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THESIS

APPLICATION OF EDFR FOR IMPROVING COASTAL FISHERY MANAGEMENT OF VIETNAM

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A Thesis Submitted in Partial Fulfillment of
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The aim of this study was to clarify the fishery management situation, readiness for participation and the role of community for fishery management in Haiphong Province and to propose coastal fishery management approach for Vietnam by applying Ethernographic Delphi Future Research (EDFR). Sixty eight fishers composing of small-scale, medium-scale, and commercial-scale fishers were interviewed. EDFR was applied in to collect data about the opinion of effectiveness of present fishery management measures and management approach in the future from the experts. The study revealed that most of experts agree that fishery resources and present management measures are in serious problems when environmental problem is in moderate level. There were still the difficulties in fishery management in the past and the lack of law enforcement. The role of community in fishery management participation was at low level due to lacking of decentralization from government and lacking of activities to develop the competency of community. Therefore, it is necessary to prepare the readiness in participation of fishers, government officers, researchers and NGOs, and building up co-learning of all stakeholders in order to achieve fishery co-management. NGOs should act as main drivers in working with community and the government should manage fishery with new paradigm for effective fishery management. To increase the potential of community and decentralize from the central government to local community for fishery co-management, with applied EDFR techniques would help in co-establishment of action plan for fishery development in Vietnam which would consequentially result in the success of sustainable fishery afterward.

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Anh Quoc NGUYEN

April 2010

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF FIGURES

APPLICATION OF EDFR FOR IMPROVING COASTAL FISHERY MANAGEMENT OF VIETNAM

INTRODUCTION

Vietnam is developing country with fisheries sector that contributes to secure the food safety and improving livelihoods for people in rural, coastal, mountainous and island areas. Fishery provided 40 percent of animal protein in the Vietnamese diet, created jobs for totally 5 million labors (Vu. D.V., 2006), and contributed approximately 6 percent of Vietnam's GDP (USDA, 2007). The fisheries sector is characterized as traditionally small-scale fisheries. This character caused complicated environmental problems for fisheries development. The fisheries production of Vietnam has increased continuously with a high speed in both capture fisheries and aquaculture in the last decade. Vietnam recently had faced fishery problems due to the depletion of aquatic resources. Though renewable, these resources can also be exhausted. Currently, the fisheries resources of Vietnam are being exploited by every means, including destructive fishing gears that lead to the resources depletion in coastal areas. Coastal fishery resources are being overfished by an estimated 10 – 12 percent. Many precious and rare species with high economic value are being lost because of overfishing, use of destructive gears, waste discharge, and environmental pollution.

In general, coastal waters are very important to fisheries in Vietnam. They produce 80 percent of the total marine catch and comprise the fishing grounds for small fishing vessels. Coastal waters is very important for conservation of fishery resources as it serve as a nursing ground, breeding of juvenile fish and other animals, spawning ground, and spawning aggregation. It also serve as the source of living for poor fishers, whose population constitutes of 88 percent of the total capture fisheries labor , and poor fishers are injured very easily by negative socioeconomic. However, the main problem of coastal fishery is resources depletion from a huge number of fisher in coastal area. So far, Vietnam management regime is a 'top-down' structure which all of the management program are established by central government and implemented without

local community consultation. In addition, the institutional arrangement and law enforcement are weak. Many policies and enforcement are very difficult.

In order to maintain and develop the fisheries in a sustainable way, it is necessary to have appropriate management measures to reduce fishing pressure on coastal waters, promote offshore fisheries and regulate coastal fishing activities in correspondence with current stock status. To achieve the above objectives, it needs some tools for fishery management, and Ethnographic Delphi Future Research (EDFR) is one of the tools for research and improve fishery management approach.

OBJECTIVES

1. General objective

The research objective is to study the status of coastal fisheries management, and to improve fishery management approach for Vietnam.

2. Specific objective

1. To research on community readiness for participation and role of community for fishery management.

2. To research, analyze and evaluate the coastal fishery management problem.

3. To propose a Vietnam coastal fisheries management approach.

SCOPE OF THE STUDY

1. Scope of Content

The scope of content is to study on community readiness for participation and the role of community for fishery management, problem situation of coastal fishery resources, coastal environment, fishers, management organization, and fishery policy in Vietnam.

2. Scope of area

The study area of Ethnographic in part of community readiness for participation and role of community for fishery management is take place in Haiphong province in the north of Vietnam. When Ethnographic in part of fishery problem and Delphi technique is take place in the north coastal, central coastal, and south coastal of Vietnam.

3. Scope of time

The study period is from November 2008 to March 2010.

DEFINITION

1. “Fisheries resource” by Vietnam Fishing Law refers to aquatic living resources that exist in natural waters and have economic and scientific value for the development of capture fisheries, and the conservation and development of fisheries resources.

2. “Coastal area” refers to the sea area under the jurisdiction of Vietnam, that definite at Decree 123/2006/ND-CP dated October 27th 2006 of the government regarding the management of fishing operations conducted by Vietnamese organizations and individuals in all marine areas. Which the coastal route shall be areas measured from the coastline to the line linking the points which are 6 nautical miles distant from the coastline.

3. “EDFR” means Ethnographic Delphi Future Research which combined of Ethnographic method and Delphi technique for surveying and collecting the opinions of the experts on the particular subjects.

4. “Coastal fisheries management” means the measures and actions to manage coastal fishery resources, environment and ecosystem, and specific conservation and management actions to be taken by the States.

LITERATURE REVIEW

1. Vietnam fishery

1.1 Geography and demography

Vietnam is approximately 331,688 km² in area. It is bordered by China to the north, Laos to the northwest, Cambodia to the southwest, and the South China Sea to the east. With a population of over 86 million, there are more than 54 ethnic minority groups throughout the country. The religions are 85 percent Buddhism, Christianity 8 percent, Caodaism 3 percent, and others 4 percent.

On 12 May 1977, the Government of Vietnam has claimed the territorial sea, the contiguous zone, the exclusive economic zone (EEZ) and the continental shelf of Vietnam. According to the provisions of The United National Convention on the Law of the Sea, the EEZ of Vietnam extends principally up to 200 NM from the baseline, and the area of EEZ amounts to on one million km^2 including the Hoang Sa (Paracel) and Truong Sa (Spratly) Islands. The United National Convention on the Law of the Sea was approved by the National Assembly on June 23rd 1994, and become Parties Member. Vietnam sea was divided four main fishing areas (MOFI, 2000):

- Gulf of Tonkin, shared with China;
- Central Vietnam;
- Southeastern Vietnam;
- Southwestern Vietnam, part of Gulf of Thailand, shared with Cambodia and Thailand.

The United National Convention on the Law of the Sea 1982 was implemented and it spread the Vietnam sea with 3,260 km coastal line and 1 million km^2 EEZ. The state is required to have appropriate policy to manage, and conserve in order to achieve sustainable fishery management.

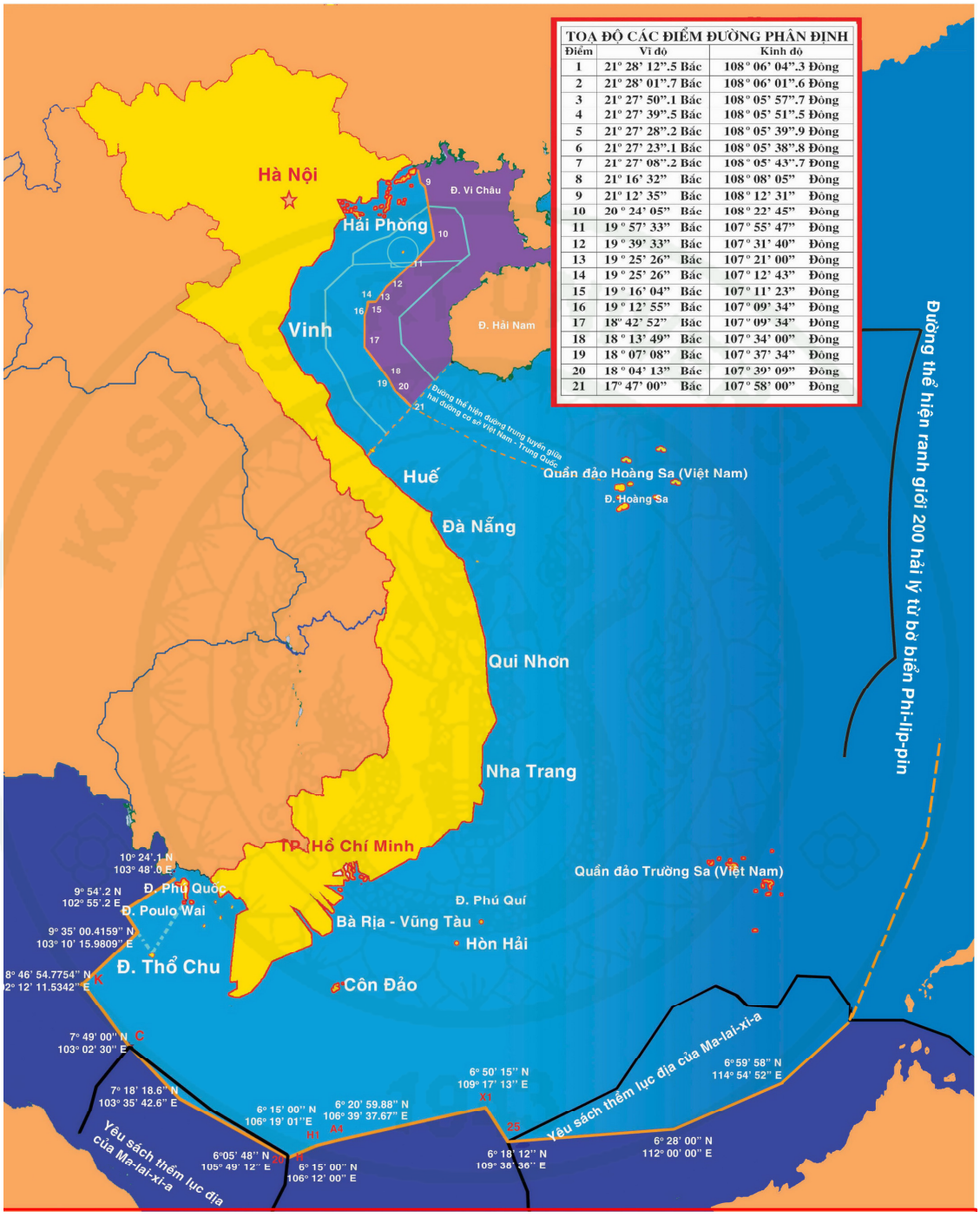

Figure 1 The map of Vietnamese sea

Source: NADAREP (2007)

1.2 Fishery

1.2.1 Capture fishery

Capture fishery is included with marine and inland fishery. Most of production of capture fishery received from marine as 1,790,000 tons while 340,000 tons were from inland capture (MARD, 2008). Capture fishery is creating many jobs for coastal communities and contribute for economic development.

1.2.1.1 Marine capture

Marine fishery in Vietnam is mostly done by small scale fishers around coastal areas. Signs of stress due to overexploitation are becoming evident in these areas, where several species are now seriously overfished.

1.2.1.1.1 Standing stock and potential yield of marine fish

Vietnam's sea is rich in biodiversity with 11,000 species of marine animals, plants and seabirds. Among them, there exist 2,038 species of fish. Coral reef areas are 1122 km^2, which centrally distributed in coastal waters in central and offshore island (RIMF, 2003).

In spite of multi-species, the quantity of each species is few and of which on 130 species are commercial species. In general, fish distribute rarely concentrate in large schools, and because of their seasonal distribution, the catch rate is greatly affected. Fish schools mostly distribute in the water areas of 20 m depth outwards. The small shoals are 84.2 percent of total number of fish shoals when medium and large shoal is 15.0 percent and 0.8 percent, respectively. The small fish shoals are distribute in inshore water and lead to small scale fishery formulation in coastal areas (RIMF, 2003).

Based on the research result of Research Institute for Marine Fisheries in 2002 (project of assessment of the living marine resources in coastal areas and offshore seawaters), standing stock and potential yield were estimated to be about 3,100,000 tones and 1,400,000 tones, respectively. The coastal areas standing stock was on 694,691 tons and potential yield was 331,069 tons.

1.2.1.1.2 Fishing household

There are 28 coastal provinces with 628 communes, which have fishery communities in their provincial sea areas. There are 550,000 fulltime fishers of the whole country. There are 5,000,000 labors who work in fishery sector and live near the coast (Vu, D.V, 2006). The fishing communities located differently along the coast; 10.0 percent living in town, 35.0 percent living in sandy coastal area and 55.0 percent living in the river and estuary areas. Traditional small-scale fishery is performed in order to supply fish for the local market. Fish consumption per capita was 10.5 kg in 1990 and increase to over 12 kg and over 17 kg in 1995 and 2005, respectively (Vu, D.V, 2006).

Fishery labors work hard in dangerous environment with low safety which was result in illness and loss of their life. The son is accompanied with his father to go to the sea when he was young. Thus, the educational level in fishery communities is generally low. Sixty-eight percent of residents have not finished primary school, 20 percent have finished primary school, about 10 percent have finished secondary school, and 1 percent of fishers have a certificate or diploma from a vocational school or university (GSO, 2007).

1.2.1.1.3 Fishing boats

In recent years, the number of fishing vessels is considerable changed. There is a replacement of small-sized fishing vessels with large-sized and high capacity of engine. Regarding the structure of fishing fleets, reports of Fisheries Departments in 2006 showed that the number of fishing vessels was more than 94,000 units. Most of

fishing vessels were small-sized and able to operate only in the coastal areas. The fishing vessels have been increasing both small-scale and large-scale. The large scale vessels have increased faster than small scale due to the subsidy provided by the government in 1999.

Table 1 Number of fishing boats in 2006

N0	Province	Number of fishing boats (Unit) Divided by horsepower						
		No engine	<20	20-<50	50-<90	90-<150	150-<400	>400
1	Quang Ninh	1,660	4,130	886	199	138	28	8
2	Hai Phong	845	285	640	246	206	52	4
3	Thai Binh	0	826	27	159	24	51	1
4	Nam Dinh	25	1,325	480	87	13	29	6
5	Ninh Binh	0	59	12	0	0	2	0
6	Thanh Hoa	0	3107	706	530	252	227	2
7	Nghe An	48	1,099	1,649	535	270	123	6
8	Ha Tinh	160	2,093	141	17	0	39	0
9	Quang Binh	0	1,614	781	679	117	29	0
10	Quang Tri	0	1,380	405	22	27	5	0
11	TT Hue	0	3,918	236	140	80	2	0
12	Da Nang	0	327	917	151	63	87	6
13	Quang Nam	0	1,893	1,124	137	38	52	1
14	Quang Ngai	0	355	2,020	754	308	329	12
15	Binh Dinh	0	1,680	3,548	1,743	146	81	1
16	Phu Yen	0	1,857	1,182	477	323	281	0
17	Khanh Hoa				5,340			
18	Ninh Thuan	132	818	479	215	260	110	5
19	Binh Thuan	0	3,103	2,675	1,201	426	652	25
20	Vung Tau	0	1,142	1,024	522	598	1,353	363
21	HCM city	209	628	585	35	11	73	22

Table 1 (Continued)

N0	Province	Number of fishing boats (Unit) Divided by horsepower						
		No engine	<20	20-<50	50-<90	90-<150	150-<400	>400
22	Tien Giang	1	126	419	197	134	499	27
23	Ben Tre	11	326	1,405	431	223	564	146
24	Tra Vinh	6	287	657	142	39	54	1
25	Soc Trang				1,081			
26	Kien Giang	0	2,856	1,674	605	142	1,722	1,133
27	Bac Lieu	0	170	233	44	21	294	0
28	Ca Mau	0	954	1,148	303	178	1,045	27

Source: NADAREP (2007)

1.2.1.1.4 Fishing gears

Small-scale fishing gears are often operated in the fishing grounds of less than 30 m in depth. Particularly, the engine boats of less than 20 HP only work in the estuaries, coastal areas and catch small fish. There are three major fishery groups of fishing gears consisting of trawlers (28.7 %), gillnet (19.6 %), long line hook (17.2 %), and others (34.5 %) (NADAREP, 2007). Many fishers use nets together with dynamite, chemical, or strong light to catch fish which affect small fish, juveniles fish and coastal ecosystem, and consequentially result to fishery resource depletion.

1.2.1.1.5 Production

The fisheries sector is one of the most dynamic and fastest growing sectors of the Vietnamese economy. During 1994-2008, total production from capture fishery and aquaculture has increased approximately 3.6 times to 4.580 million tons and fisheries export value has increased more than 9.8 times to US$ 4.5 billion in 2008. The total fishery production in 2008 was 4,580,000 MT including marine capture of

1,790,000 MT, inland capture of 340,000 tons, and aquaculture of 2,450,000 MT (MOFI, 1994; MARD, 2008).

Table 2 Marine capture fishery production 1994 – 2008

Years	Yield (tons)	Year	Yield (tons)
1994	889,998	2002	1,378,587
1995	954,640	2003	1,426,223
1996	962,500	2004	1,923,500
1997	1,078630	2005	1,995,400
1998	1,151,400	2006	2,026,600
1999	1,212,800	2007	2,063,800
2000	1,280,590	2008	2,130,000
2001	1,347,800		

Source: MOFI (1994-2007) and MARD (2008)

1.2.1.2 Fresh water fish

Vietnam has over 2,000 km^2 of lakes, most of which are man-made reservoirs, with only 10 percent being natural lakes. Two main rivers are Mekong River in the South and Red river in the North. During the rainy season, numerous pools of flooded land occurred in the Mekong Delta with some as large as 1,400 km^2 in Dong Thap Muoi and 2,180 km^2 in Long Xuyen Quadrangle Areas. Commercial catch recieved from the Mekong River each year is about 30,000 tons (USDA, 2007).

Small vessel with no engine or less than 20 HP engine are usually used to catch fish in fresh water. Gill net, lift net, trap and cast net are used for fishing with only one or two labors in the vessel. Production from fresh water capture during 2004 to 2008 was described in figure 2.

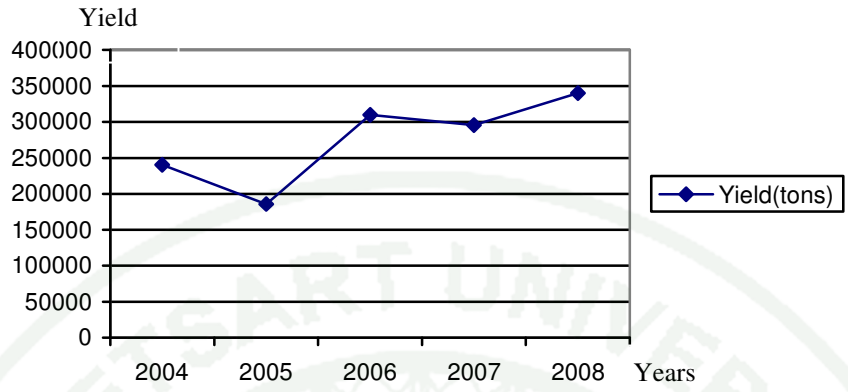

Figure 2 The yield of fresh water capture 2004-2008

Source: MOFI (2004-2007), MARD (2008)

1.2.1.3 Institution arrangement

On January 3rd 2008, the government enacted the Decree No.01/2008/ND-CP regulating mandate and organizational structure of Ministry of Agriculture and Rural Development which have regulated role and function of Ministry of Agriculture and Rural Development. The state manages over the sectors and fields of agriculture, forestry, salt production, fisheries, water resources, and rural development throughout the country. The State also manages over the public services in the sectors and fields within scope of management of the Ministry (MARD, 2008).

The fishery organizational structure was changed from central government to local government so it takes more time to stabilize the organization. Some parts of work have been overlapped with other organization resulting in the difficulties of enforcement. In addition, the number of staffs and patrol boats for enforcement are rather limited for controlling, monitoring and surveillance in fishery activities.

It is necessary to restrict fishery institutional system from top level to bottom level, particularly focusing on local level and enhance control, monitoring and surveillance activities. It is necessary to have suitable legislation for giving some authorities to provincial government and local communities to manage and conserve coastal fishery resources.

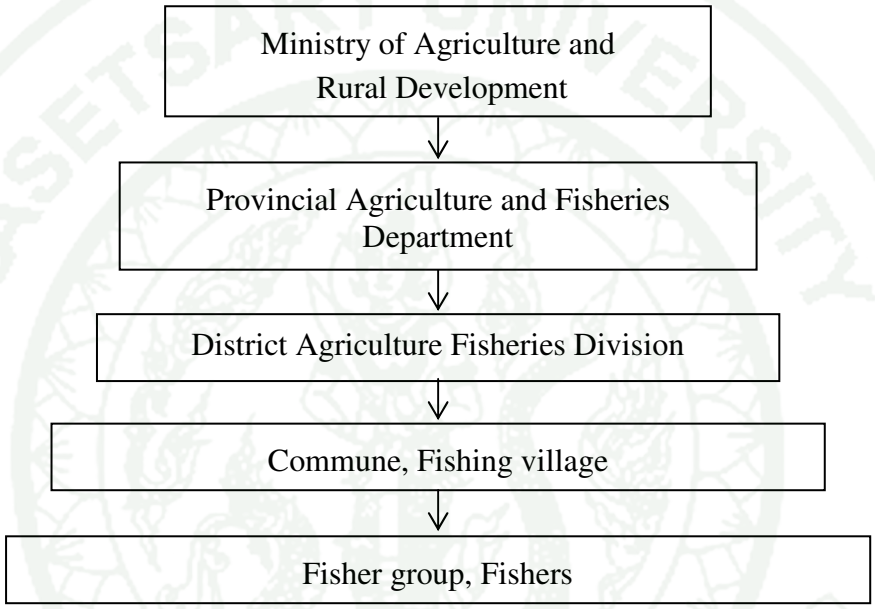

Figure 3 Vietnam fishery management organization after September 2007

Source: MARD (2008)

Figure 4 Vietnam Ministry of Agriculture and Rural Development Structure

Source: MARD (2008)

- Fishing Control

Coastal fisheries resources are being overfished by an estimated 10 – 12 percent, while aquaculture is being conducted in an unregulated and spontaneous manner. Many precious and rare species of fish with high economic value are being lost because destructive fishing gears and methods, discharge of waste, and environmental pollution. Moreover, the government have used many measures to manage fishery resources and control IUU fishing but with lack of manpower, capital, and strict laws.

There are 58 patrol boats of fishing control system supervising in 3,200 km coastal line in Vietnam. The number of inspectors is 450 persons, who working on boats and in office. There are a few patrol boats with limited budget which make it to be very difficult to monitor, control, carry on surveillance of illegal fishing activity in Vietnam sea water (NADAREP, 2007).

- Academics and institutes

There are two marine institutes, one in Haiphong city and the other in Nhatrang city, and one university and four colleges. Researchers and fishers can work collaboratively to focus on identifying and researching the behaviors. They wish to see the change within their fishery. They consult with the government to make the suitable policy with scientific information, and also help in organizing and participating in the focus groups, surveys, and observational studies required for identifying the barriers and benefits to which ever behavior change. They can be directly responsible for the piloting, implementation, and evaluation of their own campaign (MOFI, 2006).

Some works finish with low quality or fail due to the limited budget for research institutes. The university offers few courses to do research on marine science and fishery management, which is basic knowledge for fishery development.

1.2.1.4 Policy and legislation

The management of coastal fishery in the last six decades has changed dramatically, shifting the sector from coastal fishery to an export production oriented fishery, and at the same time, try to maintain sustainable fishery resources utilization. The coastal fishery management can be classified into three periods from 1945 to 1975, 1976 to 2003 and 2004 to presently.

Period 1945 – 1975

• During the period 1945–1954, the policy of the government towards the fishery sector was for a small-scale industry to supply local demand for seafood.

• The period of 1955–1975, while the country divided, there were different policy directions. In the North, there was collectivization and development of state fishing enterprises policy. In the South, there was policy for a more market-based industry through modernization and mechanization of the fleet and development of processing facilities for an export market.

Period 1976 – 2003

• From 1976 to 1985, as the country worked on reification, there was continuing collectivization of the fishing industry and the establishment of fishing cooperatives and fishing companies. Commune level cooperatives owned all fishing gear, subsidized by the central government. The government invested heavily to increase production and to modernize the fishing fleet through the cooperatives and companies but the efficiency of these enterprises did not allow production to meet planned objectives. Then result in negative impact on national economy on hungering, poverty, and economic crisis problem. The period of 1986 to the early 2000s is characterized by a rapid increase in production and an even larger increase in fishing effort, both inshore and offshore. The development of the sector was brought on with more efficiency in fishing operations and improved business management. Fisheries

management, however, was given limited attention in this market-driven environment (Pomeroy, et al., 2008).

• The period from 2000 to 2003 is characterized a new management approach applicable. Vietnam were support from donor country to implement many pilot projects along coastal area, also this period have plan to establish 15 marine protect areas. This time was period for preparation of fishing law issued.

In summary, during the period 1985–2003, near shore fishery management activities were limited, though the structures to execute management were provided. There was a 100 percent increase in overall catch since the 1980s. Extensive overexploitation of near shore fisheries was apparent. Catch was poorly reported and some was under reported. The management and enforcement regimes for near shore fisheries were weak. Illegal, unreported and unregulated fishing was a significant problem, even though destructive fishing methods, such as poisons, explosives, and electricity, were prohibited (Pomeroy, et al., 2008).

Period 2004 to presently

The legislation was promulgated to regulate capture fishery activities. After the fishing law was enforced, the government promulgated ten decrees and eight decisions adjust fishing activities including capture fishery:

• The Fisheries Law was approved by the National Assembly on November 26th, 2003 and come in force on July 1st, 2004. To implement the Law of Fisheries, the Government and Ministry of Fishery have promulgated many under-law documents and national policies.

• The Decision No. 131/2004/QD-TTg approving the Aquatic Resource Protection and Development Program until 2010.

