As an archipelago country, Indonesia has about 81.000 km of coastline and 17.508 of big and small islands that are scattered around the equator (Dahuri 2000). It has 33 provinces and situated in the Southeast of Asia with the capital city of Jakarta. In 2005, the population has reached 241,9 M . It has five of main islands, namely Java, Sumatra, Kalimantan, Sulawesi and Papua. Indonesia shared borders with Malaysia on the island of Kalimantan, Papua New Guinea on the island of Papua, and East Timor on the island of Timor. There are about 360 different local languages and dialects. Although Indonesia's constitution guaranteed the religious freedom for all citizens, the Government officially only recognizes six religions, namely Islam, Protestantism, Catholicism, Hinduism, Buddhism and Confucianism. About 85,2% of Indonesians declared Muslim[1].

The NAD province situated in the westernmost of Indonesian country or in the northernmost of Sumatera island. It has 17 districts, 4 cities and lies between the potential fishing areas of Indian Ocean and Malacca Strait. In 2002, the population were about 4.166.040 M and were reducing after the tsunami disasters to about 4.031.589 M (BPS and NZAID 2005; PFA 2004). The marine area is about 295.370 km^2 that is consists of 56.563 km^2 of the sea territory and 238.807 km^2 of the EEZ[2].

2.2. General views of the history, social and cultural

2.2.1. The history of Acehnese

The Achenese have connected to the international trade since the sixteenth centuries for instance, with India, Middle East, and China, due to its strategic position in the northernmost of Sumatera Island. This made Aceh[3] into an important place, particularly its position that lies between international trade route in Malacca Strait and close to the Indian Ocean. As the meeting point from many nations, the process of trade had triggered the social interaction between the outsiders and Acehnese. This then allows the migration and cultural or religious integration to take place (Usman 2003).

[1] http://id.wikipedia.org/wiki/Indonesia
[2] http://id.wikipedia.org/wiki/Nanggroe_Aceh_Darussalam
[3] A common and previous name of NAD province.

The history of Aceh can be divided into the phases of *kesultanan*[4], wars, and Republic of Indonesia. During *kesultanan* phase, Aceh had grown to become a prosperous region and was establishing the cooperation with world's kingdoms during the sixteenth centuries, including England, Ottoman, and the Netherlands. The sixteenth and eighteenth centuries are the phase of wars with Portugal, England, and the Netherlands colonisation. The Japanese is also involved in this phase. During the phase of Republic of Indonesia, many of the movements for fighting were characterized by the cooperation between nationalist and politicians. Some of the local movements for freedom had arisen, like the fighting of Daud Beureuh and GAM[5]. These triggered the military operation (DOM)[6] for about 14 years (1989 to 2003) (MMAF 2005c).

As the wind of reformation had blown, the government was giving the status of autonomy to the Achenese due to the implementation of decentralization laws[7]. After almost 30 years, GAM and Indonesian government eventually signed the peace of agreement on 15 August 2005 in Helsinki-Finlandia, and ended the conflicts. This event should have become the starting point for building the 'New Aceh'. However, the earthquakes and tsunami disasters were struck and destroyed the coastal areas in both west and east coasts of NAD province (MMAF 2005c).

2.2.2. The social-cultural characteristic of Acehnese

The NAD province is a diverse region occupied by some ethnic and language groups. The ethnic in Aceh is categorized as one of the Melayu ethnic (Usman 2003). The major ethnic groups are the Acehnese, Gayo, Alas, Tamiang, Aneuk Jamee, Kluet, and Simeulue. There are also a significant population of Chinese, including few of Arab and India (MMAF 2005c).

The structures of government during the *kesultanan* period were already existed since the fifteenth centuries until the NAD integrated to Republic of Indonesia. These are *gampong* (sub-villages), *mukim* (villages), *nanggroe* (sub-districts), and *sagou* (district), and *kesultanan* (kingdom). However, the structures formally are not functioning anymore including the *mukim* and *gampong*. Since the implementation of decentralization laws, there is an effort to re-establish some of the relevant structure for instance, *mukim* and *gampong*, and other social-cultural values. Nowadays, these have been adopted from either social-

[4] The kingdom period in Aceh.
[5] An organisation's movement for Aceh freedom.
[6] A period of military operation in Aceh.
[7] Special autonomy of laws for NAD province (UU No.18/2001).

cultural or civilization of inheritance, and formally exist in the government structures. In the structure of Acehnese society, the *mukim* is a leader that is able to protect people, a person that can be asked for help and consultations. After the Indonesia's freedom, the *mukim* still functioned informally, but their role decreased due to a lack of recognition from the government. However, their role-functions strongly existed morally and informally in the Acehnese's life. The fact shows that majority of people had trust and respect in them, especially during conflict resolution or problem solving. Through the *Qanun*[8], *mukim* was adopted by the government of NAD province (MMAF 2005c; Usman 2003).

Mukim is also responsible to regulate the resource management through some of the units, which are responsible for each resource, for instance agriculture, forests, rivers, and marine (MMAF 2005c). In addition to *panglima laot*, this institution functioned particularly in the marine unit. This will be discussed further in the chapter five.

The fishing communities in NAD province have the traditional fishing techniques that are regulated and controlled under the *adat*[9] of the sea. The local indigenous institution that is called *panglima laot* enforces this. The fishers also engages in the social structure of fishing capture and marketing that shaped their social-economic characteristics. This will be discussed further in the chapter five.

2.3. General views of fieldwork sites: Aceh Besar and Banda Aceh districts

After the tsunami, the Aceh Besar's population is about 281.361. The majority of them are refugees. It has 22,40% of the total number of refugees, which the largest in the NAD province. The Banda Aceh also has relatively large number of refugess (11,5%) (BPS and NZAID 2005).

Both districts are relatively more developed than the other districts. As the capital city, Banda Aceh is the centre of economic, political, social and cultural activities in the NAD province, and situated close to the Aceh Besar district. The Aceh Besar has 22 subdistricts and situated in the east of the Indian Ocean, and west of Malacca Strait. It also shares the border with Banda Aceh in the north, Aceh Jaya in the southwest, and Pidie in the south and southeast (figure 1).

Banda Aceh has the 9 subdistricts, and situated in the north of Malacca Strait and east of the

[8] Local government regulation. *Qanun* is the Arabian language and has adopted to Achenese language.
[9] Customary law and ritual practices.

Indian Ocean. It shares border with Aceh Besar in the south, west and east (figure 1). The population after the tsunami is about 174.341 (BPS and NZAID 2005).

The figure 1 illustrated the fieldwork sites and the 10 districts were seriously affected by the tsunami. The southern parts of both coastlines were less damaged than the northern parts, with particularly heavy damage on the west coast, where in some cases entire villages were wiped out (World Bank 2006).

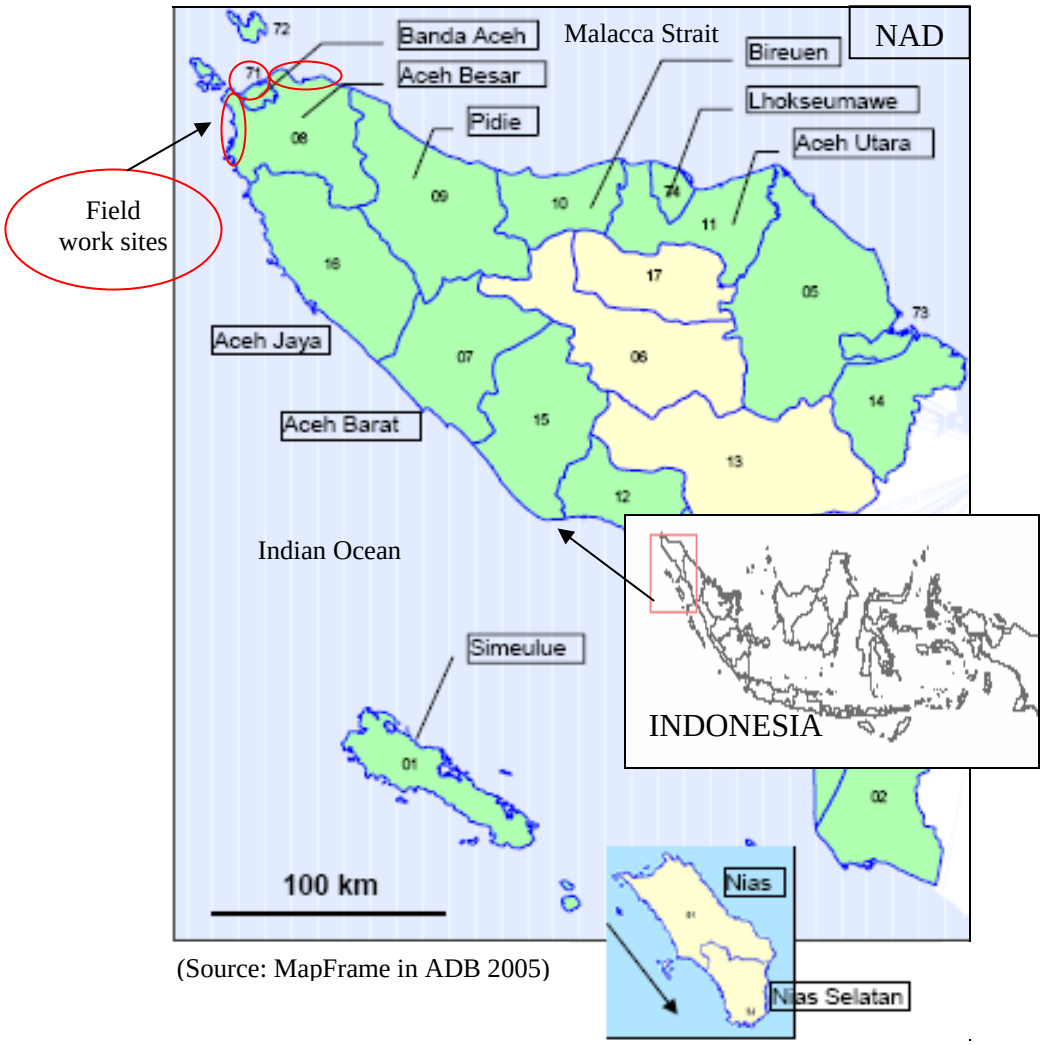

Figure 1. The fieldwork sites and the ten seriously affected districts in the west and east coasts, NAD province.

2.4. The fisheries profile in general

2.4.1. The potency and utilization

The fisheries sector is the important and strategic resource for economic development in Indonesia, with the marine waters about 5,8 M km^2 that is consists of sea territorial (0,3 M

km^2), archipelagic waters (2,8 M km^2), and 2,7 M km^2 of EEZ (Martosubroto and Widana 1990).

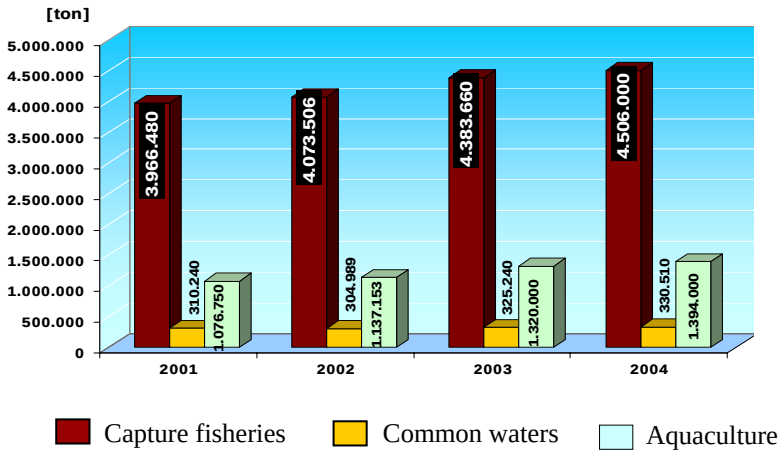

Figure 2. The fish productions (DGCF 2004).

The total landing from capture fisheries was about 2 M tons in 1998 and mainly derived from purse seine, lift net, trammel net, and pole-and-line, and others. These are mainly conducted by small-scale fisheries and they mostly caught the pelagic species, and concentrated primarily in the Java Sea, South China Sea, Malacca Strait and Maluku Sea (FAO 2000). The catches increased in 2004 to about 4,5 M tons. During 2003-2004, the total productions increased to 2,71%. The three categories are steadily increasing and the capture fisheries are the most increasing ones (figure 2).

The potency of capture fisheries is about 6,4 M ton/year. The level of exploitation is about 4,069 M ton/year or 63,49% of the maximum sustainable yield (MSY). The Malacca Strait and Java Sea have been over-fished whereas the rest of management areas are under-fished (table 1). The potency of aquaculture is about 58 M ton/year, which 1,6 M ton/year have been exploited. It has predicted about 8,36 M Ha of marine waters indicated could be used for the marine aquaqulture development, for instance fin fish, shellfish, sea weeds and others. Most of the fish-farmers were engaged in fresh water ponds (65 %), and the rest were in paddy field, brackish-water, and few using cages. In the production, brackish-water, pond, and paddy-field aquaculture is contributed to about 55.88 %, 25.93 %, and 14.24 % respectively (MMAF 2005b).

Table 1. The potentials, productions, and status of marine fisheries exploitation in the marine management areas.

Management Areas	Potentials (1.000 ton/year)	Productions (1.000 ton/year)	Status
Malacca Strait	276,03	389,28	Over-fishing (>100%)
South China Sea	1.057,05	379,90	Under-fishing (35,94%)
Java Sea	796,64	1.094,41	Over-fishing (>100%)
Makassar Strait & Flores Sea	929,72	655,45	Under-fishing (70,50%)
Banda Sea	277,99	228,48	Under-fishing (82,19%)
Seram Sea & Tomini Bays	590,82	197,64	Under-fishing (33,46%)
Sulawesi Sea & Pacific Ocean	632,72	237,11	Under-fishing (37,47%)
Arafura Sea	771,55	263,37	Under-fishing (34,14%)
Indian Ocean	1.076,89	623,78	Under-fishing (57,92%)
Total of National	MSY: 6.409,21	4.069,42	Under-fishing (63,49%)

(Source: MMAF 2005a)

The NAD province is one of the traditionally Indonesian's most productive of fishing regions, generating US$ 164/m^2 in income from both capture fisheries and aquaculture, and producing 108,000 ton of marine fish (2004) and 24,000 ton from aquaculture (2003). The fisheries sector accounted for 3% of the NAD's gross domestic product (GDP). About 57% of the fishing historically took place in the East coast, and accounted for 60% of fisheries' GDP. Before the tsunami, about 90,000 fishers were active in Aceh, and about 60% were classified as full time fishers. The subsistence fishers rely on both fishing and agriculture, and small scale aquaculture as well. The fishers are grouped into fisher's associations known as the *panglima laot* (World Bank 2006).

The NAD's EEZ is not yet fully exploited and the level of utilization by fishers and fish-farmers is low. The potential area of aquaculture is about 256.478 Ha and so far it has produced about 30.573 ton/year or Rp. 637 B (US$ 70 M). The Aceh Besar is one of the potential areas of aquaculture (about 1.006 Ha). The potential of fishing capture investment is bluefin tuna, skipjack tuna, eastern little tuna, shrimps, groupers, and lobsters. The potential of aquaculture production is giant tiger, milkfish, crabs, and seaweeds. The giant tiger is difficult to be developed due to the spreading of white spot virus and most of the fish-farmers have changed to the white-leg shrimp *(Pennaeus vannamei)* (PFA 2004). However, East coast (Malacca Strait) have indicated over-fishing, and the West coast is potential to be more exploited (under-fishing status) (Bappeda NAD 2006).

2.4.2. Fisheries in the Indonesian economy

Fisheries GDP were increasing from year to year (21,72% on the average) and have contributed to the national GDP about 2,9% (Kompas 2004). It has targeted to increase about 3,1%, and the fisheries production as well to about 13% (7,7 M tons) in 2006 (MMAF 2006).

The fishing fleets and fishers

It estimates that 60% of the total fisheries production are made by small scale groups, which very much provides employment for the fishers.

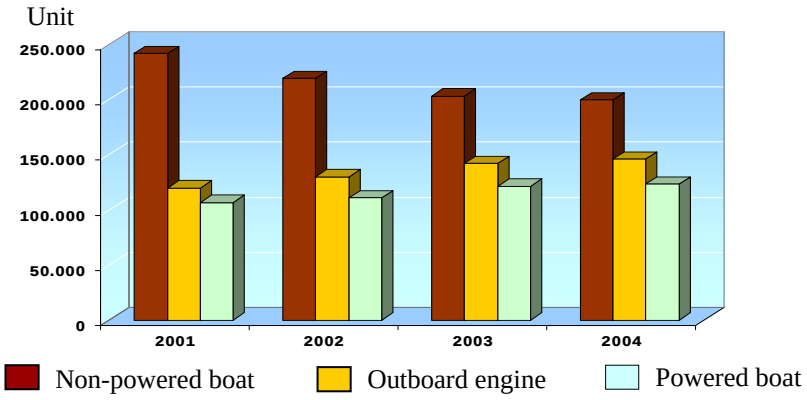

Figure 3. The trend of fishing fleets (DGCF 2004).

During 2001-2003, the number of fishers increased from about 3.286.500 to 3.476.200, also vessels were steadily increasing from 468.321 to 474.540 units (MMAF 2005a). These have indicated in the figure 3, which both the outboard engine and powered boat are steadily increasing. In aquaculture, the fish-farmers are increase from about 2,2 M in 2000 to 2,5 M in 2004.

Most of the fishers categorize as poor are engages in the artisanal fisheries using a wide variety of gear, including gillnets, cast nets, traps, seines, and hook and line. They have less capacity to access the information, education, technology and credit. These have stimulated by the factors of; the social structure, cultural, high dependence on the resources, and policy that leads to the marginalization. The government and other relevant organizations have empowered them through the implementation of programs, for instance fuel subsidize, relocation, economic empowerment and revitalize of small-scale fisheries, in order to reduce the poverty and to increase their quality of life.

The exports

During 2003-2004, the export are increases to about 7,37% (volume) and 30,33% (value) (figure 4). The fishes, for instance shrimp, tuna, crab, and seaweed are exported mainly to

Japan, US, South Korea, Australia and European Union (EU) (Martani 2005). In 2002, the shrimp and tuna productions from capture fisheries are steadily increasing until 2004 (MMAF 2005a).

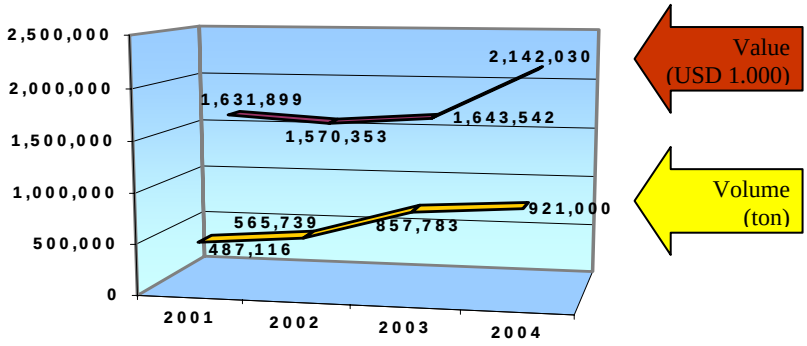

Figure 4. The volumes and values of the fisheries export (DGCF 2004).

The fisheries management

The fishing activities are more concentrated in the western part of Indonesia that is densely populated than in the eastern part. These caused for instance, the catch per unit effort (CPUE) in the Malacca Strait were declined by 40 % in the past decades. In some areas, the over-fishing occurs simply because there are too many fishers concentrating on the limited resources in the coastal areas. This may lead to the high competition on the same fishing grounds that already depleted. Destructive fishing practices exacerbate this situation. The conflict also occurs between industrial and small-scale fisheries. Actions have been taken to prevent and to solve the problems, such as: i) a ban of trawling based on Presidential Decree No. 39/1980, ii) establishing the Fishing Zones Regulation based on the Agriculture Ministry decree No. 392/1999, iii) allocating the marine waters in the western part for the artisanal fisheries, and iv) the transmigration program has launched to diverting the fishers away from the overcrowded areas (FAO 2001; Saad 2003).

Table 2. The regulation of capture fisheries zones based on the decree of Agriculture Ministry No. 392/1999.

Capture Zone	Specification	
	Fishing Area (mile)	Vessel (m or GT)
Zone I	0-3	Traditional boat without engine
	3-6	Out-board engine (<12 m) or (<5 GT)
Zone II	6-12	Powered boat (<60 GT)
Zone III	12-200	Powered boat (<200 GT)

(source: Saad 2003)

Based on the previously (No. 9/1985) and recently (No. 31/2004) of Fisheries Laws, the fisheries management principle is aim for the communities' welfare, and pays due heed to the resources sustainability. The new regulation is more emphasised on controlling, surveillance (MCS) and enforcement aspects for instance, special court for fisheries, a more powerful of inspectors and punishments. The government also has to deal with some issues concerning the implementation of MCS and illegal, unregulated, and unreported (IUU) Fishing, for instance; i) the subsidized fuel for the fishers in many cases has occupied by non-intended vessels; ii) the state's earnings significantly decreased due to the illegally operation of foreign vessels that using the Indonesian flag, and most of the catches are directly brought outside the Indonesian marine water. It also affects the earnings from exports and influenced the credibility during implementing the IUU Fishing; iii) the job opportunity for fishers is occupied by the foreign illegal vessels that employed foreign labour; and iv) the fish stock threatened due to many of the vessels is undetectable (MMAF 2005a).

