Thesis for the Degree of Master of Fisheries Science

Unsustainability of Fisheries Management in Developing Countries: Viet Nam Case

by

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KOICA-PKNU International Graduate Program of Fisheries Science

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개발도상국가 어업관리의 비지속성에 관한 연구: 베트남 사례

Advisor: Prof. Seong-Kwae Park

by

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(Chairman)	**(Member)**
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Abbreviations

DFID	Department for International Development
IUU	Illegal, Unreported and Unregulated
FAO	UN Food and Agriculture Organization
EEZ	Exclusive Economic Zone
CPUE	Catch per unit effort
TACs	Total allowable catches
MEY	Maximum economic yield
DICAFIREP	Directorate of capture fishery and fisheries resource protection
FICEN	Fisheries information centre of Viet Nam
MARD	Ministry Agriculture and Rural Development
MOFI	Ministry of Fisheries MPAs Marine Protected Areas
MSY	Maximum Sustainable Yield
MSY	Maximum sustainable yield
OSY	Optimal sustainable yield
VIFEP	Vietnam Institute of Fishery Economic and
GSO	General Statistic Office
DFish	Directorate of Viet Nam Fisheries
MRC	Mekong River Commi

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Unsustainability of Fisheries Management in Developing Countries:

Viet Nam

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Abstract

The main purpose of this research is to analyze the fisheries management policies of Viet Nam including several other developing countries and to draw some meaningful policy implications for bettering Viet Nam's fisheries management.

The research results showed that Viet Nam's Fisheries management is failing in all categories of six evaluation dimensions of management such as management objective, framework or precaution, regulation and MCS dimensions. Fisheries management of Viet Nam has a little progress, comparing the surveyed results of fisheries management of Viet Nam by UN code 2006 to the adjustments evaluation implemented until 2010. These results indicated that the progress has just referred to the management intentions such as management objective and frameworks but its management effects were very insufficient from the perspective of three dimensions: socks, fleets/gears, and MCS in assessing the actual practice and performance.

Viet Nam provide little information about precautionary dimension that is mentioned in management plan. The main reasons for unsustainability in Viet Nam fisheries management is: i) long term management objective has not been translated into management actions, that is, the specific objectives of fisheries management are not made explicit, ii) lack of good scientific evidence available to support fisheries management organization, iii) data base and fisheries information as well as fisheries science are insufficient and/or inaccurate, iv) controlling, monitoring and enforcement are much insufficient at both central and local levels, v) open access fisheries are resulting in overcapacity and/or overcapitalization, vi) conflicts between inshore and offshore fisheries are frequently taking place, and vii) government financial transfers tend to increase overall fishing effort.

Such reasons for unsustainability in Viet Nam fisheries management would help Viet Nam fisheries administration develop its better fisheries governance system for improving Viet Nam's fisheries and/or resources management sustainability.

I. INTRODUCTION

Since 1960, global fisheries production has increase rapidly to the current level of 132 million metric tones valued at over US$58 billion. Developing countries account for over 60% of fisheries production. Fisheries also provide employment for over 38 millions fishers in developing countries, mainly in Asia (84%). Total employment including associated trades, input suppliers and fish processing exceeds 150 million. Finally, fish is an importance food source - 60% of people in developing countries depend on fish for at least 30% of animal protein supplies (DFID 2005).

However, in developing countries, the exploitation of renewable marine resources is often characterized by poorly defined property rights, accompanied by overcapitalization where too many vessels and fishermen catch too few fish too small stocks. Management is often open access fisheries, where vessels with or without permission to fish land as much as they can catch due to limited monitoring and enforcement activities.

According to the report of the state of world fisheries and aquaculture in 2008 showed that about 19 percent of stocks was overexploited, 8 percent was depleted and 1 percent recovering from depletion. Thus, they are yielding less than their maximum potential owing to excess fishing pressure. A further 52 percent of stocks were fully exploited and, therefore, producing catches that were at or close to their maximum sustainable limits with no room for further expansion. Only about 20 percent of stocks were moderately exploited or underexploited with perhaps a possibility of producing more (FAO 2008).