• The Decree No. 191/2004/ND-CP was on management of fishery activities of foreign fishing vessels in Vietnam's seas.

• The Decree of the Government No 27/2005/ND-CP was to regulate and guide the implementation of certain articles in the Fisheries Law.

• The Decree No. 59/2005/ND-CP was on conditions for a number of aquatic resources production and business lines.

• The Decree 14/2009/ND-CP regarding the revision and supplement of Decree 59/2005/ND-CP dated May 4th 2005 on trade and production conditions of fisheries-related occupations.

• The Decree No. 66/2005/ND-CP on ensuring safety for people and ships engaged in fisheries activities.

• The Decree No. 128/2005/ND-CP providing for sanctioning of administrative violations in the fisheries domain.

• The Decision No. 10/2006/QD-TTg approving the master plan on development of the fisheries sector until 2010 and orientations toward 2020. The purpose of this Decision is to develop fisheries into a major commodity industry with high productivity, quality and competitiveness, and capable of earning greater export turnover.

• Decree No. 123/2006/ND-CP on management of aquatic resource exploitation by Vietnamese organizations and individuals in sea areas. The Decree provides for the management of aquatic resource exploitation by Vietnamese organizations and individuals within and outside Vietnam's sea areas, and for the division of sea areas and demarcation of aquatic resource exploitation areas.

- The Decree No. 57/2008/NĐ-CP promulgation of Regulation governing marine protected areas of Vietnam which are of national and international importance.

- The Decision 29/QD-TTg regarding the establishment and regulation on organization and operation of Vietnam fund for aquatic resource reproduction.

In summary, the period from 2003 to present, after the fishing law come into force, the Vietnam government was issue many policies to regulate coastal fishing activities. The basic policy has enacted, but enforcement of fishery policy was very limited. In this situation, the competition for resources is unavoidable and intensifying between small-scale and large-scale fisheries, between fleets, between fishing vessels, and between local fishing vessels and foreign fishing vessels. There level of conflict is increasing between small and large-scale fishing vessels that operate destructive fishing methods. Coastal aquatic resources have been overexploited severely and declining. Coastal fishing capacity, in terms of quantity of fishing vessels and catch, has increased far beyond the sustainable limit. The number of fishing vessels has increased, earnings per vessel have fallen and competition is getting harder while resources become more and more exhausted. Most fishers in coastal communities are poor and unable to invest in offshore fishing vessels, and lack of knowledge of modern techniques and management for offshore fisheries. There have not been sufficient studies to define the right dimensions for fleet size in accordance with the current capacity of stocks, and to decide appropriate fisheries management policies (NADAREP, 2007).

1.2.1.5 Fishery management program

1.2.1.5.1. The delimitation of fishing zone for each group vessel.

For conflict reduction and improve fishery management, Vietnam has regulated the coastal marine waters zoning and allocation for local communities to operate marine culture and aquaculture.

The Area I is from shore outwards 6 nautical miles far: artisanal and out-board engine fishing boats with less than 20 HP are allowed to operate. The Area II is from 6 – 24 nautical miles far from the shore: fishing boat that has engine of less than 90 HP was allowed to operate. The Area III is from 24 – 200 nautical miles far from the shore: fishing boat that has engine of more than 90 HP was allowed to operate.

This regulation has been implemented with the objective to reduce pressure on coastal water where was use only for small scale and aquaculture. It also able to reduce conflicts between small-scale and large-scale fishers and provide fishers clearly where they have right to fish, and also assist policemen and competent forces to monitor, control and carry on surveillance in Vietnam sea easier than before.

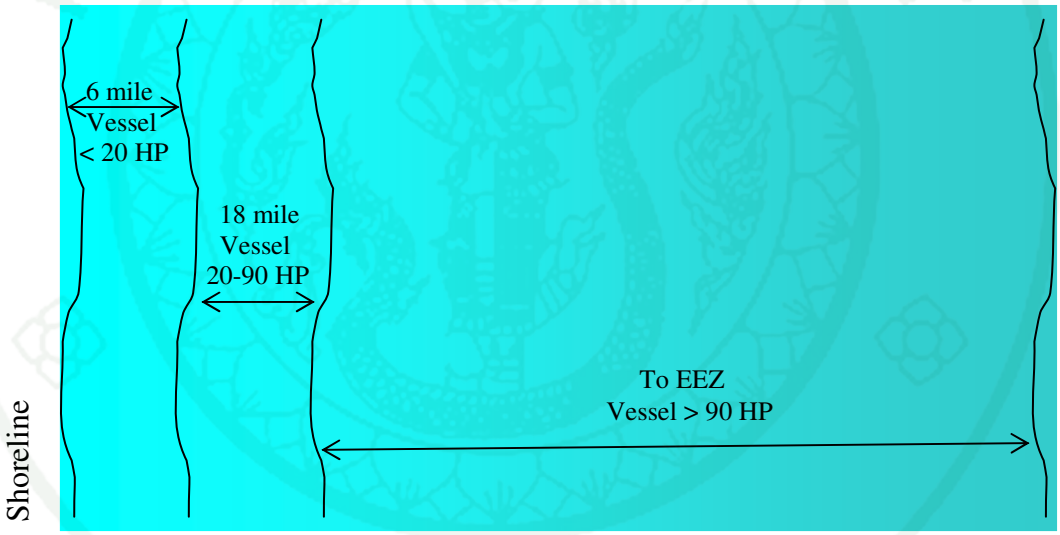

Figure 5 Fishing zone of Vietnam sea

1.2.1.5.2. License system

The license system is common measure to manage fishing vessel in many countries. Vietnam has implemented fishing license since April 25th, 1989 when State Council enacted Ordinance on Protection and Development of Fisheries Resources. The objectives are to manage, protect, rehabilitate the nation fishery resources. Currently, in November 2003 the Parliament enacted Fishing law which was

noted that organizations and individuals engaged in fishing operations have to hold fishing licenses except the individuals fishing by fishing vessels with less than 0.5 GT or fishing without boat.

The government enacted Decree No. 59/2005/ND-CP on conditions for a number of aquatic resources production and business lines requiring permits as well as permit granting procedures and conditions for aquatic resource activities which do not require permit. It also make regulations relating to process, procedures and competent agencies dealing with the granting and withdrawal of fishing licenses.

The government enacted Decree No. 123/2006/ND-CP on management of aquatic resource exploitation by Vietnamese organizations and individuals in sea areas. The Decree provides for the management of aquatic resource exploitation by Vietnamese organizations and individuals within and outside Vietnam's sea areas, and for the division of sea areas and demarcation of aquatic resource exploitation areas. The license is granted to less than 20 HP vessels, which are allowed to operating in the coastal area.

Currently, the fishing license is inefficient in purposing of sustainable fishery resource management because every body can get the license. The government does not limit number of fishing vessel in each fishing ground and they were not withdraw the license when fishers violated the legislation. For sustainable utilization of fishery resources, the license in each fishing ground have to be limit and strictly controled of fishing license.

1.2.1.5.3. Seasonal and area closures

Seasonal and area closures are common measures to manage fishery resources and ecosystem. The government enacted Decree No. 59/2005/ND-CP on conditions for a number of aquatic resources production and business lines and Circular No. 02/2006/TT-BTS Guiding the Implementation of the Government's Decree No. 59/2005/ND-CP on Production and Business Conditions of a Number of Fisheries

Trades. It is regulated that some duration of time and some areas have to be prohibited for fishing operation with the purposes to maintain, restore, and protect fishery resources and conserve for concentrate spawning and juveniles' fish nursing in the coastal area.

1.2.1.5.4. Marine protected area

- The marine protected area has been recognized as an effective and uncostly tool to maintain and manage coastal marine living resources, to protect biodiversity and to meet other marine conservation targets, as well as coastal people livelihoods. Basically, the marine protected area with no-take, core zone and limited fishing zone have fostered effectively fisheries management.

In 2000, Ministry of Fisheries was appointed to prepare a representative marine protected area system planning and management regulation for Vietnam toward year 2010 by Government of Vietnam Decree no. 111/ND-CP, February 2rd, 2000. A series of 15 marine protected area have been proposed, within a national MPA network managed by the Ministry of Fisheries. Four of the 15 sites have already been funded and are under implementation, Hon Mun (Khanh Hoa Province commencing in 2000, Cu Lao Cham (Quang Nam province from 2003), Phu Quoc (Kien Giang province from 2007), and Con Dao (Ba Ria Vung Tau province from 2005). The marine protected areas were success in first period, the core reef in that area have rehabilitated and created many job for fishery community near marine protected areas, also make fishers have awareness on ecosystem, and resource conservation (Hoi, N.C. 2006).

1.2.1.5.5. Restriction of gears, exploitation method, and fish size, prohibited catch rare species.

The Fishing law, Decree No. 59/2005/ND-CP on conditions for a number of aquatic resources production and business lines and Circular No.

02/2006/TT-BTS Guiding the Implementation of the Government's Decree No. 59/2005/ND-CP were regulated that the prohibited activities shall be the followings:

- Fishing gear

o The use of fishing gears that obstruct, interfere with or cause damages to the fishing organizations are prohibited.

o Prohibited trawling net, push net, and net combine with light operating in coastal area.

o The mesh size of net have to be larger than the minimum mesh size of net that mentioned in the regulated list which declared by Ministry of Agriculture and Rural Development.

- Exploitation method

o The use of prohibited fishery activities and methods, i.e., the use of explosives, poisons, electric and other destructive fishing methods are not allowed.

o The illegal exploitation and destruction of submarine reefs, coral reefs, submarine plantation systems, mangrove forests and other aquatic habitats and the illegal destruction and interference with the natural movement path of fish species living in rivers, lakes, lagoons, straits, bays and gulfs is prohibited.

- Species and size of fish catch

o The exploitation of fish species under the prohibited lists including the time-limited prohibition lists except for scientific research purposes allowed by the government, and the exploitation of fish with smaller size than regulated, except for cases allowed for aquaculture.

o The import and export of fish and fishery products under the prohibited import and export lists is not allowed.

The species in the list of aquatic species which are named in the Red Book of Vietnam and other species are prohibited to be fished. The list of aquatic species which are prohibited to be fished in time-limited manner and the closed time as well regulated by Ministry of Agriculture is not allowed.

1.2.1.5.6. Fisheries resource enhancement

In order to restore fishery resources, the Vietnam government has implemented many measures for fishery resources conservation such as rehabilitation of the environment of fishing grounds, production and release of fry and artificial reefs installing. The artificial reef is installed in the sea areas where are important for fish spawning and breeding. The government has released some species of fish such as grouper, common tiger prawn for resources enhancement.

In 2004, the government enacted the Decision No. 131/2004/QD-TTg approving the Aquatic Resource Protection and Development Program until 2010. The present decision provides for the protection, development and management program of aquatic resources in the inland and territorial waters of the country up to 2010, aiming at the protection, rehabilitation and social community awareness relating to the resources and the wetlands and their possible environmental, economic, social and biodiversity potential, as well as the education of the fishers community.

In 2005, the government enacted the Decree of the Government No 27/2005/ND-CP regulating and guiding the implementation of certain articles in the Fisheries Law. This Decree regulates regarding marine protected areas and inland protected areas, financial sources for rehabilitation of fisheries resources, responsibilities of the specialized agencies to ensure the rights of organizations and individuals engaged in fishing operations.

In 2007, the government enacted the Decision 29/QD-TTg regarding the establishment and regulation on organization and operation of Vietnam fund for aquatic resource reproduction. The method to rehabilitate of the environment of fishing ground, and some species is very important for restore fishery resources, which have been degrade sharply. The artificial reef have been prevent trawling vessel and push net vessel to operate in coastal area, provide good environment for fish spawning and fish nursing.

1.2.1.5.7. Co-management approach

The Ministry of Agriculture and Rural Development of Vietnam has endorsed fisheries co-management as a strategy for managing inshore and estuarine areas. Recognizing the diversity of the coastal zone and regions in the country and the difficulty for effective monitoring and enforcement, the Ministry will undertake a program to delegate resource management functions to local institutions, including fishers' organizations. Co-management have been implemented at Khanh Hoa , Kien Giang, Binh Dinh, Hue, Nghe An and Quang Ninh, beginning with pilot sites to develop models and gain practical experience in co-management. The lessons learned from these pilot sites have been integrated into national policies and laws to support co-management.

Pilot site activities are currently underway as Haiphong province, TT-Hue province, Quangnam province, Nghean province, Binhdinh province, Nhatrang province, Bentre province, Camau province, and Kiengiang province. The successful of all projects are strong communities, awareness of resources conservation, and community cooperation in monitoring, control, and surveillance tasks within the demarcated zone. Prohibited fishing gear such as trawler, push net, luring light net and collapsible crab trap in demarcated zone, and reduce local small-scale fishing gear to be destroyed (SCAFI, 2005).

1.2.2 Aquaculture

Vietnam's aquacultures are operated in marine, brackish and fresh waters all of which are widely available throughout much of the country. In 2006, the total area used for aquaculture in Vietnam was 10.5 thousand km^2 which result in a fast growing industry in Vietnam. Aquaculture is importance for food supply for people and increase national income.

1.2.2.1 Freshwater culture

Aquaculture is practiced in small ponds, seasonal flooded areas, lakes and low-lying paddy fields, which are typical areas for freshwater cultures. The main cultured fish species are grass carp, common carp, mud carp, silver carp, common silver barb, tilapia, catfish and crossbred catfish. High value targeted species such as catfish, tilapia, grass carp, hybrid carp are raised in cages in rivers, streams and reservoirs. River catfish is the most popular freshwater culture fish. Production of river catfish has increased rapidly, due to increasing of international market demand. Total annual production increased from 400,000 tons in 2004 to 1,100,000 tons in 2008 with export value of U$D1.45 billion (USDA, 2007).

1.2.2.2 Brackish water culture

Aquaculture in brackish water farming entails hatching and rearing aquatic species which final growth stage takes place in brackish water. Cultured species include shrimp, sea perch, grouper and conger. Popular production methods are mono cropping one species, intercropping among various species, crop rotation or culture of fish in mangrove forests. The common tiger prawn is popular species of brackish water culture, and from 2007 starting again to culture white leg shrimp. Shrimp culture is raising in essentially natural conditions without using chemicals, antibiotics, and stimulants (USDA, 2007).

1.2.2.3 Marine Culture

Marine aquaculture farming entails hatching and raising aquatic species which final growth stage takes place in marine waters. Vietnam's primary marine culture species are shrimp, lobster, and marine fish as grouper, cobia, snapper, sea bream, and mollusks as clam, granular ark, and pearl oysters. In Vietnam, marine aquaculture is operated mainly in cages and rafts submerged in marine waters along the coastline and in tidal areas. The growth potential for this faming method is enormous, given Vietnam's extensive coastline. Great strides have already been made with several species as lobsters, cobia, grouper and pearl oysters and efforts are underway to expand this type of aquaculture farming. One such effort is the expansion of the marine production area through the use of waterproof materials to cover sandy and marshy land deemed unfit for other agricultural activities (USDA, 2007)

Table 3 Aquaculture production of Vietnam 1994- 2008

Years	Yield(tons)	Year	Yield(tons)
1994	397,168	2002	950,807
1995	459,950	2003	1,110,138
1996	411,000	2004	1,150,100
1997	509,816	2005	1,437,400
1998	582,790	2006	1,693,900
1999	614,510	2007	2,085,200
2000	723,110	2008	2,450,000
2001	879,100		

Source: MOFI (1994 - 2007), MARD (2008)

1.2.3 Processing

There are 470 seafood processing factories, 296 frozen seafood factories, 32 preserved dry seafood products factories, 9 canned seafood products factories and

17 fishmeal factories. Seventy percent of all factories is located in southern of Vietnam, 24 percent in the central, and 6 percent in the North. There are 246 qualified factories to export to the European Union, and over 200 plants operate under the HACCP system. Several previously state-owned plants have converted to joint stock companies or other non-state ownership structure. State-owned plants are mainly engaged in packing marine-caught shrimp, squid and cuttlefish, all of which is exported. The private fish canning factories are engaged chiefly in processing farmed shrimps for export. Processing industry has invested heavily into improving technologies and preparing for international trade. Many of the larger companies have acquired the food safety certifications of their major trading partners, and some have been applying product quality controls like HACCP, GMP and SSOP. Still there persist a number of processing plants with food safety and environmental pollution problems (USDA, 2007).

1.2.4 Marketing

1.2.4.1 Domestic market

Domestic consumption of aquatic products has increased in recent years as the domestic industry benefited from development advances in the cold storage industry. Previously, all processed seafood for domestic consumption was imported and few could afford it. Today, several companies focus on processing for the domestic market, which now consume a wide variety of fishery products. Strong demand from the domestic market and the processing industry, particularly for fish and crustaceans is believed to be driving the rise in imports. Much of the increase in domestic demand comes from the hotel and restaurant industry as well as supermarkets. In 2006, Vietnam imported fish and fishery products valued at $95.8 million, up to 16.2 percent from 2005. It came from a variety of sources like China, Thailand, Indonesia, Taiwan and Malaysia which provided most live fish for ornamental gardens and breeding, while live salmon is imported from Norway and the United States. Fresh, chilled and frozen fish, imported for domestic consumption (USDA, 2007).

1.2.4.2 World market

Vietnam is in top ten countries of aquatic fishery export of the world. Vietnam exports fishery products to over 75 countries and territories on five continents. Japan and the United States are the two largest export destinations, by country, while European Union nations, as a group, had the largest share of exports by volume and the second largest share. Total export volume for 2008 was 1,200 thousand metric tons, a 33,7 percent increase over 2007. Catfish and shrimp are by far the largest share of aquatic exports (USDA, 2007).

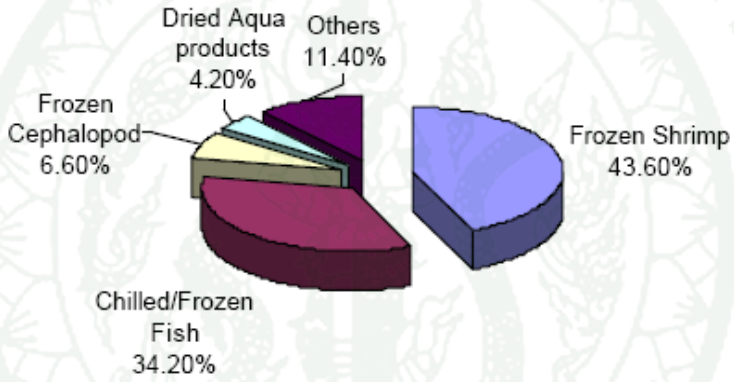

Figure 6 Vietnam's primary fishery export products in 2006

Source: USDA (2007)

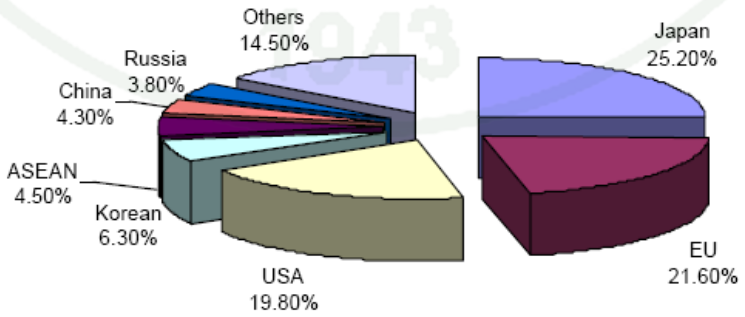

Figure 7 Vietnam's fishery products export market, 2006

Source: USDA (2007)

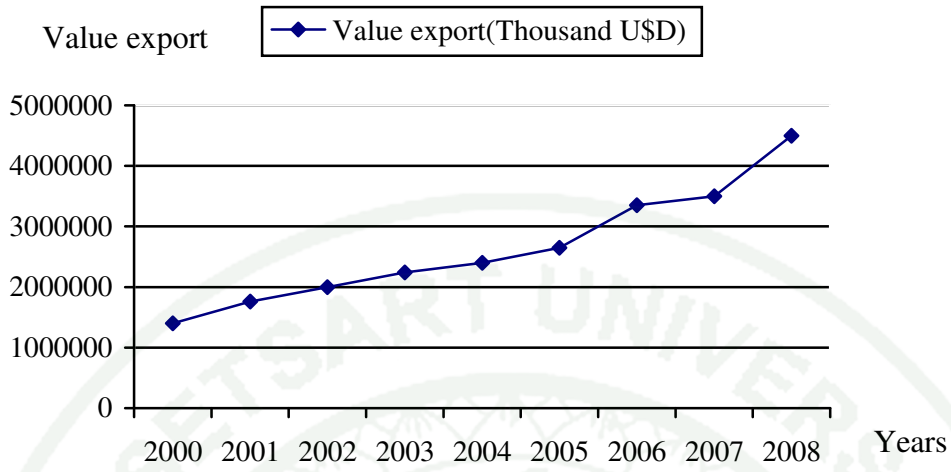

Figure 8 Vietnam's fishery products export value 2000 – 2008

Source: MOFI (2000-2007), MARD (2008)

2. Review theory of fishery management

2.1 Fishery management

2.1.1 Goal and objective of fisheries management

• Juntarashote, K (2007), mentioned that objective of fisheries management including four factors, first is biology to achieve conservation of fish stock. Second is economic to earn the reasonable income for fishers, achievement economic optimum utilization of the resource, and increasing fisheries employment. Third is redistribution of benefit from fishery resources as earnings between fishers equitably in a manner different from the existing system. Fourth, reduce overcapacity in the fishery industry.

The obligations of resources management are conservation of fishery resources, reservation of fishery resources, and restoration of fishery resources to meet sustainable fishery management.

Conservation of fishery resources

Conservations of fishery resources are preservation and careful management of fishery resources. Conservation includes both the protection and rational use of fishery resources.

Reservation of fishery resources

Reservation of fishery resources is measure to provide the habitat for fisheries resources reproduction. These areas, such as marine protected area, area closure, and national parts reservation, cannot be used for fishing. It can be used to set aside representative areas for the conservation of biodiversity, also reduce conflicts between fishers and other users by providing areas where non-fishery users can pursue non-consumptive uses of the resources (Pomeroy et al., 2001). Setting up artificial reefs in reservation area would serve as shelter and habitat, source of food, breeding area, resource management tool, and shoreline protection.

Restoration of fishery resources

The restoration of these habitats, particularly those that limit the abundance of a resource at some life-history stage, may be the most important step to increasing stock productivity. It will enhance of fisheries resource by aquaculture and release young fish species to the sea every year. When considering introducing new species, the manager should fully explore the extensive literature that describes the many pitfalls and case histories of unexpected consequences (FAO, 1995). This trend is based on the realization that many of these habitats are important nursery or spawning areas for fishery resource species (Pomeroy, et al., 2001).

• FAO (1995) mentioned that overriding goal of fisheries management is long term sustainable use of the fishery resources. It can be divided into four subsets: biological; ecological; economic and social, where social includes political and cultural goals. The biological and ecological goals may be more correctly thought of as

constraints in achieving desired economic and social benefits. Such as maintain the target species, minimize the impacts of fishing on the physical environment, maximize the net incomes of fishers, and employment opportunities.

• Clark (1985) mentioned some objectives of fishery management follow table below:

Table 4 Objectives of fishery management

N_0	Objective	Main purpose		
		Sustaincapability	Economic	
			Efficiency	Equity
1	Maximize catches		•	
2	Maximize profit		•	
3	Conserve fish stocks	•		
4	Stabilize stock levels	•		
5	Stabilize catch rates		•	
6	Maintain healthy ecosystem	•		
7	Provide employment			•
8	Increase fishers' incomes			•
9	Reduce conflicts among fisher groups or with non-fishery stakeholders			•
10	Protect sports fisheries		•	•
11	Improve quality of fish		•	
12	Prevent waste of fish	•	•	
13	Maintain low consumer prices			•
14	Increase cost-effectiveness		•	
15	Increase women's participation			•
16	Reserve resource for local fishers			•
17	Reduce overcapacity	•	•	
18	Exploit underutilized stocks	•	•	

Table 4 (Continued)

N_0	Objective	Main purpose		
		Sustaincapability	Economic	
			Efficiency	Equity
19	Increase fish exports		•	
20	Improve foreign relations		•	•
21	Increase foreign exchange		•	
22	Provide government revenue		•	

Source: adapted from Clark (1985)

• Ministry of Fisheries of Vietnam (2005), mentioned the goals for coastal fishery management strategy are; first is to make appropriate adjustment of coastal fishing and restore and preserve coastal marine resource and its ecosystem. Second is to improve the livelihoods of fishers dependent on coastal marine resource in order to contribute to the food security and poverty alleviation among them.

The goal of coastal fishery management are sustainable fishery resources management and efficient of economic-social as maximize income of fishers, and maximize employment opportunities.

2.1.2 Co-management

Co-management is cooperation between government, local communities, and stakeholders to manage and conserve fishery resources (Figure 9). It covers various partnership arrangements and degrees of power sharing and integration of local and centralized government management (Pomeroy, R.S. and Rivera. R.G, 2006).