In addition to the marine management areas (table 1), the MCS programs are concerned on the number and type of gears, licensing regulation in the central and regional level, and total catch. So far, it has to be arranged properly, to ensure the responsible fisheries and sustainability. The capacity of particular agencies in the stock assessment needs to be strengthened due to validity of stock and catches data is essential. The fisheries management involved the parties with their respective competencies pursuant to their respective rules and regulations. Such conditions, however, present great challenges to the Ministry of marine affairs and fisheries (MMAF) to stipulate an optimally certain management system during MCS implementation. It also becomes some service hindrances for fishery communities and industry. The information of stock, total catches and exports are not presented accurately yet due to the less capacity in the stock assessment methods, monitoring and reporting systems, which carried out by fishing companies and/or government agencies (DGCS 2004). However, by enforcing the vessel monitoring system (VMS) effectively, the government is trying to combat the IUU fishing and to improve the capacity of fisheries inspectors.

2.4.3. The tsunami disasters and rebuilding fisheries

- The impacts of tsunami on fisheries

About ten districts were heavily destroyed by the tsunami particularly those which are situated in the western province, including Aceh Besar and Banda Aceh. In Banda Aceh, fish landing ports and brackish water culture are destroyed, and in Aceh Besar, brackish water culture is the most destroyed ones (figure 5). About 9,799 fishers and fish-farmers lost their

lives in the two respective disasters (earthquakes and tsunami) in the NAD province, including about 3403 people lost their lives in that two districts (table 3). The largest extent of loss were experienced in Banda Aceh, Aceh Besar, Aceh Barat, Aceh Jaya and Pidie. The loss of human capital extends further to traders, boat builders, creditors and other ancillary workers. The community associations have been disrupted by the loss of leaders and group savings. The fishing vessel losses were heavy in almost all the affected regions with the total losses amounting to 14,520 vessels of various sizes. Regarding the physical infrastructures, such as fishing ports and harbors, the most badly affected areas were in the northern parts of NAD province in both the western and eastern coasts. The port structures on the west coast were almost completely destroyed and key infrastructures washed away. Aquaculture, specifically the brackish water culture, its farming activities were severely affected as well. Of the estimated 47,000 Ha of coastal ponds before the tsunami, a substantial proportion has been directly and indirectly affected. The aquaculture activities have been brought to a complete standstill in the districts along the upper part of the west coast from Aceh Barat Daya to Aceh Besar, and along the north and east coasts from Banda Aceh to Aceh Utara (World Bank 2006).

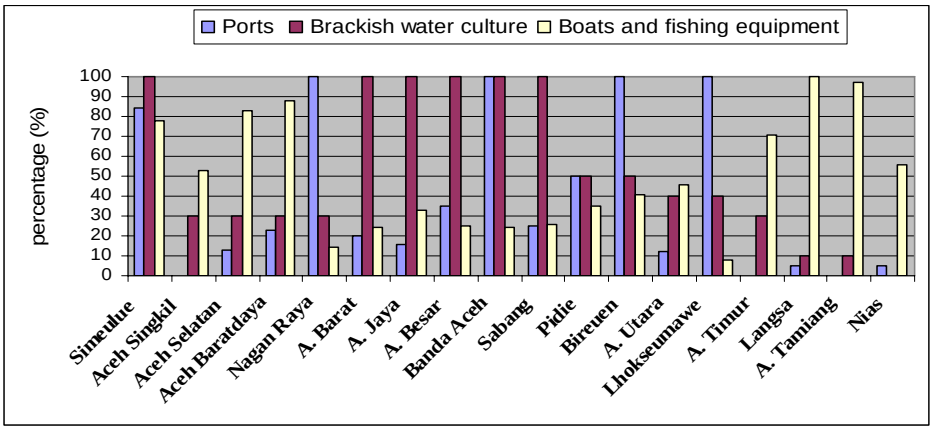

Figure 5. The tsunami impacts on the fisheries sector in the Sumatera islands (Source: data analysed, FAO 2005 in World Bank 2006).

Table 3. The number of fishers and fish-farmers died in Aceh Besar and Banda Aceh districts, NAD province.

Districts	Fishers		Percentage Loss (%)	Fish-farmer		Percentage Loss (%)
	Pre-tsunami	Died		Pre-tsunami	Died	
Aceh Besar	11.921	2.643	22,2	731	8	1,1
Banda Aceh	1.535	503	32,8	396	249	62,9
Others	77.825	6.249	8	28.590	147	0,5
Total	91.281	9.395	10,3	29.717	404	1,4

(Source: data analyzed; World Bank 2006)

- The rehabilitation process

The stakeholders and financial support

Many parties have been involved and implemented the variously type of programs. Some of them utilized their own support and the other were relying on donor agencies in implementing the programs. International donor, for instance, has largely provided the assistances and aid during rehabilitation process. This mostly organised by *BRR* with coordination to other parties such as FAO, ADB and many others that represent NGOs and some countries. Some of the programs that was funded, for instance initial remedial and reconstruction work. These include redeveloping fish markets, fishponds reconstruction, and other vital fisheries infrastructures. *BRR's* fund is mainly supported by IDR. The decisions regarding rehabilitation are made through the consultation between the provincial and district fishery agency, and the village head or *panglima laot* (World Bank 2006). The main issue in this part is a great challenge for all parties involved in terms of the effectiveness of responses, coordination and synchronization of the programs.

Restoring the livelihoods and strengthening the capacity

Some organisations have worked on the fishing assistance, including provided the logistics, and the others designed the capacity-building programs. The activities mainly concern the restoration of the livelihoods. Some organisations have conducted the empowerment program, providing the best practice of the fishponds management or seaweed culture to the fish-farmers. The main issues in the capture fisheries are unevenly distribution, inaccessible, and the qualities of the fishing assistances. The boat construction appears to have been focused on specific regions, leaving others largely neglected. Aceh Jaya district is an area where losses of fishers and fishing vessels were high, but vessel construction appears to be advancing at a very slow pace. The result is that fishers have to share the assets. Up to 40% of vessels have been supplied or built that are to the wrong specifications or are unseaworthy. Vessels that have been built, and when completed, the decisions then about allocation are made by the *Panglima laot* (World Bank 2006).

The ecological assessments and restorations

There has been no strategic of need assessment that focused to the status of resources. Biological assessments are not available and the focus has been primarily on restoring the livelihoods. However, there are some randomly activities in the particular area that related to the ecological assessment and restoration that is conducted by LIPI, BRKP and IMR Bergen-Norway, in the west coast of NAD province. BRKP also has conducted another ecological

assessment on the important ecosystem such as coral reefs, mangroves and seaweeds in the Nias and Simeulue islands (BRKP 2006). Some NGOs have initiated to conserve mangroves by seedling and planting which is also aim for re-establishing the green belt.

- Rebuilding fisheries in the Aceh Besar and Banda Aceh

Aceh Besar is the district that is connected directly to Banda Aceh city, the capital of NAD province. These districts have two side of coastal area, they are in the western and eastern part of the province and both sides has been severely damaged by the earthquakes and tsunami. The degree of damage of these two sides in general is not so different.

The hatcheries along the east coast of Aceh Besar districts were severely affected. The extent of damage ranges from total loss of the hatchery and associated equipment (blowers, generators, and pumps) to infrastructures damage. The economic losses caused by physical damage to hatcheries and loss of equipment have been estimated by LBAP Ujung Batee as Rp 42.5 B (US$4.72 M) (World Bank 2006).

In the two districts, many international and national donor agencies have implemented their programs. In Aceh Besar, the FAO assisted by Norwegian funding, has provided processing and marketing equipment, for instance sheds, drying racks, and boiling equipment along with a set of brining materials and also fish transporter packages in the Mesjid Raya and Leupung sub-districts. Some organizations also provided new equipment for fisher cooperatives in 6 villages in Baitulsalam. In Banda Aceh, the equipment is to support the small shop vendors and fish traders, which are aim to develop a new fish market. CHF is also providing the start-up capital for 130 women to strengthen the small-scale commercial activities in Alue Naga and Dayah Raya. Samaritan's Purse is providing support for empowering 6 *Panglima laot* in developing marketing concepts (World Bank 2006).

Chapter Three

METHODOLOGY

3.1. Fieldwork preparation

The fieldwork preparations were challenging, *firstly* because the tsunami-affected area has extremely different situations compared to the other normal situations. It can be known from any sources of news. People were suffering and struggling to survive with the very limited resource and capital due to most of their livelihood's facilities has been wiped out by the tsunami. Many of the outsiders came into the area with their own mission and planning. The survivors were in deeply sadness and trauma. These could be used as the preliminary information in understanding the situations. Hence, it needs to take into account the carefully approaches during interviews or observations. *Secondly*, since it was the first time visited Aceh region, it was necessary to introduce my self and establish a connection with relevant persons and organisations before visit the fieldwork site that enables to provide help during fieldwork in both Jakarta and Aceh. This includes in sharing the preliminary data and information that relevant for fieldwork. However, there was no easy task during this preparation. Some of them were not easily to share, or sometimes they were not in place. *Thirdly*, the social capital and resilience are the important topics in the tsunami-affected area, which however are challenged me, due to less experience in doing research on such topics.

The scope of the fieldwork preparation was:

i) to study the research topic;
ii) to identify the fieldwork site;
iii) to design the fieldwork plans and questionnaire;
iv) to establish a connection to the relevant persons and organisations that might be helpful in accessing data and information;
v) to prepare essential technical equipment such as tape recorder, video camera, camera, accommodation, transportation, and local partners.

Aceh Besar and Banda Aceh were chosen as the fieldwork sites based on the some consideration, such as the distance to the earthquake epicentre and the impacts of tsunami in both west and north coasts of NAD province, which severely destroyed the infrastructures of

the capture fisheries and aquaculture. Other considerations were the proximity and accessibility. These two sites are easier to access when entering or leaving the area.

3.2. Methods

The fieldwork is conducted based on the qualitative method and widely open to use the quantitative data. The primary data is obtained from the qualitative method and secondary data is collected from the documents and reports, which might contain the quantitative data. In this case, quantitative data is used to support the primary data.

3.2.1. Qualitative method

The real purposes of the qualitative research are not counting the opinions or people but rather exploring the range of opinions, the different representations of the issue, and the objective is to maximize the opportunity to understand the different position taken by members of the social milieu (Gaskell 2000). In this case, the empirical data is mainly gathered from the interviews and observations, which explored the different issues from interviewee's opinions and observing the social situations during rehabilitation process.

a. Participatory observations

The observation is focusing on the social situations that may reflect the social capital and coping strategies of the survivors. These mainly observe the situations of the places to work or to live that shaped their life, livelihoods system, and social structure in the capture fisheries or marketing. As Goffman (2002; 148-153) explained:

> *"Participant observation is not the only technique that could be employed in collecting data during fieldwork, but the technique that can be used to involve yourself in the set of contingency that plays upon a set of individuals, so that you can physically and ecologically penetrate their circle of responses to their social, work or ethnic situations".*

The materials are mainly obtained from their working or living places. I had opportunity to observe their daily life after the tsunami, which most of them were struggling to sustain the livelihoods. The key informants then were interviewed in their work places or in specific events such as netting, repairing boats, cleaning or selling the catches. In Banda Aceh district, some interviews were conducted with the fishers groups on the boats that were being repaired on the riverside of Alue Naga village. The family members were also interviewed during their spare time or when the wife was cleaning the catches in their barracks. In Aceh Besar district, the situations generally are found the same. In particular, we were sitting together during interviews with the *palong* groups, while watching them cleaning the catches.

b. Interviews

Bauer *et al.* (2000) has explained that the qualitative method research deals with interpreting social realities and the best-known type that can be used is probably in-depth interview. In this case, the interviews were conducted in the places that enabled me to explore the social realities of the fishers during rehabilitation process. During interviews, the questions were focusing on social capital and coping strategies that might provide the relevant information on social realities. Interviews were not always relying on a given pattern of the questionnaire, but more concerns on the questions guide, in order to support the flexibility and avoid the formal situation that enables interviewees to feel comfortable. Fifteen in-depth interviews were conducted in each district. All of the materials gathered were categorized to represent the different issues. In the two districts, there was significant number of homogeneity issues, for instance the problems of fishing equipment. The interviews were involving the different background of interviewees: fishers (the owners and non-owners of boat, fish sellers), fishers groups and local indigenous institution, fish-farmers, fisher-women, NGOs, government and international agencies and other units of rehabilitation and reconstruction agencies.

The interviews sometimes were challenged by the attitudes of interviewees that shaped by the 'huge aid' and uncertainty after the tsunami. Many vibrant organisations came into the areas with their financial supports and programs. This enables the competition within survivors to access the fishing assistances, and put the outsiders as an 'opportunity', so that they would behave 'nicely' just to attract the outsiders. In Banda Aceh district, some interviewees thought that I was one of the 'sources of funding'. This made me realize that the attitudes, in some cases would influence the validity. It is also sometimes constrains the observations process. Some local people were approaching me to ask the reasons for my activities, when I was observing the women, fishers, and children were collecting oysters from the river mouth[10]. I knew eventually the reason why they did such approaching. The survivors were worrying about the outsiders or insiders that sometimes were taking their own advantages from the existence of the 'huge aid' on behalf of the survivors.

In the Banda Aceh district, it was easy to conduct interviews with those who did not have access or who were unsatisfied with the fishing assistance. They were willing to tell the story and answer the questions openly and enthusiastically, which sometimes were talking about

[10] Situated close to the fishers' barracks in the Dayah Raya and Alue Naga villages.

sensitive things, for instance criticized other people or organisations. In general, the issues from interviews in the two districts are mainly related to an ineffective of fishing assistances and conflict within survivors in the accessing the assistances. These however require the flexibility in expanding the number of interviewees in order to provide the variation of issues.

3.2.2. Secondary data

Secondary data was collected in both Jakarta and some places in the two districts, for instance Provincial Fishery Agency, Etesp Program[11], Bappeda, FAO Banda Aceh, and *BRR*. It mainly consists of relevant documents or reports that I believed might be useful for data and analysis enrichments.

3.3. Sampling and representativeness

The interviews and observations were conducted in the coastal area of the two districts that were severely destroyed. Sampling data is mainly concentrated in the area where many activities of livelihood restoration took place. Hence, any attempts to survive are the clues for starting the interviews or observations. Fisher's barracks and its surroundings are the places that were used as a place for gathering information. Many fishers were doing netting, repairing boats, cleaning the catches, or even just gathering in these places. Other events or places that were used for gathering data by interviews or observation is TPI[12], the riverside for parking boats, small store or market for selling dry and fresh fish, fishponds, hatchery, and mangrove rehabilitation site.

The sampling was used to identify the key informants and particular social situations during fieldworks. After the tsunami, most of the survivors were dealing with rehabilitation programs, which enabled me to identify the representative place for interviews and observations easily, for instance a meeting place of refugees or barracks, and the place where fishing activities took place. These events or places were the major sources of sampling. The interviews were moved to the other interviewees by applying the same procedures (snowball method) in case no more variation of information found. This conducted by followed the Kanto (2005) steps concerning sampling procedures in the qualitative research. These are; i) preliminary sampling either the informants or social situations for observations, ii) continuing to choose sampling to provide more description of information and probe the variation of information, iii) ending the sampling in case there is no any variation found.

[11] A program designed to support rehabilitation process, which conducted by special unit of tsunami response under supervision of Provincial Fishery Agency and funded by ADB.
[12] TPI is the fish landing ports. A place for landing and selling fresh catches.

3.4. Validity, reliability and limitations

In-depth interviews and participatory observations are the methods that is used to produce primary data. The impacts of tsunami in the west and east coasts of NAD province, including the two districts, and the implementation of rebuilding fisheries programs by disaster authorities and others parties that started at the same time in all affected areas, had given me the arena for conducting interviews and observations.

The context of rehabilitation process enables me to elaborate any social situations. Fishers had different ability to access fishing equipment assistances[13]. Their interactions also associated with other social issues such as competition, opportunism, uneven distribution, quality of fishing assistances and migration[14]. In Banda Aceh district, some fishers were complaining about the management of fishing assistances that may influence the trust. In Aceh Besar, some fishers were taking advantages from *palong*[15] groups, which enable them to earn significant benefits from the catches. These issues were collected from exploring their daily life in the work places or barracks. In Banda Aceh and Aceh Besar districts, fishers were able to survive even though the fishing assistances were not accessible or out of use. The mechanisms of lending cash enable them to provide self-initiations. Others had been involved in the cash work program[16]. They were able also to survive due to the skills or knowledge by using very limited equipment such as *sampan*[17] and net to catch in the shallow water.

The coping strategies of the coastal communities to the tsunami impacts are mainly related to sustaining the livelihood. Hence, the data and information gathered that based on that coping strategies, I believed might be valid and has represented the reality. I also attached myself to Etesp Program and Provincial Fishery Agency to ensure the information flows is take place. The attitudes of survivors that shaped by the existence of 'huge aid' however have the potential to influence the reliability of data because sometimes they tried to 'talk nicely' in

[13] Fishing equipments encompasses the distribution of livelihood facilities in both capture fisheries and aquaculture. These are the boats, nets, engines, and fish drying facilities, supporting equipments for fishponds, processing, marketing, and transportation equipments.
[14] Another impact of tsunami. Many people were migrating to the coastal area and occupied the barracks due to the attractive circumstances that provided by rehabilitation programs.
[15] Traditionally and historically fishing method using boat and lift net, mostly passive gear. Its role will discuss in the chapter five.
[16] Some organisations were hiring people to be employed in rehabilitation project. Officially Rp. 35.000/day or US$ 3,9/day.
[17] A small boat or canoe with rowing, about 2,5 m length and 80 cm width; interview of fisher barrack of Alue Naga village.

order to attract the sympathy from donor's organisations. In this case, their intention or specific interests during interviews were relevant to be considered that may influence validity and reliability. To minimize this effect, it is necessary to avoid any clues that could lead them to recognize me as a 'source of funding'. I tried to introduce my self and the purposes of the fieldwork during interviews or observations. In some cases, I decided to use the camera, tape recorder, or notes only if the situation allowed it. However, I tried as much as possible to take notes or use tape recorder carefully. This type of approached can be considered contribute to validity and reliability. I also tried to focus on the research topic by addressing the questions guide, for instance how they survive, or what factors contribute to their ability to cope with disasters.

During writing this thesis, I had to construct the analytical part based on empirical data that I believed has shaped by my own reflection or interpretation. This can be considered as the limitation factor.

Chapter Four

THEORETICAL PERSPECTIVES

4.1. The application of theory

As the topic of the thesis is the social capital and resilience, the analysis and conclusion parts will be built based on some relevant perspectives theory. It encompasses the social capital and social structure that are applied in the analysis of the adaptation and coping strategies of the coastal communities. These, together with the vulnerability, social learning, adaptive capacity, governance implications and building resilience theories are applied in the analysis of the incentives for building social and ecological resilience, in the context of rehabilitation process.

4.2. The adaptations and coping strategies to disasters

4.2.1. Vulnerability

Before the tsunami, Kusnadi (2003) highlighted the conditions of Indonesian coastal communities that connected to the issues, such as poverty, high dependence on the fisheries resources, over exploited and degraded ecosystems, inequality in the production assets and income distribution. Thus, before the tsunami, fishers are already vulnerable.

The vulnerability is the state of susceptibility to harm from exposure to stresses associated with environmental and social changes and from the absence of capacity to adapt (Adger 2006). The massive impacts of the tsunami have exacerbated the situations by wiping out the livelihood's resources and vital public infrastructures. These made the survivors vulnerable to the insecurity of food, income, and wealth. The rehabilitation process is then mainly targeted dealing with this vulnerability. The roles of disaster authorities and others parties are essential in providing the necessary actions that enable the fishers to adapt to and cope with extreme events. As Adger (2006) explained, the role of resources distribution (natural and social) during implementation, across the systems and the institutions that mediate resource use and coping strategies are essential. When the institutions fail to plan for hazards or for changing social conditions and risks, systems vulnerability can be exacerbated. Thus, the effective frameworks for the responses need to take into account during interventions.

Kusnadi (2003) has also characterized the root causes poverty of traditional fishers in Indonesia, such as 'unsustainable' fishing due to a "*break seasons"* (bad seasons). During this season, most of the fishers were not going for fishing, hence, they were vulnerable to unsustainable income. Fishers however, cannot use their significant earnings effectively during 'good season', which provide a larger catches and higher income, and they tend to squander the earnings. The catches also were decreasing even though they went far to the offshore, while the operational costs keep increasing. In terms of fishing devices, they could not compete to the bigger and modern vessels that operated in same areas. The situations exacerbated then by the symptoms of overexploiting of some particular areas.

Adger (1999) and Kusnadi (2003) identify the same indicators of vulnerability, including the institutional ineffectiveness. As the representation of their social economy condition, the social structure in the fishing capture is potential to contribute to the vulnerability. The vertically of the workers-owners relationships is creating the vulnerability to the fishers in the lower layers.

As the greatest of impacts occurred in the fisheries sectors, the responses need to ensure that fishers are able to access and use the fishing assistances properly. Otherwise, the intervention will exacerbate the vulnerability. As Adger (1999) explained, the accessibility to resources may affect the coping ability to the impacts of extreme events. Access to resources means the ability of individuals, family, groups, or communities to use the resources, which is directly required to secure a livelihood. The diversity of income sources, and its variability across time, can be used as indicator of vulnerability at household level, where it is hypothesized that the greater the diversity of income, the greater resilience of livelihood to disruption of particular source.

During the implementation of rebuilding fisheries programs, many issues emerged in terms of fishing assistances, such as uneven distribution, inaccessible, less quality and inappropriate, and unequal capacity to sustain the livelihoods. These factors may lead to the vulnerability of the fishers, as an outcome of interventions. The ineffectiveness directly affects the ability of individuals or households to cope with the severely impacts of the tsunami. As Adger (1999) explained, inequality, affects vulnerability directly through restriction the options of households and individuals when faced the external shock, and indirectly through its links to poverty and other factors.