Although many reasons have been ascribed to the decline of fisheries resources, the role of appropriate management in the issue of overcapacity and overfishing can not be sufficient. Factors that drive this overfishing include the increasing demand for fish, global fish trade, poor management and ineffective monitoring of open access fisheries, illegal, unreported and unregulated (IUU) fishing, technological innovations, short term economic and social pressures, subsidies and overcapacity (Sumaila 2002). Overexploitation and fisheries unsustainability have been a major concern of fisheries managers and policy makers. This phenomenon occurs in most parts of the world (FAO workshop 2002).

Vietnam is a developing country in Southwest Asia, it has a coastline of about 3,260 km and its exclusive economic zone (EEZ) extends over more than one million square kilometres. Its coast has many bays and estuaries as well as diversity of coastal and marine resources and the EEZ of Vietnam contain abundant multi-species of fishery (Pho Hoang Han, 2007). These have created a good potential for development of marine capture fisheries as well as marine aquaculture in Vietnam. Therefore, in recent years, Vietnam's fisheries sector has become an important sector in the national economy, with its contribution for GDP (Gross Domestic Product) of 5.44% in 2008. According to FAO statistics, Vietnam's fisheries have achieved a high position in the world fisheries community, ranking 13th in capture production, 3th in animal aquaculture and 8th in export value in 2006 (FAO 2008).

However, Vietnam's marine fisheries have small scale, multi-species, multi-gear and open access characteristics. Marine fisheries production has continuously increased over time and the number of fishing vessels has also increased significantly and gone far beyond the control (FAO 2005). The catch per unit of

effort (CPUE) has declined from 0.89 tones/HP in 1990, to 0.31 Tones/HP in 2008. Coastal fishing capacity has exceeded the sustainable limit. The use of destructive fishing gears and methods has not been effectively prevented. It lacks monitoring, controlling and surveillance of fishing activities. Overfishing in coastal areas, degradation of the marine environment and conflicts between small-scale and large scale fishers must be resolved to realize the sector's potential.

FAO code of conduct for responsible fisheries was published in 1995 and many technical guideline documents have been published to provide the useful principles to strengthen effective fisheries management over the world. For instance, FAO technical guideline for responsible fisheries No.4 indicated that precautionary approach is important in fisheries management. It still used such criteria to evaluate and compare fisheries status of fisheries organizations and countries. Recently, Picher (2006) has developed Rapid appraisal scheme for of compliance with Article 7 of FAO Code of Conduct for Responsible Fisheries, covering six evaluation fields (Rapfish fields) of fisheries management in 44 questions. It is commonly appliance for evaluating the fisheries sustainability of countries or fisheries organizations in the world.

However, assessing the fisheries sustainability has met a lot of difficulties in developing countries, especially when it required the integration of information on the ecology, as well social and economic aspects while characteristic of fisheries are small scale, multi- species and poor statistics, 80% of fisheries production is from developing countries, majority of which come from tropical aquatic ecosystem (Yasushysa Kato 2009). So the quantitative approach is usually applies to assess the fisheries sustainability: analysing and synthesize the

information as well as link the logical process of problem research. It is commonly used for policy and the evaluation research.

The main objective of this research is to analyze the key factors of contributing to overexploitation and unsustainability in throughout some its evidences of developing countries. To evaluate the effectiveness of fisheries management in Viet Nam To evaluate the sustainability fisheries management in case study of Viet Nam base on the quantitative approach: analyzing and synthesize the secondary data and information sources, finally recommended policies for appropriate management of the Viet Nam fisheries.

This thesis is organized as follows: (i) literature review regarding the global fisheries status and their unsustainability aspects of fisheries, focusing on fisheries management of developing countries, (ii) theoretical considerations provide the salient features in fisheries management; considering the fisheries management measures and its limits; suggesting some new management approach, (iii) some case studies on Viet Nam fisheries status and policies are reviewed, (iv) assessment of fisheries management in Viet Nam, and (v) drawing some policy implications.