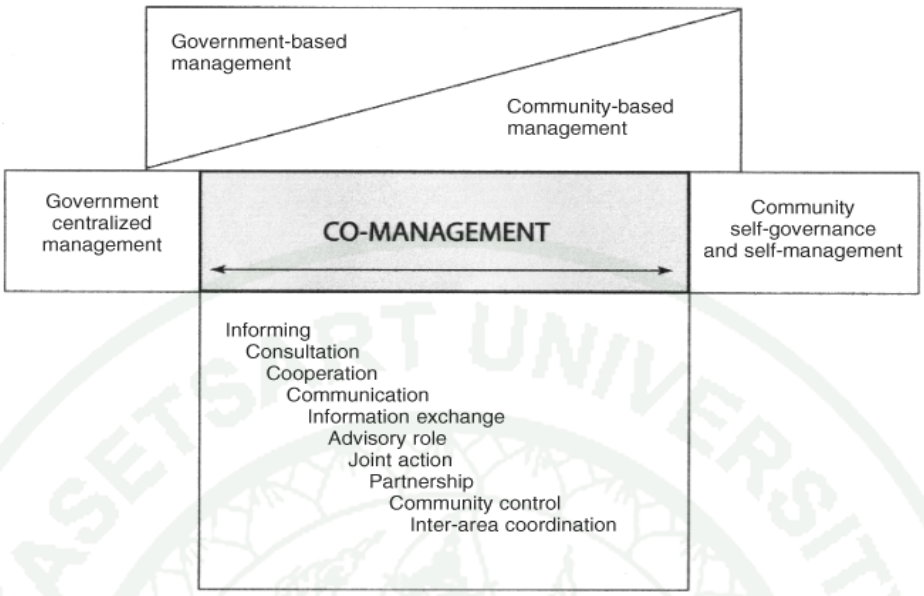

Figure 9 Co-management integrates local and centralized government management systems.

Source: Pomeroy, R.S. and Rivera.R.G (2006)

Juntarashote, K (2007), mentioned that co-management as sharing of responsibility and authority between the government and local community to mange the fishery resources. Co-management requires the central government sharing the power with the local government and organizations. Decentralization is necessary to be implementing in co-management, by Juntarashote, K (2004) it focus in four ways as follow:

Deconcentration: The transfer of authority and responsibility from central government to local government

Delegation: the passing of some authority and decision-making powers to local officers. The central government retains the right to overturn local decisions and can, at any time, take this power back.

Devolution: the transfer of power and responsibility for the performance of a specified function from the national to local government without reference back to central government.

Privatization: the transfer of responsibility for certain government functions to NGOs, voluntary organizations, community relationship, and private enterprises.

2.1.3 Management measure

There are many measures to manage resources users in order to meet goals of fishery management, i.e., area closure and seasonal closures, fishing gear restriction, catch quota, limit entry, size limit of fish to be catch, tax, and subsidy.

2.1.4 Management process

- The process was introduce by Juntarashote, K (2007), it follow eight steps below:

o Define objectives: the objective we need to meet for fishery management, such what species we need to protected, or what areas we need to protect, or what factors we need to adjust.

o Identify all aspects to be covered all of biology, economic, social, technical, and administration.

o Collect data: all data support for making decision to get the objective need to be collected.

o Data analysis and interpretation: all data need to be processed, analysed and interpreted to support decision-making.

o Formulate actions and options: to get the management objective at the first step. The decision need appropriate with real situation, and enable enforcement.

o Implement decision: to bring the decision in to the life is the very important step. It establish the success of the policy and it need to meet the management objective and efficiency.

o Monitoring: all decision needs to be monitored and estimated the efficient of decision.

o Evaluation: the decision need to be evaluated after bring to the life. It may be stopped, continued, or adjusted for suitable with current situation. All factors as biology, economic, social, technical, and administration need to be considered evaluation.

• FAO (1997) proposed fishery management process as follow:

o Setting policies and objectives for each fishery or stock to be managed, considering the biological characteristics of the stock, the nature of existing or potential fisheries and other activities.

o Determining and implementing the actions necessary to enable the management authorities, the fishers and stakeholders, to work towards the identified objectives. This task should be done in consultation with all stakeholders. The actions required will include:

Developing and implementing management plans for all managed stocks. Ensuring that the stock or stocks, the ecosystems in which they occur and their environment are maintained in a productive state. Collecting and analyzing the biological and fishery data necessary for assessment, monitoring, control and surveillance. Adoption and promulgation of appropriate and effective laws and

regulations were necessary to achieve the objectives, and ensuring that fishers comply with them to achieve the objectives.

o Consulting and negotiating with fishers or stakeholders concerned with resources and from areas not directly related to fishery activities but which impact on fisheries.

o In consultation with the users, regularly reviewing the management objectives and measures to ensure they are still appropriate and effective.

o Reporting to governments, users and the public on the state of resources and management performance.

In summary, the management processes are identified the objectives of management, and then collect and analyse all information relating with the management objective including the factors relating with biology, economic, social. After that setting the decision appropriate with real situation and implementing the decision. Finally, monitoring and evaluation the decision, it can be adjust or stop if it not suitable or inefficient.

2.2 EDFR and Delphi

2.2.1 EDFR

EDFR is Ethnographic Dilphi Future Research. The procedural steps of EDFR are quite similar to those of the Delphi technical, the primary distinguishing feature being the inclusion of a future oriented approach to ethnographic interviewing during the first round. Its advantage is the assurance that the participants will be intensely involved in generating the issues to considered for group response so that the scope and focus of the issues under consideration cannot be significantly narrowed or distorted by the biases of the researcher.

2.2.2 Delphi technique

The Delphi technique is a group process used to survey and collect the opinions of experts on a particular subject. The expert ideas completely before send to ask and add the expert group idea. The carefully selected experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments. Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel (Imran, M, 2006). A policy Delphi is one which seeks to generate the strongest possible opposing viewpoints on a policy issue from an expert panel. Rather than consensus, the emphasis is on identifying differing opinions and divergent responses through a process of debate carried out though the rounds of Delphi (Brooks, K.W., 1979).

Chia-Chien and Brain (2007) mentioned that the Delphi technique is method for gathering data from respondents within their domain of expertise and designed as a group communication process with arms to achieve a consensus on specific issues. It is enables group problem solving using an iterative process of problem definition and discussion, feedback, and revisions. The process is used to find consensus among experts who have differing views and perspectives. The applications of Delphi technique have been used in various fields such as program planning, need assessment, policy decision, and resource utilization. And three groups of people are well qualified to be subjects of a Delphi study are first, the top management decision makers who will utilize the outcomes of the Delphi study; second, the professional staff members together with their support team; third, the respondents to the Delphi questionnaire whose judgment are being sought.

The number of expert group following Chia-Chien and Brain (2007) mentioned that Witkin and Altschuld (1995) note that the approximate size of a Delphi panel is generally under 50. Ludwig (1997) document that the majority of Delphi studies have used between 15 and 20 respondent.

The number of expert group following Dunn (1994) note that the participants in the policy Delphi process should be selected to represent a wide range of opinions. Depending on the policy issue area, the number and type of participants will vary. A typical policy Delphi sample size may range from 10 to 30 participants.

Chia-Chien and Brain (2007) issued four rounds in the Delphi process, as follow:

Round 1: In the first round, the Delphi process traditionally begins with an open-ended questionnaire, the questionnaire is used as the survey instrument for the second round of the dada collection. The questionnaire is send in this round to define the problem or issue and asks each participant to list as many responses ideas, solutions, and approaches as possible.

Round 2: In the second round, each Delphi participant receives a second questionnaire and is asked to review the items summarized by the investigators based on the information provided in the first round. The result of the round two, areas of disagreement and agreement are identified, and consensus begins forming and actual outcomes can be presented among the participant's responses.

Round 3: In the third round, each Delphi panelist receives a questionnaire that includes the items and ratings summarized by the investigators in the previous round and asked to revise his/her judgment. This round gives Delphi panelists an opportunity to make further clarifications of both the information and their judgments of the relative importance of the items.

Round 4: In the fourth round and often final round, the list of remaining items, their rating, minority opinions, and items achieving consensus are distributed to the panelists. This round provides a final opportunity for participants to revise their judgment.

The time requirements for Delphi study Chia-Chien and Brain (2007) indicated that Delbecq, Van de Ven, and Gustafson (1975), Ulschak (1983), and Ludwig (1994) recommend that a minimum of 45 days for administration of a Delphi study is necessary. The time between two rounds is at least two weeks.

The data analysis of Delphi technique Chia-Chien and Brain (2007) mentioned that it can involve both qualitative and quantitative data. Basically, consensus on the topic can be decided if a certain percentage of the votes falls within a prescribed range (Miller, 2006). One criterion recommends that consensus is achieved by having 80 percent of subject's votes fall within two categories on the seven point scale (Ulschak, 1983). The major statistics used in Delphi studies are measures of central tendency (means, median, and mode) and level of dispersion (standard deviation an inter-quartile range) in order to present information concerning the collective judgments of respondent.

RESEARCH METHODLOGY

EDFR was applied in this study in order to improve the coastal fishery management of Vietnam. This technique was combined of Ethnographic method and Delphi technique. The Ethnographic method was used to collect data of status, situation of fishery problems of Vietnam from the fishers and the experts in fisheries.

The fishers were interviewed on the community readiness for participation and the role of communities for fishery management using the closed-ended questionnaire. The data of problems of fishery of Vietnam was also collected using the Ethnographic method from the expert who are governors, researchers, NGOs and fishers leaders. The consensus on fishery problems, successful opportunity of present management and alternative management from the experts were collected by Delphi technique which is performed totally three rounds.

1. Population and sample

1.1 Fishers

The population of the study was the fishers who lives in Haiphong province in the North of Vietnam. Haiphong is strongest province for capture fishery in around Tokin Gulf in the North fishing ground, Haiphong sea also is main fishing ground for fishing.

The samples in this study were taken by multistage sampling technique. The three districts (Thuy Nguyen, Kien Thuy and Cat Hai) were selected from total 12 districts of Haiphong province by proportional to sizes (PPS) sampling. In each district, the data were collected from fishers covering small, medium and large-scale fishers. The sampling size of 65 fishers was from a sample size table (Yamane, 1970) at 90 percent confidence interval for estimating of a population proportion and ± 10 percent

precision. The samples size of Thuy Nguyen, Kien Thuy and Cat Hai were 34, 10, and 21, respectively (table 5).

Table 5 Sample size of fishers of Haiphong province in the North of Vietnam

Selected district	Total number of fishing vessel	Sample size	Collected sample size			
			Small	Medium	Lager	Total
Thuy Nguyen	1,423	34	16	9	7	32
Kien Thuy	441	10	7	4	3	14
Cat Hai	901	21	11	6	5	22
Total	2,765	65	34	19	15	68

1.2 Fishery experts

The population of study was divided into four groups, i.e., government staff, NGOs, researchers, fishers leaders, who are working in fishery sector. Following Macmillan (1971), the number of expert group use for Delphi method was 18 respondents, with error of 0.02.

The sample of population distributed in three parts along coastal line. The North part 6 experts, Central part 6 experts and South part 6 experts.

- The North part is from Quangninh province to Thanhhoa province,
- The Central part is from Nghean province to Binhthuan province,
- The South part is from Vungtau province to Kiengiang province.

The respondent list established by ask random 10 persons of government staff, 5 persons of NGOs, 5 researchers, 5 fishers leaders of each part (North, Central, South), who were expert of fishery factor. One person gives at least 3 persons including each group of government staff, NGOs, researchers, fishers leaders. After that check

list in four group including government staff, NGOs, researchers, fishers leaders. Therefore, show the expert lists of government staff and ask 10 persons of government staff who is three experts, end then check who have more time consensus were selected three experts. Show the expert lists of NGOs and ask 5 persons of NGOs who is one expert, end then check who have more time consensus were select one expert. Show the expert lists of researcher and ask 5 persons of researchers who is one expert and then check who have more time consensus was select one expert. Show the expert lists of fishers leaders and ask 5 persons of fishers leaders who is one expert, end then check who have more time consensus was select one expert. The list of expert were 9 persons government staffs (3 North, 3 Central, 3 South), 3 persons of NGOs (1 North, 1 Central, 1 South), 3 researchers (1 North, 1 Central, 1 South), 3 fishers lender (1 North, 1 Central, 1 South).

2. Data collection

2.1. Type of data:

The data were collected both primary data and secondary data:

- The primary data were focus on status, situation and problems of coastal fishery resource, as resources, environment, fishing and harvest, marketing, fishers and communities, organization, and policy and legislation.

- The secondary data were collect from various sources of information related to the study including published books, reports, previous studies and documents, and indigenous knowledge. Types of data were coastal resources, coastal environment, fishers, fishing vessels, fishery organization, international and national laws.

2.2. Collecting tool and collecting method

2.2.1 Questionnaire

Three questionnaires were used in this study:

1) Closed-ended questionnaire was used to gather the data from the fishers of Haiphong province by interviewing them on the community readiness for participation and the role of community management. The content is composed of five parts as follow;

Part I	General information of fishers
Part II	Fishery
Part III	Participation in fishery management
Part IV	Fisher's desire on participation in community in the future
Part V	Assessment of community leader capability for fishery management
	Assessment of fisher capability for fishery management

Reliability analyses were performed by Cronbach's alpha coefficient for part III, IV and V. Alpha coefficient are 0.827, 0.842 and 0.798 and 0.789 for part III, IV and V, respectively. This indicated that the questionnaire is reliable.

The details of score of part III, IV and V are show as follow:

Part III:

- The difficulty of participating in fishery management decision.

1 = Very difficult 3 = Easy

2 = Difficult 4 = Very easy

- The effectiveness of fishery management for sustainable fishery management in the future.

1 = Highly effective 3 = Ineffective

2 = Effective 4 = Highly ineffective

- The effectiveness of present fishery management

1 = Highly effective 3 = Ineffective

2 = Effective 4 = Highly ineffective

- The opinion of community member on management methods

1 = Highly ineffective 3 = Effective

2 = Ineffective 4 = Highly effective

Part IV:

• The opinion of community member on communication, assistant, common goal, common beliefs.

0 = None opinion
1 = 1-25 percent
2 = 26-50 percent
3 = 51-75 percent
4 = 76-100 percent

Part V:

• The assessment of community leader and fishers.

0 = None agreement
1 = 1-25 percent
2 = 26-50 percent
3 = 51-75 percent
4 = 76-100 percent

The criteria of sum score for part III, IV and V were given as follow:

Part III The opinion of community member on management methods

6 – 12	Less effective
13 – 18	Effective
19 – 24	Highly effective

Part IV The opinion of community member on communication, assistant, common goal, common beliefs…

0 – 15	Less agreement
16 – 30	Agreement
31 – 45	Strongly agreement

Part V

- The assessment of community leader

0 – 26	Less agreement
27 – 52	Agreement
53 – 76	Strongly agreement

- The assessment of fishers

0 – 20	Less agreement
21 – 40	Agreement
41 – 60	Strongly agreement

2) Opened-ended questionnaire was used to collect data from experts on the idea of problem in fishery resources, environment, fishing and harvest, marketing, fishers and communities, organization, and policy and legislation. The data receiving from this tool were use to conduct the closed-ended questionnaire for Delphi technique.

3) Closed-ended questionnaire were used to collect data from the experts in Delphi technique. Two questionnaires were set up for 2 rounds.

Round 1: The content of the questionnaire is composed of the list of Vietnamese fishery problems from opened-ended questionnaire. The problems are group into five categories: fishery resources, environment, fishers, organization and legislation. The experts were asked to give a degree of each problem ranking from 1 to 10 when 1 indicates to mild problem and 10 indicates to very strong problem, and the ranking score from 1 to 10 divided in three levels; 1 – 3.33 is low, 3.34 – 6.66 is medium, 6.67 – 10 is high. New ideas of problem and its degree were also added up in this round. The process of getting the respondent ideas was by face-to-face interview. The data from this round were analyzed and the problem degrees were calculated for median (Q2) and inter-quartile (Q3 – Q1). The managed items by Q2 were listed from maximum to minimum.

Round II: The questionnaire was developed from round I and composed of list of fishery problems, which are ranked by median of degree problem. Interquatile range of problem degree, and expert's score were given for each item. Present management of each fishery problem were listed. The degree of successful opportunities of present management was from 0 to 4 when 0 indicates to no successful opportunity and 4 indicates to high successful opportunity.

A new questionnaire corresponding for one respondent was used to gather data by interviewing. The experts were asked to confirm their score of all items or give new score when they disagree with their own score of the first round. The degree of successful opportunity of management was also given by the experts in this round. If the opportunity degree to be success was very low, asked the experts to give the better options for those problems.

3. Data analysis

Descriptive and Inferential statistics were used for data analysis. All analysis was conducted using statistical package program. Descriptive statistics such as percentage, mean, standard deviation, mode, median and inter-quartile range were conducted to describe the general information of fishers, situation and status of fishery in Vietnam. Identified problems of fishery and successful opportunity of the present management was described by mode, median and inter-quartile range.

Hypotheses testing for comparison and correlation analysis were conducted using inferential statistics. Comparing the difference of assessment of community leader and fishers, and degree of fishery problem in Vietnam between groups was conducted using inferential statistics. When the comparison was done based on two groups, t-test statistic was used to test the hypothesis when data distribution is normal while Mann-Whitney test statistic was used in case of data distribution is not normal. When the comparison was based on at least three groups and the normality assumption and equality of variance hold, analysis of variance techniques (ANOVA) was used to examine the hypothesis. Brown-Forsythe statistic was used in comparison when the assumption of equality of variance does not hold while Kruskall Wallis test statistic was used in case of both assumptions do not hold.

For correlation analysis, the relationship between overall opinion of fishers on the effectiveness of fishery management, the opinion of community member and the assessment of community leader and fishers was examined by Pearson's correlation coefficient when data distribution is normal and variables are interval scale. Spearman's rank correlation was used to examine the relationship between two variables in case of the normality assumption does not hold. In case of variables were in nominal scale such as village, Contingency coefficient is used to analyze the relationship between village and the opinion of fishers on the effectiveness of fishery management. When variables were in ordinal scales such as the opinion of the difficulty to participate in fishery management, the opinion of fishers on the effectiveness of fishery management in each issue, the difficulty to participate in

fishery management and the effectiveness of long term health fishery in village, the relationship between two variables is analyzed by Kendall's tau b coefficient.

RESULTS AND DISCUSSIONS

EDFR was applied in this study in order to improve the coastal fishery management of Vietnam. This technique was combined of Ethnographic method and Delphi technique. The Ethnographic method was used to collect data of the community readiness for participation and the role of communities for fishery management, status, situation and problem of fishery of Vietnam from the fishers and the experts in fisheries. The data of problem of fishery of Vietnam was also collected using the Ethnographic method from the experts who were governors, researchers, NGOs and fishers leaders. The consensus on fishery problems, successful opportunity of present management and alternative management from the experts were collected by Delphi technique which was performed totally three rounds.

The results of the study were presented in 3 parts; Ethnographic result, Delphi result, and Vietnamese fishery management approach. The Ethnographic result was divided into 2 parts of community readiness for participation and the role of communities for fishery management, and fishery problems of Vietnam.

1. Community readiness for participation and the role of communities for fishery management

1.1 General information

The data were collected from the fishers of four subdistricts in three districts; Cat Ba (32.4 %), Dai Hop (20.5 %), Lap le (30.9 %) and Pha Le (16.2 %).

Gender, age and religious: All respondent was male. For fishers' age, the average age was 41.2 years old with standard deviation of 8.4 years old. The youngest fisher was 24 years old while the oldest fisher was 57 years old. More than one third of fisher was 31 – 40 years old and 41 – 50 years old (36.7 % and 38.3 %, respectively) (table 6). All fishers were Buddhism.

Table 6 Age of fishers. (n=68)

Age	Frequency	Percentage
24-30 years old	8	11.8
31-40 years old	25	36.7
41-50 years old	26	38.3
51-60 years old	9	13.2

Educational level: More than half of fishers graduated in primary school (58.8 %) while on one-third of them graduated in secondary school (30.9 %). There were only 10.3 % of them graduated in high school (table 7).

Table 7 Educational level. (n=68)

Educational level	Frequency	Percentage
Primary school	40	58.8
Secondary school	21	30.9
High school	7	10.3

Social status: Fisher did not attend to any social group and did not have any social position in community.

Married status: Most of fishers were married (97.1 %) and only 2.9 percent of them were divorced (table 8).

Table 8 Married status. (n=68)

Married status	Frequency	Percentage
Married	66	97.1
Widow	2	2.9

Family member: For the number of family member, about half of fishers had 1-2 male and 1-2 female in the family (52.9%). Forty-seven point one percent of them had 3-4 male and 3-4 female in the family (table 9).

Table 9 Number of family member. (n=68)

Family member	Frequency	Percentage
Family member (Male)		
1 – 2 persons	34	50.0
3 – 4 persons	32	47.1
5 – 6 persons	2	2.9
Family member (Female)		
1 – 2 persons	33	48.5
3 – 4 persons	32	47.1
5 – 6 persons	3	4.4

Occupation: Fishing was a main occupation of all respondent. The fishers did not have any second occupation and their wives supported in net making and fish selling after vessel landed.

Experience: The average fishing experience of fishers was 21.3 years with standard deviation of 6.9 years. Minimum and maximum fishing experience of fishers was 6 years and 35 years, respectively. For the fishing experience of gear, 42.6 percent of them did fishing gear for 6 – 10 years. One-third of them did fishing 11-15 years and only 4.4 percent and 5.9 percent of them did fishing less than 6 years and more than 20 years, respectively (table 10).

Table 10 Fishing gear experience. (n=68)

Fishing gear experience	Frequency	Percentage
1 – 5 years	3	4.4
6 – 10 years	29	42.6
11 – 15 years	21	30.9
16 – 20 years	11	16.2
21 – 25 years	4	5.9

Economic status: All income in family of fishers derived from fishery (95.6 %) and 4.4 % of fishers had the major source of income from fisheries. Thus, fishery income was main income of family. Half of fishers were small scale (50%) which their income ranged from 2,000,001 to 3,000,000 dong/family/month (14.7%). One third of them had income from 3,000,001 to 6,000,000 dong/family/month (33.8%). Only 1.5 % of fishers had income from 30,000,000 to 40,000,000 dong/family/month. Another half of fishers was medium and large scale (50%). Their income ranged from 40,000,000 to 50,000,000 dong/family/month (19.1%), 50,000,001 to 60,000,000 dong/family/month (8.8%) and 60,000,001 to 70,000,000 dong/family/month (4.4%). For the rest of them, their income ranged from 70,000,001 to 90,000,000 dong/family/month (8.9 %). When comparing fishers' income with their expense, more than half of them balanced with their expense (51.5 %). Otherwise, they had higher income than expense (48.5%).

Table 11 Economic status. (n=68)

Economic status	Frequency	Percentage
Income from fisheries		
All income in family	65	95.6
Main income (>50 percent of all income)	3	4.4

Table 11 (Continued)

Economic status	Frequency	Percentage
Income of family per month		
Less than 2,000,000 dong	1	1.5
2,000,001 - 3,000,000 dong	10	14.7
3,000,001 - 6,000,000 dong	23	33.8
30,000,000 – 40,000,000 dong	1	1.5
40,000,000 – 50,000,000 dong	13	19.1
50,000,000 – 60,000,000 dong	6	8.8
60,000,001 – 70,000,000 dong	3	4.4
70,000,001 – 80,000,000 dong	6	8.8
80,000,001 – 90,000,000 dong	5	7.4
Income compared with expense		
Income > expense	33	48.5
Income = expense	35	51.5

Debt: About one-third of fishers had debt (30.9 %) and most of them (95.6 %) did not have saving money. Though 69.1 percent of fishers did not have debt but there was only 4.4 percent of fishers have saving money (table 12).

Table 12 Debt and saving money. (n=68)

Debt and saving money		Frequency	Percentage
Debt	No	47	69.1
	Yes	21	30.9
Saving money	No	65	95.6
	Yes	3	4.4

1.2. Fishery

1.2.1 Small-scale fishery

All fishers in small-scale group were owner the vessel. Fishing vessel was inboard engine vessel. The length of vessel was 6-11 m and engine power was 6-18 horsepower (HP). Labors employed in fishery were family member and two labors were employed.

Most of fishers used two types of gear in each trip (97.1 %), only 2.9 percent of them used only one type of gear (table 13). Hook and gill net had been used most of all fishing gears (91.2 % and 82.4 %, respectively) (table 13).

Table 13 Fishing gears and main fishing gears of small-scale fishery.

Fishing gear	Frequency	Percentage
Gear		
Hook (n=34)	31	91.2
Falling net (n=34)	2	5.9
Gill net (n=34)	28	82.4
Trap (n=34)	6	17.6
Main gear (n=34)		
Hook	13	38.2
Falling net	19	55.9
Gill net	0	0
Trap	2	5.9
Number of gear (n= 34)		
1	1	2.9
2	33	97.1

For the fishing ground, fishers operated fishing in the region of Cat Ba island and Bach Long Vi which was in the coastal area of Haiphong sea. The maximum

fishing trip per month was 25 trips. Around two-third of fishers (67.7 %) operated fishing 18-20 trips/month, while around one-fourth of fishers (23.5 %) operated fishing 22 trips/month (table 14).

Table 14 Number of fishing trips of small-scale fishery (trips/month). (n=34)

Number of fishing trips of small-scale fishery	Frequency	Percentage
18	11	32.4
20	12	35.3
22	8	23.5
23	2	5.9
25	1	2.9

The main target species in capture of small-scale fishers was mackerel (85.3 %), squid (58.8 %), and threadfin (44.1 %) (table 15).

Table 15 The main target species of small-scale fishery.

Main target species	Frequency	Percentage
Squid (n=34)	20	58.8
Sardine (n=34)	8	23.5
Mackerel (n=34)	29	85.3
Crab (n=34)	4	11.8
Anchovy (n=34)	8	23.5
Threadfin (n=34)	15	44.1
Snapper (n=34)	10	29.4
Butterfish (n=34)	7	20.6
Fly fish (n=34)	7	20.6

Average catch of each fishing trip of small-scale fishers was 7-15 kg/trip. 44.1 percent of fishers had an average catch of 10 kg while 23.5 percent of them had an

average catch of 12 kg (table 16). However, this fish catch was lower than the catch in the last 5 years.

Table 16 The average catch per trip of small-scale fishery (kg/trip). (n=34)

Average catch per trip	Frequency	Percentage
7	2	5.9
8	6	17.6
9	2	5.9
10	15	44.1
12	8	23.5
15	1	2.9

The average daily value from catch was 12,000 – 20,000 dong/kg. 29.4 percent of fishers had average daily value 15,000 dong/kg or 20,000 dong/kg (table 17).