The impact of skewed access to resources can be ameliorated in all social situations by the effectiveness of institutions. Institutional effectiveness affects all the indicators of vulnerability that all institutionally determined, and hence central to a political economy that device and implement the legal enforcement of property right, and all economic structures can be conceptualizes as dependent on the institutional structure (Adger 1999). In the context of the tsunami, the existing of governance structures influences the effectiveness of the interventions. Ineffective intervention may exacerbate the vulnerability. In this case, Adger (2003) emphasised the challenges to deal with vulnerability both for analysis of governance solutions and for the implementations of governance solutions to environmental changes. Policy interventions need to incorporate vulnerable people and places that are often excluded from decision-making and from access to power and resources. It is then the challenge of the design of good governance to promote resilience.

4.2.2. Social capital

It is clear that much confusion has been thrown up in the social capital literature by different definitions, and number of critics has argued for a clearer distinction between the subcomponents of social capital (Anheir and Kendall 2002; Halpern 2005; Nuissl 2002; Portes 1998). However, it has characterized that the important of social capital components are: *relations of trust; reciprocity and exchanges; common rules, norms and sanctions; and connectedness (bonding, bridging and linking) in networks and groups*. The relations of trust lubricate the cooperation and so reduce the transaction costs between people. The reciprocity increases trust and refers to simultaneous exchanges of goods and knowledge of roughly equal value, or continuing relations over time. It is also contributes to development of long-term obligations between people, which helps in achieving positive environmental outcomes. Common rules, norms, and sanctions are the mutually agreed upon or handed-down drivers of behaviour that ensure group interest are complementary with those of individuals. The term of social capital captures the idea that social bonds and norms are critical for sustainability (Coleman 1988; Putnam 1993; Wade 1994; Taylor 1982; Woolcock 2001).

Social capital refers to the norms and networks that enable collective action. Increasing evidence shows that social cohesion is critical for poverty alleviation and sustainable human and economic

development (World Bank 2007). In the context of the tsunami, understanding the social capital and coping strategies are essential in dealing with the vulnerability. Adger (1999) has clearly defined the social vulnerability as an individual and collective vulnerability to adapt to and cope with extreme events. The individual vulnerability is determined by access to resources and the diversity of income sources, as well as by social status of individuals or households within a community. The collective vulnerability is a nation, region, or community that is determined by institutional and market structures, such as the prevalence of informal and formal social security and insurance, and by infrastructure and income. At the community level, social vulnerability is affected by relative distribution of income, access to and diversity economic assets, and by the operation of informal social institutions, which organize warning and planning arrangements.

The ability of survivors to deal with the vulnerability is strongly determined by existing social capital components. The roles of individuals, households, fishers groups, or local institutions during rehabilitation process are the references for identifying social capital. However, as the World Bank (2006) reported, the impacts of the tsunami in Aceh have lost the human capital for instance, traders, boat builders, creditors, and other ancillary workers. Community associations have been disrupted by the loss of leaders and group savings, so in the short term, it was challenges to identify social capital components within the survivors or other social relations.

The context of rehabilitation process is the arena for identifying social capital. As the majority of the survivors in coastal area were concern the livelihood, the fisheries infrastructures and other livelihood facilities have to work well to support them. An attempt to raise the issues and to fix the livelihood problems are the ingredients for the social capital identification. Before the tsunami, the roles of local indigenous institution like *panglima laot* in the resource management were essential. They have potential to bridge or link groups since their norms and values that is called *adat*, have shown their ability for collective action in the ecological adaptations. In the context of complexity resource management after the tsunami, their roles might be essential and may influence the governance that strengthens the local resource-users in the rule's compliance. As Grafton (2005) explained, an understanding of the social capital can be used to improve the fisheries governance. Adger (2003) also emphasizes this, by saying that an understanding of social capital may lead to an effective intervention, particularly when dealing with the social exclusion and vulnerability.

4.2.3. Social structure

Coleman (1988) is emphasizing the relationship between social capital and social structure. Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structure, and they facilitate certain actions of actors-whether persons or corporate actors-within the structures. It is inherent on the structure of relations between actors and among the actors.

Linton (1936) characterized the social structure by discussing the nature of society, and pointed out that the functioning of societies depends upon the presence of patterns for reciprocal behavior between individuals or groups of individuals. He then defined two concepts concerning the social structure: *status* and *roles.* A status is simply a collection of rights and duties. A role represents the dynamic aspect of a status. The individual is socially assigned to a status and occupies it with relation to other statuses. When the rights and duties which constitute the status into effect, it is performing a role.

Kusnadi (2003) characterized in general, the status and roles of the fishers in Indonesia. Their social-economic systems mainly can be divided into the two structures: *fish capture* and *fish marketing.* After the tsunami, the coping strategies of the fishers in some cases were reflecting their dependence to these structures. The structure of capture fisheries is occupied by the owners in the higher layers and the fishers labor in the lower layers. This structure however emerged the issues of vulnerability, such as inequality of access to productions assets and income.

4.3. Building of social and ecological resilience

4.3.1. Learning from experiences

International Collective in Support of Fishworkers or ICSF (2006b) has studied the fisheries interventions in the four tsunami-affected countries. It has summarized that the interventions need to take careful action since the damage was much greater than expected. Thus, the long-term resilience to natural disaster has to be strengthened. These can be achieved through a *learning* and *review* of the state of rehabilitation efforts by applying in-depth analysis of significant issues in the rehabilitation process such as relief and compensation, livelihood restorations, relocation, the problems of surplus or quality of the boats, including the right and role of fisherwomen. It is also important to understand the coping strategies of the individuals,

households, or local institutions. As Bavinck (2006) explained the social and historical roles of fishing caste *panchayats* in Tamil Nadu-India that essential during fisheries rebuilding process. A framework for learning and review is also important to address during rehabilitation process in Aceh. These will evaluate the fisheries interventions that should have focused on understanding of coping strategies of the individuals, households, and local institutions. ICSF (2006a) has also emphasized the essential recommendation from lessons learned on post-tsunami, which need to address the integrated intervention issue. This requires a quality and a broader development approach of rehabilitation process.

Pomeroy *et al.* (2006) highlighted the issue of vulnerability in the coastal communities as the important scope of the fisheries interventions, instead of physical reconstruction. This has also emphasized what Kusnadi (2003) and Adger (1999) have mentioned about vulnerability. In the tsunami-affected area of Asian countries, the rural coastal communities generally have a higher percentage of people living below the poverty line than the national average. Thus, the concerns of the rebuilding fisheries programs are not merely concentrate on building the physically aspect but also addressing fundamental social, economic and environmental reforms that affect coastal communities and their livelihoods. Specifically, Pomeroy *et al.* (2006) argued that the rehabilitation of coastal livelihoods should be focused on the: i) *a framework,* for understanding the diversity of coastal livelihoods and the source of their vulnerability; ii) *a process,* for designing interventions that build on this understanding in order to strengthen and revitalize; iii) *a focus,* on the longer challenge of building future resilience and sustainability by addressing the root causes of vulnerability.

Pomeroy *et al.* (2006) has also critically argued that large volumes of aid and a vast array of actors have flowed into affected areas that might create incentives to risk's occurrence on rehabilitation process. Thus, the rehabilitation response may lead to the two directions; i) the risk of simplistic thinking, dominated by easy and ill-considered option in the fisheries management, or; ii) look beyond reinstating past problems and seek to address the root causes of vulnerability, rebuild their resilience to future threats and capacity to exploit opportunities.

4.3.2. The effectiveness and integrated intervention

Pomeroy *et al.* (2006) underlined the importance of the rehabilitation of coastal livelihoods as an opportunity to strengthen and revitalize the ability of coastal communities. The focus of rehabilitation efforts should be on rebuilding the economic basis of livelihoods rather than on physical reconstruction, and on giving coastal people the skills and resources for self-recovery. These can be achieved through effective intervention. The fisheries intervention in NAD province needs to take into account the ability of people to adapt to and cope with disasters. Despite concerns on physical reconstruction, it also need to concern on how to provide adaptive capacity to the fishers or local resource-users, including the adaptive change of rules in the extreme changes of the environment. However, it is also important to ensure that all fisheries infrastructures are working well and may support the building capacity process.

Integrated intervention emerged from the complexity of resource management after the tsunami. The responses to disasters are going to deal with the complexity of resources management as the tension of exploitation in the capture fisheries and aquaculture will increase. The accumulation of rebuilding fisheries programs could lead to the complexity of human-technology-environment systems. The different goals will be in conflict and the notion of 'integrated' clearly indicates that resources management should be approached from a broad perspective taking all potential trade-off and different scales in space and time into account (Wostl 2007).

Addressing the effective responses

Folke *et al.* (2003) explained that there are three responses possible when the crisis occurs. These are: i) no effective responses; ii) responses without experiences; and iii) responses with experiences. Inability to provide effective responses will lead to preserve the status quo and less incentive to promote the resilient communities. This also may be contributed by 'responses without experiences'. However, this response is potential to promote resilient community through institutional learning. These can be achieved by allowing goal to be discovered and commence an exploration. The context of vulnerability should be addressed as a goal that is treated as hypotheses, since the preferences are not stable and evolve through process (Jentoft 2007; Wostl 2007). The 'responses with experiences' option does not always provide a guarantee for successful managing the process to resilient community.

A social learning and adaptive capacity

As the Folke *et al.* (2003) explained, the 'third responses' may provide incentives to the institutional learning and adaptive capacity. Wostl (2007) explained, it is important to ensure that social learning is in place or how it is promoted and its implications for the long-term goals. The integrated intervention needs the framework of social learning in the complexity of resource management.

Olsson *et al.* (2004) emphasized the theory of development adaptive co management. It shows how local groups self-organize, learn, and actively adapt to and shape change with social networks that connect institutions and organisations across level and scales and that facilitate information flows. It can be characterized by vision, leadership, trust, enabling legislation, funds for responding to environmental change, capacity for monitoring and responding to environmental feedback, information flow through social network and arena for social learning. It also relies on the collaboration of a diverse set of stakeholders operating at different levels, often in networks, from local users to municipalities, to regional and national organizations, and also to international bodies.

The vulnerability assessment

The vulnerability system need to be approached by the implementation that across the social and ecological systems, including the roles of institutions. The resource use and coping strategies that mediated by institutions roles, are essential for setting a properly plan for a changing social and ecological conditions, and may avoid the exacerbating of the vulnerability (Adger 2006). These can be achieved through enabling the frameworks of social learning to take place. This learning provides necessary actions to assess the vulnerability, and to provide properly intervention in order to reduce the vulnerability.

The governance implications

In the long-term perspective, the extreme impacts of the tsunami need an approach from a broader perspective. It means that the rebuilding fisheries need to be approached by better governance structures. These, including the categorization of the governance modes to the coastal management, as Jentoft (2007) explained that the *contextualization, coordination,*

learning, and *safe-guarding* in the fisheries governance are fitting to the different governance modes. It depends on the extent of the diversity, complexity, and dynamic contexts.

As the complexity issues emerged, the effective governance structures are important to deal with the vulnerability and to provide effective actions during recovery process. As Bavinck *et al.* (2005) explained, the effectiveness is a reliable criterion for evaluating problem solving and opportunity creation. Thus, a learning approach is perhaps the only way to cope with uncertainty and change. The governance also should be affected by the understanding of social capital and coping strategies. It means that the intervention should take into account the extent of social capital. An understanding of the social capital is also potential to improve fisheries governance that enables the policy makers to see how a social capital perspective improving the management outcomes" (Adger 2003; Grafton 2005).

The governance structures also need to strengthen the capacity of the local resource-users due to the complexity resource management after the tsunami. The collective actions are essential to ensure the rule's acceptance and compliance by the coastal communities in the ecological adaptations. Collective action is at the heart of many decisions on the management of natural resources (Adger 2003). Through this, the role of *panglima laot* can be strengthened to support the collective actions, since their norms and values in the ecological adaptations are potential to support the governance structures. As Jentoft (2004) characterized the pillars, that need to be addressed in the empowerment of local resource-users. These are: i) *the rule* that regulate behaviour may be under-developed or poorly enforced; ii) *the norms* that may provide few incentives and little guidance; iii) *the knowledge* that could inform decision-making may be inadequate or insufficient.

4.4. Summary

The topic of this thesis is the social capital and resilience in the tsunami-affected area. Hence, the concepts are presented and discussed mainly concern the social capital, building resilience and other concept that essentially required and relevant. The severe impacts of the tsunami on the capture fisheries and aquaculture sector were incapacitated coastal communities to recover properly. This occurred in the context of vulnerability that existed before the tsunami, and exacerbated by ineffectiveness of tsunami's intervention. Thus, the concept of vulnerability and

lesson learned on previously tsunami response are relevant for the discussion of social capital and building resilience. An understanding of the social capital through the coping strategies and vulnerability of the coastal communities is important for formulating the effective intervention. In this case, the social structure is one of the contexts that represented their coping strategies.

The massive destruction in both west and east coasts of NAD province caused a high demand of promoting social and ecological resilience to shape the fisheries rebuilding process. Hence, this concept provided and offered the way forward that assumed may be contributed in building resilience. This encompasses the discussion of the effectiveness and integrated intervention concepts as the consequence of the complexity in managing social and ecological aspects after the tsunami. In this case, the concept discussed the essential options and approaches that assumed may effective to be applied during fisheries rebuilding process such as effective response, a framework for social learning and adaptive capacity, vulnerability assessment and the governance implications.

To be able to provide groundwork for application of these concepts, the relevant data are provided in the next chapter. These encompass the capital development on capture fisheries and aquaculture that essential in ensuring the livelihood for the survivors. The role of individuals, households, fisher groups, and local indigenous institution during this capital development together with their interaction with parties that involved in the fisheries rebuilding process is also presented. The social capital of these institutional coping strategies is also presented, including the role of *palong* as the group of fishing method, and *panglima laot* as the local indigenous institutions, and their social-economic characteristic that represented by social structure in the capture fisheries.

The concept or theory presented is going to be applied in the analytical part in the chapter six. The construction of the chapter six is mainly based on the empirical data that will be presented in the chapter five and the application of relevant concept or theory that has presented in this chapter.

Chapter Five

THE INCENTIVE FACTORS FOR THE SOCIAL CAPITAL

5.1. Capital development

The discussion of *capital* is often used in the economic context. These include financial, physical, human, and environmental capital. These capitals can be seen by visual sense, while social capital is more abstract and its analysis sometimes discussed separately to the other capital. In the context of the tsunami, social capital and other capital in the fisheries sector are mainly shaped by rehabilitation programs, due to the tsunami disasters wiped out the majority of these capital.

The impacts of the tsunami on the production assets and livelihood's components have reduced the capacity for adaptation and the coping strategies of the coastal communities. The rehabilitation process then is responsible for providing basic needs and other supporting components for sustaining the livelihoods.

Financial capital may not be assumed as money but as a tool for people to create physical, human, and social capital in the production of goods and services. Financial capital is sometimes represented by symbols and rights, and functions as a social relation within social institutions (Lawang 2004). In this case, the survivors are dealing with financial capital in terms of fisheries livelihoods, which are influenced by social capital of the costal communities and development of other capital during rehabilitation process.

Financial capital is characterized by activities that were implemented by disaster authorities and other parties, for instance cash for work. This program aims to provide income to the survivors through repairing or rebuilding the vital public of fisheries infrastructures. This includes the roads, houses, offices, and fish landing ports. The survivors are also involves in the reconstruction of fishponds and the repair of dikes and irrigation systems. Some organisations have given cash to help in the repairing or building the boats, or to buy fishing equipment, for instance net components or boat's engines. Some of the survivors have also already sustained the

livelihoods properly and obtained earnings through selling the catches, drying fish, or harvesting milkfish and shrimps from rehabilitated fishponds (table 4).

Table 4. The types and sources of financial capital during fisheries rebuilding process in Banda Aceh and Aceh Besar districts.

Types of financial capital	Sources of financial capital
Cash for work	- Houses or roads reconstruction - Fishponds reconstruction (dikes, irrigation systems) - Seedling and planting mangroves - Other infrastructures
Cash for sustain livelihoods	- Cash for building and repairing boats - Cash for buying other fishing equipments (net, engine) - Cash for fishpond business
Earnings from livelihoods	- Selling catches - Selling dried fish - Harvesting fishponds
Alternative livelihoods	- Collecting oysters - Caught fish by using traditional net and hook - Caught shrimps and crabs by using traditional trap - Selling goods in marine tourism
Lending cash	- Other fishers - Family's members

(source: in-depth interviews; observations)

Figure 6. Fish-farmer and the rehabilitated fishpond for milkfish and shrimp in Ladong village, Aceh Besar district.

During the rehabilitation process, the survivors relied on logistics supply and fishing. Some have engaged in collecting oysters[18], small shrimps and crabs[19], and catching fish with the traditional

[18] The survivors were collecting oysters as a source of foods and incomes during low tide in the river mouth.
[19] The survivors were collecting small shrimps or crabs as a source of food and income during the night by using traditional trap equipment.

hook. The survivors, sometimes in the night, caught fish without boat by using traditional hook or net, to provide additional food and income. Fishers were also lending the cash to other fishers or family members to repair or to buy fishing equipments (table 4). In this case, they have developed *trust* in dealing with uncertainty. This could help them in minimizing the impact of inaccessible or unusable of the fishing assistances.

Physical capital can be used to support production activities. In the fisheries rebuilding process, the disaster authorities and other parties have built the vital public of infrastructures and other supporting physical capital. These include the essential things for the survivors such as fisher's barracks. Fisher's barracks have built and occupied by survivors or refugees (mostly by fishers) (figure 7). However, some of them were still living in the emergency house/tent. The location of the barracks is close to the coastline, which makes easy for them to restore and to access the fishing equipments. However, the issues of the quality and safety of the barracks have emerged. Other physical capital are the fish landing ports, distribution of fishing equipments and reconstruction of fishponds, hatcheries, or cages.

The fishers also encountered the issues that emerged during the distribution of fishing equipments. In some places, fishers were not able to operate the boats because unseaworthiness. They are easy to sink, imbalance when floating on the water, using bad quality of material or engine, or incomplete equipments, for instance some boat without engine or net. Other issues are inappropriate, less quality of the materials, or some boats or engines were stolen before distributed. The distribution process also influenced the understanding or trust among fishers, or between fishers and other organisations. However, in some places, fishers are able to use the fishing equipment and to sustain the livelihoods properly. In Lambada village, fishers were enthusiastic after the fish-landing port is repaired (figure 8) and they are starting to use the productive boat from Pidie, which now is the valuable asset of the villages. In some areas, fishers were decided to fix the quality problems of fishing equipments. Some of them were initiated to repair or to buy the brand new boat engine through the lending cash mechanism. Many unusable boats were parked in the riverside of Dayah Raya village (figure 9).

The tsunami destroyed the fishponds or fishing fleets in the two districts. Hence, this production assets that essential for coastal communities' livelihoods, need to be replaced and rehabilitated

properly (table 5). The large numbers of NGOs with their desire to do something quick and noticeable were providing many boats. As the result, most of the survivors now have boats. This has emerged the fisheries management issue, which the rapid increasing of boats have the potential to increase the tension of the pressure on a particular fishing area. This also may lead to a change of social structure, as many fishers have now turned from worker to owner and many of them will not working as the crew anymore.

Figure 7. The fisher's barracks for survivors and refugees in Deah Raya village, Banda Aceh district.

Figure 8. The rehabilitated of fish landing port that enable fishers to go back for work in Lambada village, Aceh Besar district.

Figure 9. Boat assistances parked and many of them unusable on riverside of Dayah Raya village, Banda Aceh district.

Table 5. The affected physical capital on aquaculture and fishing capture in the Banda Aceh and Aceh Besar.

Districts	Fishponds		Affected fishing fleets & fish landing ports				
	Area (Ha)	Affected Area (Ha)	Non-powered boat	Outboard engine	Inboard engine	Powered-boat	Fish landing ports
Banda Aceh	724	724	35	80	114	229	2
Aceh Besar	1.006	1.006	218	475	202	895	8

(source: data is analysed; Bappenas 2005)

Environmental capital is the natural resources that for instance can be used as a raw material in the production process. This encompasses fishponds, mangroves, coral reef, and fishing areas in both west and east coasts of NAD province. In aquaculture, the rehabilitation of fishponds (figure 11) and mangroves is mainly focused on how to support the livelihoods. This includes the improving of the fish-farmers' skill in dealing with ecological feedback through the training of seaweed culture, or the best practices workshop in aquaculture. These programs enable them to deal with the technical issues such as soil acidity or white spot virus, which is a common shrimp disease that they already faced before the tsunami. The rehabilitation of mangroves is not only for re-establishing the buffer zone in the coastal area, but also for maintaining its functions as an important ecosystem. To do so, seedling and planting mangroves have been conducted in some areas. FAO-Banda Aceh has introduced a mangrove plan in the training of fishpond and mangrove management. These will emphasize on *Silvo-fisheries*[20] model that suitable for a traditional aquaculture systems in Aceh.

[20] A combination of mangrove plantation with coastal aquaculture.

(source: Munthadar 2005)

Figure 10. The condition of mangroves with 10 hectares before tsunami and now severely destroyed in Kuala Cakra Ulee Lheue, Banda Aceh district.

Most of the mangrove vegetation was destroyed in both east and west coasts. The example of this can be seen at figure 10. The rehabilitation process should re-establish the functions of mangrove as the nursery, spawning, and feeding ground and as the buffer zone as well.