II. LITERATURE REVIEW

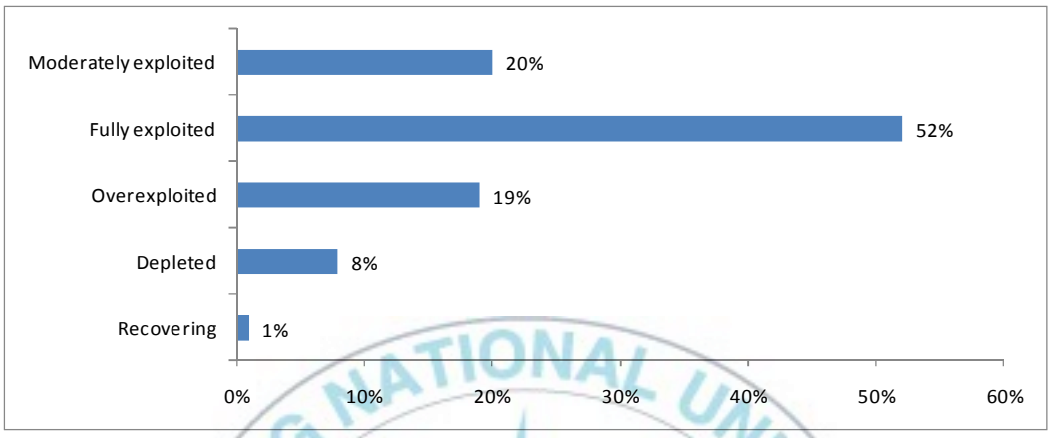
1. Global fisheries status and mismanagement

In recent years, world fisheries have become a dynamically developing sector of the food industry, and many states have striven to take advantage of their new opportunities by investing in modern fishing fleets and processing factories in response to growing international demand for fish and fishery products.

According to the data collected by Food and Agriculture Organization (FAO 2010), the food fish worldwide supply in 2008 was about 115 million tones, including 47 percents from aquaculture. Fish provides animal proteins for 3 billion people. The worldwide capture fisheries production was about 90 million tones in 2009, including about 10 million tones from inland waters and 80 million tones from marine waters. The fisheries sector is a source of income and livelihoods for millions of people around the world. In 2008, 44.9 million people were directly engaged full time or past time, in capture fisheries or aquaculture. In many countries, especially in developing countries, most fishers and their families work in small-scale fisheries.

The report of state of world fisheries and aquaculture showed exploited status (Figure 1) in 2007, about 28 percent of stocks were overexploited (19 percent), depleted (8 percent) or recovering from depletion (1 percent) and thus yielding less than their maximum potential owing to excess fishing pressure. A further 52 percent of stocks were fully exploited and, therefore, producing catches that were at or close to their maximum sustainable limits with no room for further expansion. Only about 20 percent of stocks were moderately

exploited or underexploited with perhaps a possibility of producing more" (FAO 2008). If fishing continues at the current rate, fish could disappear from our oceans within half a century.



Source: FAO 2008

Figure 1. Exploited status of world fisheries

Moreover, the world fishing fleet is estimated 4.3 million vessels in 2009; there is a continuing expansion of fishing effort in many developing countries. For example, the number of motorized fishing vessels in Cambodia increased by 16 percent from 38 253 in 2006 to 44 420 in 2008. Indonesia' fleet increased by 15 percent from 337 188 in 2005 to 387 178 in 2007; Viet Nam has a 6 percent increase in offshore fishing vessels (the engines of more than 90 HP). Meanwhile Developed fishing nations such as Norway, Japan, the Russian Federation and the United Kingdom, have effectively reduced units (FAO 2010), but in contrast with developing countries where continued increasing number of fishing vessels.

World aquaculture has grown dramatically in the last 50 years. From a production of less than 1 million tones in the early 1950s, production in 2006 was reported to

have risen to 51.7 million tones. Aquaculture continues to grow more rapidly than other food – producing sectors. While capture fisheries production stopped growing in around mid-1980 (FAO 2008). However, one of the most important issues facing aquaculture development is its impact on the environment. These impacts include, inter alia, genetic impacts on wild fish stocks, on water quality, as well as land use for the development of fish ponds. Since the avenue of intensive coastal aquaculture in Asia and Latin America, hundreds of thousands of hectares of coastal mangrove stands have given way to shrimp farms, and have profoundly modified coastal ecosystems and their integrity. Mangroves provide coastal communities with a range of "ecological services" which include, but are not limited to the prevention of coastal erosion, the protection of coral reefs, the provision of nursery grounds for commercial species, and a source of timber, food and traditional medicines (FAO 2009).

It is generally accepted that without management, the benefits that most fisheries produce will diminish. This is the "tragedy of the commons" (Hardin 1968) argument, and it is now clear that a tragedy will occur in the absence of management, whether that management comes from central government or local communities. In many cases, the resources will even become commercially extinct (that is, even though some members of the species survive, they are not worth fishing for). In extreme cases, they may become biologically extinct (Roberts and Hawkins 1999). This possibility of biological or economic extinction has only recently been appreciated.