Table 17 The average daily value of small-scale fishery (dong/kg). (n=34)

Average daily value	Frequency	Percentage
12,000	1	2.9
15,000	10	29.4
16,000	1	2.9
17,000	4	11.8
18,000	5	14.7
19,000	3	8.8
20,000	10	29.4

Small-scale fishers often did not pay labors cost to the crews because the crews were family members. When comparing present income with the previous year income, present income of fishers was less than their income of previous year. Beside that, no fishers had any additional income.

Minimum of total monthly income of fisher was 1,944,000 dong/month and maximum of total monthly income was 6,000,000 dong/month. On one-third of fishers had total monthly income of more than 2,000,000 dong/month (table 18).

Table 18 The total monthly income of small-scale fishery. (n=34)

The total monthly income (dong/month)	Frequency	Percentage
1,944,000 (≤2,000,000)	1	2.9
≤3,000,000	10	29.4
≤4,000,000	10	29.4
≤5,000,000	10	29.4
≤6,000,000	3	8.9

1.2.2 Medium-scale

All fishers in medium-scale group were owners of the vessels. Fishing vessels were inboard engine vessels. Minimum length was 10 m and maximum length was 13 m. The horsepower was 20 – 45. The number of crews including the captain was 4 (52.6 %) and 5 (26.3 %) (table 19).

Table 19 The number of crew on boat of medium-scale fishery. (n=34)

Number of crew (person)	Frequency	Percentage
3	4	21.1
4	10	52.6
5	5	26.3

For the number of fishing gears, on three-fourth of fishers used two types of gear (78.9 %) while one-fourth of fishers used only one type of gear (21.1 %). Falling net and gill net have been used most of all fishing gears (68.4 % and 63.2 %). On two-third of them used falling net as the main fishing gear, otherwise, the main fishing gear was gill net (table 20).

Table 20 Fishing gear usually used of medium-scale fishery.

Fishing gear	Frequency	Percentage
Gear		
Hook (n=19)	8	42.1
Falling net (n=19)	13	68.4
Gill net (n=19)	12	63.2
Trap (n=19)	1	5.3
Main gear (n=19)		
Falling net	13	68.4
Gill net	6	31.6
Number of gear (n= 19)		
1	4	21.1
2	15	78.9

Medium-scale fishers operated fishing in 6 nautical miles from shore line of Haiphong sea. Main fishing grounds of fishers were Bach Long Vi and middle of Tonkin Gulf. The range of fishing trip per month was 5-6 trips. Most of fishers operated fishing 5 trips/month (63.2 %) (table 21).

Table 21 Number of fishing trips per month of medium-scale. (n=19)

Number of fishing trips of medium-scale	Frequency	Percentage
5	12	63.2
6	7	36.8

Main target species of medium-scale fishers were squid and snapper. Others target species in capture were mackerel (68.4 %) and fly-fish (31.6 %) (table 22).

Table 22 The main target species of medium-scale fishery.

Main target species	Frequency	Percentage
Squid (n=19)	19	100.0
Mackerel (n=19)	13	68.4
Crab (n=19)	1	5.3
Anchovy (n=19)	2	10.5
Threadfin (n=19)	4	21.1
Snapper (n=19)	19	100.0
Butterfish (n=19)	4	21.1
Fly fish (n=19)	6	31.6

Average catch of each fishing trip of medium-scale was 300- 600 kg/trip. Thirty-six point eight percent and fourth-seven point four percent of fishers had average catch level of 300 – 400 kg and 401 - 500 kg, respectively, while 15.8 percent of them had an average catch level of 501 - 600 kg (table 16). However, this fish catch was lower than fish catch in the last 5 years (table 23).

Table 23 The average catch per trip of medium-scale fishery(kg/trip) (n=17)

Average catch per trip	Frequency	Percentage
300 – 400	7	36.8
401 – 500	9	47.4
501 – 600	1	15.8

The average daily value from fishing was 17,000 – 32,000 dong/kg. 42.1 percent of fishers had average daily value 18,000 dong/kg while on one-fourth of fisher had average daily value of 17,000 dong/kg. There were only 5.3 percent of fisher had average daily value of 32,000 dong/kg (table 24).

Table 24 The average daily value dong per kg of medium-scale fishery. (n=19)

Average daily value	Frequency	Percentage
17,000	5	26.3
18,000	8	42.1
20,000	2	10.5
30,000	3	15.8
32,000	1	5.3

When comparing the present income with the previous year income, all fishers had income lower than the previous year income. Besides that, fifty percent of their value had to be share with the crews (89.5 percent). Only 5.3 percent of fishers had to share value with crew in the rate of 60:40 (table 25).

Table 25 The rate share value with crew of medium-scale fishery. (n=19)

Share value with crew	Frequency	Percentage
No Share	1	5.3
Number share	18	94.7
Rate share		
50:50	17	89.5
60:40	1	5.3

Minimum of total monthly income of fishers was 38,700,000 dong/month and maximum of total monthly income was 57,600,000 dong/month. Forty-seven point four percent of fishers had total monthly income of 45,000,000 dong/month and 21.0 percent of fishers had total monthly income of 50,000,000 dong/month or 55,000,000 dong/month. (table 26).

Table 26 The total monthly income of medium-scale fishery (dong/month). (n=19)

The total monthly income	Frequency	Percentage
38,700,000 (≤40,000,000)	1	5.3
≤45,000,000	9	47.4
≤50,000,000	4	21.0
≤55,000,000	3	15.8
≤60,000,000	2	10.5

The operating cost per day was 1,400,000 to 1,700,000 dong/day. More than half of fishers (57.9 percent) had operating cost of 1,400,000 – 1,500,000 dong/day. On one-third of them had the operating cost higher than 1,600,000 dong/day (table 27).

Table 27 Fishing cost per day of medium-scale fishery (dong/day). (n=19)

Fishing cost per day	Frequency	Percentage
1,400,000	5	26.3
1,450,000	3	15.8
1,500,000	3	15.8
1,550,000	2	10.5
1,600,000	5	26.3
1,700,000	1	5.3

1.2.3 Large-scale fishery

All fisher in large-scale group was owners the vessels. Fishing vessels were inboard engine vessels. Minimum length was 12 m and maximum length was 22.2 m. The horsepower was 99 – 250 HP. The crew number including the captain was 5 (26.7 %), 6 (46.6 %) and 7 (26.7 %) (table 28).

Table 28 Number of crews on boat of large-scale fishery (person). (n=15)

Number of crews	Frequency	Percentage
5	4	26.7
6	7	46.6
7	4	26.7

For the number of fishing gears, on three-fourth of fisher used two types of gear (73.3 %) while on one-fourth of fishers used only one type of gear (26.7 %). Falling net, gill net and hook have been used most of all fishing gears (86.7 %, 46.7 % and 40.0 %, respectively). On 86.7 percent of them used falling net as the main fishing gear, otherwise, the main fishing gear was gill net (table 29).

Table 29 Fishing gears mainly employed by large-scale fishery.

Fishing gear	Frequency	Percentage
Gear		
Hook (n=15)	6	40.0
Falling net (n= 15)	13	86.7
Gill net (n=15)	7	46.7
Trap (n=15)	0	0.0
Main gear (n=15)		
Falling net	13	86.7
Gill net	6	13.3
Number of gear (n= 15)		
1	4	26.7
2	11	73.3

For large-scale fishery, fishers operated fishing 24 nautical miles from shoreline of Haiphong Sea. Main fishing ground of fisher was middle of Tonkin Gulf. Most of fishers, did fishing 1 trip per month (100.0 %) (table 30).

The main target species of catch were squid (93.3 %), sardine (46.7 %), mackerel (53.3 %) and anchovy (33.3 %) (table 30).

Table 30 The main target species of large-scale fishery.

Main target species	Frequency	Percentage
Squid (n=15)	14	93.3
Sardine (n=15)	7	46.7
Mackerel (n=15)	8	53.3
Anchovy (n=15)	5	33.3
Threadfin (n=15)	1	6.7
Snapper (n=15)	1	6.7
Butterfish (n=15)	1	6.7
Fly fish (n=15)	5	33.3

Average catch of each fishing trip of large-scale was 3,500-5,000 kg/trip. Half of fishers had average catch per trip of 3,500 – 4000 kg/trip (53.3 %), half of fishers had average catch per trip of 4,500 – 5,000 (46.7 %) (table 31). The fish catch was lower than the last 5 years.

Table 31 Average catch per trip of large-scale fishery (kg/trip). (n=15)

Average catch per trip	Frequency	Percentage
3,500	3	20.0
4,000	5	33.3
4,500	4	26.7
4,800	1	6.7
5,000	2	13.3

The average daily value of fishers' catch of large-scale was 17,000 dong/kg (33.3 %), and 18,000 dong/kg (66.7 %) (table 32).

Table 32 Average daily value of large-scale (dong/kg). (n=15)

Average daily value	Frequency	Percentage
17,000	5	33.3
18,000	10	66,7

All fishers' income was lower than the previous year (100.0 %). Most of income was from fishing and the fishers did not have any additional income. All fishers of large-scale shared income to the crews (100.0 %) with sharing rate of 50:50 (100.0 %) (table 33).

Table 33 Share value rate paid to crews of large-scale fishery. (n=15)

Share value paid to crew	Frequency	Percentage
Number share	15	100.0
Rate share		
50:50	15	100.0

Minimum of total monthly income of fishers was 59,500,000 dong/month and maximum of total monthly income was 90,000,000 dong/month. One-third of fishers had total monthly income of 70,000,000 dong/month (33.3 percent), 20.0 percent of fishers had total monthly income of 60,000,000 dong/month and others 20.0 percent had 80,000,000 dong/month. (table 34).

Table 34 Total monthly income of large-scale fishery (dong/month). (n=15)

The total monthly income	Frequency	Percentage
59,500,000 (≤60,000,000)	1	6.7
≤65,000,000	2	13.3
≤70,000,000	1	6.7
≤75,000,000	4	26.7

Table 34 (Continued)

The total monthly income	Frequency	Percentage
≤80,000,000	2	13.3
≤85,000,000	3	20.0
≤90,000,000	2	13.3

The operating cost per day was 2,200,000 – 3,000,000 dong/day. On haft of fisher had an operating cost of 3,000,000 dong/day (46.7 %) while one-third of fishers had an operating cost of 2,500,000 dong/day (33.3 %). Thirteen point four percent of fishers had an operating cost of less than 2,500,000 dong/day (table 35).

Table 35 Fishing cost per day of large-scale fishery (dong/day). (n=15)

The cost per day	Frequency	Percentage
2,200,000	1	6.7
2,300,000	1	6.7
2,500,000	5	33.3
2,700,000	1	6.7
3,000,000	7	46.7

1.3 The opinion on fishery management in Vietnam

National Assembly enacted the fishing law that is the highest policy for fishery management of Vietnam Sea in 2003. After fishing law, the government enacted seven degrees reve to fishery management as management of fishery activities of foreign fishing vessels in Vietnam's seas, regulating and guiding the implementation of certain articles in the Fisheries Law, conditions for a number of aquatic resources production and business lines, ensuring safety for people and ships engaged in fisheries activities, providing for sanctioning of administrative violations in the fisheries domain, management of aquatic resource exploitation by Vietnamese organizations and individuals in sea areas.

The Vietnam sea fishing was divided into three zones for small-scale, medium-scale, and large-scale fishery. The three fishing zones were regulated for what fishing vessels were allowed to catch and what method to be used for catch.

The fishery management measures used in Vietnam appeared as follow:

- Gear restrictions
- Limited entry
- Mesh size limits
- Minimum size limits
- Seasonal closures
- Slot size limits

Most of fishery management measures were applied in coastal area, except mesh size limits and minimum size limits which were applied for whole fishing zone. In addition, some new management approaches have been use in the recent year such as co-management and marine protected area.

1.3.1 The opinion of fishery management

The opinion of fishers on effectiveness of management measures such as gear restriction, limit entry, mesh size limits, minimum size limits, seasonal closure and slot size limits was shown in Table 36. 67.6 percent of fishers believed that slot size limits is ineffective when 60.3 percent of fishers believed that minimum size limits is ineffective. Half of fishers believed that gear restrictions are effective.

Table 36 The opinion on fisheries management measures.

Measure	Assessment of fishery management measures	
	Ineffective	Effective
1. Gear restrictions	48.5	51.5
2. Limited entry	47.1	52.9
3. Mesh size limitation	47.1	52.9
4. Minimum size limits	60.3	36.8
5. Seasonal closures	55.9	44.1
6. Slot size limits	67.6	32.4

1.3.2 The opinion of fishery management measures by group of fishers.

Gear restriction: The opinion of small-scale fishers on effectiveness of gear restriction measures, three-fourth of them believed that this measure is ineffective while all fishers in-group of large-scale fishers believed that this measure was effective. Beside that more than half (57.9 %) of medium-scale fishers believed that this measure is also effective (table 37).

The relationship between the opinions of fishers on effectiveness of management measures and groups of fishers showed in Table 37. The fishers opinion on effectiveness of fishing gear restriction measure had high significant relationship with groups of fishers (p=0.000). This showed that the fishers' opinion on effectiveness of gear restriction concern with groups of fishers. As seen from Table 37, three-fourth of small-scale fishers believed that this measure was ineffective. Small-scale fishers also has the same believe because they saw many destructive fishing gears, i.e., push net and trawlers still operate in near shore and the regulation of gear restriction measures apply only for inshore area.

Limited entry: The opinion of small-scale fishers on effectiveness of limited entry measure, most of small-scale fisher believed that that the measures of limited entry was ineffective (73.5 %) while one-fourth of fisher believed that this

measure was ineffective (26.5 %). Because of fishers saw higher number of vessels and high conflict in near shore area. Three-fifth of medium-scale fishers believed that limited entries are ineffective (63.2 %). All of large-scale fishers believed that limited entry is effective (table 37).

The relationship between the opinion of fishers on effectiveness of management measures and sizes of vessel was shown in Table 37. The fishers' opinion on effectiveness of limited entry measures had high significant relationship with size of vessel (p=0.000). This showed that the fishers opinion on effectiveness of limited entry concern with size of vessel. From Table 37 showed that three-fourth of fishers in small-scale group believed that this measure was ineffective. Small-scale fishers believed that this measure is high ineffective because the measure could not reduce number of fishing vessels operating in inshore area where is their fishing ground, while medium-scale and large-scale vessels operate in offshore area where there was no high conflict.

Mesh size limit: Third-fourth of fishers (73.5 %) believed that this measure is ineffective. While on three-fifth of medium-scale fishers believed that mesh size limits are effective (63.2 %). All of large-scale fishers believed that mesh size limitation are effective (table 37).

The relationship between the opinion of fishers on effective of management measures and size of vessel was shown in Table 37. The fishers opinion on effectiveness of fishing mesh size limits measures has high significant relate to size of vessel (p=0.000). This showed that the fishers' opinion on effectiveness of mesh size limits measure concern with size of vessel. From Table 37 showed that three-fourth of fishers in small-scale group believed that this method is ineffective. The small-scale fishers believed that this measure is high ineffective while medium-scale and large-scale believed that it is effective, because small-scale operate in inshore area where is the nursing ground of juvenile and young fish and caught small fish with small mesh size. The medium and large-scale operate in offshore area thus they always-caught big fish and they believed that this measures is effective.

Minimum size limitation: The opinion of small-scale fishers on effectiveness of minimum size limitation, four-fifth of small-scale fishers (76.5 %) believed that this measures is ineffective and half of large-scale fishers believed that this measure ineffective (53.3 %). While three-fifth of medium-scale fishers believed that this measures is effective (63.2 %) (table 37).

The relationship between the opinion of fishers on effectiveness of management measure and size of vessel was shown in Table 37. The fishers' opinion on effectiveness of fishing minimum size limitation measures had significant relationship with size of vessel (p=0.019). This showed that the fishers opinion on effectiveness of minimum size limitation concern with size of vessel. From Table 37 showed that three-fourth of fishers in small-scale group believed that this measure is ineffective because they often found fishing vessel caught small size of fish in inshore area.

Seasonal closure: Both groups of small-scale and medium-scale fishers believed that that seasonal closure is ineffective measure (67.6 % and 63.2 %, respectively). Inversely to large-scale fisher opinion, most of them believed that that this measures is effective (80.0 percent). Only 20 percent of them believed that that this measure is ineffective (table 37).

The relationship between the opinion of fishers on effective of management measure and size of vessel was shown in Table 37. The fishers' opinion on effectiveness of seasonal closure measures has significant relationship to size of vessel (p=0.006). This showed that the fishers' opinion on effectiveness of seasonal closure related to size of vessel. From Table 37 showed that three-fifth of fishers in small-scale group believed that this measure is ineffective. Small-scale and medium-scale fishers believed that it is ineffective, while large-scale fishers believed that effective, because this measure was applied only in some inshore areas thus small-scale and medium-scale fishers found fishing vessel always violate this regulation.

Slot size limitation: For the effectiveness of slot size limit measure, all group of fisher believed that the slot size limit measure is ineffective (64.7 %, 73.7 % and 66.7 %, respectively) (table 37).

The relationship between the opinion of fishers on effectiveness of management measure and size of vessel is show in Table 37. The fishers' opinion on effectiveness of fishing slot size limitation measure had no significant relationship with size of vessel (p=0.976). This showed that the fishers' opinion on effectiveness of slot size limits measure did not related to the size of vessel. There were same opinions on effectiveness of slot size limitation between these three groups of fishers. As seen from Table 37, most fishers in each group believed that this measures is ineffective because they hardly to see any patrol boat or police on the sea at daytime and nighttime. Besides that, the fuel was not enough for patrol boat survey.

Table 37 Assessment of fishery management measures.

Group of fishers	Effectives of fishery management measure	
	Ineffective	Effective
1. Gear restrictions		
Small-scale (n=34)	73.5	26.5
Medium-scale (n=19)	42.1	57.9
Lager scale (n=15)	0.0	100
Contingency coefficient = 0.502, p= 0.000**		
2. Limited entry		
Small-scale (n=34)	73.5	26.5
Medium-scale (n=19)	36.8	63.2
Lager scale (n=15)	0.0	100
Contingency coefficient = 0.502, p= 0.000**		
3. Mesh size limits		
Small-scale (n=34)	73.5	26.5
Medium-scale (n=19)	36.8	63.2
Lager scale (n=15)	0.0	100
Contingency coefficient = 0.508, p=0.000**		

Table 37 (Continued)

Group of fishers	Effectives of fishery management measure	
	Ineffective	Effective
4. Minimum size limits		
Small-scale (n=34)	76.5	23.5
Medium-scale (n=19)	36.8	52.6
Lager scale (n=15)	53.3	46.7
Contingency coefficient = 0.385, p=0.019*		
5. Seasonal Closures		
Small-scale (n=34)	67.6	32.4
Medium-scale (n=19)	63.2	36.8
Lager scale (n=15)	20.0	80.0
Contingency coefficient = 0.360, p=0.006**		
6. Slot Size Limits		
Small-scale (n=34)	64.7	35.3
Medium-scale (n=19)	73.7	26.3
Lager scale (n=15)	66.7	33.3
Contingency coefficient = 0.082, p=0.796^{ns}		

Note: ^{ns} refers to no relationship between variables, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$.

1.3.3 The effective of fishery management

The opinion of fishers on effectiveness of fisheries management in village for ensuring the long-term health of the fisheries, more than three-fourth of fishers believed that that the present fishery management in their villages is ineffective (77.9 %), while on one-fourth of them (22.1 %) believed that that it was highly ineffective. This showed that fishers believed that that the present fishery management in their villages could not lead to sustainable fishery in the future.

Most of small-scale fishers, medium-scale fishers and large-scale fishers saw the ineffectiveness of fishery management for ensuring the long term health of fishery (85.3 %, 73.7 % and 66.7 % respectively) (table 38). Fishers saw the number of fishing vessels still continuous increase, while their product was decreased.

When considering the opinion by group of fishers, most of small-scale fishers (85.3 %) thought that that the present fishery management in their villages is ineffective. This similar to the opinion of medium-scale and large-scale fishers, three-fourth of medium-scale fishers (73.7 %) and two-third of large-scale fishers thought that the present fishery management in their villages is ineffective (66.7 %). The remaining fishers thought that that the present fishery management in their villages is highly ineffective (14.7 %, 26.3 % and 33.3 % for small, medium and large-scale fishers, respectively) (table 38).

Table 38 The opinion of fisher group on effective of fishery management. (n=68)

Group of fishers	Opinion on effective of fishery management for ensuring the long-term health of fisheries.			
	Highly ineffective	Ineffective	Effective	Highly effective
Small-scale	14.7	85.3	0.0	0.0
Medium-scale	26.3	73.7	0.0	0.0
Large-scale	33.3	66.7	0.0	0.0
Total	22.1	77.9	0.0	0.0
Contingency coefficient = 0.184, p=0.304^{ns}				

Note: ^{ns} refers to no relationship between variables, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$.

1.3.4 The fishers' opinion on fishers participation in fishery management

For the difficulty to participation in fishery management, most of fisher found that it is difficult to participate in fishery management decision while 13.2 percent of them found it is very difficult to participate in fishery management decision. Fishers thought that that the management decision is the main responsibility of government so that they do not have right to participate (table 39).

Table 39 The participation in fisheries management decisions.

How easy or difficult to participate in fishery management	Frequency	Percentage
Very Difficult	9	13.2
Difficult	59	86.8

Besides that, most fishers in group of small, medium and large-scale had same opinion on participation in fishery management decision. It was difficult for them to participate or join in fishery management because any decisions for solving the problem depend on the government (table 40).

Table 40 The opinion of fishers on participation by group of fishers. (n=68)

Group of fishers	Opinion on difficulty to participate in fishery management	
	Very Difficult	Difficult
Small-scale	8.8	91.2
Medium-scale	5.3	94.7
Large-scale	13.3	86.7
Total	13.2	86.8
Contingency coefficient = 0.099, p=0.712^{ns}		

Note: ^{ns} refers to no relationship between variables, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$.

1.3.5 The opinion of fishers on other measures

Sixty-one point eight percent of fishers had very high agree on control number of fishing vessel and 38.2 percent of fishers had high agree. Sixty-one point eight percent of fishers had very high agreed on control fishing (61.8) and 19.1 percent fishers had low or high agree. About one-fourth of fishers disagreed on control number of fishers (22.1 %), while 41.2 had very high agree on control number of fishers. 69.1 percent fisher had very high agree on control fishing gear (table 41).

Table 41 The opinion of fishers on other measures. (n=68)

Detail	Level agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
1. Should control number of fishing vessel in each HP group	0.0	0.0	0.0	38.2	61.8
2. Should control fishing	0.0	0.0	19.1	19.1	61.8
3. Should control number of fisher	22.1	2.9	0.0	33.8	41.2
4. Should control fishing gear	0.0	0.0	0.0	30.9	69.1

Conclusions, though the government enacted many policies to manage fishery resources, their enforcement were still ineffectiveness. Fishers expressed their opinion on overall present management that all measures are ineffective. Besides that, the fishers' opinion on effectiveness of measures related to group of fisher. Small-scale fisher though that gear restriction, limited entry and mesh size limits measures are ineffective because they have seen push net, trawl are still operate fishing in inshore area.

Small and medium-scale fishers thought that seasonal closure measure is ineffective because the measure cannot stop vessel to operate during closure period. Small and large-scale fishers thought that minimum size limits measure is ineffective because many small fish continuous to be caught.

The present management in village could not lead to sustainable fishery in the future. For the fishers' role in fishery management decision, fishers did not take part in any government decisions because they believed that it was difficult for them to participate or join in management decision. They also thought that fishery management decision was the responsibility of the government and they did not have right to join it. This may result from top-down management process of government.

1.4 Fishers desire on participation in community in the future

Half of fishers had high desired on participation in communication of community member, and 41.2 percent had very high desire on participation in communication of community member. Most of fishers desired on participation to assist each other among community member (45.6 % high agree, 44.1 % very high agree). Most of fishers desire on common goals of community (55.9 % very high agree, 39.7 % high agree). Most of fishers desired there were common beliefs of community member (44.1 % very high agree, 41.2 % high agree). Fishers also desired on participate help each other between community member at high level and very high level (44.1 %, 50 %, respectively). Most of fishers desired on participation in to learn and practice together, co-management, strong group in community, well education leader at high level and very high level (table 42).

Table 42 Percentage of fisher desire on participation in community**.** (n=68)

Detail	Level agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
1. Communication of community member	0.0	0.0	8.8	50.0	41.2
2. To assist each other between community member	0.0	0.0	10.3	45.6	44.1
3. There are common goals of community	0.0	0.0	4.4	39.7	55.9

Table 42 (Continued)

Detail	Level agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
4. There are common beliefs of community member	0.0	0.0	14.7	41.2	44.1
5. To help each other between community member	0.0	0.0	5.9	44.1	50.0
6. To learn and practice together	0.0	0.0	2.9	29.4	67.6
7. There is co-management	0.0	0.0	0.0	30.9	69.1
8. There is strong groups in the community	0.0	0.0	0.0	52.9	47.1
9. There is a well-educated leader	0.0	0.0	0.0	30.9	69.1

The future desire on participation in community of small-scale fishers was at high level (76.5 % and 60.0 %, respectively). The medium-scale fishers had future desire on participation in community at low level (63.1%) while the future desire of this issue of large-scale fishers was at medium level (60.0 %) (table 43).

Table 43 The fishers desire on participation in community in the future by groups of fishers (n=68)

Group of fishers	Level agreement		
	Low (<29 score)	Medium (30-34 score)	High (>34 score)
Small-scale	23.5	17.6	58.9
Medium-scale	63.1	31.6	5.3
Large-scale	40.0	60.0	0
Total	38.2	30.9	30.9

There was a highly significant different on participation in community in the future among group of fishers at significant level 0.01 (p=0.000) (table 44).