In capture fisheries, Bappeda NAD (2006) has estimated that the MSY for the period of 2000-2004 is about 149.504,14 ton/year, and the stock exploitation is about 107.902 ton/year (72,17% of the MSY) (the fisheries production can be seen at table 6). In this case, it is suggested to increase the catches to about 11.703,63 ton/year (7,83%), with the assumption that the catches is 80% of the MSY. However, this has indicated that the level of exploitation in NAD province is approaching the MSY value. As a result, the CPUE trend in the east coast (Malacca Strait) has decreased, and the west coast is steadily increasing. Thus, the symptom of over-fishing is identified in the east coast.

Figure 11. The rehabilitated dikes and irrigation systems enable fish-farmers to go back for work in Baet village, Aceh Besar district.

Table 6. The six biggest of species (45 species overall) in the fisheries production of NAD province.

Species[21]	Production (ton/year)
Tongkol /Little eastern tuna	8.750,70
Cakalang /Skipjack tuna	6.370,62
Teri/Anchovies	5.750,38
Biji Nangka/Goat fishes	5.132,06
Selar /Trevallies	4.923,74
Kembung /Indian mackerels	4.691,10

(Bappeda NAD 2006)

Human Capital can be distinguished from the social capital. Human capital is more about personal skills. It encompasses education or occupation that survivors have. In the context of rebuilding fisheries, the human capital in the two districts is not homogeneous due to the tsunami impacts have changed the human compositions. Many people died and migrate from one coastal area to another, and even people from a higher land have moved to the coastal area, due to circumstances and attractive situations that rehabilitation programs offered. In some cases, the fishers have turned from being worker to become boat owner. Young people want to become fishers due to many of their parents died and the proliferation of boats as well. Some organisations, for instance FAO and ADB, have empowered fishers and fish-farmers to provide the capacity to adapt to and cope with changes.

The role of women in the fisheries after the tsunami can be identified through their participation in helping the households or the fisher groups in the processing, marketing and netting. They are important labour in the household fisheries (figure 12). Some people were also working as a boat builder, a fish trader, or a house builder.

[21] Species are written in Indonesian and English names.

Figure 12. A woman involved in the processing and marketing of the catches in Leupung sub-district, Aceh Besar district.

5.2. Social structure: a status and role in fisheries

The sense of social structure almost certainly includes a concern with power and status, and its distribution among social formations such as classes, ethnic groups, age grade groups, gender, and professional relations (Schegloff 2002). In this case, the status and role will be identified through the age, experiences, sex, households, and their relationship with the social structure and marketing in the capture fisheries.

5.2.1. Age and experiences: *an important indicator for the roles*

The roles are identified through the age or experiences. Most of the boat captains are older than the crew. They are also more experienced in the fishing capture than the crew is. In the case of *panglima laot*, Djuned *et al.* (1995) explained that most of them are chosen because their outstanding experiences in the fishing capture. To be a *panglima laot*, it should be started from the lowest layer in the social structure. Leadership skills and morality are required to get the recognition from coastal communities. From the lowest layer to the highest can be mentioned respectively: *aneuk pukat-apet-pawang pukat-panglima laot. Aneuk pukat* (crew) is mainly responsible to deploy net and to identify the fishing ground. *Apet* is the assistant of *pawang pukat* (captain) who sometimes is responsible for replacing the position of boat's leader, which must be occupied by a person who understands the situation of fishing the areas and who is capable to operate the boat as well. Captain is not chosen formally and their election is mainly based on the skill and knowledge on capture fisheries. The election of *panglima laot* is attended by all *pawang pukat* from each *lhok.* The election also will consider the recommendations and approval procedures from local governments and other leaders in the coastal communities.

After the tsunami, the boats proliferation has influenced the worker-owner relationship in term of their status and role that enabled them to step up on the status ladder in capture fisheries. This also has enabled fishers to continue their occupation and then feed themselves and family members.

5.2.2. Sex: *sharing the responsibilities*

Man and woman have shared responsibilities in terms of fisheries livelihoods before and after the tsunami. The majority of men is occupying the fishing capture or aquaculture, while the women are taking part in the processing and marketing (figure 12). Some women are also involved to help in making nets. They also play the important role of helping the family to diversify the alternative livelihoods such as collecting oysters, or drying fish[22]. In some case, the composition of *palong's* crew is equally between man and woman that lead to an equal right of catch sharing mechanism[23].

5.2.3. Households: *the family networks*[24]

In some case, the father and his son are playing important roles in the fishing capture. The role of the son becomes more essential when the father is getting old and the son has to feed his own family members. In some cases, family members in the different layers sometimes occupy the structures of fishing capture. Another case, the age indicator is neglected because sometimes the son is taking fully responsibilities in the capture fisheries and put the father as his crew on the boat. Most of the family members were working for the boat owner as the crews.

5.2.4. Fishing capture and marketing systems

Before and after the tsunami, the social economic layering in fishing capture and marketing characterizes an artisanal fishery in Indonesia, including the NAD province. Their social-economic interactions are embedded in the social structure that has divided the fishers into a several layers or identities. The layers are occupied by the different statuses and roles of fishers that will determine their social-economic identities in the fishing capture and marketing.

In figure 13, the owners[25] are occupying the highest level and play significant roles in the fishing

[22] Interview with fisher's wife in Alue Naga village.
[23] Interview with women's *palong* crews in Leupung.
[24] Interview with fishers in Alue Naga village.
[25] In local name is called *bos ikan* or money lender/big traders. Sometimes also is called *toke.*

capture and marketing. They frequently lend the boats or cash to the captains[26]. During fishing, the captains were helped by fishers' labor[27]. The higher the level, the more of the earnings they obtain. The lowest the level, the less of cash and bargaining position they obtain. In this case, as they occupied the lowest level, fishers' labor is frequently owed to the owners before fishing, so that after fishing they have to pay back.

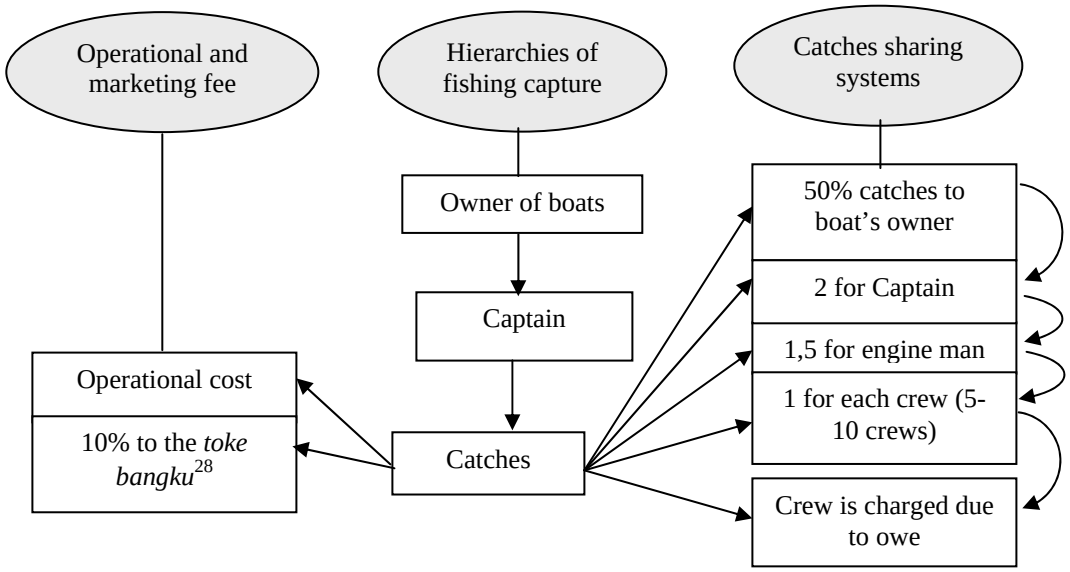

Figure 13. The illustrations of social structure in the capture fisheries (indepth interview; PFA 2004).

During fishing, the operational cost is covered by the owners including boat's maintenance fees. Sometimes captains is responsible for the maintenance fees in case the boats or nets is broken or lost. In particular case, sometimes the owners have given extra money for the extra catches, and they will be charged if the catches is zero or negative, which will be counted as the owe to the owners. In case of the catches are exceeding the normal productions, sometimes the fish is brought outside the area, particularly during 'good' seasons. After fishing, the catches have to be charged by the operational cost and marketing fees. After charging, 50 % is going to the owners. Other 50% is shared between captain and his crews with composition 2:1,5:1 to captain, engine man and fisher labor respectively. This sharing composition sometimes took place from the

[26] In local name is called *pawang.* They are responsible for fishing operations and sometimes functioned as local traders.
[27] In local name is called *aneuk pukat* or *ABK.* Some functioned as engine man or helping captain during fishing.
[28] Written in local name. He is the responsible man in the marketing that earned 10% for marketing fees. He also sometimes functioned as a money lender.

simple to the complex ways, based on the some aspects such as the type of fish species caught, type or size of boats or fishing gears used.

In the fish marketing, the owners or non-owners sometimes are selling the catches directly to the fish landing ports, or to the collectors or local traders[29], and will be selling to big traders that usually selling fish out of the area (figure 14).

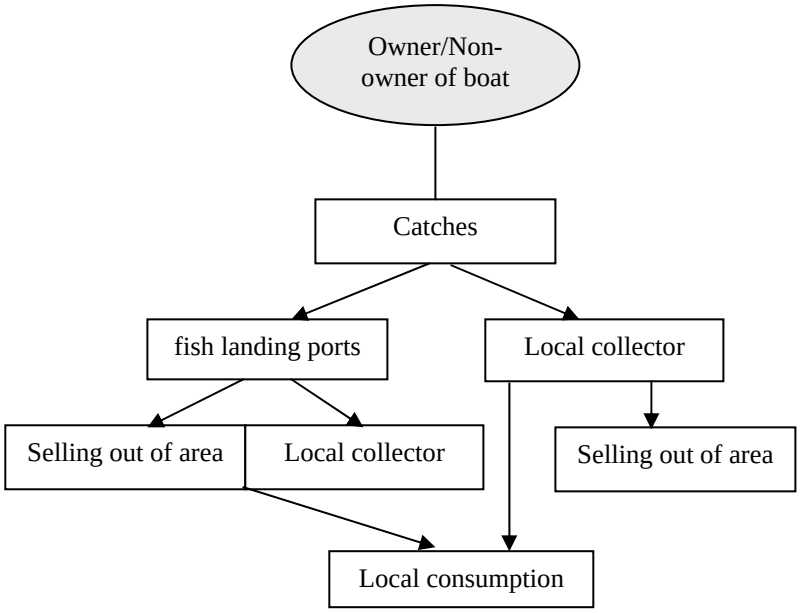

Figure 14: The illustrations of fish marketing process in the capture fisheries (in-depth interview; PFA 2004).

5.3. *Panglima laot* : the local knowledge and indigenous institution

Panglima laot[30] is the *adat* institution in NAD province that has been playing the important roles in the coastal resources management. Even after the tsunami, they have been significantly contributed in the organising fishers and fishing assistances distribution. This made them an essential instrument in the fisheries rebuilding process. Their potentials and roles in social and ecological systems before and after the tsunami are also relevant in the context of building resilience of coastal communities.

[29] In local name is called *muge* or *toke lokal*. Sometimes the equipments for fish transporters is also called *muge.*
[30] They are called in other local names such as *panglaot* (shorter name for *panglima laot*), *jenderal nelayan* (general of fishers), or *abu laot* (the father of sea).

5.3.1. Historical background

In the past, *panglima laot* is the assistant of the *sultan*[31] in the collecting of tax from the coastal communities, during the Samudera Pasai kingdom in fourteenth centuries. Their roles have changed, particularly during Netherlands' colonisation. They have functioned as the *adat* leader of fishers that is organizing and regulating their ecological adaptations. Their roles are recognized and formally adopted by the government of Aceh Besar district in 1977. In 1990, the provincial government of Aceh also adopted their roles (MMAF 2005c; Chamim 2005).

5.3.2. The organisation and jurisdiction areas

Panglima laot is responsible to enforce the local *adat* of the sea[32]. Their jurisdiction areas do not refer to the administratively areas of the government, but based on the certain areas where fishers mostly conduct their activities, for instance a place to park the boats, to sell the fish or even a place to live. These places are called *lhok*[33], where the coasts or bays may encompasses one or the combinations of some villages, sub-districts, or the islands.

According to MMAF (2005c), their organisational structure had started to change systematically in the meeting of all *panglima laot* in NAD province in June 2002. The conflicts between fishers in the level of *lhok* are facilitated by *panglima lhok*[34]. If the conflict could not be solved, it is going to be facilitated by *panglima chik*[35] in the higher level (districts) (figure 15).

[31] A local name for the king. It is also a name for noble birth or the leader of Moslem.
[32] In local name is called *hukom adat laot.* The customary laws and ritual practices that enforced by *panglima laot* in the marine and coastal areas.
[33] The jurisdiction area of *panglima laot.*
[34] The jurisdiction area of *panglima laot* in the level of village.
[35] A local name for *panglima laot* in level of district.

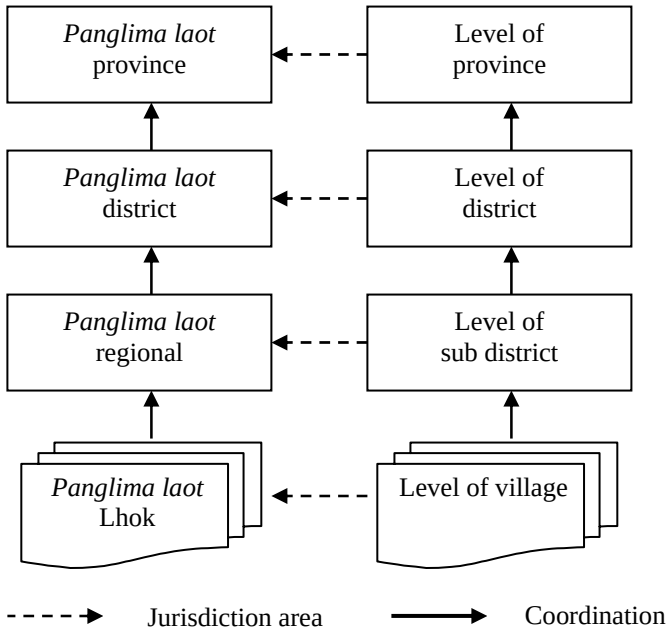

Figure 15. The structure of *Panglima Laot* (source: FAO 2005 in World Bank 2006).

5.3.3. The responsibility and local knowledge

According to the local laws[36], the *panglima laot* is responsible to help the head of villages[37] in some aspects for instance, the *adat* enforcement, and organising other social and cultural aspects in the fishing capture.

The main responsibilities of this institution are; i) to regulate the fishing capture aspects (*meupayang*); and ii) to facilitate the conflict resolution between fishers during fishing. *Meupayang* encompasses the time and rules during fishing, the prevention of pollution, the utilization of coastal areas and the safety during fishing. The fishers are allowed to go for fishing everyday except on Friday. The reason is that every Friday fishers shall to pray in the mosques and also the time for ensuring that the boats and all fishing equipments are in good conditions, which enable effectiveness and security during fishing. The Friday is also used by fishers for meeting. Here *panglima laot* lead the fishers to solve the conflicts that occurred during fishing. There are some another days, for instance Indonesian independence day or a special days in Islam. In case that an accident occurs during fishing, fishers are not allowed fishing for three

[36] In local name is called Peraturan Daerah (Perda No. 2/1990).
[37] In local name is called *keuchik*. They are formally as the part of government structures.

days, but are asked to provide help through searching and rescuing. They also have the traditional ceremony[38] that is conducted to pray for God's blessness and safety during fishing.

During fishing, it is not allowed to use trawl because it will harm the juvenile fishes and important habitats. It is not allowed to intervene in other fisher's fishing grounds[39] or to catch fishes during spawning seasons. Fishers are not allowed to spill the engine oil on the sea water surface or build something on the sandy coasts without permission. *Panglima laot* has the right to enforce the rules and punishments, and mediate the conflicts that occurs during ecological adaptations. More of this can be seen at table 7 (Djuned *et al.* 1995; Chamim 2005; MMAF 2005c).

5.4. Social structure and social capital relationship

Lin (2001) explained that the collective actions by the actors in the groups are lead to the emergence of social structure, due to the interactions and inter-dependence between the two: the action affects the structures and the structure affects the actions. Status and role that are embedded in the social structure are incentives to form the extent of social capital. Status and role that are represented by the interactions of individuals, households, fisher's groups or other local institutions during fisheries rebuilding process are instrumental in generating social capital. Thus, the effectiveness of status and role in the social structure is essential for social capital effectiveness.

The roles of individuals or households in the two districts are characterized by the social structure such as age, sex, or experiences that represents their different status and role in the capture fisheries. Their interaction during fisheries rebuilding process is shaped by the trust, reciprocity, and altruistic behaviours in the sustaining of livelihoods. Their social capital is based on the limited networks, which mainly occurred within family networks. Some also have attached into the social economic layering in the capture fisheries and majority has occupied the lower layers. Proliferation of boats after the tsunami has changed their status and role in the worker- owner relationship.

The groups of fishing method for instance, *palong*, has also characterized by the social economic

[38] In local name is called *kenduri adat laot* and conducted every 3 years.
[39] Each fisher's fishing ground has a specific code for instance, rising the hand or putting the buoys.

layering. It consists of the owners and fishers labour. In some cases, after the tsunami, *palong* has changed their structures in the fishing through the introducing of the ownership. Their social capital also determined by the trust, reciprocity, and altruistic behaviours in the limited networks.

The significant roles of *panglima laot* in the resource management are essential to shape the limited networks. Bonding social capital on the roles of the households and groups of fishing method can be strengthened through optimizing their social capital components. In this case, *panglima laot* with their strong leadership, legitimacy, trust, norms, and values is potential to provide collective actions within different groups of coastal communities. Their social capital effectiveness is potential to drive the bonding social capital into effective behaviour during ecological adaptations. More of this will be presented below and in the table 7 as well.

5.5. The social capital in the fisheries rebuilding process

Hasbullah (2006) explained that the social capital is the potentials of the groups and the types of individuals' relations within the groups or between the groups. It concerns social networks, norms, values, and trust that are created and enforced by the groups.

5.5.1. The rebuilding fisheries program: the source of *social capital*

The rebuilding fisheries programs are required to help the survivors in providing of the important capital in the tsunami-affected areas. The program provides the capital developments that enable fishers to go back for work and to sustain the livelihoods. The process of interactions between stakeholders during program interventions is the arenas for identifying the coping strategies, which could provide the information of social capital connectedness.

5.5.2. The participation in the s*ocial networks*

The rebuilding fisheries programs are facilitating the social interactions to take place within coastal communities, and the coordination between disaster authorities and other donor organisations. Their interactions are shaped by the different type of networks within coastal communities, and mainly based on how to access the fishing assistances and how the programs are implemented.

The participation in the social networks is characterized by the roles of individuals or households that provide the extent of trust, reciprocal actions, and altruistic behaviours. These have oiled

their initiation in the accessing the assistances, or in the attempt to fix the problems that constraint them to sustain the livelihoods properly. These can be seen when some of the individuals or household's members were lending the cash to the others without interest rate. The participation also is characterized by the high dependence on the outsider, due to the limited choice of alternative livelihoods after the tsunami. Many of the vibrant organisations are doing something quick and noticeable to help people. However, they sometimes pay less attention to the effectiveness of their programs (figure 16), or the limited knowledge on the local suitability such as social economic characteristics or appropriateness of boats. The participation also presents challenge due to the 'huge aid' that has created some issues, for instance social envy, opportunisms, and conflict of interests.

Figure 16.The boat assistances being repaired on the riverside of Dayah Raya village, Banda Aceh district.

The emergency and rehabilitation phases have raised the issues of the fishing assistance effectiveness. In some cases, fishers were vulnerable to the food insecurity and income due to inability to use the fishing equipments. The proliferation of boats may lead to the excess of capacity in the fishing fleets. These have been caused by the lack of an effective plan on the fisheries management in both phases. However, this can be understood due to the nature of the phases, or the massive influences of the tsunami in both capture fisheries and aquaculture that is sometimes hampered the recovery processes.

[40]In the Alue Naga village, the facilitators were providing helps for fisher's groups in the designing programs that will be funded by the donor organisations, for instance the program of

[40] Interview with a woman, a local trader in Alue Naga village.

fish drying or fish processing. Only few of the programs were approved, while the others need to wait with uncertainties. There is also a rumour that opportunists were taking advantages from the 'huge aid' by collecting the survivors' identities, and to be submitted to the donor organisations on behalf of the survivors. However, in some cases, fishers are able to go back for work (figure 17). *Palong* is one of the successful of the fishing method groups that enable their crews to earn significant income from the catches (figure 19 and 21).

Figure 17. The fishers are able to go back for work on the riverside of Dayah Raya village, Banda Aceh district.

The *BRR* is formally and the most responsible agency for the rebuilding fisheries sectors. During the implementation, they were doing a consultation and collaborating with some of the NGOs and government agencies. They were mostly concerned with the physical reconstructions to provide a properly fisheries infrastructures. Some international agencies have collaborated with the NGOs to provide skills and knowledge of fishers and fish-farmers to deal with ecological matters (figure 18).

With many of the parties involved in the tsunami-affected area, it is important to take into account what they do, how they do it, or whether they work permanently or temporarily. What they have been imprinted should be based on the responsibility and sustainability principles. Many of implemented programs are based on the missions and rapid need assessment that they have. Some have provided the interventions either for the short-term or long-term purposes. In the short-term, it is essential to provide the basic need for sustaining the livelihoods and building a vital of public infrastructure. The problem of fishing assistance is mainly caused by the nature of emergency and rehabilitation phases that are conducted quickly and in the simple fashion. In the long-term, this ineffectiveness can be shaped by the long-term goals that is assumed may

strengthen the long-term capacities and resilience of the survivors and coastal communities. Thus, the rehabilitation process needs a carefully action in design the effective interventions and in understanding of how the system to be governed functions (Jentoft 2007).