The literature is full of examples citing that unmanaged fisheries will lose their economical viability or even collapse in the current literature (Berkes, et al, 2001). Berkes affirmed some fish stock decline examples related in large fish

stocks like the Peruvian anchoveta, northern cod, New England groundfish, bluefin tuna and Atlantic swordfish (Buckworth 1998). From this global perspective, there appears to be consensus on the necessity of fisheries management.

1.2. Factors of unsustainability

In fact, there are many factors affect to unsustainability in fisheries; it can not be a single factor, even in the absence of fishing. The threats to the sustainability of unexploited fish resource may be identified as natural variability and external threats “the impact of human activities not related to exploitation of the fish resource” (FAO No. 672). However, the problem of unsustainability becomes seriously when race for fishes that its main cause of the fail management. It needs to consider all the factors may regard of the management regime.

Considering these factors interact to have adjustment in management measures are much important. FAO has organized the International workshops to determine the main factors contributing to unsustainability and overexploitation in fisheries. The result of discussion at the regional workshops indicated the main factors of non-sustainability which is shown in the Figure 2.

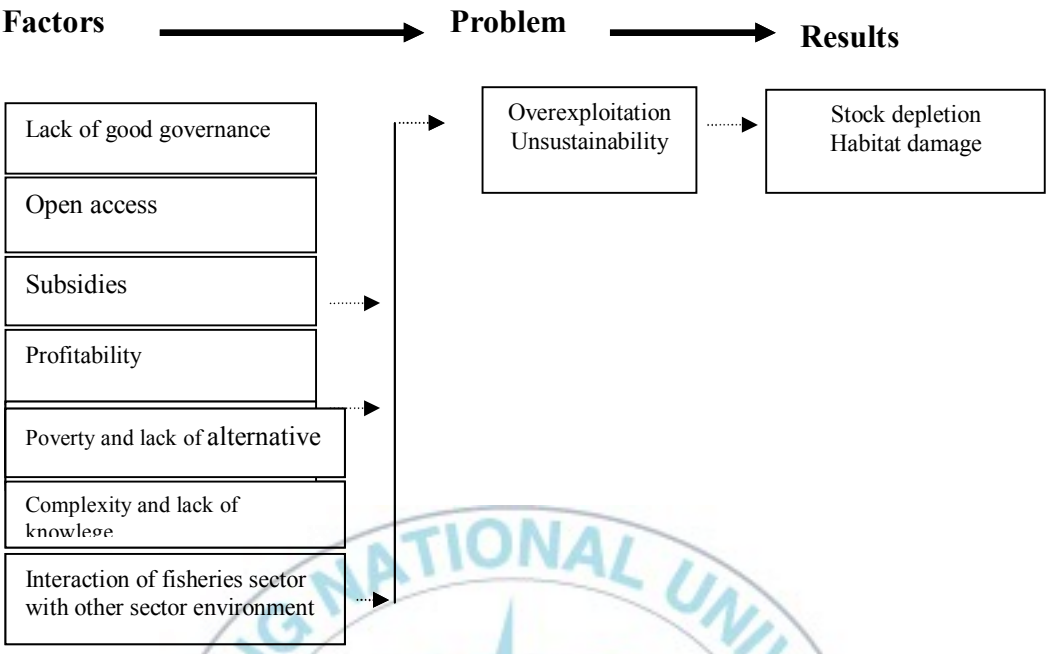


Figure 2. Factors of unsustainability

One of fundamental factors of overcapacity and non-sustainability in fisheries is the prevalence of free and open access to the resource or subsidies that led to increasing fishing effort in developing countries.

1.2.1. Open access

Open access systems, where anyone who wishes to has a right to exploit the resource, can have severe consequences. In the absence of control, open access systems will invariably lead to over-exploited resources and declining returns for all participants. This has been found to occur in virtually all fisheries under open access, from small-scale artisanal fisheries to large-scale industrial fisheries

whether national or international, and have dubbed the "Tragedy of the Commons."