Small-scale fisher had different requirement on participation in their community in the future from others group of fishers. The small-scale fisher desired was concerns with having a good relationship between communities, having co-operation and having a strong group in community. These can lead them to have a better life. The requirement of small-scale fisher on participation in community in future was highest.

Table 44 Comparison of the desire of fishers on community by groups of fishers.

(n=68)

Groups of fishers	Desire of fishers on community					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Small-scale	34	33.3	3.5	38.685	0.000**	a
Medium-scale	19	29.3	2.2			b b
Large-scale	15	29.7	2.2			c b

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

1.5 Assessment of community leader capability for fishery management

Awareness

Most of fishers assessed community leader on community and environment awareness at very low agree and low agree. Fishers found that the leader realizes of situation in community at very low agree (54.4 %) and low agree (41.2 %). Fishers assessed the leader that they aware of natural resources and environment at very low level (51.1 % and 29.4 % respectively) and low level (42.6 % and 57.4 % respectively) (table 45).

Table 45 Assessment of community leader on community and environment awareness. (n=68)

Awareness	Level agreement			
	Very low Agree	Low agree	High agree	Very high agree
1. The leader realizes of situation in community	54.4	41.2	4.4	0.0
2. The leader aware of common benefits	47.1	36.8	16.2	0.0
3. The leader aware of self-reliance	30.9	52.9	16.2	0.0
4. The leader aware of natural resources	51.5	42.6	5.9	0.0
5. The leader aware of the environment	29.4	57.4	13.2	0.0

Table 46 Comparison of awareness of community leader on community, resources and environment by groups of fishers. (n=68)

Groups of fishers	Assessment on awareness of community leader					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	11.47	1.25	55.235	0.000**	a
Small-scale	34	7.91	1.53			b b
Medium-scale	19	6.95	1.03			c c

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

There was highly significant difference on awareness of community leader on community, resources and environment among groups of fishers at significant level 0.01 (p=0.000) (table 46). The large-scale fishers assessed on awareness of their community leader on community, resources and environment and the awareness was

found to be higher than other groups. Similarly, to the small-scale fishers, the awareness was found to be higher than medium-scale fishers (table 46).

For the comparison of awareness of community leader on community, resources and environment by villages, the result was shown in table 47. There was significant difference on awareness of community leader on community resources and environment between villages at significant level 0.01 (p=0.008) (table 47). Fishers from village 7, 4 and 2 assessed the awareness of their community leader on community, resources and environment to be higher than the remaining group. Inversely, fishers from village 5 assessed the awareness for their community leader on community, resources and environment lower than the other groups (table 48).

Table 47 Comparison of awareness of community leader on community, resources and environment by groups of fishers. (n=68)

Groups of fishers	Assessment on awareness of community leader					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	11.47	1.25	55.235	0.000**	a
Small-scale	34	7.91	1.53			b b
Medium-scale	19	6.95	1.03			c c

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

Table 48 Comparison of awareness of community leader on community, resources and environment by villages. (n=68)

Villages	Subdistrict	Assessment of fishers on awareness of community leader					Multiple comparison
		N	Mean	SD	F^r	p-value	Tamhane
7	Cat Ba	9	10.00	2.55	37.169	0.008**	a
4	Dai Hop	7	9.00	2.41			a b
2	Lap Le	21	8.43	2.15			a b c
8	Cat Ba	13	8.23	1.64			b b c d
3	Pha Le	11	7.45	1.04			c b d d e
5	Dai Hop	7	6.57	0.79			d b e d e

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between villages of fishers refers to indifferent between groups at significant level 0.05.

Capability

The fishers assessed the leader that the leader respects the other knowledge and intellect at high level (23.5 %), low level (41.2 %) and very low level (35.3 %). Half of fishers assessed that the leader is generous to members at low level (55.9 %) and very low level (41.2 %). The fishers assessed the leader that they have self knowledge at high agree (27.9 %), low agree (42.7%), and very low agree (29.4%). Haft of fishers assessed the leader that the leader loves to learn new things at low level (50.0 %) and high level or very low level (20.6 %) (table 49).

Table 49 Assessment of community leader capability. (n=68)

Capability	Level agreement			
	Very low agree	Low agree	High agree	Very high agree
1. The leader respects the other knowledge and intellect	35.3	41.2	23.5	0.0
2. The leader is generous to members	41.2	55.9	2.9	0.0
3. The leader has self knowledge	29.4	42.7	27.9	0.0
4. The leader loves to learn new things	20.6	50.0	20.6	8.8

There was highly significant different on assessment capability of community leader among small-scale fishers, medium-scale fishers, large-scale fishers at significant level 0.01 (p=0.000) (table 50). The large-scales assessed the capability of community leader to be higher than other groups. While small-scale fishers assessed the capability of community leader to be lower than others groups.

Table 50 Comparison of capability of community leader by groups of fishers. (n=68)

Groups of fishers	Assessment capability of community leader					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	9.27	1.03	62.833	0.000**	a
Medium-scale	19	7.42	0.96			b b
Small-scale	34	7.09	1.66			c b

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between villages of fishers refers to indifferent between groups at significant level 0.05.

There was significant different on assessment capability of community leader between villages at significant level 0.01 (p=0.000) (table 51). The fishers of village 7, 4 presented that capability of community leader had capacity than other villages. The fishers of villages 7, 4 believed that their community leader had more capability than others groups. While fishers of village 5 assessed the capability of community leader to be lower than other (table 51).

Table 51 Comparison of the assessment of fishers on capability of community leader by villages. (n=68)

Villages	Subdistrict	Assessment of fishers on capability of community leader					Multiple comparison
		N	Mean	SD	F^r	p-value	Tamhane
7	Cat Ba	9	9.11	1.17	55.780	0.000**	a
4	Dai Hop	7	8.86	0.69			a b
2	Lap Le	21	7.90	1.55			b b c
8	Cat Ba	13	7.69	1.03			c b c d
3	Pha Le	11	6.64	1.36			d c d e e
5	Dai Hop	7	5.43	0.79			e d e f e

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between villages of fishers refers to indifferent between groups at significant level 0.05.

Behavior

The fishers assessed that the leader receives of news and information at low level (41.1 %), at high level (36.8 %) and at very low level (19.1 %). Most fishers assessed that the leader communicate with members, the leader build up learning, the leader analyze fishery problems at low level (48.6 %, 50.0 % and 54.5 %, respectively) and very low level (33.8 %, 41.2 % and 42.6 %, respectively) (table 52).

Table 52 Assessment on behavior of community leader. (n=68)

Behavior	Level agreement			
	Very low agree	Low agree	High agree	Very high agree
1. The leader receives of news and information	19.1	44.1	36.8	0.0
2. The leader communicate with members	33.8	48.5	13.2	4.4
3. The leader build up learning	41.2	50.0	8.8	0.0
4. The leader analyze fishery problems	42.6	54.4	2.9	0.0

There was highly significant different on behavior of community leader assessment among small-scale fishers, medium-scale fishers, large-scale fishers at significant level 0.01 (p=0.001) (table 53). The large-scales assessed that the behavior of community leader was higher than other groups. While small-scale assessed the behavior of community leader was lower than others groups (table 53).

Table 53 Comparison the assessment on behavior of community leader by groups of fishers. (n=68)

Groups of fishers	Assessment behavior of community leader					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	9.20	1.01	51.328	0.000**	a
Medium-scale	19	7.16	0.50			b b
Small-scale	34	6.62	1.48			c b

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

There was a significant different on behavior of community leader assessment among villages at significant level 0.01 (p=0.000). The fishers of village 7, 4, and 2 assessed that the behavior of community leaders was higher than other villages (table 54).

Table 54 Comparison of the assessment of fishers on behavior of community leader by villages. (n=68)

Villages	Subdistrict	Assessment of fishers on behavior of community leader					Multiple comparison
		N	Mean	SD	F^r	p-value	Tamhane
7	Cat Ba	9	8.56	1.59	35.017	0.000**	a
4	Dai Hop	7	8.29	1.80			a b
2	Lap Le	21	7.81	0.98			a b c
8	Cat Ba	13	6.77	1.30			b c d d
3	Pha Le	11	6.73	1.10			c d e d e
5	Dai Hop	7	5.43	1.40			d e f e f

Note: [r] analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, [ns] refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between villages of fishers refers to indifferent between groups at significant level 0.05.

Participation

The fishers assessed that the leader had common goals with members, participated in thinking, participated in decision making, participated in working with members, received the common benefit, and participated in assessment as shown in table 55. Fishers assessed that leader participated in decision making at very low level (54.4 %) and low level (35.3 %). Fishers assessed that the leader participated in assessment at low level (55.9 %), high level (23.6 %) and very low level (17.6 %) (table 55).

There was highly significant difference on participation of community leader assessment among small-scale fishers, medium-scale fishers, large-scale fishers at significant level 0.01 (0.006) (table 56). Fishers of large-scales assessed the participation of community leader to be higher than others groups.

Table 55 Assessment on participation of community leader. (n=68)

Participation	Level agreement			
	Very low agree	Low agree	High agree	Very high agree
1. The leader has common goal with members	30.9	58.8	10.3	0.0
2. The leader participate in thinking	23.5	51.5	25	0.0
3. The leader participate in decision making	54.4	35.3	10.3	0.0
4. The leader participate in working with members	45.6	47.0	7.4	0.0
5. The leader receives the common benefit	14.7	38.2	39.7	7.4
6. The leader participate in assessment	17.6	55.9	23.6	2.9

Table 56 Comparison the assessment on participation of community leader by groups of fishers. (n=68)

Groups of fishers	Assessment participation of community leader					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	12.67	1.23	62.053	0.006**	a
Medium-scale	19	11.47	2.76			a b
Small-scale	34	10.63	1.30			b b

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

There was significant different on participation of community leader assessment among villages at significant level 0.01 (p=0.006). Fishers from village 5 assessed that the participation of community leaders in their villages was lower than others (table 57).

Table 57 Comparison the assessment on participation of community leader by villages. (n=68)

Villages	District	Assessment of fishers on participation of community leader					Multiple comparison
		N	Mean	SD	F^r	p-value	Tamhane
7	Cat Ba	9	12.22	1.20	58.224	0.006**	a
2	Lap Le	21	12.10	2.68			a b
4	Pha Le	7	12.00	1.63			a b c
8	Cat Ba	13	11.69	2.02			a b c d
3	Pha Le	11	10.82	2.09			a b c d e
5	Dai Hop	7	9.00	1.29			b c d e e

Note: [r] analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, [ns] refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between villages of fishers refers to indifferent between groups at significant level 0.05.

1.6. Assessment of fishers role for fishery management

Awareness

The assessment found that the fishers realizes of situation in community, realized of news and information, aware of common benefits, aware of self-reliance, aware of natural resources, aware of the environment at low level and high level, as shown in table 58. The assessment found that they realizes of situation in community at high level (52.9 %), and low level (38.3 %). The fishers aware of the environment at low level (60.2 %) and high level (32.4 %) (table 58)

Table 58 Assessment awareness of fishers capability. (n=68)

Awareness	Level agreement			
	Very low agree	Low agree	High agree	Very high agree
1. Fishers realizes of situation in community	0.0	38.3	52.9	8.8
2. Fishers realizes of news and information	0.0	70.6	29.4	0.0
3. Fishers aware of common benefits	0.0	64.7	33.8	1.5
4. Fishers aware of self-reliance	0.0	61.8	38.2	0.0
5. Fishers aware of natural resources	0.0	54.4	36.8	8.8
6. Fishers aware of the environment	7.4	60.2	32.4	0.0

Table 59 Comparison the assessment on awareness of fishers by groups of fishers. (n=68)

Groups of fishers	Assessment awareness of fishers					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	9.60	1.24	49.816	0.000**	a
Small-scale	34	8.56	1.44			b b
Medium-scale	19	7.68	0.82			c c

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

There was highly significant difference on awareness of fisher in community among groups of fishers at significant level 0.001 (p=0.000) (table 59). Large-scale fishers assess on the awareness of themselves and others fishers in the community and found that they had higher awareness than small and medium-scale

fishers. Inversely, medium-scale fishers assess the awareness of themselves and others fishers in the community and found that it was lower than others (table 59).

Capability

The assessment found that the fishers respect the other knowledge and intellect at low level (23.5 %), very low (29.4 %), high level (32.4 %), and very high level (14.7 %). The fishers were generous to members at very low level (63.2 %), low level (29.4 %) and high level (7.4 %). The fishers has self knowledge at very low level (47.1 %) and low level (52.9 %) (table 60).

Table 60 Assessment on capability of fishers. (n=68)

Capability	Level agreement				
	Very low agree	Low agree	High agree	Very high agree	Very low agree
1. Fishers respects the other knowledge and intellect	0.0	29.4	23.5	32.4	14.7
2. Fishers is generous to members	0.0	63.2	29.4	7.4	0.0
3. Fishers has self knowledge	0.0	47.1	52.9	0.0	0.0
4. Fishers loves to learn new things	0.0	32.4	29.4	32.4	5.8

There was highly significant different on assessment of capability of fishers among small-scale fishers, medium-scale fishers, large-scale fishers at significant level 0.01 (p=0.000) (table 61). Large-scales fishers assessed capability of themselves and others fishers and revealed that it had higher than other groups, while small-scale assess themselves and others fishers on the capability to be lowest.

Table 61 Comparison the assessment capability of fishers by fishing operation. (n=68)

Fishing operation	Assessment capability of fishers					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	8.93	0.70	53.041	0.000**	a
Medium-scale	19	8.74	1.52			a b
Small-scale	34	6.00	1.67			b c

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

Behavior

The assessment found that the fishers communicate with members at very low level (35.3 %) and low level (51.5 %). The fishers build up learning at low level (19.1 %) and very low level (66.2 %). The fishers analyze fishery problems at low level (22.1 %), disagree (35.2 %) and very low level (42.7 %) (table 62).

Table 62 Assessment on behavior of fishers. (n=68)

Behavior	Level agreement			
	Very low agree	Low agree	High agree	Very high agree
1. Fishers communicate with members	0.0	35.3	51.5	13.2
2. Fishers build up learning	8.8	66.2	19.1	5.9
3. Fishers analyze fishery problems	35.2	42.7	22.1	0.0

There is highly significant different on assessment of behavior of fishers among small-scale fishers, medium-scale fishers, large-scale fishers at significant level 0.01 (p=0.000) (table 63). The small-scales assessed behavior of fishers to be higher

than other groups, while medium-scale assessed the behavior of fishers was lowest in the group.

Table 63 Comparison the assessment on behavior of fishers by groups of fishers.

(n=68)

Groups of fishers	Assessment on behavior of fishers					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Small-scale	34	4.50	1.08	54.473	0.000**	a
Large-scale	15	3.87	0.74			b b
Medium-scale	19	2.74	0.45			c c

Note: [r] analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, [ns] refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

Participation: The assessment found that the fishers has common goal with members, participate in thinking, participate in decision making, participate in working with members, receives the common benefit, participate in assessment as shown in table 63. The fishers had common goal with members at high level (22.1 %), very low level (27.9 %), and low level (42.6 %). The fishers participate in decision making at disagree (83.8 %) and very low level (16.2 %). The fishers participate in assessment at disagree (80.9 %) and very low level (19.1 %) (table 64).

Table 64 Assessment on participation of fishers. (n=68)

Participation	Level agreement				
	Very low agree	Low agree	High agree	Very high agree	Very low agree
1. Fishers has common goal with members	0.0	27.9	42.6	22.1	7.4
2. Fishers participate in thinking	41.2	35.2	16.2	7.4	0.0
3. Fishers participate in decision making	83.8	16.2	0.0	0.0	0.0
4. Fishers participate in working with members	39.7	38.2	22.1	0.0	0.0
5. Fishers receives the common benefit	0.0	30.9	22.1	35.2	11.8
6. Fishers participate in assessment	80.9	19.1	0.0	0.0	0.0

Table 65 Comparison the assessment on participation of fishers by groups of fishers. (n=68)

Groups of fishers	Assessment participation of fishers					Multiple comparison
	N	Mean	SD	F^r	p-value	Tamhane
Large-scale	15	8.67	1.11	54.897	0.000**	a
Medium-scale	19	7.37	1.26			b b
Small-scale	34	4.94	1.32			c c

Note: ^{r} analysis by using Brown-Forsythe statistic and it is asymptotic to F statistic, ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of fishers refers to indifferent between groups at significant level 0.05.

There was highly significant different on participation of fishers assessment among small-scale fishers, medium-scale fishers, large-scale fishers at significant level 0.01 (table 65). Large-scale fishers assessed themselves and others fishers on participation of fishers higher than other groups, while small-scale assessed the participation of fishers to be lowest (table 65).

1.7 The correlation between fishers desire on participation in community in the future and assessment of community leader and fishers capability for fishery management.

1.7.1 Small-scale

The correlation between small-scale fishers' desire on participation in community in the future and assessment of community leader and fishers capability for fishery management is shown in table 66. There was no relationship between small-scale fishers' desire on participation in community in the future and assessment of community leader and fishers capability for fishery management (p=0.278 and p=0.722, respectively).

Table 66 Correlation between small-scale fishers desire on participation in community in the future and assessment of community leader and fishers capability for fishery management.

(n=68)

	The assessment of community leader	The assessment of fishers
Desire on participation of community member	0.192 (p=.278^{ns})	0.063 (p=.722^{ns})

Note: ^{ns} refers to no relationship between variables, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$.

1.7.2 Medium-scale

The correlation between medium-scale fishers' desire on participation in community in the future and assessment of community leader and fishers capability for fishery management is shown in table 67. There was no relationship between medium-scale fishers' desire on participation in community in the future and assessment of community leader and fishers capability for fishery management (p=0.285 and p=0.134, respectively).

Table 67 Correlation between medium-scale fishers desire on participation in community in the future and assessment of community leader and fishers capability for fishery management.

(n=68)

	The assessment of community leader	The assessment of fishers
Desire on participation of community member	-0.258 (p=.285^{ns})	-0.356 (p=.134^{ns})

Note: ^{ns} refers to no relationship between variables, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$.

1.7.3 Large-scale

The correlation between large-scale fishers' desire on participation in community in the future and assessment of community leader and fishers capability for fishery management is shown in table 67. There was a significant relationship between large-scale fishers' desire on participation in community in the future and assessment of awareness of community leader being at high level, desire less community participation in the future. Inversely to fishers who find the awareness of their community leader being at low level, desire more community participation in the future (p=0.010) (table 68).

Table 68 Correlation between large-scale fishers desire on participation in community in the future and assessment of community leader and fishers capability for fishery management. (n=68)

	The assessment of community leader	The assessment of fishers
Desire on participation of community member	-0.638 ($p=.010^{*}$)	-0.361 ($p=.186^{ns}$)

Note: ^{ns} refers to no relationship between variables, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$.

2. The problem of fishery resources

Based on Ethnography method, the initial study on problem of fishery resources in Vietnam was conducted by using the open-ended question with group of experts. The issues found are as follow:

- Decline in biodiversity,
- Endanger species continuous to be caught,
- Overexploiting,
- CPUE decrease,
- Disturbance ecological balance,
- Coastal pollution and coastal erosion,
- Declining of mangroves forest and coral reefs,
- Erosion, discharge waste water, garbage to coastal, aquaculture discharge waste to coastal,
- Relationship, awareness, participation, education level, receive information, knowledge, quality of life (income, saving, debt, heath) of fishers,
- Logistic, low price of fish, middleman, misbalance of market share, poor equipment of market, consumption at domestic market, consumption at world market,

- Good governance, structure of government, empowerment, facilities, government, NGOs, academics, institutes.,
- Effective of policy, policy support as subsidy, constructions, other infrastructure, process of policy making, propaganda, disseminate the policy to fishers, role of community in decision making, decentralization, role of fishers in manage coastal resource.,

These problems become the point of study using Delphi technique by closed-ended questionnaire in the second round, and also presented to all experts. The completely interpreted result including questions in part of opportunities for success of present management was presented to the experts in order to confirm their answers. All experts reconfirmed same answers with the answer obtained in the second round. The final result obtained in third round are appeared as follows:

2.1 Status of coastal fishery

Water quality and coastal utilization

All experts expressed their opinion that the coastal zone utilized most by fishers in capture fishery. More than half of experts thought that the coastal zone utilized for culture at medium level (55.6%). While about three-fourth of experts thought that the coastal zone was least utilized for tourism (72.2%).

At present, water quality in coastal zone was not polluted. As seen that most experts thought that water in coastal zone was in good quality (61.1%). While one-third of experts thought that, the status of water quality in coastal zone was normal quality (33.3%). Similar to the status of water quality for coastal communities, most experts thought that its quality was normal. Only 16.7% of experts thought that its quality was polluted (table 69).

Table 69 The status of coastal utilization and water quality. (n=18)

Detail	Level of status		
	Polluted	Normal	Good
Coastal utilization			
- Fishers use coastal zone for capture	0.0	0.0	100.0
- Fishers use coastal zone for culture	44.4	55.6	0.0
- Fishers use coastal zone for tourism	72.2	27.8	0.0
Water quality			
- Water quality in coastal zone	5.6	33.3	61.1
- Water quality for coastal communities	16.7	72.2	11.1

Infrastructures

The infrastructures readiness in part of medicine shop or hospital in communities was found to be in low level (100.0%). Similar to the readiness of nursery school in the communities which most of experts thought that the readiness was in low level (94.4%). Readiness of fishing port and fish market construction found that the scale of readiness was in medium level (83.3%). Similar to the readiness of logistic for fish landing and hygiene of fishing port, most experts thought that the level of its readiness was at moderated level (88.9% and 77.8%, respectively). However, more than one-third of experts though that the equilibrium of market share was at low level (38.9%) (table 70).

Table 70 The status of infrastructures of fishery community. (n=18)

Detail	Level of status		
	Low	Medium	High
- Medicine shop or hospital in communities	100.0	0.0	0.0
- Nursery school in the communities	94.4	5.6	0.0
- The internet in the communities	66.7	33.3	0.0
- Fishing port, fish market constructions	11.1	83.3	5.6

Table 70 (Continued)

Detail	Level of status		
	Low	Medium	High
- Level of logistic for fish landing	11.1	88.9	0.0
- Level of equilibrium of market share	38.9	61.1	0.0
- Hygiene of fishing port	5.6	77.8	16.7

The roles of NGOs, institute and academic

Experts expressed their opinion on the role of NGOs that NGOs were playing significant role in fishery resources management at high level (61.1%). However, more than half of experts thought that NGOs were neither playing less nor significant role in fishers' income at moderate level (55.6%). For the role of academics, half of experts thought that academics were playing fewer role in supporting fishers and government in fishery management while another half of them thought that academics were playing significant role (50%). Two-third of experts thought that academics were neither playing less nor significant role in developing technique for fishery at moderate level (66.7%). For the role in fishery management, more than half of experts thought that academics were playing significant role in fishery management at high level (55.6%). For the institutes' roles, about three-fourth of experts thought that the institutes were playing high level role in developing techniques but 11.1% of them thought that the institutes were playing less role in fishery resources management (table 71).

Table 71 The role of NGOs, institute and academic. (n=18)

Detail	Level of status		
	Low	Medium	High
- Role of NGOs in fishery resources management	0.0	38.9	61.1
- Role of NGOs in fishers' income	0.0	55.6	44.4
- Status of Academics for support fishers and government to manage fishery resource	50.0	50.0	0.0

Table 71 (Continued.)

Detail	Level of status		
	Low	Medium	High
- Role of Academics in technique development for fishery	0.0	66.7	33.3
- Role of Academics to manage fishery	0.0	44.4	55.6
- Status of institute for support fishers and government to manage fishery resource	50.0	50.0	0.0
- Role of institutes to develop technique	0.0	27.8	72.2
- Role of institutes to manage fishery resource	11.1	50.0	38.9

Quality of fishers' life

Experts expressed their opinion about quality of fishers' life that most of them had a moderate income (61.1%). No fishers had saving money but they had medium-to-high debt (94.4%). Fishers had many children in their family (94.4%). Besides that, they also had a high cost of living and fishing (77.8%). Fishers' health care condition, fishers' education and safety of life were found to be at low level (88.9%, 88.9% and 88.9%, respectively) (table 72).

Table 72 The quality of fishers life. (n=18)

Detail	Level of status		
	Low	Medium	High
- Income	38.9	61.1	0.0
- Saving	100.0	0.0	0.0
- Debt	0.0	44.4	55.6
- Health care condition	88.9	11.1	0.0
- Education	88.9	11.1	0.0
- Number of children in fishers family	0.0	5.6	94.4
- Cost of living and fishing	0.0	22.2	77.8
- Safety of life	88.9	11.1	0.0

2.2 Problems of coastal fishery

Resources

Most of experts (94.4 %) expressed their opinion about resource problems that the degree of overall problem was in high level. When considering in each problem of biodiversity, endanger species and overexploiting, the overexploiting problem in issue of CPUE decrease was found to be in serious level (94.4 %). Besides that, most of experts mentioned that the problem of catch of endanger species in coastal zone and decreasing of rare species was at high level when more than one-third of expert (38.9 %) believed that degree of declining biodiversity problem was at moderate level (table 73).

Table 73 Degree of resources problem. (n=18)

Resources problem	Degree of problem		
	Low	Medium	High
Biodiversity			
- Declining biodiversity	0.0	38.9	61.1
- Disturbance ecological balance	0.0	27.8	72.2
- Rare species continuous decrease	0.0	11.1	88.9
Endanger species			
- Catch level of endanger species	0.0	11.1	88.9
Overexploiting			
- Overexploiting in coastal zone	0.0	27.8	72.2
- CPUE decrease	0.0	5.6	94.4
Total	0.0	5.6	94.4

There was significant difference thinking on the resource problems among groups of expert at significant level 0.05 (p=0.036) (table 74). Comparing the opinion on the resource problems among NGOs, government and researcher showed that the opinion on the resources problem of NGOs was differed from the other groups. As seen

from the average scores of the opinion on resources problem, NGOs responded that this problem is more serious than other groups. Fishers leaders responded that the problem was lowest serious than others.