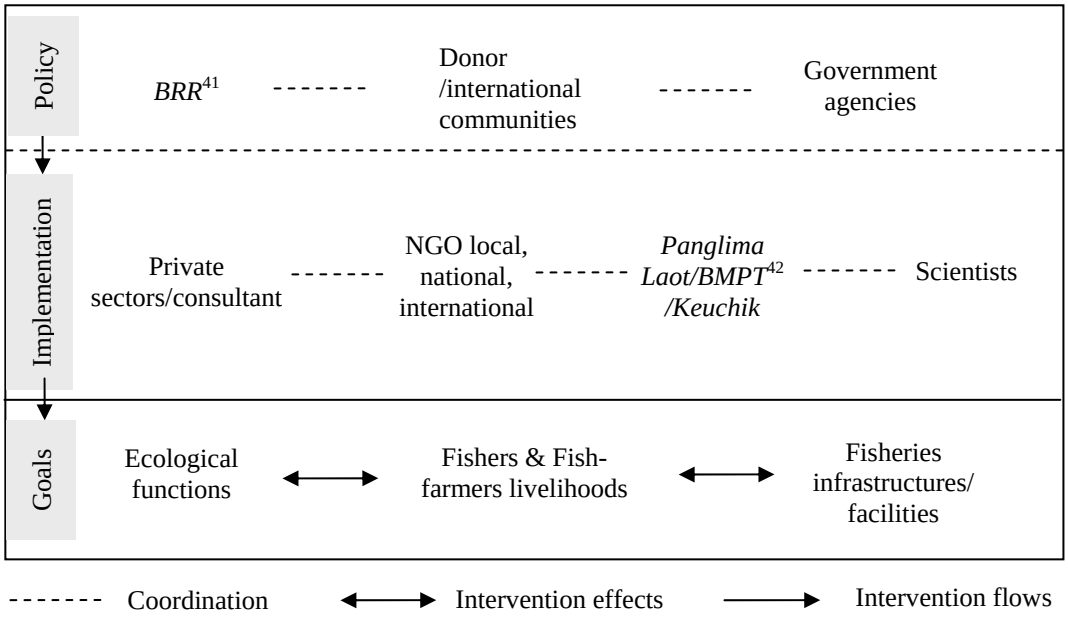

Figure 18. The illustrations of the stakeholders that involved in the responses to disasters.

The parties involved are categorized as the 'outsiders' and 'insiders' due to the sustainability of the programs. It is important to concern the type programs that they have implemented before leaving the area. Some have collaborated but others are working alone. In this case, it needs to take into account the frameworks for programs design and coordination, so that the rehabilitation process can be driven effectively and emphasizing on the relevant scopes. The role of vibrant and temporal institutions needs to contribute in shaping the tsunami-affected area by providing effective programs that incentive to long-term capacities and resilience. In fact, ineffectiveness occurred that might lead to exacerbating the vulnerability. This can be initiated by focusing on strengthening local institutions capacity in the resource management, or promoting security and sustainability. Thus, the rebuilding of fisheries program can be seen as an empowerment through the strengthening the local resources-user.

[41] The representative of the government agency for rehabilitation and reconstruction.
[42] The local organisation for the fish-farmers.

5.5.3. *Trust and reciprocity*

- *Palong*[43]

Palong is the lift nets that deployed the nets horizontally. Special woods or bamboos frame the nets. It is built on the special boats (hulls) or can be also built statically on the sea bottom. One unit of *palong* consists of the big of net, supporting boats[44], and traditional houses for processing[45]. Each unit employed about 8 to 15 people. The size vary and the standard size is 9 m length, 2 m width, and 1,3 m depth. In the case of Leupung district, the number of crew is 5 people, which is smaller than in other areas (figure 19).

Before the tsunami, *palong* is the most profitable fishing method, the largest Achenese fishing boat and also the most expensive boat in Banda Aceh and Aceh Besar districts. The price is about Rp. 135 to 200 M/unit or US$ 14.500 to 22.000. It is one of the famous fishing boat and method and has given the significant contribution to the development of local economy. The main catch is the anchovies[46] and historically is marketed out to the main city like Banda Aceh or Medan[47]. Medan is the biggest market and that is why many people have associated anchovies as the production from Medan. In facts, the anchovies is mainly produced in the NAD province and was branded in the Medan (figure 20a).

The tsunami wiped out most of the *palong* and its components. After the tsunami, most of the fishers desired to have the *palong,* particularly in the some places like Leupung, Lhoong, and Kreung Raya. In these places, *palong* has started and became a major sources of income and enable to support the development of local economy. Before the tsunami, the number of *palong* operated was about 30 to 45, but now it is only about 2 to 5 for each subdistrict.

Some organizations have empowered fishers through establishing the new structures that divided the benefit of the catches to the *palong's* groups and communities' welfare. Ideally, it is 50% to the community and the rest is going to the members. The catch share system is based on the responsibilities that captain and crew have (figure 20b). The cost of building the *palong* is also shared between the fishers and donor organisations. Since the number of *palong* is limited, the

[43] Interviews with palong's groups in Leupung.
[44] The boats that functioned to move the *palong* from one location to another.
[45] In local name is called *jambo rebus.*
[46] In local name is called *Ikan Teri.*
[47] The capital city of North Sumatera and as the neighbour's province of the NAD in the south.

catches are only for local consumptions and the rest is sold at the local market (figure 20a).

> *"We have to build a group if we will apply for the palong's supports. It is the requirement from the donor"* [48].

> *"Our group consist of five members and we have to share the catches equally, even though some of our members are refugees that coming from outside this area"* [48].

The issue of boat quality has also occurred on *palong*. Some *palong* was unseaworthy after two weeks operated because of the less quality or incomplete equipments.

Figure 19. The *palong* that is used by fisher's groups in Leupung, Aceh Besar district.

The trust among the members is the important value for the *palong* groups due to the members are coming from different areas. In Lhokseudu community for instance, the half of the catches is shared with the communities. This enables the reciprocity to take place because they are not only of concern for the group's interests but with also to the communities. However, some *palong* groups are not sharing catches with the communities. Below are the quotes from IRC, the organisation that empowered *palong* groups in coastal village of Lhokseudu.

> *"The proceeds of the palong should be split in two: half for the crew and the other half going to the community".*

> *"Since the grant alone was not sufficient to cover all the expenses, the community has made an appreciable contribution to the costs. This stimulates a sense of ownership, a key ingredient for the sustainability of the project".*

[48] Interviews with palong's groups in Leupung.

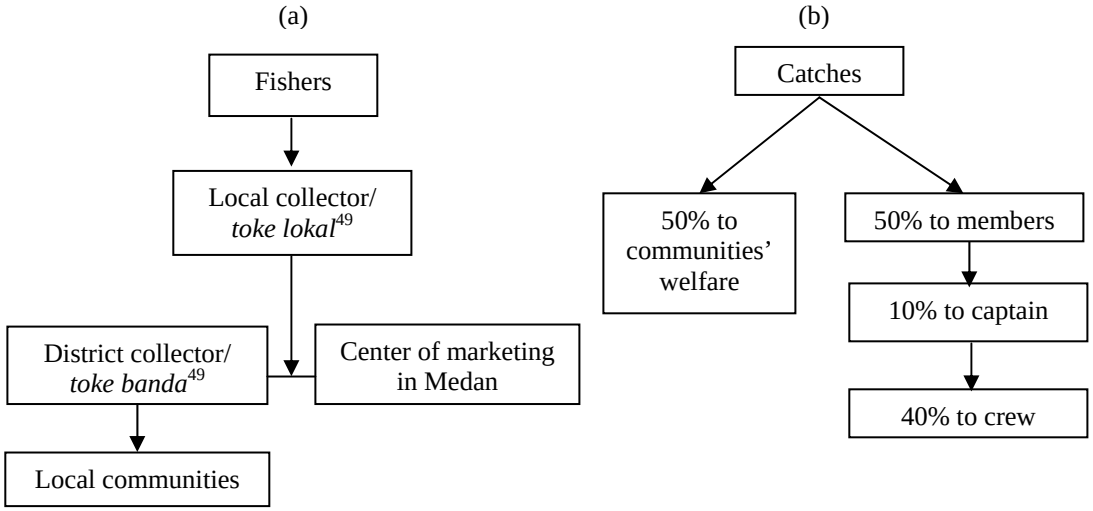

Figure 20. The illustrations of the marketing systems (a) and the catches sharing systems (b) of the *palong* (source: indepth interview; IRC 2006).

Figure 21. The catches from *palong* that enable fishers to go back for work in Leupung, Aceh Besar district.

- Individuals and households

The households are the structures that are used by the survivors to establish the networks during sustaining the livelihoods. They were developed the trust and reciprocity as the basis for the social networks, to access the fishing assistances or to establish the self-initiations. As the distribution or benefits of the fishing assistances are not always evenly distributed, accessible, usable, or appropriate, the survivors then initiate to establish the networks within the family members and between fishers.

[49] Written in local name. It is also the responsible man in marketing but the coverage area for marketing is bigger than *toke lokal*. It is called *toke banda* because operated in Banda Aceh district.

> *"We do not have enough money to buy or to repair the fishing equipment, so that now we just relied on the owners and the lending cash."*[50].
>
> *"We are not comfortable with the credit because of the interest rate and of regularly paying the loan. We prefer to borrow the money to relatives or money lender"* [50].
>
> *"It is easy to work within the family members for instance, we can borrow the money to buy net components because we have trust, and more simple in the procedures, without interest rate and it can be returned when we are ready"*[51].
>
> *"Our family members relied on the catches from the boat owner. My son borrows the boat to feed us and his family as well"*[51].

The role of the households was connected to the social structure in the capture fisheries. Sometimes the households were employing their family members to work together at the same boat and occupying the layers in the social structure. In case the boat equipments from the owners are not complete, they then initiate to provide nets and other equipments by asking the relatives or other fishers to lend the money.

Figure 22. The households that relied on the owners and occupying the barracks in Alue Naga village, Banda Aceh district.

The trust and reciprocal actions are possible due to the existing of a cultural value in the communities for instance, the willingness to tolerate, [52]willingness to work together voluntarily and equally that based on the empathy.

> *"Everyone should help each others because if you help people, they then will do the same even more"* [53].
>
> *"We have knowledge and willingness to go fishing, so any chances should be used optimally"* [53].

[50] Interview with fishers-captain in Alue Naga village.
[51] Interview with fishers-crew in Alue Naga village.
[52] In local name is called *gotong royong*.
[53] Interview with fishers-crew in Alue Naga village.

> *"We have to fix the broken engine by asking the relatives for help. Some of them are experience in fixing the engine. We also need other fisher's help to take out the engine from the boat, which needs about 5 to 6 adult men"* [54].

In some cases, the fishers were also having less capacity to access the fishing assistance.

> *"We did not go there, because we did not know the procedures. So, if there is no one helps, then we might have no fishing equipment"* [55].
>
> *"The only thing that can help is the panglima laot because they are representative of disaster authorities in distributing the fishing equipment. But, we can not easily or freely to access through them, because sometimes we need to pay to get the assistance."* [55].

On the other hand, the fishers have different point of view about the role of Provincial Fishery Agency.

> *"Before the tsunami, we were more appreciating the role of Provincial Fishery Agency, because the procedures in distributing assistance are more transparent and directly distribute to us"* [56].
>
> *"Now we can go back for work since we have received some boats. One of the boats is valuable for our villages and now it is organized by fisher's cooperative"* [56].

During fisheries rebuilding process, many NGOs were helping fishers to access the fishing assistances. However, their attempt to solve the livelihood matters sometime challenged by the opportunists.

> *"We were helped by NGO to know how to make the proposal to the donor. We already made and submitted the proposal of fish processing and fish drying. Our friends have got approved but we have not yet"* [57].
>
> *"So far, we did not have the information concerning the approval of proposals. We were worried because some opportunists operated here. They were collected our identities (KTP) and said that the identities will be submitted together with the proposal to the donors"* [57].

5.5.4. *Social norms and values*: the case of *panglima laot*

The roles of *panglima laot* are concern the control mechanism of the local coastal communities in their ecological adaptations. This norm and value specifically contain the rules and sanctions in the fishing capture (table 7). As they said in Chamim (2005):

> *"Everything has to do with rules, and all of our behaviour cannot disturb the rights of other people. So, the fishers must follow the rules and sanctions"*.
>
> *"You better call me a stupid, rather than call me a person that do not know about the adat"*.

[54] Interview with fishers-crew in Dayah Raya villages.
[55] Interview with fishers-crew in Alue Naga village.
[56] Interview with fishers-crew in Lambada village.
[57] Interview with woman, a local trader in Alue Naga village.

The fishers are following the rules voluntarily, collectively and out of respect for their leaders. The trust and legitimacy occur due to the historical roles of the *panglima laot* in the resources management. The leaderships, the ability to provide fairness during conflict resolutions, and the ability to protect and provide help for fishers are the essential factors in oiling their relationship with fishers. As Chamim (2005) said:

> *"In case conflicts occur during fishing, the fisher will come to panglima laot. They then will solve the problems fairly".*
>
> *"After deeply consideration, the panglima laot will decide who is guilty, and they will be punished, for instance by taking over half or all the catches, or no fishing for several days".*
>
> *"When accident occur during fishing that made fishers ill, disabled, or died, panglima laot with their own money or encourage other fishers supporting, is taking care of fishers and their family. Without insurance, fisher then relied on panglima laot's help and support. Sometime panglima laot directly involved searching and rescuing fishers that lost during fishing in faraway places such as India or Filipina islands".*
>
> *"The emotional ties between fishers and panglima laot are stronger when panglima laot successful in negotiating the 20 illegal vessels of Thailand that caught in marine water of Aceh, and to be used for Achenese fishers welfare".*

The ability to organise and to mediate fishers during rehabilitation process is also important. After the tsunami, they were organising the fishers in the accessing the fishing assistances distribution, and were providing spirit for fishers to continue the life. As survivor and former Ministry of MMAF said in Chamim (2005):

> *"Please, come to meet the panglima laot. Help our leaders, our generals. Support them in helping fishers".*
>
> *"Please, come to meet the panglima laot. Many things that can be done together with this adat institution".*

Panglima laot needs an outstanding skills and knowledge about fisheries resources and maritime aspects. This made their position in the local resource management is essential. After the tsunami, this position is stronger since their significant role in helping fisher to cope with tsunami. As Chamim (2005) said:

> *"Tsunami disaster made panglima laot position stronger in the heart of coastal community. They always provide spirit for the fisher to continue the life".*

(source: *Panglima Laot* 2005).

Figure 23. The meeting of all the *panglima laot* in NAD province as the responses to the tsunami.

Table 7. The rules and sanctions in the capture fisheries that enforced by the *panglima laot.*

Rules	Aspects	Sanctions/Fines
No fishing on Friday	Religious, fishing safety and regular meeting for problem solving	Conflicts that arise during fishing are mediated by *panglima laot* and will provide a problem solving. Sanctions or fines are usually take place in the form of taking over half or all the catches or no fishing for 3-7 days.
No fishing on other specific days	Religious and social right	
No fishing for 3 days if accident occurs	Fishing safety/search and rescue	
No trawl	Conflict of gears/stock and ecosystem protections	
No intervene of other fishers schooling fish	Conflict of fishing ground	
No oil spill & other sewages	Marine pollution	
No explosions and poisons	Stock and ecosystem protection	
No illegal use of sandy coastal: no cutting trees or illegal building	Coastal protections	
No catch during spawning seasons	Stock and ecosystem protections	

(sources: Djuned *et al.* 2005; Chamim 2005).

5.6. Summary

The data presented are mainly related to institutional social capital and coping strategies in the context of fisheries rebuilding process. These data are essential as the basis for the construction of analysis in the next chapter.

The capital development in both capture fisheries and aquaculture is presented as the background in the discussion of social capital and resilience. The reflection of institutional coping strategies

can be drawn from this background. This includes the approaches of disaster authorities and other parties involved in general. These data, together with institutional coping strategies are essential later in the discussion of effective intervention and vulnerability after the tsunami. Social capital and social structure are presented in order to provide data concerning the diversity within coastal communities, which are important later in the discussion of vulnerability and social and ecological resilience. The data presented here are also as a groundwork in the discussing the possibility of fisheries rebuilding process to promote resilient community in the tsunami-affected area, including the potential of social capital for the collective action in the complexity of resource management after the tsunami. In the next chapter, this will be discussed through the analysis of the approaches that assumed may provide effective framework in building resilience, such as effective responses, vulnerability assessment, social learning and adaptive capacity, and the implication to the governance modes.

In particular, the voices from rehabilitation process are included in the beginning part of the next chapter, as an introduction of analytical part. This is presented in order to provide additional information about social capital component, institutional coping strategies, and other perspectives of the parties involved, and to support some material that has presented in this chapter. This additional information also provided as the complement to data that have presented and as groundwork for analytical part in the next chapter.

Chapter Six

THE SOCIAL CAPITAL AND BUILDING RESILIENCE

6.1. The voices from rehabilitation process

6.1.1. The fishers: non-boat owners and *palong*

What concern the fishers the most after the tsunami is how to obtain assistances regarding fishing equipments, which are essential for their livelihood. The fishing equipments have successfully helped some of the survivors, but others were struggling to access the assistances or to solve the problems of the quality of fishing assistance.

> *"My families' members were survived, but then I have to feed them and cannot merely rely on the logistic assistances. So I need to go fishing"*[58].

> *"We need to go fishing, but the fishing assistances cannot be used properly as we had before for instance, the boats. They also provided boat but without net. It is a difficult situation"*[58].

In the some cases, the fishers were working for the boat owners, and the others have turned from being a worker to become boat owners.

> *"We should be responsible for the safety of the owner's properties during fishing, otherwise we have to pay for the broken part. We need them to keep trust on us. Sometimes the net is broken and we need to borrow the money to fix it, or to buy our own net components. We need also more money, since we owe them"*[58].

Many people have migrated closer to the coastal areas in order to access the fishing assistances and the barracks.

> *"We are the refugees from Pidie, so we have few relatives or access to get more fishing assistance. Recently, we have not been working for the boat owners"*[59].

> *"I only can use 'sampan' instead of the boat assistance. The boats are broken and I am afraid to use them because unseaworthy. 'Sampan' can be used to help provide food for the family, but I cannot go far, and only caught fish with the hook and deploy a small net around the coast where I live"*[59].

Fishers also were taking advantage of the fishing assistances. The *palong* groups were satisfied with the earnings from the catches.

[58] Interviews with fishers in Alue Naga village.
[59] Interviews with fishers/refugees in Alue Naga village.

> *"Before the tsunami, this place was occupied by palong's fishers and they are rich, but now they all have gone. We would like to follow them and so far, the catches are promising. We could earn approximately Rp. 10 M or (US$ 1500)/ day and that is valuable money for us"*[60].

However, fishers were able to survive even in the absence of effective interventions. Local ecological knowledge and experiences for instance, *palong*, is able to provide a chance to survive. On the other hand, the rehabilitation process need to take into account ineffective fishing equipment that lead to the vulnerability of insecurity food and income.

6.1.2. The fish-farmers

The fish-farmers are now able to go back for work and some were working for the owners of fishponds. So far, they have been able to sustain their livelihoods. They also found the temporary jobs.

> *"We were helped from repairing the dykes, seeding, to harvesting. Many of fishponds in the surrounding also have started to work and they are waiting for the harvesting"*[61].

> *"After the tsunami, we moved to the coastal areas and participate in the seedling and planting mangroves program. Now we have become a fish-farmer and work for the owners"*[62].

Some organisations were providing the capacity for adaptations to the fish-farmers, for instance the training on the fishponds management and mangroves development.

> *"It is about the best practices of how to handle issues like soil acidity, shrimp deseases and silvo-fishery model. Mangroves plans should be promoted both inside and outside the fishponds following the silvo-fishery model that is suitable to the traditional aquaculture systems in Aceh"*[63].

These programs are essential for the long-term resilience of the fish-farmers, which provide capacity to deal with the ecological feedback. In some cases, the land for the fishponds is owned by individuals. The rehabilitation process need to take into account the development of the aquaculture as a common sources of food and income, so that the benefits are able to be accessed by non-owners and other households. It is also important to consider the development of aquaculture as an alternative to capture fisheries, since the symptoms of the over-fishing area have been identified, particularly in the east coast of NAD province.

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[60] Interview with the *palong's* crews in Leupung subdistrict.
[61] Interview with fish-farmer, a fishpond's worker in Ladong village.
[62] Interview with fish-farmer, a fishpond's worker in Baet village.
[63] The report of best practice workshops in aquaculture, provided by Head of LBAP, Ujung Batee.

LBAP or the local agency for the brackish water aquaculture in Ujung Batee, plays an important roles in the providing and coordinating the programs that enable fish-farmers to sustain the livelihoods and to deal with the technical issues in aquaculture after the tsunami. The programs conducted by ADB, FAO and NACA and collaborated with government agencies and NGOs. In particular, they also have designed Lamnga as the site of mangroves reforestation. Lamnga was the first village that was struck by the tsunami in Aceh, and used to be a mass site of mangroves deforestation to create shrimp ponds. To start the programs, the owners of ponds are paid an equivalent of US$1 cent and above, for every mangrove seedling in their ponds that have designated by the government as a green belt areas[64].

6.1.3. *Panglima laot*

In their meeting after the tsunami, *panglima laot* were identifying the present and future conditions of Aceh, as have indicated in the proceeding of meeting[65]:

> *"The ideal conditions after the tsunami is that when the social institutions is better, infrastructures are built properly based on the management space and accessibility of the communities principle"* (*Panglima Laot* 2005).