Under such management structures, one or more elements of the fishery system are constrained (e.g. total catch under TAC systems or restrictions on the use of boats and gears) but fishers' access to the fishery remains free and open within the constraint. The major instruments used to regulate open access do not address the management of fishing capacity itself, at least in any lasting way. Among these are TACs, mesh size and fish size restrictions, effort limitation, gear restriction, seasonal closures and other instruments basically aimed at preserving the productivity of the stock (e.g. protection of certain year classes and reproductive areas) or limiting the overall catch. Lee (2009) stated that as long as fishing is profitable more and more people will enter the fisheries, so that the average catch per fisherman declines, until fishing is no longer profitable. Total costs go up without increasing value.

1.2.2. Subsidies

According to the Fisheries Centre Research Reports of University of British Colombia (2006), there are three categories of subsidies with eleven program types are identified globally in this study:

a. Good subsidies

- Fisheries management programs and services;
- Fishery research and development.

b. Bad subsidies

- Tax exemption programs;
- Foreign access agreements;

- Boat construction renewal and modernization programs;
- Fishing port construction and renovation programs;
- Fishery development projects and support services;
- Marketing support, processing and storage infrastructure programs.

c. Ugly subsidies

- Fisher assistance programs;
- Vessel buyback programs; and rural fishers' community development programs.

The result of the subsidy estimates by categories mentioned above the 'bad' category are the highest, amounting to US$ 16 billion, with 70% of the global total provided in developing countries. 'Good' subsidies are the next highest in total amount (US$ 6.6 billion), mostly given in developed countries. 'Ugly' subsidies are by far the least (US$ 3.4 billion), with 75% also provided in developed countries. 'Bad subsidies' are defined as subsidy programs that lead to disinvestments in natural capital assets once the fishing capacity develops to a point where resource exploitation exceeds the Maximum Economic Yield (MEY).

This is equal to the maximum rent obtainable from the fishery, computed as the largest positive difference of total cost and total revenues. As such, MEY corresponds to an effort level lower than the maximum sustainable yield (MSY). Excessive disinvestment can lead in some cases to outright destruction of the natural resources (Bjorndal and Munro, 1998). Fishery economics theory holds that, in an open access fisheries, in which fishing cost is assumed to be proportional to fishing effort, effort will continue to increase even though revenues per unit of effort are declining, and that ultimately revenues will

decline until they equal costs (Gordon 1954). The point at which total revenue equals total cost is commonly regarded as the bionomic equilibrium (BE), where both industry profits and resource rents have been completely dissipated (Figure 3). With subsidies, the fishing effort can actually exceed E3 (Sumaila 2002).

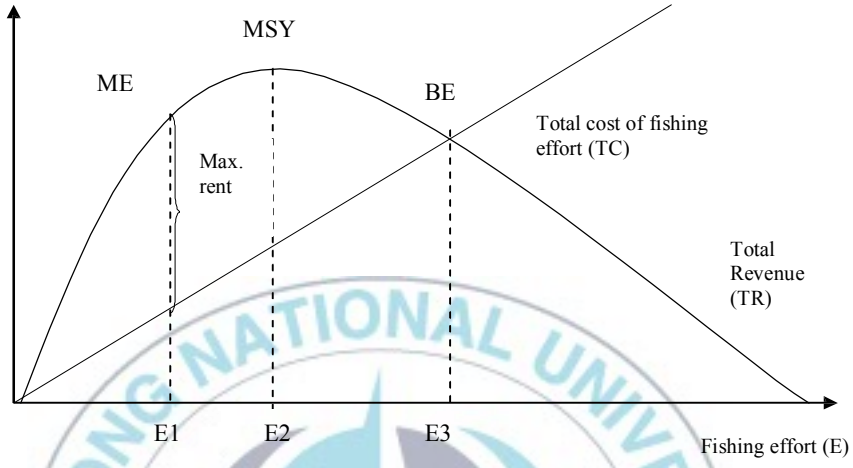


Figure 3. Gordon. Schaefer bioeconomic model (Gordon, 1954)

Source: Fisheries Centre Research Reports of University of British Colombia, 2006

There is broad agreement that regardless of the definition used, subsidies can contribute, in the absence of effective fisheries management, to generate excessive levels of fishing effort and overcapacity, which will ultimately affect the sustainability of the fish stock. There is broad agreement that regardless of the definition used, subsidies can contribute, in the absence of effective fisheries management, to generate excessive levels of fishing effort and overcapacity, which will ultimately affect the sustainability of fish stock (UCB 2006).