Table 74 Comparison of the opinion on resources problem by groups of expert.

(n=18)

Groups of experts	Opinion on resources problem				Multiple comparison
	Mean	SD	F	p	LSD
NGOs	8.7	0.6	3.761	0.036*	a
Government	7.2	1.2			b b
Researcher	7.0	1.0			b c
Fishers leader	5.7	1.2			c d

Note: ns refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Environment

The environmental problems consisted of mangrove problem, coral reefs problem, coastal erosion and coastal pollution. For the overall problem of environment, experts mentioned that the degree of problem was in medium-to-high level (table 75).

Mangrove problem

Most of experts expressed their opinion about mangrove problem that people destroy mangrove for aquaculture was the most serious problem (83.3%). Most of them mentioned that degree of the problem about mangrove forest decreased was at medium-to-high level (94.4%). However, 44.4% of them mentioned that the problem of mangrove destroyed by climate change was not a serious problem (table 75).

Coral reefs

All experts mentioned that decreasing of coral reefs caused by some activities was a serious problem and its degree was at medium-to-high level. Two-third of experts mentioned that the illegal exploitation of rare coral was a serious problem (66.7%). Most of experts mentioned that impact of tourism to coral reefs is at moderate level (72.2%) (table 75).

Coastal erosion

Experts thought that erosion have negative effect to coastal communities at high level (94.4%). Experts thought that erosion problem is caused by human activities and more than one-third of experts thought that degree of the problem is at low level (38.5%) (table 75).

Coastal pollution

Most of experts thought that problem degree of direct discharge garbage from communities to coastal, discharge waste to coastal by companies and aquaculture is at high level (88.9%, 88.9% and 88.9%, respectively). However, about three-fourth of experts (72.2%) thought that the problem of oil spill pollution is not a serious problem (72.2%) (table 75).

Table 75 Degree of environment problem. (n=18)

Environment Problem	Degree of problem		
	Low	Medium	High
Mangrove			
- Mangrove forests have been decreased	5.6	50.0	44.4
- Mangrove destroy by climate change	44.4	50.0	5.6
- People destroy mangrove as for aquaculture	0.0	16.7	83.3

Table 75 (Continued)

Environment Problem	Degree of problem		
	Low	Medium	High
Coral reef			
- Coral reefs have been decreased	0.0	50.0	50.0
- Rare coral continuous illegal exploiting	0.0	33.3	66.7
- Tourists' negative impact to coral reef	11.1	72.2	16.7
Coastal erosion			
- Erosion negative effect to coastal communities	0.0	5.6	94.4
- Erosion by climate	0.0	33.3	66.7
- Erosion by human	38.9	50.0	11.1
Coastal pollution			
- Oil spill are cause pollution coastal zone	72.2	22.2	5.6
- Direct discharge garbage from communities to coastal	0.0	11.1	88.9
- Companies discharge waste in to coastal	0.0	11.1	88.9
- Aquaculture discharge waste in to coastal	0.0	16.7	83.3
Total	0.0	50.0	50.0

The comparison of opinion on environmental problem between groups of experts showed that there is a significant difference (p=0.015). NGOs expressed their opinion on the problem differ from other groups. While the other groups of experts had same opinion about the problem. NGOs mentioned that the environmental problem was more serious and they paid more attention on negative impact of environment to fishery, coastal ecosystem and coastal communities (table 76).

Table 76 Comparison of the opinion on environment problem by groups of experts.

(n=18)

Groups of experts	Opinion on environment problem				Multiple comparison
	Mean	SD	F	p	LSD
NGOs	6.80	0.23	8.290	0.015*	a
Researcher	6.27	0.33			b b
Fishers leader	6.07	0.24			c b c
Government	6.00	0.32			d b c

Note: ns refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For multiple comparison, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

*Fishers' problem*s

Fishers' problems were composed of the problem of conflict, problem of relationship and awareness. The degree of overall problem was found to be at moderate level (88.9%).

The problem of conflict

More than one-third of experts mentioned that the problem of conflict between commercial and small-scale fishers is a serious problem (38.9%). More than half of experts mentioned that the problem of conflict between indigenous coastal communities and others coastal communities is a serious problem (50.0%). However, 44.4% of experts mentioned that the problem of conflict between small-scale and culture company is not a serious problem and its degree is at low level (table 77).

Relationship and awareness

Most of experts mentioned that less relationship between fishers and leaders of villages was a problem and its degree is at high level (94.4%). Most of experts thought that less awareness of fishers on resources and environment policy and

less relationship between fishers in communities is a serious problem (83.3% and 72.2%, respectively) (table 77).

Table 77 Degree of fishers' problems. (n=18)

Fishers' problems	Degree of problem		
	Low	Medium	High
Conflict			
- Between commercial and small-scale	16.7	44.4	38.9
- Between small-scale and culture company	44.4	55.6	0.0
- Between indigenous coastal communities with others coastal communities	0.0	50.0	50.0
Relationship and awareness			
- Less awareness of fisher on resource and environment policy	0.0	16.7	83.3
- Less relationship of fishers in communities	0.0	27.8	72.2
- Less relationship of fisher and leader of village	0.0	5.6	94.4
Total	0.0	88.9	11.1

When comparing the opinion about fishers' problem between groups of experts, the result showed that there was no significant difference between groups of experts. Government, NGOs, researcher and fishers' leader thought in the same way about the problem (p=0.403). They believed that fisher's problems are serious except the problem of conflict between small-scale and culture company (table 78).

Table 78 Comparison of the opinion on fishers' problems by groups of expert.

(n=18)

Groups of experts	Opinion on fishers' problems			
	Mean	SD	F	p
NGOs	6.94	0.35	7.573	0.403^{ns}
Government	6.57	0.51		
Researcher	6.50	0.50		
Fishers leader	6.39	0.19		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For multiple comparison, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Government organization

The problems of government organization consisted of the lack of manpower of government staff, weakness of governor service, inefficient in fishery management of government, and unsuitable government structure. The problem of government organization was found to be at moderated level (72.2%). More than three-fourth of experts mentioned that unsuitable government structure was a problem at high level (77.8%). Two-third of them mentioned that inefficient fishery management by government is a serious problem (66.7%) but degree of problem about weakness of governor service for fishers is found to be at moderate level (66.7%). Besides that, 11.1% of experts mentioned that the lack of manpower of government staff is not a serious problem at low level (table 79).

The comparison on the opinion about problem of government organization between groups of experts found that all groups of experts thought in the same way about the problem (p=0.843). They believed that organization problems are serious problems (table 80).

Table 79 Degree of problem of government organization. (n=18)

Government Organization	Degree of problem		
	Low	Medium	High
Government			
- Lack of manpower of government staff	11.1	50.0	38.9
- Weak governor service for fishers	0.0	66.7	33.3
- Inefficient fishery management by government	0.0	33.3	66.7
- Unsuitable government structure	0.0	22.2	77.8
Total	0.0	72.2	27.8

Table 80 Comparison of the opinion on organization problem by groups of expert. (n=18)

Groups of experts	Opinion on organization problem			
	Mean	SD	F	p
NGOs	6.92	0.72	6.146	0.843^{ns}
Government	6.64	0.47		
Researcher	6.42	1.01		
Fishers leader	6.42	0.76		

Note: the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.01 and 0.05, respectively.

Legislation

The problem of legislation consisted of the problem of regulation and policy supporting.

For problem of regulation, all experts mentioned that communities are playing fewer roles in decision-making. Besides that, the experts mentioned that fishers

are playing fewer roles in coastal resources management (94.4%). These two points were serious problems. Similar to the opinion about the lack of right decentralization to communities in order to manage fishery resources and the lack of knowledge and discipline of fishers about policy, these two points were also serious problems at high level (83.3% and 77.8%, respectively).

Half of experts thought that degree of problem about inefficient policy is at high level (50.0%) while another half of experts thought that its degree is at moderate level (50.0%). One-third of experts thought that the weakness of propaganda and disseminate the policy of fishers is a at moderate scale problem (33.3%) (table 81).

Most of experts mentioned that the degree of overall problem of legislation is at high level (88.9 %) and medium level (11.1 %). The policy system was enacted but ineffective. The policy propaganda and dissemination to communities was very weak with fewer roles of fishers in decision-making. Most of experts thought that the problem of inefficient of policy is a serious problem at medium level (50.0 %) and high level (50.0 %), respectively (table 81).

For the budget providing to improve the quality of life, alleviate poverty, eliminate hunger and subsidy to change occupation, the experts mentioned that a weakness in the subsidy of government about budget, alleviating poverty and eliminating hunger and changing occupation are serious problems (94.4% and 83.3%, respectively). This indicated that the government has limited action for providing the budget to improve quality of life, alleviate poverty, and eliminate hunger and subsidy to change occupation (table 81).

Table 81 Degree of legislation problem. (n=18)

Legislation problem	Degree of problem		
	Low	Medium	High
Regulation			
- Inefficient of policy in the real life	0.0	50.0	50.0
- Propaganda, disseminate the policy to fishers is weak	0.0	33.3	66.7
- Less knowledge and discipline of fishers about policy	0.0	22.2	77.8
- Role of community in decision making is very weak	0.0	0.0	100.0
- Role of fishers in manage coastal resource is very weak	0.0	5.6	94.4
- Less decentralization right for communities to manage fishery resources	0.0	16.7	83.3
Policy supporting			
- Subsidy the budget to improve their life, alleviate poverty, eliminate hunger from government is weakness	0.0	5.6	94.4
- Subsidy to change occupation from government is weak	0.0	16.7	83.3
Total	0.0	11.1	88.9

There was no significant difference thinking on legislation problem between groups of expert (p=0.534). The opinion of government, NGOs, researcher and fishers' leader were same and they mentioned that legislation problem is a serious problem (table 82).

Table 82 Comparison of the opinion on legislation problem by groups of expert.

(n=18)

Groups of experts	Opinion on legislation problem			
	Mean	SD	F	P
Researcher	8.04	0.07	7.869	0.534^{ns}
Fishers leader	7.96	0.40		
Government	7.85	0.69		
NGOs	7.50	0.57		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For multiple comparison, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

2.3 The degrees of present management system

The present management system synthesized from experts responding on present management measures to manage fishery resources, environment and fishers. The study indicated that many of the present management measures are ineffective such as area closure, seasonal closure, fishing gear restriction, and the regulation for fishery management is not enough. The degree of present management system is described as follows:

Seasonal closure

The experts expressed their opinion about success opportunity degree of seasonal closure measure at medium level (72.2%). About three-fourth of experts thought that this measure has medium chance in management of capture in the coastal zone, decreasing of CPUE, overexploiting in coastal zone and declining biodiversity (72.2%, 72.2%, 72.2% and 72.2%, respectively). This indicated that the measure was not completely success because many vessels violated the regulation and the government did not control fishing vessels operating fishing during prohibited period (table 83).

Table 83 The opportunities degree of present management measure. (n=18)

Seasonal closure	Opportunities degree		
	Low	Medium	High
- Fishers use coastal zone for capture	27.8	72.2	0.0
- CPUE decrease	27.8	72.2	0.0
- Overexploiting in coastal zone	27.8	72.2	0.0
- Declining biodiversity	27.8	72.2	0.0
Total	27.8	72.2	0.0

There was no significant difference about degree of success of the seasonal closure measure when comparing the opportunities' degree of success of measure between groups of experts (p=0.974). Government, NGOs, researcher and fishers leaders assessed that the measure was not completely success (table 84).

Table 84 Comparison of the opinion on seasonal closure measure by groups of experts. (n=18)

Groups of experts	Opinion on seasonal closure measure			
	Mean	SD	F	p
Government	7.1	1.8	0.073	0.974^{ns}
NGOs	6.7	2.3		
Researcher	6.7	2.3		
Fishers leader	6.7	2.3		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For multiple the comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Area closure

About two-third of experts expressed their opinion about success opportunities degree of area closure that overall degree of success of the measure is at medium level (61.1%) while more than one-third of them thought that the degree of success of the measure is at low level (38.9%). About two-third of experts thought that the measurement of area closure had medium chance in management of capture in coastal zone, CPUE decrease, overexploiting in coastal zone and declining biodiversity (61.1%, 61.1%, 61.1% and 61.1%, respectively). This indicated that the measure is not completely success. (table 85).

Table 85 The opportunities degree of area closure. (n=18)

Area closure	Opportunities degree		
	Low	Medium	High
- Fisher use coastal for capture	38.9	61.1	0.0
- CPUE decrease	38.9	61.1	0.0
- Overexploiting in coastal zone	38.9	61.1	0.0
- Declining biodiversity	38.9	61.1	0.0
Total	38.9	61.1	0.0

The comparison of opportunity degree of success of area closure between groups of experts found that there was no significant difference thinking about degree of success of the measurement (p=0.444). Government, NGOs, researcher and fishers leaders thought that the measure is not completely success (table 86).

Table 86 Comparison of the opinion on area closure measure by groups of experts.

(n=18)

Groups of experts	Opinion on area closure measure			
	Mean	SD	F	p
Government	6.2	2.1	0.948	0.444^{ns}
NGOs	5.3	2.3		
Researcher	6.7	2.3		
Fishers leader	8.0	0.0		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For multiple the comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Limited entry

Overall degree of success of limited entry measure was low-to-medium level. Half of experts thought that the measure has medium chance in management of capture in coastal zone, decreasing of CPUE, overexploiting in coastal zone and declining in biodiversity while another half of them thought that the chance of success was at low level. This indicated that the measure was not completely success (table 87).

Table 87 The opportunities degree of limited entry. (n=18)

Limited entry	Opportunity degree		
	Low	Medium	High
- Fishers use coastal for capture	50.0	50.0	0.0
- CPUE decrease	50.0	50.0	0.0
- Overexploiting in coastal zone	50.0	50.0	0.0
- Declining biodiversity	50.0	50.0	0.0
Total	50.0	50.0	0.0

When comparing the opportunity degree of success of limited entry between groups of experts, there was no significant difference opinion about degree of success of the measure (p=0.820). Government, NGOs, researcher and fishers leaders thought that the measure is not completely succeed (table 88).

Table 88 Comparison of the opinion on limit entry by groups of experts. (n=18)

Groups of experts	Opinion on limited entry			
	Mean	SD	F	p
Government	6.2	2.1	0.307	0.820^{ns}
NGOs	5.3	2.3		
Researcher	6.7	2.3		
Fishers leader	5.3	2.3		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

Marine protected area

Degree of success of marine protected area was at low-to-medium level. Half of experts thought that the measure has medium chance in management of capture in coastal zone, decreasing of CPUE and rare species while another half of them thought that the chance of success for this measure was at low level because its implementation depended on the financial supporting (table 89).

Table 89 The opportunities degree of marine protected area. (n=18)

Marine protected area	Opportunity degree		
	Low	Medium	High
- Fisher use coastal for capture	50.0	50.0	0.0
- CPUE decrease	50.0	50.0	0.0
- Rare species continuous decrease	50.0	50.0	0.0
Total	50.0	50.0	0.0

There was no significant difference thinking on degree of success for the measurement of marine protected area between groups of expert (p=0.820). Government, NGOs, researcher and fishers leaders thought that the measure is not completely succeed (table 90).

Table 90 Comparison of the opinion on marine protected area by groups of experts. (n=18)

Groups of experts	Opinion on marine protected area			
	Mean	SD	F	p
Government	4.7	1.6	0.307	0.820^{ns}
NGOs	4.9	1.7		
Researcher	5.0	1.7		
Fishers leader	4.0	1.7		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

Fishing gear restriction

More than half of experts expressed their opinion about success opportunity of fishing gear restriction that the degree of success of the measure is at medium level

(55.6%). However, 44.4% of experts thought that the measure had low chance in management of capture in coastal zone, decreasing of CPUE, overexploiting in coastal zone and declining in biodiversity. Because the fishers saw many fishing gears such as push net and trawl still operated in the prohibited area of inshore (table 91).

Table 91 The opportunities degree of fishing gear restriction.

(n=18)

Fishing gear restriction	Opportunity degree		
	Low	Medium	High
- Fishers use coastal zone for capture	44.4	55.6	0.0
- CPUE decrease	44.4	55.6	0.0
- Overexploiting in coastal zone	44.4	55.6	0.0
- Declining biodiversity	44.4	55.6	0.0
Total	44.4	55.6	0.0

Table 92 Comparison of the opinion on fishing gear restriction by groups of experts.

(n=18)

Groups of experts	Opinion on fishing gear restriction			
	Mean	SD	F	p
NGOs	8.0	0.0	1.167	0.357^{ns}
Fishers leader	6.7	2.3		
Government	5.8	2.1		
Researcher	5.3	2.3		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

The comparison of opportunity degree of success for fishing gear restriction measure between groups of experts found that there was no significant difference thinking on degree of success for the measurement (p=0.357). Government, NGOs, researcher and fishers leaders thought that the measure is not completely succeed (table 92).

Mesh size limits

Overall degree of success of mesh size limits measure was at medium level (66.7%). One third of experts thought that overall degree of success of the measure is at low level (33.3%). About two-third of experts thought that the chance of success of this measure to solve the problem of overexploiting in coastal zone and declining in biodiversity is at medium level (61.1% and 66.7%, respectively) (table 93).

Table 93 The opportunities degree of mesh size limitation. (n=18)

Mesh size limitation	Opportunity degree		
	Low	Medium	High
- Overexploiting in coastal zone	38.9	61.1	0.0
- Declining biodiversity	33.3	66.7	0.0
Total	33.3	66.7	0.0

The comparison of opportunity degree of success for the mesh size limits measure between groups of experts found that government, NGOs, researcher and fishers' leaders though in the same way about chance of success of the measurement (p=0.876) (table 94).

Table 94 Comparison of the opinion on mesh size limitation by groups of expert.

(n=18)

Groups of experts	Opinion on mesh size limitation			
	Mean	SD	F	P
Government	3.1	1.1	0.226	0.876^{ns}
NGOs	3.7	0.6		
Researcher	3.3	1.2		
Fishers leader	3.3	1.2		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For multiple comparison, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

Minimum size of fish to be caught

Overall degree of success of minimum size limits measure was at medium level (61.1%). More than one third of experts thought that the chance of success for the measurement to solve the problem of overexploiting in coastal zone and declining in biodiversity is at low level (38.9% and 38.9%, respectively) (table 95).

Table 95 The opportunities degree of minimum size of fish to be caught. (n=18)

Minimum size of fish to be caught	Opportunity degree		
	Low	Medium	High
- Overexploiting in coastal zone	38.9	61.1	0.0
- Declining biodiversity	38.9	61.1	0.0
Total	38.9	61.1	0.0

When comparing the opportunity degree of success for the measurement of minimum size fish to be catch between groups of experts, there was no significant

difference assessment on the chance of success of minimum size limited measure (p=0.806) (table 96).

Table 96 Comparison of the opinion on minimum size of fish to be caught by groups of experts (n=18)

Groups of experts	Opinion on minimum size of fish to be caught			
	Mean	SD	F	p
Government	2.7	1.0	0.324	0.806^{ns}
NGOs	3.3	1.2		
Researcher	2.7	1.2		
Fishers leader	2.7	1.2		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

Monitoring, control and surveillance

Overall degree of success for the measure of monitoring, control and surveillance was at medium level (72.2%). About three-fourth of experts thought that the measure has medium chance to solve the problem of discharging waste water to the coastal zone by companies and aquaculture and direct discharging garbage from communities to coastal (72.2%, 72.2% and 72.2%, respectively). Two-third of experts thought that the measure has medium chance to solve the problem of continuous illegal exploiting of rare coral, decreasing of mangrove forest and lacking of hygiene of fishing port. Besides that, 5.6% of experts thought that this measure has high probability success to manage problem of water quality in coastal zone. However, more than half of experts thought that this measure is not success in managing the problem of coral reef decreasing (55.6%). This indicated that the measure is not completely succeeded due to the violation of many vessels (table 97).

Table 97 The opportunities degree of monitoring, control and surveillance. (n=18)

Monitoring, control and surveillance	Opportunity degree		
	Low	Medium	High
- Companies discharge waste water in to coastal zone	27.8	72.2	0.0
- Direct discharge garbage from communities to coastal	27.8	72.2	0.0
- Aquaculture discharge waste water in to coastal	27.8	72.2	0.0
- Water quality in coastal zone	33.3	61.1	5.6
- Rare coral continuous illegal exploiting	33.3	66.7	0.0
- Mangrove forest are decrease	33.3	66.7	0.0
- Hygiene of fishing port	33.3	66.7	0.0
- Coral reef are decrease	55.6	44.4	0.0
Total	27.8	72.2	0.0

Table 98 Comparison of the opinion on monitoring, control and surveillance by groups of expert (n=18)

Groups of experts	Opinion on monitoring, control and surveillance			
	Mean	SD	F	p
Government	13.6	3.3	0.060	0.980^{ns}
NGOs	12.7	4.0		
Researcher	13.0	4.4		
Fishers leader	13.7	4.0		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

There was no significant difference of opportunity degree of success of the monitoring, control and surveillance measure between groups of experts (p=0.980).

Government, NGOs, researcher and fishers leaders thought the same about the achievement of this measure and they thought that the measure is not success (table 98).

License for using coastal zone

Most of experts thought that overall degree of success of license measure is at medium level (94.4%) and only 5.6% of experts thought that this measure has high probability of success in management. One-third of experts thought that the measure of license for using coastal zone has high chance in solving conflict management between small-scale fishers and culture company (33.3%). Besides that, the measure had high probability of success in managing the aquaculture utilization in coastal zone (33.3%). However, the chance of this measure to manage tourism in coastal zone was at medium level (88.3%) (table 99).

Table 99 The opportunities degree of license for using coastal zone. (n=18)

License for using coastal zone	Opportunity degree		
	Low	Medium	High
- Conflict small-scale and culture company	0.0	66.7	33.3
- Fisher use coastal zone for culture	0.0	66.7	33.3
- Fisher use coastal zone for tourism	0.0	88.3	16.7
Total	0.0	94.4	5.6

The comparison of the opportunity degree of success for the license measure between groups of experts found that government, NGOs, researcher and fishers leader thought in the same way about opportunity (p=0.437) (table 100).

Table 100 Comparison of the opinion on license for using coastal zone by groups of expert. (n=18)

Groups of experts	License for using coastal zone			
	Mean	SD	F	p
Government	7.0	1.1	0.964	0.437^{ns}
NGOs	6.7	1.2		
Researcher	7.3	1.2		
Fishers leader	6.0	0.0		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05

Zoning of fishing ground

All experts thought that overall degree of success for zoning of fishing ground is at medium level. Two-third of experts thought that the measure has medium chance in success in managing the aquaculture in coastal zone (66.7%) but one-third of experts thought that the chance of success is at high level (33.3%). Most experts thought that the measure has medium chance of success in conflict management between small-scale fishers and culture company (61.1%). However, more than one-third of experts thought that the measure is not more success for conflict management between indigenous coastal community and others coastal community and between commercial and small-scale fishers (38.9% and 38.9%, respectively) (table 101).

Table 101 The opportunities degree of zoning of fishing ground. (n=18)

Zoning of fishing ground	Opportunity degree		
	Low	Medium	High
- Conflict indigenous coastal community with other coastal community	38.9	61.1	0.0
- Conflict between commercial and small-scale	38.9	50.1	11.1
- Conflict small-scale and culture company	16.7	66.7	16.7
- Fisher use coastal for culture	0.0	66.7	33.3
- Fisher use coastal for tourism	0.0	94.4	5.6
Total	0.0	100.0	0.0

The comparison of opportunity degree success of zoning of fishing ground between groups of experts found that there was no significant difference (p=0.973). All groups of experts thought the same about the probability of success of the measure (table 102).

Table 102 Comparison of the opinion on zoning of fishing ground by groups of experts. (n=18)

Groups of experts	Opinion on zoning of fishing ground			
	Mean	SD	F	p
Government	9.7	1.3	0.075	0.973^{ns}
NGOs	10.0	1.0		
Researcher	9.7	0.6		
Fishers leader	9.7	0.6		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Prohibition for endangers species capture

Overall degree of success for the prohibition for endangers species capture was at medium level (94.4%). Only 5.6% of experts thought that the measure has low probability for success. Most experts thought that the measure has medium probability success in limiting the exploitation method, which affect marine resources (88.9%). About three-fourth of experts thought that the measure has medium probability success in restriction illegal seabed exploitation (72.2%). Besides that, 22.2% and 11.1% of experts thought that the measure has high chance for mangrove's destructible restriction for aquaculture and prohibition to capture rare species. However, more than one-third thought that the probabilities for the capture prohibition of endanger species success is at low level (38.9%). By regulation, the capture of endanger species was prohibited but fishers has been violated and many endanger species continuous to be caught (table 103).

Table 103 The opportunities degree of prohibition for endangers species capture.

(n=18)

Prohibition for endangers species capture	Opportunity degree		
	Low	Medium	High
- Prohibited catch endanger species	38.9	61.1	0.0
- Prohibited catch rare species	22.2	66.7	11.1
- Limited destroy method to exploiting marine resource	11.1	88.9	0.0
- Restriction destroy mangrove for aquaculture	11.1	66.7	22.2
- Restriction illegal seabed exploitation	27.8	72.2	0.0
Total	5.6	94.4	0.0

The comparison of opportunity degree of success for the capture prohibition of endangered species measure between groups of experts found that there was highly significant difference (p=0.001). Government thought differently from others groups. The government mentioned that the measure has probability success higher than others

did. However, both researcher and fishers' leader thought in the same way about the probability success of this measure but their opinion was difference from NGOs (table 104).