One of the recommendation is to strengthen the role of *panglima laot* and to involve them actively in the decision making process during the fisheries rebuilding process. Their ability to provide norms and values, leadership, and legitimacy is essential for collective action in resource management. Hence, the scopes of rehabilitation process need to take into account their essential roles in the complexity of resource management after the tsunami.

The *panglima laot* has shown their leadership and commitment through a significant role in the fisheries rebuilding process. However, the complexity of disasters management, including the presence of the 'huge aid' are sometimes challenging. In some cases, *panglima laot* were reported selling the fishing equipments. This simplistic thinking is potential to erode the trust and legitimacy, which should have been preserved. It is important to strengthen the extent of their social capital, due to their essential roles in the resources management.

6.1.4. The International Community

FAO and ADB have contributed in promoting the essential frameworks for rebuilding of capture

[64] The report of the best practice workshops in aquaculture, provided by Head of LBAP, Ujung Batee.
[65] On February 2005 or about two months after the tsunami, all *panglima laot* in NAD province were attending the meeting to discuss the impacts and the future of Aceh.

fisheries and aquaculture. They are not only working on the rehabilitation of the infrastructures, but also actively building the capacity to adapt to and cope with disasters. The best practices on the fishponds management and mangroves development are the important programs that provide a skill and knowledge in the ecological adaptation and sustaining the livelihoods.

FAO has also developed the fisheries management aspects for instance, introducing VMS due to the rapid increasing of the boats assistances after the tsunami that should have registered.

> *"We have planned to rebuild the fisheries sectors in an integrated ways, including to rehabilitate the fishponds, hatcheries, and also to distribute the fishing assistances. We are going to introduce and to apply the VMS for controlling the activities of all the boats assistances. Some of the programs are the pilot project, so it is possible to replicate to other locations if applicable for instance, we are going to build hatcheries that later will be a pilot project for the local communities, NGOs and private sectors"*[66].

These programs are essential to provide better management practices in the fisheries after the tsunami. International organisations are needed to shape the rehabilitation process to ensure the long-term resilience in the complexity of resources management. It is also important to prepare the necessary actions before international or other temporal organisations leaving the area, so that a thing will not return to the former situation. This can be done by improving the capacity of local authority and other stakeholders that will ensure the on-going frameworks, or other building resilience approaches for instance, enabling a social learning in the rehabilitation process.

> *"The key factors for essential frameworks are: the management of improving a biophysical conditions, the importance of stakeholder participation in the decision process, a strong contributions to the economic returns and livelihoods, an adequate legal and policy frameworks, having a capacity for law enforcement, a building durable institutions beyond leadership changes, the role of private sectors in performing the tasks, avoiding becoming too dependent on 'project', and using education and raising awareness to accomplish the tasks"*[67].

6.1.5. The disasters authority

In general, the policy and strategy of the capture fisheries development after the tsunami in NAD province are:

[66] Interviews with the Fisheries Advisor of FAO in Aceh.
[67] The papers are presented by USAID in the International Conference on Coastal Zone Asia Pacific, 29 August-1 September 2006, Batam-Indonesia.

> *"In the phase of emergency, the replacement of the boats is focus on 8 GT. In the rehabilitation phase, building the fishing fleet is focus on 10-30 GT, and during reconstruction phase, it will focus on building the >30 GT to be able to compete with foreign vessel in IEEZ.. Also, the development of artisanal fisheries combined with small islands, MPAs and ecosystem restorations"*[68].

In particular, it is emphasized on the roles and empowerment of local resource-users:

> *"The policy is including the empowerment of panglima laot, a capacity building of local government and widely open for stakeholder's participation during rehabilitation process"*[68].

As the representative of the disaster authorities, *BRR*, together with other parties, are responsible to establish an effective coordination and programs during the rehabilitation process, and to lead all parties to hand in hand in the transition process.

> *"The rebuilding of capture fisheries for the fisher's welfare is the long-term target, which is not relying on the BRR alone, but all relevant stakeholders need to participate. The key words in the rebuilding fisher's economic are hand in hand and coordinations"*[68].

6.1.6. The NGOs

The interactions between the parties involved during the rehabiltation process have arisen some issues, particularly the roles of *panglima laot.*

> *"The panglima laot still functioned, and the conflict of interests sometimes occurs between the panglima laot and head of villages (formal leader), due to the 'huge aid'. Each is fighting to prove their leadership and power. Sometimes they monopolize the distribution process, and hence, influenced the understanding and trust among the fishers"*[69].

> *"The outsiders have a limited knowledge about existing social and cultural conditions"*[69].

The massive destructions have triggered the 'huge aid' and large numbers of parties involved. These situations have made them working quickly and noticeably with a less carefully planning and less attention paid to the effects of the ineffective assistances. The survivors were also competing to access the fishing equipments assistances.

> *"Uneven distribution leads to the social envy and influence the stakeholders' interactions. Ineffective coordination leads to ineffective programs (double or wrong target)"*[69].

> *"Uneven distribution leads to the social envy and influence the stakeholders' interactions. Ineffective coordination leads to ineffective programs (double or wrong target)"*[69].

[68] The papers are presented by Director of marine and fisheries development, BRR, in the National Seminar on Capture fisheries, 10 August 2006 in Bogor-Indonesia.
[69] Interviews with the NGO.

> *"The local governement sometimes working alone in the top down distribution without coordination, it then creates conflict within fisher population. Most of stakeholders work on their own agenda through a weak coordination. The coordination took place mainly as a formality, but the commitment for a comprehensive programs and sitting together occurs rarely"*[70].

After the tsunami, the complexity in the resources management is relevant to take into account. The rapid increasing of the fishing infrastructures and equipments is present challenges for the fisheries management. On the other side, the interventions also need to be conducted effectively, due to the context of vulnerability and the demand to promote social and ecological resilience.

> *"It needs to ensure that the infrastructures are working well and even distribution of aid is in place. The priority, mobilizing fishers and an intensive empowerment are essential. The rule compliance and stakeholders' participation are important to be conducted honestly and seriously"*[70].

> *"The point is how to understand the characters and cultures of the fishers, to achieve the quality of participation, to develop a particular potential area, to avoid the use of aid that incentives to excess capacity in fishing fleets. A blue-print of policy is essential for a better future for fisheries"*[70].

6.2. The social capital and capital development

The rehabilitation process encompasses some of the capital development such as human, physical, financial, and environment capital. These capitals are inter-connected, and the ineffectiveness or unbalances of one capital will affect the others. The existence social capital is oiled by other capital development. These enable people to participate and collaborate through the social networks, and to formulate a common goal in the context of sustaining the livelihoods. However, the development of other capital is sometimes ineffective or inaccessible. In this case, the survivors are relying on their own coping strategies that based on the trust and reciprocity. These are essential to help the survivors in the addressing the issue of fishing equipment quality and to solve the livelihood problems.

The massive destruction in the tsunami-affected area has influenced the ability to provide responses properly. The early responses during several months after the tsunami are conducted quickly and in the simple fashion. It is then made no easy tasks. In some cases, survivors have to deal with the risks, when fishing assistance is not always accessible. If accessible, then

[70] Interviews with the NGO.

another issues emerged, the fishing equipment problems. If it is not accessible, then the survivors have to deal with the alternative livelihoods (figure 24), or expecting the logistic assistances. However, in the long-term perspectives, these conditions should be considered as the ingredients for building resilience frameworks.

Figure 24. The small boat *(sampan)* for collecting oysters on the river mouth of Alue Naga village, Banda Aceh district.

The rebuilding of physical capital in the aquaculture for instance, rehabilitation of fishponds or mangroves is essential to provide the sources of food or income. In capture fisheries, for instance rebuilding the fish landing ports, replacing fishing equipments, fish processing, transportation and marketing infrastructures enable fishers to go back for work. Instead of concern the infrastructure, it is also important to improve the skills and knowledge of coastal communities in dealing with ecological feedbacks and livelihoods matters. These include the best practices to deal with shrimps diseases, soil acidity, fishponds management (seeding, harvesting and marketing), and alternative livelihoods.

Based on Wostl (2007), the extent of social capital is enabling a certain quality of the interactions between the coastal communities and the contents of disaster management (development of other capital). A social learning enables to provide both adaptive capacities and interaction qualities. This may lead to the mechanisms that enable fishers to behave sustainably in dealing with natural resources. The boats assistance should not incentives to the excess capacity of fishing fleets, as the issue proliferation boats now takes place. This should be

addressed in the learning process. Thus, the development of other capital shall promote the effectiveness and the sustainable of fishing and aquacultures.

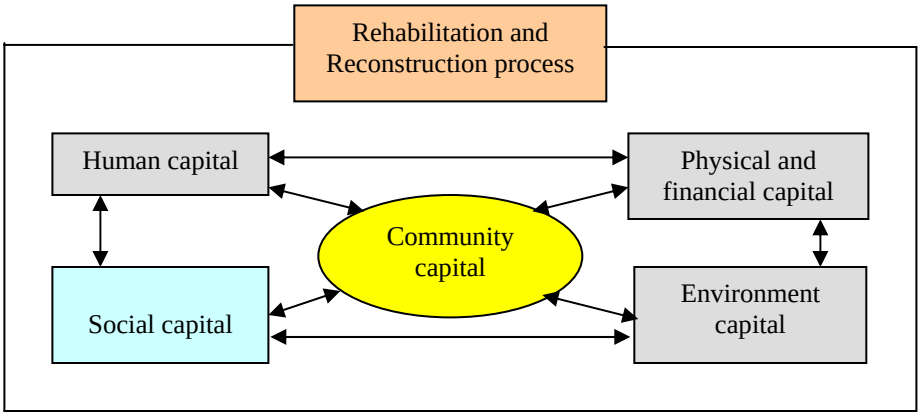

Figure 25. The illustrations of the relationship between social capital and other capital development in the rehabilitation and reconstruction process in the NAD province; adopted and modified from Hasbullah (2006).

6.3. The social capital and structures of fisher's networks

The structures of networks

In resources management, the rehabilitation process especially in the rebuilding fisheries program has a potential to provide the opportunity to re-organise the social interactions and ecological functions. The building of the key infrastructures in the capture fisheries and aquaculture helps fishers to sustain the livelihoods as a context of interactions. As the fishers have the high dependence on natural resources, the process of extracting the resources will continue. During this process, they will re-organise themselves in the form of social networks that are embedded in the social structure. The fisheries rebuilding programs may provide a framework for effective intervention based on their social capital, which essential to the resilient communities. It will depend on the extent of the social capital components that will characterize the ability of fishers to response properly. Specifically, it is determined by the extent of trust and reciprocity that originate from the cultural values and belief systems that are embedded in the cultural of the individuals, groups, or households. Thus, the rebuilding of fisheries may contribute in building social capital.

Trust is the essential element of social capital that could provide the energy and power for individuals, households, or groups to initiate or to address issues of rehabilitation. In the context of rebuilding fisheries, the extent of trust occurs in each individual, social group, household, and local indigenous institution. The fishers are 'comfortable' to ask for help from the individuals (owners of boat), as the trust historically and culturally is built on worker-owner relationships. This enables the owners to take more advantages, as they already occupied the highest layer. In the lower layers, some fishers are developing the trust to their families or other relatives by asking them to participate in the fishing. Trust also helps them to overcome the problems of uneven distribution or qualities of the fishing equipments for instance, their families or other relative is able to lend cash for repairing boats or buying net components. The cultural values of Achenese people enables them to provide trust, reciprocity and altruism without desire a short-term feedbacks, which is essential in uncertain situations.

The effectiveness of social capital is determined by either high or low trust. The trust that is built on individuals or households relationships is based on the cultural values, which only provide trust for the same groups of ethnicity, households or lineage, and relatives in the form traditional relationships (Hasbullah 2006). This has indicated in the coping strategies of the survivors in both Banda Aceh and Aceh Besar districts. The social cohesion of individuals in the groups is relatively high and essential for building a solidarity, which is based on the norms and values that they have agreed. However, it is built on the *narrow network* so that they tend to have shortly *radius of trust,* which might lead to the *low external trust*. This *limited network of trust* is essential to help them survive and to access the fishing assistances, but might provide less incentive for further improving of the group's abilities. Thus, a wider network of trust is going to achieve *high trust* that may incentives for social capital effectiveness.

Kusnadi (2003) explained that the social structure in the capture fisheries is the representation of social and economy characteristics of coastal communities. The structures are built on the vertical form, which the higher layer is taking more advantages than the lower layer. The boat owners and big traders are occupying the highest. The local traders or the leaders of boat occupy the middle layer, and the lowest layer is occupied by the fishers labour. Few of fishers have represented the highest layer, and majority has occupied the lowest layers. In the policy implications, it needs to take into account the link between the vulnerability, poverty, and this

social structure that may hamper the effectiveness of interventions. Kusnadi (2003) argued that the layering of social and economy has indicated that an access to production's equipments, credit, and marketing is only accessible by few people in the coastal communities.

The existing of social structure in the capture fisheries or fish marketing in the two districts has influenced the individuals, social groups, or household actions. The fishers were starting their actions in the context of sustaining the livelihoods by occupying the different layer in the social structure. In some cases, there was a change from a worker to the owner, which however influenced their position in the structures. The social structure in the capture fisheries has challenged the fishers in the lower layers. They tend to rely on the higher layers that are available to provide help. This made them difficult to improve their economic capacities due to limited choices in diversifying the livelihoods or improving the income, which may put them in the circle of poverty. The households' structures also have trust and reciprocity, but they have limitation on how to access more information because they tend to have shortly radius of networks. However, this *social value* enables to provide help even though with the limited choice in the livelihoods during rehabilitation process.

Before the tsunami, *palong's* crews are also characterized by the layering system. After the tsunami, some have turned to the new form due to the empowerment that conducted by NGOs. Trust, reciprocity, and altruistic behaviour are the basis for *palong* operations now. The reciprocity is in place, which the catches are going to share not only to the crews equally but also to the communities in their village. They have planned to invest for the community development for instance, building supporting infrastructure, repairing or buying a new *palong* or can be used for household's needs. However, this method is not evenly occurring in all places, but can be used as a lessons learned in the building resilience after the tsunami. In this case, their trust, reciprocity, and altruism are essential to help them to be able to sustain the livelihoods properly. These may be an effective social capital because *palong* is built on the ownership and equality principle, and consensuses that will help those are beyond their group.

The experiences and ecological knowledge are essential in determining the ability of people to survive and recovery. *Palong* is the historically and ecologically the most valuable fishing method for fishers in NAD province, which today, again some fishers have chosen it as the main

sources of income. Their coping strategies are actualized in the social structure of *palong*. Their trust, reciprocity, norms, and values are embedded in the social structure. Based on Adger (2003), the extent of social capital in both households and *palong* enable fishers to 'oiling the wheels' of decision making. Thus, social structure functioned as a 'vehicle' to enforce the goals and to take the benefits from natural resources.

The typology of networks: bonding, bridging and linking

The narrow network of the trust hamper the ability of people to establish a relationship beyond their group. This has identified as one of *bonding* groups characteristic, which tend to have a tight relation within group's members and exclusive networking. *Palong* and households are categorized as bonding groups that have priority on the solidarity and interests of the groups. However, in some cases, the typology of *palong's* network has changed and potential to improve the group's ability, and can be strengthened as bridging groups. However, bonding social capital enables to provide strong solidarity, which later will influence the reciprocity within groups.

Before and after the tsunami, the role of *panglima laot* in the resource management or in social interaction made people to keep the trust on them. Inclusiveness enables all different groups in the coastal communities to engage in the ecological adaptations based on the norms and values. By the existing norms and values, ecological adaptations can be controlled through *adat* enforcements. This control mechanism has potential to be effective due to the inclusiveness that accommodates different perspectives in the decision-making. They also historically and socially provide the respect and trust to the local leaderships and legitimacy of the *panglima laot* in the resource management.

The role of *panglima laot* is to bridge people into the consensus that is essential for collective action in the resources management. Their norms and values are able to provide the effectiveness in the complexity of resource management after the tsunami. Bridging social capital, enable them to provide a space for dialogue and a multi-alternative in the problem's solving, fairness, flexibility, and accountability. It could also provide the wider identity and more variation of reciprocity, and may develop a learning mechanism due to many inputs from the groups. After the tsunami, they need to be empowered by strengthening the capacity to deal with the uncertainty and complexity. Their roles in the distribution of fishing assistances are significant,

but in some cases, the fishers were complaining about their fairness and accountability, which might erode the trust. On the other side, they have involved in the decision-making during rehabilitation process. Many rehabilitation agencies were involved them in consultation about the programs and asking for help in organizing the survivors.

Table 8. The types of social capital connectedness: bonding, bridging, and linking within the coastal communities in Banda Aceh and Aceh Besar districts.

SOCIAL CAPITAL	
BONDING	BRIDGING & LINKING
Households *& Palong*	*Panglima laot*
Exclusive networks	Inclusive, wider and flexible networks
Priority on group's & family's solidarity	Priority on coastal communities solidarity
Group's interests	Broader interest: collective actions in the management of marine resources
Dichotomy insiders and outsiders	No dichotomy and universal
Embedded in the social structure	Not embedded in the social structure, but *adat*
Relies on trust, reciprocity, and norms	Relies on trust, social norms and values, legitimacy, strong leadership
Vertically relationship	Horizontally relationship
Economically interest	Social control, economic and ecological interest

The *panglima laot* can be seen as *linking groups* during rehabilitation process. The procedures of fishing equipments distribution is coordinated by *panglima laot* on each districts. They also are involved in the design and implementing of a program in their own *lhok.* As the linking group, they are responsible to establish a connection beyond the groups to access the fishing assistances from the disaster authorities or other organisations. As the representative of coastal communities, they are responsible to mediate the groups in the process of negotiation with other stakeholders including with local government. On the other hand, before the tsunami, this institution has successfully negotiated the twenty vessel of Thailand that caught by Indonesian Navy because of illegal fishing in the marine water of Aceh (Chamim 2005). Together with other institutions like MMAF, the vessels eventually have become the valuable assets for Achenese fishers. In general, the horizontally networks structures is sometimes providing a better opportunity for community improvement, while vertically networks structures provide less incentive for further improvisations.

6.4. The collective actions: social capital, institutions, and ecological adaptations

"Collective action is at the heart of many decisions on the management of natural resources" (Adger 2003). The natural resources are characterized by the common property that needs a collective action in the adaptation of coastal communities. The collective actions can be encouraged through the extent of social capital in the roles of institutions, as a 'vehicle' in the ecological adaptations. This is essential in the complexity of resources management after the tsunami, and incentives for promoting the social and ecological resilience.

As the bonding groups, the individuals, households, and other fisher groups including *palong* is essential for certain groups and particular areas, but may not be effective for collective action to take place, as Adger (2003) meant. Their social capital components are only for the group's compliance and rarely for the purposes that beyond their group. They have limited concern about conservation and ecological sustainability, but more concerns on economic or livelihood issues instead. However, their coping strategies and the extent of social capital are essential to deal with uncertainty during rehabilitation process.

Panglima laot is the historically most legitimate of local indigenous institutions with a set of rules and sanctions in the resources management. The coastal communities respect the rules and punishments. The rule is not change even though some of *panglima laot lhok* have died. Their social capital is categorized into the higher connectedness (bridging-linking). Their strong leadership, legitimacy, trust, reciprocity, social norms and values are essential to facilitate collective actions in resources management after the tsunami. The rehabilitation process needs to take into account the complexity in the resource management, which requires a vision of local resource-user in the ecological adaptations. After the tsunami, most of the activities in both capture fisheries and aquaculture soon return to normal. Local resource-users or many of the new boat owners together with their labour will start to compete on the same fishing ground, which are already overexploited (east coast/Malacca Strait). This then needs to take into consideration during implementation of rebuilding fisheries programs. Preparing the frameworks for collective actions to take place is one of the options. In this case, *panglima laot* with the leadership and higher social capital can be supported to do so, which enable to enforce the *adat* of the sea, and to ensure the frameworks for social control and ecological sustainability are in place. The intervention can be started through the improving of their capacity in guiding the compliance of

adat of the sea. In this case, Jentoft (2004) suggested strengthening the role of local resource-users by learning their pillars such as: *the rule* that regulate behaviour may be under-developed or poorly enforced; *the norms* that may provide few incentives and little guidance; and *the knowledge* that could inform decision-making may be inadequate or insufficient.

6.5. The social and ecological resilience

The tsunami can be seen as an opportunity by promoting the social and ecological resilience within coastal communities. This should be addressed as a 'heart' of the rehabilitation programs. The state is responsible to ensure that the rehabilitation process can be addressed as a transition phase to the social and ecological resilience. Based on Adger (2003), the fisheries rebuilding programs need to focus on how to promote the security and sustainability, and to avoid ineffective interventions that may exacerbate the vulnerability. The ability of rebuilding fisheries programs to provide the incentives for the social and ecological resilience will be determined by the extent of social capital. Bonding social capital on the households and other fisher's groups for instance, *palong*, need to be approached by promoting effective responses such as security and sustainability. Their limitation on how to access the information flow and resources due to the narrow of networks, can be substituted by promoting the security and sustainability. Ineffective responses, for instance the problems of fishing assistances, may create social exclusion and exacerbate the vulnerability, although some social groups are inevitably excluded from all formal social security (Adger 2003). In the absence of the effective responses, bridging-linking social capital enables to substitute state control in the local resource management. Thus, the transition process needs to provide a mechanism for understanding the social capital within the coastal communities that works as pillars for resilient communities (figure 26).