1.2.3. Other contributing factors

Overcapacity in world fisheries has also come about as a result of various factors that have influenced the profitability of fishing. Some are the result of the normal evolution of any industry, such as: The rapid expansion of fish markets which provides for relatively favorable market prices; the resilient profitability of the industry as a consequence of both technical progress and high demand, which has offered opportunities for the exploitation of new fisheries, but which has also prevented downward fleet adjustments in overfished fisheries. The globalization of markets for fish and fish products, so that they are subject to the forces of internationally traded commodities; The changing nature of the fishing industry, which is increasingly competitive and capital intensive; The rapid growth in harvesting technologies that enable vessels of similar size to catch several times what they would have caught 25 years ago.

1.3. The obstacle factors to the fisheries management in developing countries

Recently theoretical and empirical research has concluded that “there is not single element that is responsible for success in fisheries management” (Cunningham and Bostock, 2005). The main factors of non-sustainability are relate to management arrangement and institution (ineffective institutions, insufficient monitoring, control and surveillance, insufficient information for decision making and implementation, unclear access conditions, absence rights, etc..) and to the economic aspects of the fisheries system (technological innovations, overcapacity, subsidies, illegal financial transfers); the bio-ecological factors of non-sustainability (stock status, uncertainty, variability, fragility) and the social factors (low public awareness, equity issues). In the international workshop of FAO

(2002) identified unsustainable factors in the context of the Pressure State Response (PSR) framework. Under the State component of the PSR framework (table 1)

Table 1. Key factors of unsustainability

Factors	**State component of the PSR framework**			
Social	**Driving Force**	**Pressure**	**State**	**Response/Government**
	Population growth, poverty	Lack of alternative Sources of income	Overcrowding cause conflicts Dependence on social welfare	Low public awareness Inadequate organization
Economic	Market force, globalization Making fisheries relative income higher than alternative activities to increase exploitation	Profitability – return on over and above what is need to pay capital cost Technological innovations leading overfishing	Overcapacity: Fishing units. Exceeds the productive capacity of resource	Industry adaptation, new fisheries and new area Short term and long term
Bioecological	Climate and environment changes	Variability and uncertainties in the resources	Uncertainty in present and future state. Environment damage, resource depletion, collapse	Uncertainty, undermines management
Institutions	Insufficient human and financial resources; Political issues	High demands for resource create conflicts	Weak institutions, weak enforcement, Decision-making and conflict resolution	Weak institutions, Inadequate knowledge; inappropriate management…

Source: FAO fisheries report No. 672, 2002.

The table shown that base on fourth dimensions about Social, Economic, Bio-ecological and Institutions, there are some fundamental different factors between the fisheries of developed countries and developing countries that they affect to ineffective management. It is known as the distinguishable characteristics between the large-scale (commercial/industrial) fisheries from the small-scale fisheries

(table 2), whereas, traditional, artisanal, and subsistence fisheries are also in the category of small-scale fisheries. Small-scale fisheries tend to predominate in tropical, less-developed areas, where fisheries (and environmental) management capacity may be poorly developed or even non-existent. Artisanal and subsistence fisheries are seldom well documented, even when they occur side-by-side with large-scale commercial fisheries (Fikret Berkes, et al.2001).

Though little studied, they are the predominant fishery in tropical developing countries (King 2000). The multispecies and multi-fleet harvest sectors common in tropical areas make the task of managing small-scale fisheries more challenging. It has been noted that the fisheries authorities in developing countries may be limited in their capacity to manage small-scale fisheries. This incapacity may be caused by their use of conventional fisheries management methods that were developed and do not suit small-scale fisheries.