Table 104 Comparison of the opinion on prohibition for endangers species capture measure by groups of experts. (n=18)

Groups of experts	Opinion on prohibited measure				Multiple comparison
	Mean	SD	F	P	LSD
Government	10.0	0.14	8.899	0.001*	a
Researcher	8.7	1.5			b b
Fishers leader	8.7	0.6			c b c
NGOs	7.0	1.0			d c d

Note: ns refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Mangrove recovering measure

Overall degree of success for the mangrove recovering measure was found to be at moderate level (83.3%). For restoration of mangrove forests, two-third of experts thought that the measure had medium probability success in restoration the mangrove forests, which destroyed by climate change (66.7%). However, about three-fourth of experts thought that the measure is not success in restoration the mangrove forests destroyed by aquaculture (72.2%). About three-fourth of experts thought that the measure has medium probability success in preventing erosion by building stone embankment (72.7%). However, half of experts and 44.4% of experts thought that the measure is not success in culture arrangement along coastal line and restoration the marine ecosystem, respectively (table 105).

Table 105 The opportunities degree of mangrove recovering measure. (n=18)

Mangrove recovering measure	Opportunity degree		
	Low	Medium	High
Restore mangrove forests			
- Restore mangrove forests which were decreased	33.3	66.7	0.0
- Restore mangrove forests which were destroy by climate change	33.3	66.7	0.0
- Restore mangrove forest caused destroy by aquaculture	72.2	27.8	0.0
- Restore coral reef	72.7	27.8	0.0
- Restore marine ecosystem	44.4	55.6	0.0
- Created new generation for rare species	72.2	27.8	0.0
- Prevent erosion by building stone embankment	27.8	72.7	0.0
- Culture arrangement along coastal line	50.0	50.0	0.0
Total	16.7	83.3	0.0

Table 106 Comparison of the opinion on recover measure by groups of experts.

(n=18)

Groups of experts	Opinion on mangrove recovering measure			
	Mean	SD	F	P
Government	12.3	1.0	1.003	0.420^{ns}
NGOs	10.7	2.5		
Researcher	12.0	2.0		
Fishers leader	11.3	1.5		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

The comparison of opportunity degree success of mangrove recovering between groups of experts found that there is no significant difference (p=0.420). Government, NGOs, researcher and fishers leader thought the same about the probability success of this measure (table 106).

Improvement of fishers' knowledge

Most of experts thought that overall degree success for improvement of fishers' knowledge is at medium level (88.9%). About three-fourth of experts thought that the improvement of fishers' knowledge about catch level of endanger species in the coastal zone has medium level of success which is similar to probability success of the improvement of fishers' knowledge about rare species continuous to be decreased. More than one-third of experts thought that the chance of success of propaganda on resources and environment knowledge for community is at low level. (table 107).

Table 107 The opportunities degree of improvement fishers' knowledge. (n=18)

Improvement of fishers' knowledge	Opportunity degree		
	Low	Medium	High
- Propaganda for fishers family to compliance regulation of government	27.8	61.1	11.1
- Propaganda on resources and environment knowledge for community	38.9	61.1	0.0
- Propaganda the important of resources and environment knowledge for fishers communities	38.9	50.0	11.1
- Propaganda fishery policy for fishers	38.9	50.0	11.1
- Improving fisher knowledge about catch level of endanger species in coastal zone	22.2	72.2	5.6
- Improving fisher knowledge about rare species continuous decrease	22.2	72.2	5.6
Total	11.1	88.9	0.0

The comparison of success opportunity degree for the improvement of fishers' knowledge between groups of experts found that there is highly significant difference (p=0.003) and government thought differently from others groups. The government mentioned that the improvement of fishers' knowledge has higher probability success than others did. While NGOs, researcher and fishers leader thought in the same way about the probability success of improvement fishers' knowledge (table 108).

Table 108 Comparison of the opinion on improvement fishers' knowledge by groups of experts. (n=18)

Groups of experts	Opinion on improving fishers' knowledge				Multiple comparison		
	Mean	SD	F	p	LSD		
Government	11.9	1.1	7.436	0.003**	a		
NGOs	9.3	2.1			b	b	
Fishers leader	9.3	0.6			c	b	c
Researcher	9.0	1.0			d	b	c

Note: ns refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Fishery co-management

About three-fourth of experts thought that overall degree of success for fishery co-management is at medium level (72.2%). About two-third of experts thought that co-management approach in fishers awareness on resources and environment has medium chance success. While 11.1% of experts thought that it has high probability of success. More than half of experts thought that the application of co-management to communities has medium chance of success while 5.6% thought that it has high probability of success. Half of experts thought that success opportunity degree of

co-management application is at low level while another half of experts thought that it has medium chance of success (table 109).

Table 109 The opportunities degree of fishery co-management. (n=18)

Fishery co-management	Opportunity degree		
	Low	Medium	High
- Co-management application	50.0	50.0	0.0
- Co-management approach (Knowledge and discipline of policy of fishers)	50.0	50.0	0.0
- Co-management approach (awareness of fisher about resource and environment)	27.8	61.1	11.1
- Application co-management to communities	38.9	55.6	5.6
- Application co-management for small-scale	44.4	55.6	0.0
Total	27.8	72.2	0.0

Table 110 Comparison of the opinion on fishery co-management by groups of experts. (n=18)

Groups of experts	Opinion on fishery co-management			
	Mean	SD	F	p
Government	7.8	1.9	1.067	0.395^{ns}
NGOs	7.7	1.2		
Researcher	9.3	0.6		
Fishers leader	7.0	1.7		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

There was no significant difference assessment on the chance of success when comparing the success opportunity degree for fishery co-management between groups of experts, (p=0.395) (table 110).

Government's subsidy

Most experts thought that opportunity degree of success of government's subsidy is at medium level (83.3%). All experts thought that the opportunity degree success of central government investment logistic is at medium-to-high level. About three-fourth of experts thought that the education encouragement to fishers' child has medium chance of success (72.2%). About two-third of experts thought that the success opportunity in supporting the education on occupation to fishers with free of charge was at medium level (72.2%) and 61.1% of experts thought that the opportunity degree of success in supporting the budget for a program of free internet for poor people is at medium level (61.1%) which is similar to the success opportunity degree of government subsidy on annual financial and technical supports for poor communities with free interest rate. However, most experts thought that the success opportunity degree of provincial government investment and central government control and supply water for community is not success. Its success degree was at low level (83.3% and 72.2%, respectively) (table 111).

There was highly significant difference (p=0.001) when comparing the success opportunity degree for government's subsidy between groups of experts. Government and researcher thought differently from NGOs and fishers' leaders. The government and researcher mentioned that the government's subsidy has success probability higher than others did. However, government and researcher thought in the same way about the government's subsidy achievement (table 112).

Table 111 The opportunities degree of government's subsidy. (n=18)

Government's subsidy	Opportunity degree		
	Low	Medium	High
- Central government investment logistic	0.0	83.3	16.7
- Province government investment	38.9	55.5	5.6
- Private investment	83.3	16.7	0.0
- Government control and supply water for community	72.2	27.8	0.0
- Subsidy resource tax and fuel	27.8	44.4	27.8
- To building stone embankment	33.3	66.7	0.0
- Severely enforcement of fishery policy	38.9	50.0	11.1
- Open internet to every one	22.2	61.1	16.7
- Support from government to use internet at rural area	55.6	38.9	5.6
- Program budget with free interest rate for poor people	27.8	61.1	11.1
- Support educate occupation for fishers with free charge	33.3	66.7	0.0
- Encourage fisher's child go to school	22.2	72.2	5.6
- Government subsidy financial and technical annual year for poor communities with free interest rate	27.8	61.1	11.1
- NGOs subsidy financial and technical for poor communities	11.2	44.4	44.4
Total	16.7	83.3	

Table 112 Comparison of the opinion on government's subsidy measure by groups of expert. (n=18)

Groups of experts	Opinion on government's subsidy				Multiple comparison		
	Mean	SD	F	p	LSD		
Government	26.9	2.3	10.28	0.001**	a		
Researcher	26.3	3.5			a	b	
NGOs	21.0	1.5			b	c	c
Fishers leader	19.7	1.5			c	d	c

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

Fishery management

All experts thought that the success opportunity degree for fishery management is at medium level. About one-third of experts thought that the success opportunity degree in number of child limitation in family and community supply by themselves is at high level (38.9% and 33.3%, respectively). About three-fourth of experts thought that degree of success for subsidy for fishers'child's education who graduated under secondary school is at medium level (72.2%). About two-third of experts thought that degree of success of providing the lifebuoy for fishers and regulation the criterion for safety is at medium level (61.1% and 61.1%, respectively). About three-fourth of experts thought that chance of success for government's program for supporting and eliminating hunger and alleviating poverty and prevention people in harvest the mangroves and sands is at medium level (77.8% and 72.2%, respectively) (table 113).

Table 113 The opportunities degree of fishery management. (n=18)

Fishery management	Opportunity degree		
	Low	Medium	High
- Limited number of child in family 1 or 2 children	5.6	55.6	38.9
- Subsidy class fee for fishers' child under secondary school	22.2	72.2	5.6
- Provide the lifebuoy for fishers	22.2	61.1	16.7
- Regulation the criterion for safety go out the sea.	27.8	61.1	11.1
- Program of government to support eliminate hunger and reduce poverty	0.0	77.8	22.2
- Communities supply by themselves	0.0	66.7	33.3
- Prevent people harvest mangroves, harvest sands	27.8	72.2	0.0
- Encourage people to maintain mangrove	33.3	66.7	0.0
Total	0.0	100.0	0.0

Table 114 Comparison of the opinion on fishery management by groups of expert. (n=18)

Group	Opinion on fishery management				Multiple comparison
	Mean	SD	F	p	LSD
Government	17.0	1.7	3.725	0.037*	a
Researcher	16.0	3.0			a b
Fishers leader	14.7	1.2			b b c
NGOs	13.0	1.7			c d c

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

There was significant difference (p=0.037) when comparing the success opportunity degree for fishery management between groups of experts and the government thought differently from NGOs and fishers leader. Besides that, government and researcher thought differently from NGOs about the degree of success of fishery management. Both government and researcher mentioned that degree of success of fishery management is higher than others did (table 114).

Fish market and fishing port hygiene

Most of experts thought that overall success degree of fish market and fishing port hygiene is at medium-to-high level (94.4%). More than one-third of experts thought that fishing port and fish market controlled by company belongs to government has high chance of success (38.9%). Most experts thought that in order to control fish price, the middleman must be controlled in medium-to-high level because the middleman were significant playing roles in the chain value of fish market in Vietnam (83.3%). About two-third of experts thought that the chance of success of establishing the hygiene criterion of fishing port was at medium while more than one-fourth of experts thought that it is not success. Its degree of success was at low level (27.8%) (table 115).

The role of middleman was very important in the chain of fish market in Vietnam, not only supporting financial for fishers, but also controlling fish price. Half of experts believed that middleman controls fish price at medium level (55.6 %). 16.7 percent of the experts responded that the fishing port is mostly controlled by company belonging to the government at low level when 38.9 percent and 55.6 percent of experts responded at high level at medium level, respectively (table 115).

Table 115 The opportunities degree of fish market and fishing port hygiene.

(n=18)

Fish market and fishing port hygiene	Opportunity degree		
	Low	Medium	High
1. Issues criterion of fishing port hygiene	27.8	61.1	11.1
2. Middleman control fish price	16.7	55.6	27.7
3. fishing port, market control by company belong government	16.7	44.4	38.9
Total	5.6	88.8	5.6

There was no significant difference (p=0.502) when comparing the success opportunity degree for fish market and fishing port hygiene between groups of experts. Government, NGOs, researcher and fishers leaders thought in the same way about the success degree of fish market and fishing port hygiene (table 116).

Table 116 Comparison of the opinion on market and fishing port hygiene by groups of expert. (n=18)

Group	Opinion on market and fishing port hygiene			
	Mean	SD	F	p
Government	6.4	1.4	0.824	0.502^{ns}
NGOs	5.3	0.6		
Researcher	6.7	1.2		
Fishers leader	5.7	1.5		

Note: ^{ns} refers to indifferent between groups, * refers to $p < \alpha = 0.05$, ** refers to $p < \alpha = 0.01$. For the multiple comparisons, the similar alphabet between groups of expert refers to indifferent between groups at significant level 0.05.

3. New management option

The experts gave some ideas for fishery resources management in the next step such as applying ecosystem approach, governance interaction approach, applied turtle exclude device (TED) for trawl, vessel monitoring system (VMS), implement grant catch certificate for prove fish production from fish catch not from IUU vessel, prohibition building new fishing vessel in 10 years, and implement buy back fishing vessel and sinking for artificial reef.

For the coastal environment, fishers, and legislation, experts responded that there should be an improvement of high level for environment criteria, give certificate for environmental friendly of aquaculture product, applying GIS for management mangrove forest. There should be prohibiting the utilization in coral reef for ornamental fish, confiscate fishing vessel violates coastal area third time, annual assessment of hygiene of fishing port. The government should give budget for woman association to lend fisher's family for investment new job, enact environment criteria for sea aquaculture, prohibit sand exploitation at the sensitive costal area, and educate children in secondary school and high school. There should be propaganda of fishery policy on television and setting up fishery information on internet at fishery community (table 117).

Table 117 The new management option for management plan of next stage.

Items	At present management	New management option
1. Number of child in fishers family	1. Limited number of child in family 1 or 2 children	To improving knowledge, awareness of fishers
	2. Propaganda for fisher family to compliance regulation of government.	
2. Fishers use coastal zone for capture	1. Close season	To integrate coastal use
	2. Close area	Ecosystem approach
	3. MPA	
	4. Fishing gear restriction	
	5. Limited number of fishing boat	
3.Companies discharge waste in to coastal	1 Monitoring, control and surveillance	Improvement of high level for environment criteria.
		Give communities power for monitoring and surveillance
4. Direct discharge garbage from communities to coastal	1. Monitoring, control and surveillance	Improving community in environment management
	2. Propaganda of environment knowledge for community	
5. People destroy mangrove as for aquaculture	1. Restriction destroy mangrove for aquaculture	Give certificate for aquaculture product friendly with environment
	2. Restore mangrove forest	
6. CPUE decrease	1. Close season	Applied out put control like quotas for Tuna
	2. Close area	To apply VMS
	3. MPA	Integration approach
	4. Fishing gear restriction	Ecosystem Approach
	5. Limited number of fishing boat	

Table 117 (Continued)

Items	At present management	New management option
7. Catch level of endanger species in coastal zone	1. Prohibited catch endanger species	Applied Turtle Exclude Device (TED) for trawl
	2. Improving fisher knowledge	To implement grant catch certificate for prove fish production from fish catch not from IUU vessel
8. Rare species continuous decrease	1. Prohibited catch rare species	High penalty who catch rare species.
	2. Improving fisher knowledge	Propaganda for people don't eat rare species
	3. MPA	
	4. Create new generation for rare species	
9. Aquaculture discharge waste in to coastal	1. Monitoring, control and surveillance	Building aquaculture criteria with restrict environment
10. Disturbance ecological balance	1. Limited destroy method to exploiting marine resource	Ban twin trawl fishing
	2. Restriction illegal seabed exploitation	Ecosystem approach
11. Water quality in coastal zone	1. Monitoring, control and surveillance	Fisher communities attend management water quality
12. Erosion by climate	1. Prevent by building stone embankment	
	2. Cultivate mangrove along coastal line	
13.Rare coral continuous illegal exploiting	1. Improvement monitoring, control, surveillance	To ban use coral reef for ornament

Table 117 (Continued)

Items	At present management	New management option
14. Overexploiting in coastal zone	1. Gear Restrictions	To ban building new fishing vessel in 10 years.
	2. Limited entry	Buy back fishing vessel and sinking for artificial reef.
	3. Mesh size limit	To apply VMS
	4. Minimum size limit	Integration approach
	5. Close season	Ecosystem Approach
	6. Close area	
	7. Co-management application	
15.Declining biodiversity	1. Gear Restrictions	To ban building new fishing vessel in 10 years.
	2. Limited entry	Buy back fishing vessel and sinking for artificial reef.
	3. Mesh size limit	To apply VMS
	4. Minimum size limit	Integration approach
	5. Closure season	Ecosystem Approach
	6. Close area	
	7. Restore marine ecosystem	
16.Conflict indigenous coastal communities with others coastal communities	1. Devise coastal zone for indigenous communities	To transfer right and support finance and force to indigenous communities
	2. Application co-management to communities	
17. Coral reefs are decrease	1. Improvement monitoring, control, surveillance	To ban use coral reef for ornament
	2. Restore core reefs	
18. Mangrove forests are decrease	1. Monitoring, control, surveillance	Improving applied GIS for management mangrove forest
	2. Restore mangrove forests	

Table 117 (Continued)

Items	At present management	New management option
19. Conflict between commercial and small-scale	1. Devise area for small-scale and commercial	To confiscate fishing vessel violate coastal area third time.
	2. Application co-management for small-scale	To apply VMS
20. Hygiene of fishing port	1. Issues criterion of fishing port hygiene	Annual assessment of hygiene of fishing port,
	2. Monitoring, control, surveillance hygiene	To close any fishing port not get criteria
21. Level of logistic for fish landing	1. Central government investment	To give support finance and right for private company to invest and manage fishing port
	2. Province government investment	
	3. Private investment	
22. Water quality for coastal communities	1. Government control and supply to communities	To support communities test quality of water when they supply by themselves
	2. Communities supply by themselves	
23. Level of equitable of market share	1. Middlemen control fish price	To apply auction fish market
	2. fishing port, fishing market control by company belong government	
24. Fishers income	1. No resource tax and fuel subsidy from government	To training for woman of communities new job for get extra money.
	2. Program of government to support eliminate hunger and reduce poverty	To give Budget for woman association to lend fisher's family for investment of new job.

Table 117 (Continued)

Items	At present management	New management option
25. Conflict small-scale and culture company	1. To license for culture	Co-management apply
	2. Regulation where culture area and capture area	
26. Fishers use coastal zone for culture	1. To license for culture	To enact environment criteria for sea aquaculture
	2. To regulate where area for culture	
27. Erosion by people	1. Prevent people harvest mangroves, harvest sands	To ban exploit sand at the sensitive costal area
	2. To building stone embankments	
28. Mangrove destroy by climate change	1. Restore mangrove forest	Apply high technology to manage mangrove like GIS
	2. Encourage people to maintain mangrove	
29. Knowledge and discipline of policy of fishers	1. Propaganda fishery policy to fishers	To educate in second school, and high school.
	2. Severely enforcement of fishery policy	Propaganda of fishery policy on television
	3. Co-management approach	
30. The internet to the communities	1. Open internet to every one	To make fishery information on internet at fishery community.
	2. Support from government to use internet at rural area.	
31. Subsidy to change occupation from government	1. Program budget with free interest rate for poor people.	To create more job at community as build traditional trade village at com
	2. Support educate occupation for fishers with free charge	

Table 117 (Continued)

Items	At present management	New management option
32. Awareness of fisher about resource and environment	1. Propaganda the important of resource and environment for fisher communities 2. Co-management approach	To attach in the school book for teaching.
33. Fishers education	1. Encourage fisher's child go to school	To improving knowledge the important of education for fishers
	2. Subsidy for class fee for fishers 'child under secondary school	
34. Fishers use coastal zone for tourism	1. To license for community operate tourism	To combine fisher community and tourist company to service tourism at community.
	2. To regulate where area for tourism	
35. Subsidy the Budget to improve their life, reduce poverty, eliminate hunger from government.	1. Government subsidy financial and technical annual year for poor communities with free interest rate	To improving the role of woman at fisher communities.
	2. NGOs subsidy financial and technical for poor communities	To give Budget for woman association
36. Safety of life	1. Regulation the criterion for safety when go out the sea.	To stop go out the sea when not enough criterion of safety.
	2. Provide the lifebuoy for fishers	To apply VMS and Search Rescue for vessel

4. Management approach

4.1 Fishery resources management

Recall the experts' opinion on fishery resources problem, experts expressed their opinion that fishery resources are serious problems, especially in point of overexploitation and decreasing of CPUE, continuous catching of endangered species

and rare species, declining on biodiversity, and disturbance of ecological balance. Based on the result of comparatively opinion on resource problems by group of experts, NGOs had realized of fishery resource problems more than other groups, while the fishers leader had realized of this problems less than other groups.

For the success opportunity of present management measures such as seasonal closure, area closure, fishing gear restriction, limited entry, prohibited catch of endangered species and rare species, the success opportunities of all present management measures is less than 50 percent.

The main problems of fishery resources of Vietnam were the lack of efficient of fishery management measures and the different understanding of problem status of the resources among the stakeholders who were government officers, researchers, NGOs, and fisher leaders. The assessment of the fishery resource and fish stock would result in understanding of stakeholders about the status and situation of fishery resources. This could lead to the establishment of acceptable fishery management approach by all stakeholders. The management approach would be as follow;

- Fishers, NGOs, government officers and researchers should together do the research on fishery resources. NGOs should have a key role in working with fishers as co-workers and mediator for common understanding of all stakeholders. Government officers and the researchers should support the activities that relate to fishery and perform the in-depth research in order to provide the answers of any questions about fishery resources and optimize the utilization of such resources.

- All the implemented measures should be strictly enforced. There should be the monitoring and assessment of all related institutes and the roles of each should be clearly defined, particularly the roles of fishers. The fishers should have participation in measures establishment and illegal fishing monitoring in community. Small-scale fishers thought that the present fishery management measures are less effective than medium and large-scale fisher thought. Small-scale fishers are the major group of

fishers with less opportunity in fishery. Strengthening the small-scale fishers by setting up the voluntary fishery group and allow the community members to participate in rule setting and watch over the community area would be benefit in fishery management of coastal area.

- The propaganda of news and information about fishery resources and its crisis need to be widely distributed to all stakeholders for their realization of situation of fishery resources, particularly on rare species which were utilized both for consumption and jewelry production. Spreading news and information of the important of rare species to all stakeholders would build up their realization of such problems and the fishers would have willingness to protect them.

- The attitude of the government officers both central and province needed to be change from the old-style decision making to the new paradigm. The role of government officer should be extended and linked up to NGOs, researchers and community leaders in order to build up fishery co-management. There is a need to build up the transparency system by setting up the index of work and improve the knowledge competency of government officers including database development, which is necessary for contemporary resource management.

- Fishery co-management is very important approach for coastal management. It offers roles to fisher in fishery management and right to participate in fishery management.

4.2 Environment management

The experts responded that the environment is serious problem such as decreasing of mangrove forest, destroy mangrove for aquaculture, erosion that cause negative effect to coastal communities, discharge garbage and waste water to coastal zone. Comparing the opinion on environment problems among NGOs, fisher leaders, researchers, and government officers, the government officers believed differently from other groups with the lowest mean score.

The experts responded that the present management such as monitoring, control and surveillance, restriction on mangrove destruction for aquaculture, restriction on coral reef exploitation, restore mangrove and coral reef cannot lead to high success in fishery management. The management approach proposed for environmental problems are;

- The research on the environment for database preparation and assessing fishery production potential and impact of pollution would be useful information for all stakeholders in order to make a right decision making when solving fishery problems. The research need to be done corporately between researchers and government officers in order to establish the criteria of environmental standard and select the study area which represent the pollution sources when collecting data. This should be done with participation of community member with the coordination of NGOs who transfer the research result to fishers afterward.

- It is necessary to improve the knowledge of government officers on environmental issues due to the lack of understanding of environment problems. To work closely in the area would give a better understanding to both central and provincial government officers. In addition, the environmental law should be enacted by central government and the law enforcement should be opened to the community in order to monitor and assess. Therefore, setting up the environment quality index together with readiness preparation of the government officers would be a driven force to solve the environmental problems.

- The news and information about environment should be based on contemporary academic i.e. GIS and easily accessed via internet. There should be a warning system of environmental status, which tends to cause problems for people through TV, radio or publications.

- It is a need to build up the responsibility of business owners, who mostly cause impact to the environment, by setting up the cooperative social responsibility (CSR) and granting the permission document to them. Pushing community to have

co-responsibility in coastal community wastewater or launch out regulations and strong punishment would lead to law unbreak.

- Co-management should be applied to fishery management in order to protect the environment. Government officers, fishers, researchers, NGOs, and stakeholders should work and act together to manage the environment. They should exchange the news and information and support each other to manage the environment.

- An aquaculture health certificate should be issued for aquaculture farm that produce aquatic product with environment friendly. All products from aquaculture need to have this certificate for better environment management and food safety.

- Coral reef exploitation should be prohibited. It should be strictly protected from illegal exploitation.

4.3 Fishers

The problems of fishers were low education, high conflict between small-scale and commercial scale fishers, high conflict between indigenous coastal communities and others coastal communities, less awareness of fishers on resources and environment, and low relationship of fishers and leader of village. The role of community in decision-making and the role of fishers in managing coastal resources were very weak.

The experts responded that the present management program from government for fishers is limited, budget is limited, propaganda and disseminate the policy to fishers is not enough, program of government to support hunger and reduce poverty are not success. Fishers still work in dangerous environment without ensuring safety for life. In order to improve fisher life, knowledge, the role of fishers in fishery resources and environment management, the following issues should be done:

- The fishers should set up fishery group, arrange the stage for exchanging news and information among groups, and build up leadership and networks between groups in order to follow the news and information about fishery.

- The knowledge of fishers and community leader should be improved. To make them have more understanding in legislation and social knowledge so that they can get more opportunity to get new job when unemployed.

- Improve the role of woman in community and train women for job in order to get extra money. The women should cooperate for working, selling fish, and making themselves to get more income.

- News and information should be easily accessed by building up the channels of information analyzing and exchanging. To be a fisher volunteer for co-working with other related institutes would increase the opportunity of news and information sharing.

- All stakeholders should improve market system. They need to understand the principle and goals of market which would result in accuracy of policy making.

EDFR technique in this study could provide details about situation of fishery problems in Vietnam and collect the expert's opinion and ideas of fishery management. This finding could broaden the management issues in order to obtain multi-dimension fishery management and consequently be the driving force for effective fishery management of Vietnam.

CONCLUSION

EDFR technique was applied in this study in order to improve the coastal fishery management of Vietnam. The technique was combined of Ethnographic method and Delphi technique. The Ethnographic method was used to collect data of situation and problems of fishery in Vietnam from the fishers and the experts in fisheries.