Bridging-linking social capital is also potential for promoting social and ecological resilience. They can facilitate the collective actions to take place and to drive coastal communities to engage in the learning process. The outcomes of the learning process may lead to an effective coping strategy or adaptive capacities, which is essential for dealing with extreme changes or shocks (Olsson *et al.* 2004; Wostl 2007; Adger 2003). However, with the stronger network or the greater reciprocal relations, or the higher social capital, or the more commitments, bridging-linking social capital will not always provide absolutely benefit for all individuals or all institutions. It is the combination of bonding and bridging-linking that allows communities to

confront poverty and vulnerability, resolve disputes, and take advantages of new opportunities (Woolcock & Narayan 2000 in Adger 2003). Such synergetic social capital can promote the adaptive capacity of coastal communities to cope with extreme changes (Adger 2003). The rehabilitation process has provided less incentive for the learning process to take place. In fact, this learning process is essential to deal with poverty, vulnerability, disputes, or any ineffective intervention that shaped the rehabilitation process. When (a) and (b) strengthened, institutional arrangements issues emerged, and the programs are variously described by the terms of participatory, decentralized or co management (Adger 2003; Pretty 2003). As an option, the empowerment by the state's interventions in the tsunami-affected area may seek to build trust, develop a new norm, and help form the groups. In this case, understanding social capital is relevant and all local resource-user are included in the empowerment programs.

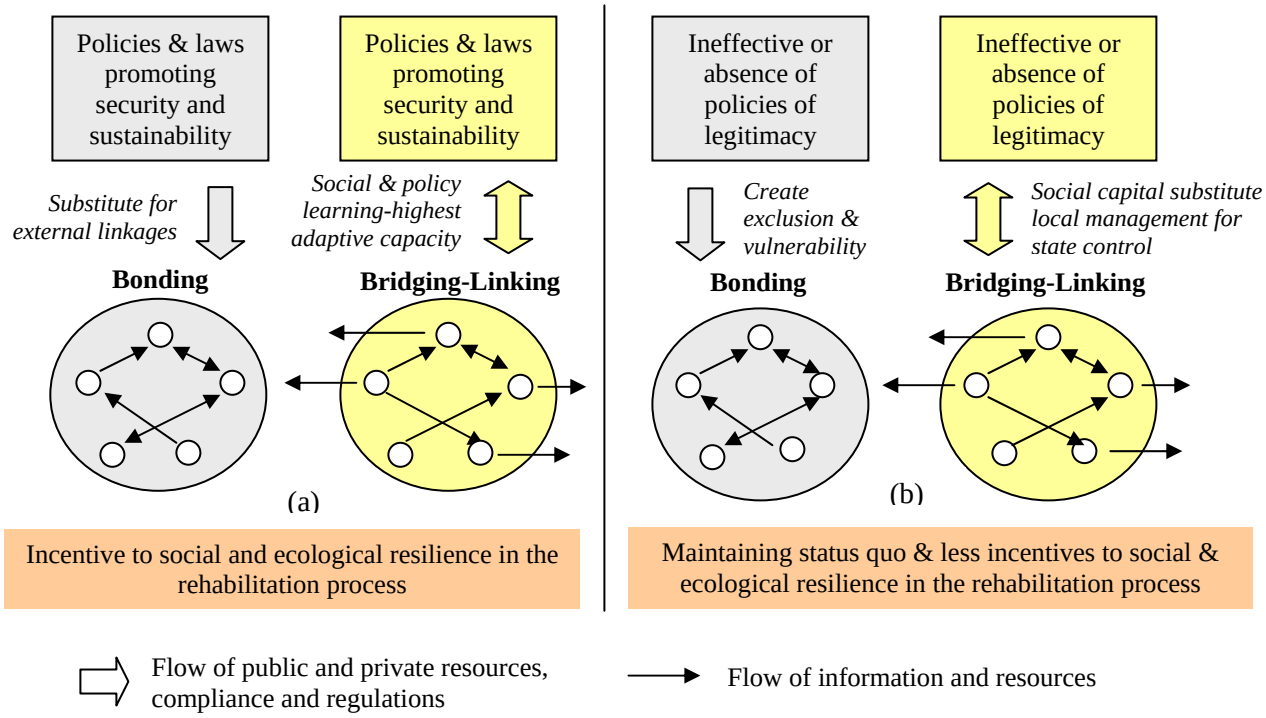

Figure 26. The vertical linkages between state's intervention and social capital with effective (a) or ineffective intervention (b) of programs during rehabilitation process; adopted and modified from Adger (2003).

Based on Adger (2003), bonding social capital (b) is the situation where response to disaster reflected ineffectiveness intervention at bonding groups, which mainly shaping the coping strategies of individuals, households, and fisher groups in the two districts. As a result, this may

lead to exacerbating vulnerability. As Adger (2003) stated, this type of program often deliberately excludes and undermines the social capital. In the long-term, the fisheries rebuilding process should avoid this. Thus, understanding the extent of social capital should be address into the learning framework.

In addition to the resources management, a relationship between social capital and state's intervention has implication for the environmental governance issue. Social capital can play an important role in the resources management or coping strategies. These can be encouraged through an appropriate intervention (Adger 2003). The fisheries rebuilding programs are then emphasizing on how to strengthen the existing or re-build a new form of social capital that enables the ecological sustainability.

6.5.1. Addressing an effective responses

The abilities to provide proper responses are determined by the knowledge or experience that rehabilitation agencies have. In chapter four, Folke *et al.* (2003) has highlighted the three responses are possible when the crisis like tsunami disaster occurs.

'No effective responses' may lead to preserve the status quo that already existed within coastal communities before the tsunami. After the tsunami, the fisheries rebuilding process has the potential to do so. The nature of emergency and rehabilitation phases reflected that this response is take place. The large numbers of vibrant organisation with their interests and willingness to help quickly and noticeably have contributed to ineffectiveness of fishing assistance. In some cases, the participation is attracted by the 'huge aid', so that the interaction between organisation involved and coastal communities may lead to simplistic thinking and ill-consideration. Based on Folke *et al.* (2003), these may influence the long-term approaches, which will create a weak framework for resource management and may lead to organisational, political, and ecological brittleness. As a result, the fisheries rebuilding process is potential to create a widespread of crisis or exacerbate the vulnerability. In this case, as Wostl (2007) stated, the quality of interactions between the parties involved and coastal communities is then essential to provide an effective response.

'Response without experience' is probably uses the tsunami-affected area as an arena for testing the theory or assumptions, and previously policies that may not appropriate. In this case, the

disaster authority and other parties involved have responded through the policies that its effectiveness has not proved yet. In fact, the fisheries rebuilding process has indicated that symptoms. A lack of effective framework for program design and coordination has added the burden of the responses. As s result, the disaster management may lead to a series of policy responses (broken lines). It is relevant to consider this, so that the responses should not create the vulnerability as an outcome. However, 'response without experience' can be driven to 'response with experience' through learning process. This then needs to identify the substantial scopes that incentives to the social and ecological resilience, which allow goals to be discovered and commence an exploration. The context of vulnerability should be addressed as a goal that is treated as hypotheses, since the preferences are not stable and evolve through process. Thus, enabling social learning is essential (Jentoft 2007; Wostl 2007). From this point of view, the opportunity for building resilience will probably lead to a 'response with experience' (figure 27, broken line b). If the rehabilitation process is fails to learn and to evaluate the first and second responses that mainly shaped the rehabilitation process, and drive it to the right direction, then it will leads to ineffective intervention or may not be able to use a 'good opportunity' of the disaster to build a better of future for fisheries (figure 27, broken line a, c, and d).

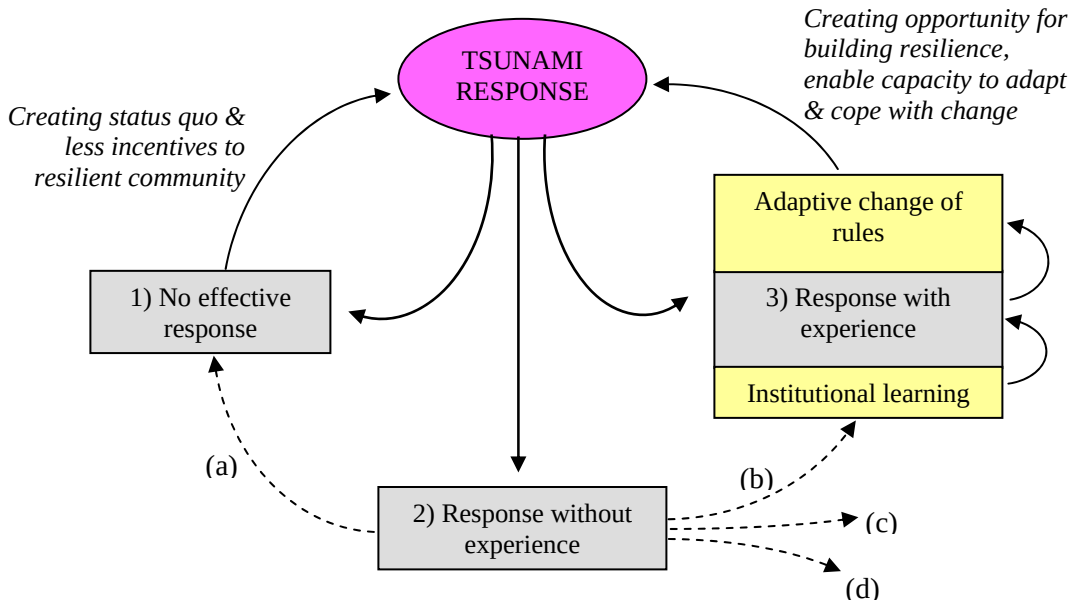

Figure 27. The responses in the process of designing interventions to the impact of tsunami; adopted and modified from Folke *et al.* (2003).

However, 'response with experience' does not always provide a guarantee for successful in providing effective response and management of complexity of resources after the tsunami. Folke then emphasized this 'third responses' as an essential approach in dealing with extreme events or shock, which enables to promote institutional learning and empowerment.

6.5.2. The vulnerability assessment

- The vulnerability before and after the tsunami: *a status quo*

Kusnadi (2003) and Pomeroy *et al.* (2006) have highlighted the vulnerability of coastal community before the tsunami, and the demand to seek the root causes of vulnerability during rehabilitation process. The responses to disaster need to take into account this vulnerability, and not merely focus on the replacing or repairing what have been lost or damaged. If the rehabilitation process is addressed in the long-term resilience, vulnerability assessment then is relevant in order to provide necessary actions to reduce the vulnerability, and to avoid the persistence of this status quo. Understanding of the social capital and institutional' roles are essential for this assessment (Adger 2000).

The high dependence on the fisheries resources limited fishers in the livelihood diversification, particularly when the time for 'bad seasons' comes. This made fishers vulnerable, particularly when the resources have been depleted due to unsustainable fishing practices. Bappeda NAD (2006) has indicated a symptom of over-fishing in the East Coast of NAD province or Malacca Strait. The implication to the policy is that the process of designing fisheries programs, particularly in the distribution of fishing assistances need to consider that symptoms.

Before the tsunami, Kusnadi (2003) explained that fisher live in a specific condition, for instance knowledge of culture, value and belief systems, and method that used to interact with natural resources. These conditions can be identified mainly in their social structure of capture fisheries and marketing that mediate them with natural resources. This layering of social-economic is the important references in understanding of how these social and economic characteristics may influence the vulnerability. Based on Kusnadi (2003), this layering is exploitative, particularly to the fisher labor, which may lead to poverty. However, they have not seen the structures as the problems, but normal conditions instead. The higher advantage that is obtained by the owners and middlemen in the catches sharing system, is seen as a normal condition. They thought that it

is the consequence of worker-owners relationship. This perception arose due to inability of fishers to changes the situation or to improve their livelihood diversification. This vulnerability need to be approached by the programs across the social and ecological systems, including institutional arrangement. The resource use and coping strategies that mediated by institutional roles, are essential aspect for such arrangement, in order to provide a properly plan for a changing social and ecological conditions, and may avoid the exacerbating of vulnerability (Adger 2006).

After the tsunami, the survivors are poor due to a lack of production capital. In the two districts, they were vulnerable to food insecurity due to the massive destructions of fisheries sectors. They are then vulnerable to insufficient income and wealth, which later will make them vulnerable to the poverty as has already indicated by Kusnadi (2003).

- The disaster responses: *vulnerability as an outcome*

The fisheries rebuilding program is potential to exacerbate the vulnerability due to ineffective interventions that may leads to social exclusion, and the vulnerability to insecurity of the income and wealth. The magnitude of disasters and experiences in the providing responses properly may affect the extent of vulnerability. In this case, the emergency and rehabilitation phases are incentive to exacerbate the vulnerability due to the approach that need to be addressed quickly and in a simple fashion.

The voices from people during rehabilitation process have indicated the existence of vulnerability as an outcome. In the two districts, some fishers are vulnerable due to inability in the accessing or using the fishing equipment properly. Some of them live in the limited resources and have not ‘taste’ yet the fishing equipment due to uneven distribution. This can be understood since the impact of tsunami is affecting the large coverage of coastal area. However, this made them struggle to survive. Some have used their trust and reciprocity to deal with fishing equipment problems through lending cash mechanism, but in the long-term, this may not be essential to provide an improvement for their groups. Ineffective approaches in fact, are potential to exacerbate the vulnerability of bonding groups in the two districts. All of these will affect their ability to recover properly in the long-term. As Adger (1999) explained, if there is a problem with access to resources, then it would affect the coping strategies of individuals, households,

fisher groups to extreme events. The rehabilitation phase then needs to evaluate the failures and provide frameworks as a basis for building social and ecological resilience, including to assess and to reduce the vulnerability. Thus, ineffectiveness creates social exclusion and exacerbates vulnerability to the bonding groups in the two districts.

Addressing equity in dealing with marginalization within decision-making processes is important in the reducing vulnerability (Adger 2006). It is also determined by the effectiveness of interventions and the extent of social capital (Adger 2003). A mean of the 'huge aid' is probably hard to ensure the equity and livelihood diversification, as the keys for reducing vulnerability to take place. It depends on whether the frameworks for vulnerability assessment are in place or not. Jentoft (2007) argued that vulnerability is one of the properties of system that need to be governed. In this case, as a system, vulnerability needs to be assessed on multi-scale of changes in the policies intervention. It encompasses infinitely diverse actors, multiple stressor, and diversity approaches Adger (2006). According to Jentoft (2007:4), vulnerability is a "fragile and therefore easily sometimes irreversibly harmed", which requires a *caution* that aims to provide properly mechanisms to deal with vulnerability, otherwise it would made "things may go wrong, harming both nature and social to the detriment of current and future generations". Understanding the vulnerability as a system is essential to support the assessments. Thus, the governing of this system needs to be informed by how the systems to be governed functioned. However, during governing system, others thing are going to affect the systems to be governed such as diversity, complexity and dynamics. Adger (2006) explained that it is necessary to be aware the effects of reducing vulnerability. The actions often reduce vulnerability of those best placed to take advantages of governance institutions, rather than reduce the vulnerability of marginalized or the undervalued part of social-ecological systems.

MMAF (2005) explained that majority of traditional fishers are categorized into the poor groups, which is dominated by small-scale fisheries. Addressing the issue of vulnerability together with poverty through providing the information on how the issue functioned is relevant. In the context of fisheries rebuilding process, it is important to assess the root causes of fisher's vulnerability, and then to provide principle of justice to reduce vulnerability to environmental change (Adger 2006). It is also relevant to provide protective measures such as legal mechanisms or social welfare programs such as a set of property rights (Jentoft 2007).

6.5.3. A social learning and adaptive capacity

After the tsunami, an understanding of social capital and institutional coping strategies is the ingredients for decision-making. It includes the interaction of individuals, households, fisher groups, or local institutions in the ecological adaptations. Their qualities of interactions can be used to support local resource-users to engage collectively in the ecological adaptations. Thus, the responses need to learn the actions and interactions that embedded in the social structure, cultural, historical, or other coping strategies of fishers. This social learning should be encouraged by the disaster authorities due to ineffectiveness of intervention and the complexity in the managing social and ecological issues after the tsunami.

According to Wostl (2007), it is important to ensure that social learning is in place or how it is promoted and its implications for the long-term goals. In this case, the role of individuals, households, *palong* or other fisher groups, and *panglima laot* in ecological adaptations are the references for the social learning. The rehabilitation of fisheries infrastructure is also important to be included, which then the integrated intervention issue emerged. Social learning is relevant for these references to deal with complexity in the integrated interventions after the tsunami. Based on Wostl (2007) in figure 28, this learning enables the social involvement and disaster management contents to provide the qualities of outcome. This quality then is essential to provide feedback to the governance as an implication. Specifically, local institutional setting together with social capital is essential to inform the adjustments of governance structures. The implication for governance is that the system is able to provide the adaptive capacity for fishers in their ecological adaptations after the tsunami. This approach is assumed to be effective in shaping the rebuilding fisheries process in the tsunami-affected area of NAD province.

Olsson *et al.* (2004:75) explained: “adaptive management is occur through a sequence of responses to environmental events that widen the scope of local management from a particular issue or resource to a broad set of issues related to ecosystem process across scale. These involved parties from individual actors to the group of actors, and to the multiple-actors processes”. In the two districts, these may be approached by addressing the learning process on the sequence of responses, the scale of issues, and the set of actors’ interaction during rehabilitation process, whereas the first and second responses in figure 27 are mainly occurred during intervention. The quality from this learning process is important to form adaptive capacity

of the bonding groups in the two districts. This can be started by elaborate more the knowledge about local institutional setting and the extent of social capital. Bonding groups should be treated by either introducing interventions that may substitute their external linkages or building a new form of groups through institutional arrangements. The essential role of FAO, ADB, and other organisations in providing best practices in mangrove and fishpond management or other training for fisher and fish-farmers needs to inform the governance structure and to shape the learning framework.

Based on Olsson *et al.* (2004), the other scopes of building adaptive capacity is that the *BRR* and other parties can provide funds and capacity for monitoring and responding to the environmental changes or feedback. Best practices for fish-farmers in solving the aquaculture issues are the relevant examples. The policy then needs to focus on building a framework to ensure the capacity for ecological adaptation and for dealing with complexity in the resource management are in place.

Panglima laot is able to provide resources management vision, leadership, legitimacy, and trust. Their bridging and linking social capital are potential to influence the quality of social interaction in the ecological adaptations. *Panglima laot* has a potential to mediate social interaction among fishers and negotiation between fisher and organisations, including national or local authorities. Based on Olsson *et al.* (2004), their role is enabling legislation that creates social space for ecosystem management through strengthening their local *adat* of the sea.

6.5.4. The governance implications

"The effectiveness is a reliable criterion for evaluating problem solving and opportunity creation" (Bavinck *et al.* 2005:37). In the context of rebuilding fisheries, the effective framework is essential in dealing with vulnerability and promoting resilient communities. This will influence the interventions during recovery process. The well-informed governance, which mainly relies on social learning is assumed can achieve this. Addressing the social learning enables rehabilitation process to provide a framework for understanding the substantial aspects in the problem solving, for instance the social capital and vulnerability. It is also important to evaluate the failures that occurred during fisheries rebuilding process. Failure to create effective frameworks may lead to exacerbating vulnerability and social exclusion of survivors. The ability

to address a learning approach would lead the response to institutional learning and adaptive capacity ('third response' in figure 27). Otherwise, it would lead to preserve status quo, widespread and persistence of crisis. As a management option, social learning may contribute to provide a set of evaluation and opportunity creation for building better fisheries. Thus, " a learning approach is perhaps the only way to cope with uncertainty and change" (Bavinck *et al.* 2005:49).

"An understanding of social capital can be used to improve fisheries governance, which enables policy makers to see how a social capital perspective can improve management outcomes" (Grafton 2005:753). The knowledge about structures and typology of networks are essential to formulate a set of intervention in the different scale or type of problems. The participation of individuals, households, or fishers groups as a bonding group in the social structure is the essential references for policy makers. Promoting security and sustainability through property rights and responsibility may help them in the absence of external links. The policy also may strengthen the bonding groups through optimizing their "strong ties", to ensure that fishers conform to the community rules, especially in the resource sustainability (Grafton 2005). Addressing more property right may trigger their participation and responsibility in resources management. Their "strong ties" is potential for oiling these processes. However, the nature of social structure probably hamper, due to the persistence of the high dependence on boat owners. Fishers labour needs more income to pay back the loan including interest rate to the owners and to feed the family, which incentive to the competition in the maximizing catches. In this case, the policy needs to provide a secure property right and more access to the vulnerable fishers in the lower layers.

Based on Kusnadi (2003), the problem solving on the fishers security is how to deal with 'exploitative behaviour' of this social structure, particularly the mechanism of lending cash between the owners and fishers labour. However, in some cases, boats proliferation has influenced the owner-worker relationship. Many fishers now have boats and are able to go back for work and to feed the family. In the future, majority of the fishers are likely to be continued to engage in this structure. Boats proliferation effect has replaced dead owners and fisher labour, and created the new ones. Afterwards, thing soon will return, which they will utilize this social-

economic layering as social-cultural identity. Thus, the fisheries governance concern is the vulnerability of resources to depletion and fishers labour to income or wealth.

The policy also needs to strengthen the role of local resource-users. As a bridging-linking group, *panglima laot's* role can be optimised through empowerment. Their wider links, higher trust, legitimate norms and values are potential for the acceptance and compliance of fishing regulations. Based on Grafton (2005), their inclusiveness is essential in the decision-making due to its potential to promote a different way of thought and methods in the ecological adaptations. This higher social capital may provide effective resource management during recovery process, particularly in the complexity of resource management after the tsunami. The governance structure may promote the effectiveness in the local resource management incorporated *panglima laot* in the resource management, as Bavinck *et al.* (2005:67) explained: "the governments may have greater responsibility for fisheries governance but the task is too large for them to undertake alone, so other actors need to take leadership roles". In this case, their leadership and legitimacy are the potential factors, to ensure the real share of responsibility is take place.