Table 2. Distinguish between the small-scale & large - scale fisheries

	CATEGORIES		
FISHERIES-RELATED	LARGE-SCALE	SMALL-SCALE	SUBSISTENCE
CHARACTERISTICS	INDUSTRIAL	ARTISANAL	
Fishing unit	Stable, with division of labour and career prospect	Stable, small, specialized with some division of labour	Lone operators, or family or community group
Time commitment	Usually full-time	Either full-time or part-time	Most often part-time
Boat	Powered, much equipment	Small; inboard motor (or small outboard)	None, or small, usually non-motorized
Equipment types	Machine-made, assembled by others	Partly or wholly machine-made materials, often operator-assembled	Often hand-made materials, operator-assembled
Investment	High; large proportion other than by operator	Medium to low; entirely by operator	Low
Catches (per fishing unit)	Large	Medium to low	Low to very low
Disposal of catch	Sale to organized markets	Organized local sale, significant consumption by operators	Primarily consumed by operator, his family, and friends; exchange by barter; occasional sale
Operator's income level	Often high	Middle to lowest brackets	Minimal
Occupationality	Full-time or seasonal	Often multi-occupational	Multi-occupational
Extent of marketing	Products found worldwide	Often national and local	Local or district-level only
Management capacity of fisheries authority	Considerable, with many scientists and managers	Minimal to moderate, with few scientists/managers	Often not managed except by the resource users
Management units	One or few large units	Usually many small units	Very many small units
Fisheries data collection	Not too difficult, given the authority's capacity	Difficult due to fisheries and authority's features	Often no data may be collected due to difficulty

Source: adapted from Smith 1979

Meanwhile, Large-scale commercial fisheries (also referred to as industrial fisheries) land a large proportion of the world's fish catch from a relatively small number of fish stocks or subpopulations. These fisheries are highly mechanized, using large, technologically sophisticated vessels and equipment, often with on-board processing. These large fisheries are the ones for which the most data are

available, and are therefore the best understood. Management tools and processes, developed mainly with these fisheries in mind, are characterized by established operational management systems, even if these have often failed to prevent overexploitation. Developed countries employing conventional fisheries science and management predominantly pursue these types of fisheries.

Those characteristic mentioned above starting point from cause of poverty go with management problems exiting in developing countries; one other reason is distinct characteristic of geography location and ecosystem differences contributing to obstacle of effective fisheries management in developing countries.

- **Poverty and management**

Poverty and management is central element of obstacle to fisheries management: as a function of population growth, is obviously the most persistent problem of sustainable natural resource management. Population growth increases pressure on already severely depleted resources and resources increasingly under pressure in the developing countries. However, increasing poverty and the lack of livelihood alternatives make access limitations a rational but socially and politically high risk choice (FAO 2004).

Poverty and management in the fisheries sector is often opposing to their purpose. If poverty reduction is the management goal, as it is the case, for example, in many poverty reduction strategies led by the Development Banks, increase in individual incomes and wealth generation is the intended effect of the resulting financial assistance projects. With most small scale fisheries approaching their respective “limits of growth”, however, investment in technology and

infrastructure (with the intended result of increased efficiency of fishing operations) further accelerates the “race for fish”, with fishers not able to compete successfully being marginalized and, ultimately, loosing their livelihoods.

Moreover, Poverty is same meaning of lack knowledge, information lead to fail of management decision. For example, In Ballades, small scale fisheries show diverse gears/catches, close integration with local culture and institutions and are remote from central government. But national fisheries management policy was based for a long time on “fisheries science paradigm, which emphasizes fish stock management (and maximum sustainable yield) through centralized command and control mechanisms. Yet it is increasingly recognized that this approach is neither appropriate for small-scale fisheries nor realistic (in the face of methodological and financial constraints (DFID 2005).

Further more, poverty as well as the political factor is complicated, the fisheries management institutions systems not so clear, lack of funding to implement effective goal. For instance: In Cambodia, 90% of the population lives in rural area; 40% of the population is below poverty line and fisheries resource is important for live hoods. Major concessions are granted each year to powerful people; small scale operators fish elsewhere in open access fisheries. The government has attempted to release fishing lots to community under a community – base Fisheries Management Programmed but without effective regulation, overexploitation continues under open access conditions. (DFID 2005).

In order to improve fisheries management preferment, these needs to be political will to change institutions and organizations in order to modify the way in which different stakeholders interact within the sectors as part of coherent national

policies on major themes such as economic and social development; In funder mental terms, the improvement of the fisheries policy process and fisheries management will depend on the creation by government of an enabling environment for appropriate change.

- **Ecosystem** (tropical fisheries)

There are differences in fisheries between temperate and tropical areas about: Ecosystem; Fisheries Structure; Social and Economic situation in relation to fisheries (Table 3). The increasing use of broad conceptualizations and designs for fisheries management system requires multi – disciplinary information and knowledge covering both natural and social science. According to Yasushysa Kato (2009), 80% of fisheries production is from developing countries, majority of which come from tropical aquatic ecosystem.