The study on community readiness for participation and role of community for fishery management at Haiphong province by interview 68 fishers implied that though the government had enacted many policies to manage fishery resources, the enforcement was still ineffective. Small-scale fishers thought that overall present management measure is ineffective. The present management could not lead to sustainable fishery in the future. For the fisher's role, fishers did not take part in any government decision due to their believing that it was difficult to participate or join the fishery management decision. The fishers also believed that the fishery management decisions had been from the government and the fishers had no right to participate. Decision making and co-management of community leader and fishers need to be made up without waiting for the government. In order to ensuring sustainable fishery management, the government should support and carried forward of the news and information sharing, fishery resources co-analyzing, and co-assessment of fishery impacts to community leader and fishers in coastal areas.

The study on problems of fishery, present management, and the trend of management for next stage indicated that most of experts (94.4 %) agreed that the degree of overall problem of resources is in strong level. When considering in each problem of biodiversity, endanger species and overexploiting, the overexploiting problem in issue of CPUE decrease is being at strong level (94.4 %). The resources problems were in serious level and present management was ineffective.

The experts responded that the coastal environment was very serious problem particularly on mangrove deforestation, coral reef exploitation, and continuous

catching of endangered species. There are fifty percent of experts responded that mangrove forest is decreasing at medium level when four-sixth of respondent responded at high level. Most of experts responded that the problem of mangrove destruction for aquaculture is at high level, when responded to problems of environmental pollution and water quality at medium level. The opinion on present management to manage coastal environment was at medium level. The trend and action of all stakeholders must be improved to manage coastal environment.

The fishery government organizations were limited due to the lack of manpower which result in unsuitable service for fishers and ineffective working. It was very hard to manage fishery resources and to enforce fishery policy. The trend and action should be constructed and improve government organization and training for government staff.

The effective of policy in fishery management were limited and many fishery management measures were limited on enforcement. The roles of community in decision-making and management of resources were low. The trend and action for improving the effectiveness of policy were to decentralize the fishery management from the government to fishery community. The government, fishers and all stakeholders should manage fishery resources together. The next management for Vietnam should be as follow;

The research study on the environment should be done corporately between government officers, researchers, NGOs and fishers. They should participate both in data collecting and analyzing and they should be informed about the research result.

News and information should be distributed to all stakeholders with the main supporting from the government and the help of coordinating between government and fishers by NGOs.

Promote about perceptibility to all stakeholders in order to make them realize about sustaining the fishery resource and the environment. Analyse the impact of

human behavior on natural resources and the environment and arrange the volunteer from government, researchers, NGOs and fishers to work together.

Establish the fisher group and develop for co-learning in both reservation management, and marketing. Leader and volunteer should be trained for well understanding in fisher tasks including participation in decision making, working, and evaluating.

Change the behavior which affect the quality of life of small-scale fishers i.e. promotion of saving, providing alternative careers, establishing cooperative group for reducing the expend and increase the income.

Develop the government system to be transparency, particularly the knowledge of government officers to be able to analyze and synthesize fishery problems with other groups, and be able to analyze work limitation in order to improve for well coordinate at work.

Fishery resources management should be based on the information about natural resource and the environment, utilization patterns, fisher behavior, readiness of the leader and the strength of community. This information should be analyzed together in order to define problem and the present limitation and all stakeholders should cooperate in learning, sharing the accuracy information for decision making which would benefit in determining the direction of the development. Looking further together would help in setting the goals that come from all groups. Therefore, EDFR would be a tool which result in increasing the effective fishery management of Vietnam and the most important is that all stakeholders should participate in fishery, particularly small-scale fishers who has less social opportunity, and participate in decision-making base on the limited natural resources in order to sustain fishery resources for the next generations.

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APPENDIX

Appendix A Ranking score of second round of Delphi technique

1. Problem of fishery resources

All experts gave high score of six items as declining biodiversity, disturbance ecological balance, rare species Continuous decrease, CPUE decrease, catch endanger species, overexploiting. They believed that fishery resources are decrease and serious problem, so the governors, fishers, stakeholders must appropriate action to recover fishery resource. CPUE decrease at high level, rare species Continuous decrease at high level, the expert identify this problem is serious.

Appendix table A1 The problem of fishery resources.

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
1. Declining biodiversity							○△			
2. Disturbance ecological balance							△○			
3. Rare species Continuous decrease								△○		
4. CPUE decrease							○△			
5. Catch level of endanger species in coastal zone								○△		
6. Overexploiting in coastal zone							○△			
Total Q1 =6.83 Median = 7.33 Q3 = 8 mode =6.83										

2. The problem of coastal environment

On the average, the problem of environment was serious problem. There were some items that the experts gave high score like discharge garbage or waste to coastal, water quality, erosion, mangrove destroy, coral reef exploiting. The experts responded people destroy mangrove for aquaculture is serious problem, erosion negative impact to

coastal communities also serious problem, discharge waste water to coastal also serious problem it can make coastal pollutant.

Appendix table A2 The problem of environment.

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
1. Mangrove forests are decrease					○	△				
2. Mangrove destroy by climate change			○	△						
3. People destroy mangrove as for aquaculture							○	△		
4. Coral reefs have been decrease					○	△				
5. Rare coral Continuous illegal exploiting						○	△			
6. Tourists negative impact to coral				○	△					
7. Erosion negative effect to coastal communities								○	△	
8. Erosion by climate						○	△			
9. Erosion by people			○	△						
10. Investment of government for resist erosion				○	△					
11. Water quality in coastal zone						○	△			
12. Water quality for coastal communities				○	△					
13. Oil spill are cause pollution coastal zone		○	△							
14. Direct discharge garbage from communities to coastal								○	△	

Appendix table A2 (Continued)

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
15. Companies discharge waste in to coastal										
16. Aquaculture discharge waste in to coastal										
Total Q1=5.80 Median =5.94 Q3 = 6.44 Mode = 5.94										

3. The problem of fishers

The experts gave problem scores, which appeared in table A3. Most value score less than median score, except the issue of fish supply for world consumption experts gave score higher than median score. There was more number of children in fisher's family. The cost of fishing and cost of life is high. There was high conflict between small-scale and commercial-scale. Almost fishers did not have saving. Besides that, they had low safety in their life and less awareness policy to manage resources and environment. The experts responded that a least of fishers' awareness on resource and environment regulations and slightly relationship of fishers in communities was the problem. Its score was higher than median score that mean the problem of fishers' knowledge is a serious problem.

Appendix table A3 The problem of fishers.

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
1. Fishers use coastal zone for capture										
2. Fishers use coastal zone for culture										
3. Fishers use coastal zone for tourism										
4. Conflict between commercial and small scale										
5. Conflict small scale and culture company										
6. Conflict indigenous coastal communities with others coastal communities										
7. Fishers income										
8. Fishers saving										
9. Fishers debt										
10. Fisher health care condition										
11. Fishers education										
12. Number of child in fishers family										
13. Cost of life and fishing										
14. Safety of life										
15. Level of logistic for fish landing										
16. Level of equitable of market share										
17. Hygiene of fishing port										
18. Less awareness of fisher on resource and environment										

Appendix table A3 (Continued.)

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
19. Less relationship of fishers in communities										
21. Relationship of fisher and leader										
Total Q1=4.45 Median=4.68 Q3 =4.78 Mode = 4.45										

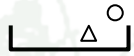
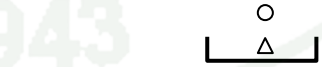
4. The problem of organization

Most experts gave score for organization equal to median score. This showed that role of NGOs, Academic, institute very important for improving resources management, fisher's income. The government staff was not enough to service and manage fishery resources.

Appendix A4 The problem of organization.

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
1. Men power of government staff										
2. Governor service fishers										
3. Efficient of government in fishery management										
4. Government structure is suitable										

Appendix A4 (Continued)

Items	Ranking score 1 2 3 4 5 6 7 8 9 10
5. Role of NGOs to manage fishery resources	
6. Role of NGOs for income of fishers	
7. Status of Academics for support fishers and government to manage fishery resource	
8. Role of Academics to develop technique for fishery	
9. Role of Academics to manage fishery resource	
10. Status of institute for support fishers and government to manage fishery resource	
11. Role of institutes to develop technique for fishery	
12. Role of institutes to manage fishery resource	

5. The problem of legislation

The experts gave score for problem of legislation lower than median score. The experts responded that it is very difficult for fishers to participate in decision-making for fishery management. In addition, fishers were playing fewer roles in resources management. Fishers had very poor quality of life because there is no a medicine shop

and nursery school in their communities. The policy on government subsidy to improve fishers' life and change their occupation was very weak.

Appendix table A5 The problem of legislation.

Items	Ranking score									
	1	2	3	4	5	6	7	8	9	10
1. Inefficient of policy in the real life						○	△			
2. Propaganda, disseminate the policy to fishers						○	△			
3. Knowledge and discipline of fishers on policy							○	△		
4. Less role of community in decision making								○	△	
5. Less role of fishers in manage coastal resource								○	△	
6. The level decentralization right for communities to manage fishery resources							○	△		
7. Less subsidy the Budget to improve their life, reduce poverty, eliminate hunger from government.								○	△	
8. Subsidy to change occupation from government							○	△		
9. Fishing port, fishing market constructions					○	△				
10. Medicine shop or hospital office in communities			○	△						
11. Nursery school in the communities			○	△						
12. The internet to the communities				○	△					

Appendix B Questionnaires for second round of Delphi technique

Part 1. Introduction

1. This study use only for my thesis.

2. Please give the score you believed that for each item. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 is ranking score you can choose. 1 is lowest point, 10 is highest point you estimate for each item.

3. Please brief introduce your self:

Full name:……..Office:…….

Address:……

Phone:……..Email:……

Date of survey:……

Part 2. Questionnaires

Appendix table B1 Questionnaires table for second round of Delphi technique

Question	Ranking score									
	1	2	3	4	5	6	7	8	9	10
1. Resources										
• Biodiversity • Endanger species • Overexploiting	1. Declining biodiversity 2. Disturbance ecological balance 3. Rare species Continuous decrease 4. Catch level of endanger species in coastal zone 5. Overexploiting in coastal zone 6. CPUE decrease									

Appendix table B1 (Continued)

Question		Ranking score									
		1	2	3	4	5	6	7	8	9	10
2. Environment											
• Mangrove	7. Mangrove forests are decrease										
	8. Mangrove destroy by climate change										
	9. People destroy mangrove as for aquaculture										
• Coral reef	10. Coral reefs have been decrease										
	11. Rare coral Continuous illegal exploiting										
	12. Tourists negative impact to coral										
• Coastal erosion	13. Erosion negative effect to coastal communities										
	14. Erosion by climate										
	15. Erosion by people										
	16. Investment of government for resist erosion										
• Water quality	17. Water quality in coastal zone										
	18. Water quality for coastal communities										
• Coastal pollution	19. Oil spill are cause pollution coastal zone										
	20. Direct discharge garbage from communities to coastal										

Appendix table B1 (Continued)

	Question	Ranking score									
		1	2	3	4	5	6	7	8	9	10
•	21. Companies discharge waste in to coastal										
	22. Aquaculture discharge waste in to coastal										
3. Fishers											
	23. Fishers use coastal zone for capture										
• Coastal utilization	24. Fishers use coastal zone for culture										
	25. Fishers use coastal zone for tourism										
• Conflict	26. Conflict between commercial and small scale										
	27. Conflict small scale and culture company										
	28. Conflict indigenous coastal communities with others coastal communities										
• Quality of life	29. Fishers income										
	30. Fishers saving										
	31. Fishers debt										
	32. Fisher health care condition										
	33. Fishers education										
	34. Number of child in fishers family										

Appendix table B1 (Continued)

	Question	Ranking score									
		1	2	3	4	5	6	7	8	9	10
• Quality of life	35. Cost of life and fishing										
	36. Safety of life										
• Fishing market	37. Level of logistic for fish landing										
	38. Level of equilibrium of market share										
	39. Hygiene of fishing port										
	40. Domestic consumption										
	41. World consumption										
• Relationship and awareness	42. Awareness of fisher on resource and environment										
	43. Relationship of fishers in communities										
	44. Relationship of fisher and leader of village										
• Government	45. Men power of government staff										
	46. Governor service fishers										
	47. Efficient of government manage fishery resources										
	48. Government structure is suitable										
• NGOs	49. Role of NGOs to manage fishery resources										
	50. Role of NGOs for income of fishers										

Appendix table B1 (Continued)

Question		Ranking score									
		1	2	3	4	5	6	7	8	9	10
4. Organization											
	51. Status of Academics for support fishers and government to manage fishery resource										
• Academics	52. Role of Academics to develop technique for fishery										
	53. Role of Academics to manage fishery resource										
	54. Status of institute for support fishers and government to manage fishery resource										
• Institutes	55. Role of institutes to develop technique for fishery										
	56. Role of institutes to manage fishery resource										
5. Legislation	57. Efficient of policy in the real life										
	58. Propaganda, disseminate the policy to fishers										
	59. Knowledge and discipline of fishers of policy										
	60. Role of community in decision making										
	61. Role of fishers in manage coastal resource										

Appendix table B1 (Continued)

Question	Ranking score									
	1	2	3	4	5	6	7	8	9	10
5. Legislation										
62. The level decentralization right for communities to manage fishery										
63. Subsidy the Budget to improve their life, reduce poverty, eliminate hunger from government.										
64. Subsidy to change occupation from government										
65. Fishing port, fishing market constructions										
66. Medicine shop or hospital office in communities										
67. Nursery school in the communities										
68. The internet to the communities										

Appendix C Questionnaires for third round of Delphi technique

Part 1. Introduction

1. This study use only for my thesis.
2. Please give the score you assessment for each item at present management. 1, 2, 3, 4 is ranking score you can choose. 1 is lowest point, 4 is highest point you estimate for each item.
3. Please brief introduce your self:

Full name: ……Office:……
Address:……
Phone:……..Email:……
Date of survey:……..

Part 2. Questionnaires table

Appendix table C1 Questionnaires table for third round of Delphi technique**.**

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
1. Number of child in fishers family	8	9		9	1. Limited number of child in family 1 or 2 children 2. Propaganda for fisher family to compliance regulation of government.		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
2. Fishers use coastal zone for capture	8	9		9	1. Seasonal closure 2. Area closure 3. MPA 4. Fishing gear restriction 5. Limited number of fishing boat		
3. Companies discharge waste in to coastal	7	8		8	1 Monitoring, Control and surveillance		
4. Direct discharge garbage from communities to coastal	7,25	8		9	1. Monitoring, Control and surveillance 2. Propaganda of environment knowledge for community		
5. People destroy mangrove as for aquaculture	7	8		8	1. Restriction destroy mangrove for aquaculture 2. Restore mangrove forest		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
6. CPUE decrease	7	8		8	1. Seasonal closure 2. Area closure 3. MPA 4. Fishing gear restriction 5. Limited number of fishing boat		
7. Catch level of endanger species in coastal zone	7	8		8	1. Prohibited catch endanger species 2. Improving fisher knowledge		
8. Rare species Continuous decrease	7	8		9	1. Prohibited catch rare species 2. Improving fisher knowledge 3. MPA 4. Create new generation for rare species		
9. Aquaculture discharge waste in to coastal	7	7,5		8	1. Monitoring, Control and surveillance		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
10. Disturbance ecological balance	6,25	7,5		8	1. Limited destroy method to exploiting marine resource 2. Restriction illegal seabed exploitation		
11. Water quality in coastal zone	6	7		7,75	1. Monitoring, Control and surveillance		
12. Erosion by climate	6	7		8	1. Prevent by building stone embankment 2. Culture mangrove along coastal line		
13. Rare coral Continuous illegal exploiting	6	7		7,75	1. Improvement monitoring, Control, surveillance		
14. Overexploiting in coastal zone	6,25	7		8	1. Gear Restrictions 2. Limited entry 3. Mesh size limit 4. Minimum size limit 5. Seasonal closure 6. Area closure 7. Co-management application		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
15. Declining biodiversity	6	7		8	1. Gear Restrictions 2. Limited entry 3. Mesh size limit 4. Minimum size limit 5. Closure season 6. Area closure 7. Restore marine ecosystem		
16. Conflict indigenous coastal communities with others coastal communities	5	6,5		7	1. Devise coastal zone for indigenous communities 2. Application co-management to communities		
17. Coral reefs are decrease	5,2 5	6,5		7,7 5	1. Improvement monitoring, Control, surveillance 2. Restore core reefs		
18. Mangrove forests are decrease	5,2 5	6		7	1. Monitoring, Control, surveillance 2. Restore mangrove forests		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
19. Conflict between commercial and small scale	4,25	5,5		7	1. Devise area for small scale and commercial 2. Application co-management for small scale		
20. Hygiene of fishing port	4	5		6	1. Issues criterion of fishing port hygiene 2. Monitoring, Control, surveillance hygiene		
21. Level of logistic for fish landing	4	5		5	1. Central government investment 2. Province government investment 3. Private investment		
22. Water quality for coastal communities	4	5		5,75	1. Government Control and supply to communities 2. Communities supply by themselves		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
23. Level of equitable of market share	3	4		5	1. Middlemen Control fish price 2. fishing port, fishing market Control by company belong government		
24. Fishers income	3	4		4,7 5	1. No resource tax and fuel subsidy from government 2. Program of government to support eliminate hunger and reduce poverty		
25. Conflict small scale and culture company	3	4		5	1. To license for culture 2. Regulation where culture area and capture area.		
26. Fishers use coastal zone for culture	3	4		5	1. To license for culture 2. To regulate where area for culture		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
27. Erosion by people	3	4		5	1. Prevent people harvest mangroves, harvest sands 2. To building stone embankments		
28. Mangrove destroy by climate change	3	4		5	1. Restore mangrove forest 2. Encourage people to maintain mangrove		
29. Knowledge and discipline of policy of fishers	2,2 5	3,5		4	1. Propaganda fishery policy to fishers 2. Severely enforcement of fishery policy 3. Co-management approach		
30. The internet to the communities	2	3		4	1. Open internet to every one 2. Support from government to use internet at rural area.		
31. Subsidy to change occupation from government	2	3		4	1. Program budget with free interest rate for poor people. 2. Support educate occupation for fishers with free charge		

Appendix table C1 (Continued)

Items	Q1	Q2	Your old score	Q3	At present management	Opportunities degree 0 1 2 3 4	Add new idea
32. Awareness of fisher on resource and environment	2	3		4	1. Propaganda the important of resource and environment for fisher communities 2. Co-management approach		
33. Fishers education	2	3		3	1. Encourage fisher's child go to school 2. Subsidy for class fee for fisher'child under secondary school		
34. Fishers use coastal zone for tourism	2	2,5		3,7 5	1. To license for community operate tourism 2. To regulate where area for tourism		
35. Subsidy the Budget to improve their life, reduce poverty, eliminate hunger from government.	2	2		3	1. Government subsidy financial and technical annual year for poor communities with free interest rate 2. NGOs subsidy financial and technical for poor communities		
36. Safety of life	2	2		3	1. Regulation the criterion for safety when go out the sea. 2. Provide the lifebuoy for fishers		

Appendix D Fishers interview

1. Questionnaires for research on community readiness for participation and the role of community for fishery management

Name……

Home no……Village……Subdistrict……...District……

Province…….Date…….……..

Part I General information

1. Gender ( ) Male ( ) Female

2. Age ……. Years

3. Civil status ( ) Single ( ) Married ( ) Divorce ( ) Widow

4. Religion: ( ) Buddhism ( ) Christian ( ) Islam

5. Educational level: ( ) illiterate ( ) can read
( ) primary school ( ) secondary school
( ) high school ( ) higher than high school and above

6. Occupation: Primary occupation: ……
Secondary occupation ……..

7. Social Status

7.1 What is your position in local community?

( ) None ( ) Head of village ( ) Sub district Administration Organization Member

( ) Committee of ……. ( ) Others……

7.2 Are you a member of any local group?

( ) Non member ( ) Member of …….

8. Economic status

8.1 Income from fisheries

( ) All income in family ( ) Main income (>50 percent of all income)

( ) less than 50 percent of all income

8.2 Income of family per month

( ) less than 1,000,000 Dong ( ) 1,000,000-2,000,000 Dong ( ) 2,000,000-4,000,000 Dong

( )Lon hon 4,000,000 Dong

8.3 Income compared with expense

( ) Income > expense ( ) Income = expense ( ) Income < expense

9. Debt ( ) No ( ) Yes

10. Saving money ( ) No ( ) Yes

11. Family member……..person (No. of male……. no. of female……..)

Part II Fishery

1. How would you describe your usual fishing gear?.....

2. How long have you been using this particular type of gear?.....years

3. Is this your preferred type of gear? ( ) Yes ( ) No why?.....

4. Do you own the vessel you use? ( ) Yes ( ) No

specify……

5. Do you own any other boats?

( ) Yes ( ) No *(If **yes**, what are the lengths of these boats)……m*

6. How long have you been a fishers? .....years

7. On average, how many fishing trips did you make in one month? …….trips

8. What are your main target species? Please give names:……

9. Approximately, what is your average catch in Kilograms per fishing trip?.....

10. Is this more or less what you used to catch 5 years ago?

( ) More ( ) Less ( ) Same

11. Approximately, what is the average daily value of your catch?.....Dong/kg.

12. Do you share your earnings with your crew?

( ) Yes ( ) No

If **yes**, what percentage does each one get?.....

If **no**, how do you pay your crew?.....

13. In your view, has your income from fishing increased, remained stable or decreased in the last year?

(If it is either increased or decreased, can you please briefly explain what are the reasons for this change)

( ) Increased ( ) Decreased ( ) Remained Stable

14. Do you have any other additional income?

( ) No ( ) Yes……

15.On average, what is your total monthly income from fishing?.....Dong

16. Approximately, what has been the average cost per day of your fishing trips to area this year?

(including fuel, labour, licenses, and other costs you may have incurred) .....Dong

17. Total costs?

( ) Increased ( ) Decreased ( ) Stayed the same

18. Activities of fishers group in this area …….groups (name)

19. Name of landing site.....

20. Is the fishing unit a visiting unit at this landing site? ( ) No ( ) Yes

21. What is the number of crew (including skipper) or fishers in unit without boat?

……

22. What is the main type of propulsion of the boat?

( ) No engine ( ) Engine ( ) sail ( ) oar/pole

23. How many people own the boat/engine/gear/? (Insert 0 for boat/engine if unit fishes without a boat)……

24. What of ownership of boat/engine/gear?

( ) Owned by skipper alone (boat, engine, gear)

( ) Owned by skipper in partnership with crew (boat, engine, gear)

( ) Owned by skipper in partnership with family (boat, engine, gear)

( ) Owned by family member (s) not incl. skipper (boat, engine, gear)

( ) Owned by middleman (boat, engine, gear)

( ) Other ……..

25. Type and length of boat (record boat length in local units)……..

26. Indicate engines in use and in stock by entering the number of horsepower

1. inboard engine (USED horsepower) ……

2. inboard engine (IN STOCK horsepower)……

Part III Participation in fishery management

1. How easy or difficult do you find participating in fisheries management decisions to be?

( ) Very Easy ( ) Easy ( ) Difficult ( ) Very Difficult

2. In your opinion, how effective is fisheries management in your village (sub-district) for ensuring the long-term health of the fisheries you are most directly involved with?

( ) Highly Effective ( ) Effective ( ) Ineffective ( ) Highly Ineffective

3. The opinion for fisheries management

Please rate the effective of the fishery management

Appendix table D1 Opinion of fishers about fishery management measures.

Management guideline	Ineffective		Effective	
	Highly ineffective	Ineffective	Effective	Highly effective
1. Gear Restrictions				
2. Limited Entry				
3. Mesh Size Limits				
4. Minimum Size Limits				
5. Seasonal Closures				
6. Slot Size Limits				

Part IV Fishers desire on participation in community in the future

Appendix table D2 Fishers desire on participation in community in the future**.**

Detail	Level of agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
1. Communication of community member					
2. To assist each other between community					
3. There are common goals of community					
4. There are common beliefs of community member					
5. To help each other between community member					
6. To learn and practice together					
7. There is co-management in order to achieve the goals					
8. There is strong groups in the community					
9. There is a well-educated leader of community					

Part V Assessment of community leader and fishers

1. Community leader

Appendix table D3 Assessment of community leader**.**

Detail	Level of agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
1. The leader realizes of situation in community					
2. The leader receives of news and information					
3. The leader communicate with members					
4. The leader build up learning					
5. The leader respects the other knowledge and intellect					
6. The leader has common goal with members					
7. The leader aware of common benefits					
8. The leader aware of self-reliance					
9. The leader is generous to members					
10. The leader participate in thinking					
11. The leader participate in decision making					
12. The leader participate in working with members					
13. The leader receives the common benefit					
14. The leader participate in assessment					

Appendix table D3 (Continued.)

Detail	Level of agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
15. The leader has self knowledge					
16. The leader loves to learn new things					
17. The leader aware of natural resources					
18. The leader aware of the environment					
19. The leader analyze fishery problems					

2. Fishers

Appendix D4 Assessment of fishers.

Detail	Level of agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
1. Fishers realizes of situation in community					
2. Fishers realizes of news and information					
3. Fishers communicate with members					
4. Fishers build up learning					
5. Fishers respects the other knowledge and intellect					
6. Fishers has common goal with members					
7. Fishers aware of common benefits					

Appendix D4 (Continued)

Detail	Level of agreement				
	Disagree	Very low agree	Low agree	High agree	Very high agree
8. Fishers aware of self-reliance					
9. Fishers is generous to members					
10. Fishers participate in believed thating					
11. Fishers participate in decision making					
12. Fishers participate in working with members					
13. Fishers receives the common benefit					
14. Fishers participate in assessment					
15. Fishers has self knowledge					
16. Fishers loves to learn new things					
17. Fishers aware of natural resources					
18. Fishers aware of the environment					
19. Fishers analyze fishery problems					

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