Based on Wostl (2007) in figure 28, through the learning framework, the content of rebuilding fisheries programs and social involvement is assumed to be able to provide the quality of outcome. The diversity of individuals, households, fisher groups, and local institutions need a well understanding to provide certain governance approach. The issue of boat proliferation is targeted to stimulate the fishers' occupation, and should not lead to over-capacity in the depleted fishing ground. The issue of exacerbating vulnerability is assumed to be solved through assessing and reducing the root cause of vulnerability, and evaluating ineffectiveness approach in fishing assistance. The large number of parties involved is the 'good opportunity' for Achenese to rebuild their fisheries. The 'huge aid' and knowledge transfer between the parties involved should be addressed and functioned properly through effective program and coordination.

These comprehensive analyses through learning process will effectively inform the governance structure (figure 28). According to Jentoft (2007:6): "*contextualization*: the greater the diversity, the more fitting the self-governance; *coordination*: the more complex, the more appropriate the co-governance; *learning:* the more dynamic, the more effective the co-governance; *safe-*

guarding: the more vulnerable, the more adequate the hierarchical mode". In this case, the role of individuals, households, fisher groups, and local indigenous institution like *panglima laot* has shown that coastal communities can exercise 'self-governance'. Based on Olsson *et al.* (2004), the policy needs to strengthen their ability to be 'self-organize' through promoting adaptive capacity. On the other hand, the vulnerability needs more intervention from the state in the form of 'hierarchical-governance'. In the absence of 'responses with experience', the intervention is expecting to be able to deal with the complexity that enables institutional learning. These then will require the 'co-governance' mode. In addition, the complexity during fisheries rebuilding process that characterized by large number of parties involved and 'huge aid' is may fit to 'co-governance'. Thus, the massive destructions on the capture fisheries and aquaculture need the integrated intervention through a multi level of governance approaches.

Chapter Seven

CONCLUSION

The tsunami disaster in NAD province has significantly affected the social and ecological functions. The fisheries rebuilding process is potential can trigger either effective or ineffective responses. It depends on the ability of the disaster authorities and other parties involved to provide effective interventions. This ability is influenced by the previous experiences in designing a policy to deal with social and ecological problems. In fact, the tsunami impacts and its responses have exacerbated the vulnerability. This influenced the ability of coastal people to adapt to and cope with disasters, which in some degree, may leads to preserve status quo. The structure and typology of networks that represented the extent of social capital in the two districts have presented the diversity of survivors. In some cases, the bonding groups are able to survive due to trust and reciprocity that enabled self-initiation. The bridging-linking groups may functions to substitute the role of state at local resource management through *panglima laot*. However, ineffective responses have contributed to the social exclusion and exacerbating of vulnerability in the some areas. This then requires strong demand of addressing the issues of social capital and resilience in the fisheries rebuilding processes. The list of questions then that must be investigated are: *(i) what are the factors that determine people's ability to cope with disasters ?, (ii) how effective are the institutional in building resilience after the tsunami?, and (iii) how can the rebuilding of fisheries promote social and ecological resilience ?.*

7.1. Understanding social capital, coping strategies, and vulnerability

These understanding is the essential means of *a framework* that emphasizing on social capital and the source of their vulnerability (Pomeroy *et al.* 2006). In order to provide an understanding of the factors that determine people's ability to cope with disasters, social capital and coping strategies of the coastal communities are relevant to be investigated by addressing the question of:

(i) What are the factors that determine people's ability to cope with disasters ?

The roles of individuals, households, fisher groups, and local indigenous institution have reflected the extent of ability of coastal communities to survive from the tsunami impacts. The

experiences and local knowledge of ecological and fisheries livelihood enable them to sustain the livelihoods even in the absence of effective responses from the state. Their ability to survive is taking place in the context of vulnerability. It has been indicated by the social structure and the intervention conditions in Banda Aceh and Aceh Besar districts. The factors that determine people 's ability to cope with disaster are:

- *Individuals and households roles*: In the two districts, individuals and households were relied on the trust, reciprocity, and altruistic behaviour that shaped their participation in the social networks. Bonding social capital has provided the power in terms of 'strong ties' and solidarity to deal with fishing equipment problems, and to access the information flow through their relatives or family connection. With the bonding social capital, they have attempted to address the issues of livelihoods with self-initiation in the poor quality of fishing assistances. They also mainly rely on the logistic supply and fishing assistances. Their coping strategies some embedded in the social structure of capture fisheries. This social structure or bonding social capital through a low external network, however, may contribute to the vulnerability. The policy intervention then need to take into account their social capital connectedness. Understanding of this is essential in promoting the secure property rights and sustainability that will strengthen their groups. The incentive for property right that reflected by the majority of fishers now have boats, is potential to shape the weakness of social structure in the capture fisheries. Fishers will have more access to production assets of fishing. However, this incentive is hampered by the quality of fishing equipment. On the other hand, this also may leads to the risk of excess capacity at fishing fleets. In this case, the responsibility of fishers is important to ensure the sustainability. The failure to set a proper intervention based on understanding their social capital and coping strategies will exacerbate the vulnerability.

- *Palong:* Some fishers were engaged in the group of fishing method, for instance *palong.* Local ecological knowledge and experiences enable them to sustain the livelihoods properly. The effectiveness of *palong* before and after the tsunami in terms of bonding social capital is different. Before the tsunami, the majority of *palong* is owned by the individuals. After the tsunami, it is mostly owned by the groups, which is more effective since proceed by equality and ownership principles. Their bonding social capital has shown the essential reciprocal behaviour since the cathces are invested to the communities'

welfare as well. This will increases the trust and refers to simultaneous exchange of goods and knowledge of roughly equal value, or continuing relations over time (Pretty 2003).. The policy needs to strengthen their potential to be a bridging group. They might be able to influence other fishing method groups to do the same. However, the issue of qualities also occur at *palong*. The responses from disaster authorities need to take into account the importance of the suitable livelihoods, which based on a historical, social cultural, and local ecological knowledge.

- *Panglima laot:* The local indigenous institutions like *Panglima laot* have shown significant roles in the resources management, which made them become a key stakeholder in the fisheries rebuilding process. Their leaderships, trust, social norms and values enable them to provide collective action in the ecological adaptations. With the bridging-linking social capital, they have capacity to achieve an effective social control in the resources management. In the context of social learning, their roles are able to shape the interaction process effectively between social involvement and rebuilding fisheries programs. Their effective roles may provide the quality of outcome in the social learning process. Their social capital can be elaborated to drive effectively the fishers' groups into the rules compliance or collective action, for instance to avoid the negative effects of the proliferation boats. Strengthening the local users and enabling the local participation in the decision-making are essential and may contribute to the effectiveness interventions in the complexity of resource management. In this case, strengthening their rules, norms, and knowledge are essential as have suggested by Jentoft (2004).

The potential of the extent of social capital and coping strategies to provide the ability to cope with disasters is influenced by the effectiveness of interventions during recovery process. In order to investigate these relationships, it needs to address the question of:

(ii) How effective are the institutional in building resilience after the tsunami?

The responses to disasters are mainly characterized by how to provide and to access the fishing assistances. The former is characterized by the quality of programs and coordination, which are implemented by disaster authorities and many others parties. The latter is characterized by the different abilities of coastal communities in accessing the fishing assistance. The quality of interaction is the key factor in creating the capacity to adapt to and cope with disasters. However,

in the absence of effective responses, fisheries rebuilding process is incentive for maintaining status quo and may not be effective in building social and ecological resilience. The interaction has presented a great challenge due to inability to provide a proper coordination between the large number of parties involved, a lack of experience in the response to disasters that leads to ineffective intervention, and lack of effective framework for understanding the diversity of the survivors. The effectiveness of the institutional in building resilience after the tsunami are:

- *Disaster authorities and others parties*: The absence of effective experiences and responses to disaster are characterized by the issues such as poor quality of equipments, uneven distribution, ineffective coordination, lack of effective frameworks, proliferation of boats and accountability. These issues may exacerbate the context of vulnerability and create the obstacles for fisheries management in the future. In the long-term, addressing social learning enables for 'response with experience' to take place and may promote: effective evaluation, effective coordination, focus on reducing vulnerability, and adaptive change of rules. The role of international community or other NGOs is essential to provide adaptive capacity by strengthening their ability to deal with ecological feedback.
- *Coastal communities*: The accessibility to the programs is different during livelihood's restorations. It depends on the ability to provide assistances effectively and the capacity of coastal communities to access properly. The disaster authorities and others parties need to ensure that quality of programs is take place and accessible. Trust and reciprocity enable them to have self-initiation in terms of livelihoods. Experience and local knowledge on fishing or aquaculture at least may help them to survive even though the situation was challenged by ineffectiveness and quality of fishing assistances. Bonding groups are able to survive, but may not be effective for their long-term resilient. Strengthening their bonding, bridging and linking social capital may contribute to the quality of outcome in the social learning, which essential for complexity of resource management after the tsunami.
- The existence of 'no effective response' and 'response without experience', a weak of coordination, self-agenda and conflict of interests may be evaluated through the social learning.

An understanding of social capital and coping strategies is the ingredients for the effective interventions. However, the symptoms of ineffectiveness during the recovery process needs to be

evaluated through a better framework in dealing with vulnerability and in promoting social and ecological resilience. In order to investigate these relationship, it needs to address the question of:

(iii) How can the rebuilding of fisheries promote social and ecological resilience ?

There are three essential points at rebuilding resilience in the tsunami-affected area, namely *a framework, a process,* and *a focus* (Pomeroy *et al.* 2006). In this case, an understanding of social capital, coping strategies, and vulnerability is the heart of *'a framework'*. The materials from this are the ingredients for *'a process'* in designing effective intervention, and for *'a focus'* on longer challenge of building resilience in the tsunami-affected area. Thus, the approaches that are assumed can contribute for promoting the social and ecological resilience in the fisheries rebuilding process are:

7.2. Aiming for integrated interventions

The integrated intervention aims to emphasize *a process* in designing intervention (Pomeroy *et al.* 2006). The integrated intervention clearly indicates that resources management should be approached from a broad perspective, which requires a social learning framework to take place (Wostl 2007). Based on Wostl (2007) in figure 28, the effectiveness of fisheries rebuilding program of either approaches or type of programs will be determined by the ability of responses to provide benefit through policy and law to the certain groups. In this case, the groups in the two districts are characterized by the bonding and bridging-linking social capital. This social capital in the effective intervention is assumed to provide effective transition and may shift to the paradigms of better fisheries governance. The extent of this social capital is oiling the information flow and communication in certain groups, which shaped the interaction between survivors and the contents of interventions. The quality of this interaction may inform the governance structure. As a result, the responses are able to ensure that vital of fisheries infrastructures must be working well and that concern must be followed by creating an adaptive capacity. In order to deal with uncertainty and complexity, rehabilitation process need to address social learning and adaptive capacity to take place. The ability of local resource-users is also important and need to be strengthened. Ineffectiveness of intervention may lead to maintaining status quo and provide less incentives for social and ecological resilience (Adger 2003; Wostl 2007).

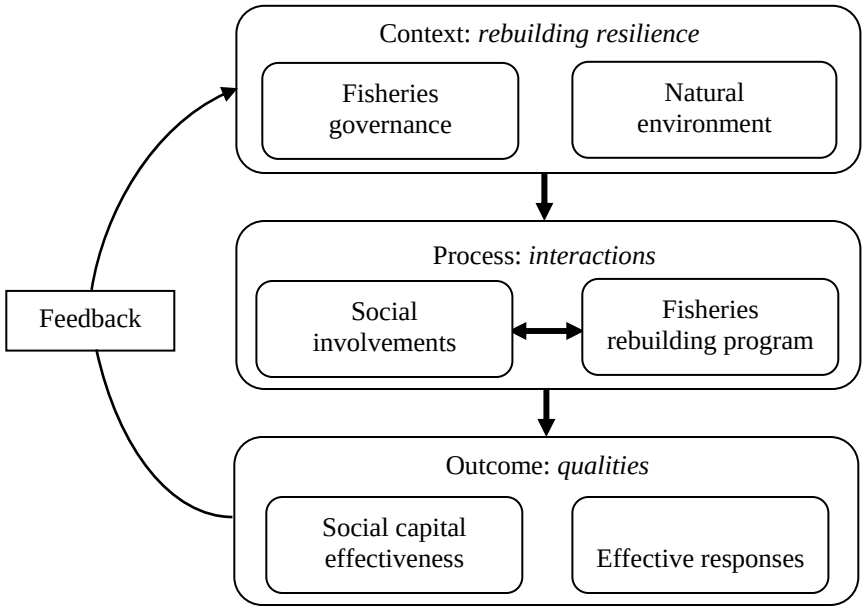

Figure 28. The framework for social learning as the consequence of integrated interventions during fisheries rebuilding process; adopted and modified from Wostl (2007).

7.3. The scopes of rebuilding fisheries

The scope of rebuilding fisheries aims to *focus* on the longer challenge of building future resilience (Pomeroy *et al.* 2006). The fisheries rebuilding process has the potential to lower the incentive for building on the long-term solution of social and ecological resilience. The scopes then are suggested as an approach to provide a focus goal. The responses need to take into account the frameworks for learning, as Bavinck *et al.* (2005) argued that is perhaps the only way to cope with uncertainty and change. Thus, merely concerns on physically reconstruction and short-term programs can be avoided, as Pomeroy *et al.* (2006) hypothesized. To promote social and ecological resilience, the process of rebuilding fisheries needs to be emphasized on some of the essential approaches. These are:

- *Effective responses*: The learning process enables the effective responses and adaptive capacity to take place, which determined by understanding the social capital and coping strategies (Adger 2003). Ineffective responses may exacerbate vulnerability and in the long-term, may not be able to promote resilience. In the two districts, ‘no effective response’ and ‘response without experience’ are the ingredients for the learning framework.

- *Assessing and reducing the vulnerability*: The effective response is assumed to be able to focus on how to deal with vulnerability and to avoid re-creating the status quo. Social structure in capture fisheries has created a poor accessibility of fishers to the production's assets. The resource vulnerability may be exacerbated by proliferation of boats and high dependence on natural resources. Ineffective, less quality and uneven distribution of fishing assistances may incentives to the vulnerability of insecurity food and income.
- *Enabling social learning and adaptive capacity*: The framework of social learning is able to achieve the effective evaluation on the rehabilitation process, and may promote the social and ecological resilience. It then requires the knowledge of social capital and institutional coping strategies. Ineffective experiences may be reduced by addressing this framework. Jentoft (2007:9) argued that experiences could be treated as theory. As he argued: "the experience is socially invented, therefore subject to reinterpretation, experimentation and revision". Promoting adaptive capacity through empowerment, for instance providing best practices in aquaculture or introducing property right and responsibility in capture fisheries are essential.
- *A well-informed governance structure*: In the long-term perspectives, the social learning is essential to promote the opportunity for future of better fisheries governance through effective evaluation on constrains that occurs during rehabilitation process. A well-informed governance structure enables effective interventions. As has explained by Jentoft (2007:9): "we may perceive new opportunities, develop new goals and values and as a result, change our governing strategies".

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Appendix

August 2006

Resilience Study in the Tsunami Damages : *the question guide*

Interview Protocol

Name of respondent being interviewed and group(s) that respondent represents:

Name: Group:

_____ _____

Date of interview (day/month/year): _____

Location of interview (e.g., home of respondent, business, government office):

_____

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Social Resilience Study in the Tsunami Damages

Investigator/Student Contact: Ardiansyah, Phone Number: (+47) 41581490;
Email:ardiansyah_h@yahoo.com, ardiansyah@dkp.go.id, International Fisheries Management Student, Norwegian College of Fisheries Science, University of Tromso, Norway.

Supervisor : Prof. Svein Jentoft, Centre for Marine Resource Management (MaReMa), Norwegian College of Fisheries Science, University of Tromso, Norway. Phone: +47 77 64 60 00, Email : Svein.Jentoft@nfh.uit.no.

You have been asked to take part in a research study which is conducted as a requirement for postgraduate thesis in the International Fisheries Management program.

You will be one of approximately 20 people that will be interviewed in this research study. All people to be interviewed were chosen based on their knowledge of social resilience and recovery of fishery in the tsunami damages.

Purpose: This research study attempts to better understand the role of social resilience and rebuilding fisheries in tsunami damages.

Duration: Your participation in this interview will last approximately one hour.

Languages: This questionnaire is made in two versions, English and Indonesian

Procedures: During this interview you will be asked to discuss the social resilience, recovery of fishery and sustainable fisheries based on your experience/perception in the tsunami damages.

Risks: We do not anticipate any risks or discomfort to you from being in this study. Comments made during the interview session will be kept confidential.

Confidentiality: All of our interviews are done voluntarily and confidentially. You will not be quoted by name, or identified by name, in any of the publications which result from this study. Your name will not appear on any transcripts; instead, you will be given a code number. The name and code number matching list will be kept in a locked file cabinet.

Benefits: There are no direct benefits to you for participating in this research project, but your answers may help us to understand how social resilience condition and the rebuilding fisheries process.

Right to Refuse or Withdraw: Your participation is voluntary. You may refuse to participate, or may discontinue your participation at any time without penalty or loss of any services that you otherwise would be entitled to receive. If you choose to participate, keep a

copy of this form for your records. You may choose not to answer any specific question for any reason.

1. Community-Based Social Capital

> *This set of questions are useful in getting respondents to focus on collection action and solidarity on a specific case in which the community worked collectively to resolve an issue, whether or not the outcome was positive. The interviewer probes a specific instance of collective action undertaken since the tsunami disaster. However, the case should be representative of the level of collective action in the community. The extent to which a community is able to come together to address an issue of common importance is an important indicator of social capital.*

1.1 After tsunami people from the same community often get together to address a particular issue that faces the community, fix a problem, improve the quality of life/livelihood, or something similar.

(Probe to suggest examples of some issues: mangroves, education, health, housing, roads and transportation, markets, credit, recreation and cultural resources, security, child care, agricultural services.)

- What are the issues that they have addressed?
- How people organise themselves to address that particular issue? Is it individually, collectively, to whom they addressed the issues?
- Is there any organisation/institution organised/helped them? Who are they (name)?
- How do you identify the needs of the people?
- How is your own role to help them to fix the issues and raise their participation?
- What are the obstacles you have found during raise their participation?
- What kind of program that you have initiated/being implemented in terms of recovery of a fishery?, where is the location of that program?
- Why you have chosen the program? and Why it is implemented in that location?
- What kind people's expectation and how their interaction during implement the programs? Are they satisfied/not, Are they compete each other? Do they trust you, Do they trust other organisation?

1.2 There have been efforts by the community to improve the quality of their life/livelihood after tsunami. The recovery program may help them to achieve the significant outcome.

- Can you describe one instance that is most representative of how the community deals with life after tsunami?
- What are your activities in the recovery of fishery program?
- Do you know about others NGOs activities? What are they?
- What is your opinion concerning government's performances during recovery of fishery?
- How is the relationship between fishers and panglima laot during recovery of fishery? Are they trust each other? Is there any instance of conflict between them? Could you explain some?

- What are the constraints which happening in the interaction between fishers, panglima laot, NGOs, and Pemda during implementing the fishery's recovery program? Who is pro or against?
- How is the procedure of coordination conducted among the stakeholders involved in the fishery's recovery program?
- What kinds of obstacles did you have during initiated or implemented the programs?
- What kinds of outcome that was gained by community effort in terms of improving quality life/fisheries livelihood?, and What about your own outcomes by doing program intervention?
- Community ever attempt to sustain the fisheries livelihood just to survive after tsunami. However, sometimes they failed and some of them were successful. Do you know why they failed? and why they successful? What are the causes factors?
- How it is should be, to be more successful?
- What would you have done differently to make the effort more successful?

2. Community Organizations

(Probe for constraints on collective action; identify roles of government, community organizations, and NGOs in influencing outcomes; and discuss the relationship between the community, representative organizations, local government, and other civil society actors).

2.1 What are the groups, organizations, or associations that function in this community on issues involving the development, use, protection, and restoration of coastal ecosystems, or recovery of fishery?

(Probe: Have the respondents list all the organizations, formal and informal, that exist in the community or part of a national or international network. Ask which organizations have emerged since the tsunami).

2.2 Which groups play the most active role in helping improve the well-being of the fishers after tsunami?

2.3 How did these most active groups or organizations get started (government initiated, through government donations, NGO donations, grassroots initiative, etc.)? What year did they get started?

2.4 Of the organizations on the list created from Question 2.1, which ones are most important accessible to the community? Which ones are less accessible?

2.5 How are the leaders selected (election, appointment, inheritance)? How stable is the leadership (frequent sudden changes, normal progressive change, or never changes)? Is the leadership generally harmonious or collective?
(Probe the case of Panglima Laot)

2.6. Which organizations from Question 2.1 are effective in working together? How do they work together (hierarchically, collaboratively)?

2.7 Are there any organizations that work against each other (compete or conflict)?

3. Sustainable Fisheries

3.1 Fishery sector have been severely destroyed after tsunami.

- What should be the main concerns of the recovery of a fishery?
- Compare with the past/before tsunami, in what concerns this recovery has the difference with the previous one?
- Will the existing regulations and stakeholders in the fisheries sector support or conducive for recovery program? If yes/no, why?
- How the stakeholders and their mechanisms are going to contribute to sustainable fisheries?
- In what direction the rebuilding fisheries should be designed?
- What is your perception concerning building sustainable fisheries?
- In terms of sustainability, how is the recovery fishery program should be?
- Is your program have been refers to the sustainable manner? What kinds of your program?
- What is your perception about the future of building new structure of fishery after tsunami in Aceh?