Table 3. Difference in Ecosystem

Characteristics		**Temperate areas**	**Tropical areas**
Ecosystem	Productivity	Relatively rich	Relatively poor (rich in inland water ecosystem)
	Species composition	Large amount by dominant species	Small, mixture species
Fishing structure	Size of fishing boats	More than 100 G/T	Less than 100 G/T 90% of boats <5G/T
	Number of fishing boats	Relatively small number (1,000-10,000	Large number: order of 100,000-1,000,000
	Name of fisheries	Name after target species: Code, Salmon, Herring Fisheries	Name after fishing gears used: Trawl, Purse Seine
	Operation	Long range and long duration	Daily operation

Source: Yasushysa Kato, Kagosima University. 2009

In case studying in the in the Southeast Asian region, Yasushysa Kato recognized based on different ecosystems and fisheries structures, fisheries have much closer links with their bases, fishing communities. MSY empirical model focused on resources not on the social and economic factors including communities and people.

However, many countries have fail management such as Bangladesh, Indonesia; when approach is not appropriate because this approach leads to explicit incorporation of uncertainty and risk in the conventional management models (Smith 1993), and often requires even greater amounts of data, information, and technical expertise than are required for the basic models. So that it needs to develop fisheries management system based on specificities of tropical fisheries has less been internationally attention.

1.4. Some evidences

The general character of fisheries in developing countries such these labor intensive, small scale, traditional, artisanal fisheries, multi – species, coastal fisheries with population growth, development and globalization to led these resource are facing tremendous pressures, and their fate rests, to a large degree, on the economic behavior of the fishing households. The majority is exploited in small scale fisheries in the developing countries; 90% are from Africa and Asia, where fisheries and poverty are synonymous (DFID 2005).

A common characteristic of these resources is that they are being exploited on open access basis. As bioeconomic theory and plenty of experience have shown open access resource will almost inevitably be depleted over time, unless policy

makers intervene (McGoodwin 1990). Yet effective resource management is often neither feasible nor practical in poor developing countries: According to the result of evaluation performance FAO Code Conduct for Responsible Fisheries surveyed (Article 7: Fisheries management of Code) of group of authors (Tony J Pitcher, et al. 2008) shown that: 28 countries (53%) had 'fail grades' of less than 40% evaluation score. In which, almost they are developing countries such as (Peru, India, Ghana, Philippines, Pakistan, Russia, Senegal, Indonesia, Iran, Thailand, Srilanka, Viet Nam, Bangladesh, Egypt, Nigeria, Angola, Myanmar, North Korea). (Figure 4).

Figure 4. Evaluating evaluation performance FAO Code Conduct surveyed (Article 7: Fisheries management of Code)

Source: Tony J. Pitcher, et al, 2008. Safe conduct? WWF, University of British Colombia

Mismanagement status, according to a repot (FAO 2008) of analysis of implementation and impact of the FAO code of conduct for responsible fisheries has indicated that the result of survey (Article 7: Fisheries management of Code).

In the 2002 monitoring exercise, 36 African countries reported the combined existence of 139 inland and marine fisheries management plans – making it an average of almost 4 fisheries management plans per country. However, when looking at the list of countries that responded in 2002, and considering the present management frameworks in place (2008), it becomes clear that about 90 percent of these countries still today do not have a single classic management plan in place. Among 10 African respondents in 2004, 10 percent reported not to have any management plans in place (in actual fact, a maximum of one of the countries responding did have any classic fisheries management plan in place). In 2006, among 21 African respondents, 29 percent reported not to have any management plans in place – marking a seemingly harsh backward trend. These results reflect problems with the variability in results due to low questionnaire returns, as much as they reflect interpretation problems about what a management plan is, and what is not.

In contrast with developed countries such as United States of America and Canada, on the other, report the combined existence of 210 fisheries management plans in 2002, a figure which rose to 277 in 2006. Overall, 20 percent of all countries responded not to have any management plans in place in 2004, rising to 26.3 percent in 2006.

The overall of evaluation result implemented FAO code conducted for responsible fisheries (Article 7: Fisheries management) in different regions indicated that, developing countries group has lowest score at fail score level for all evaluation dimensions. (Figure 5) (Tony J. Pitcher, et al, 2008).

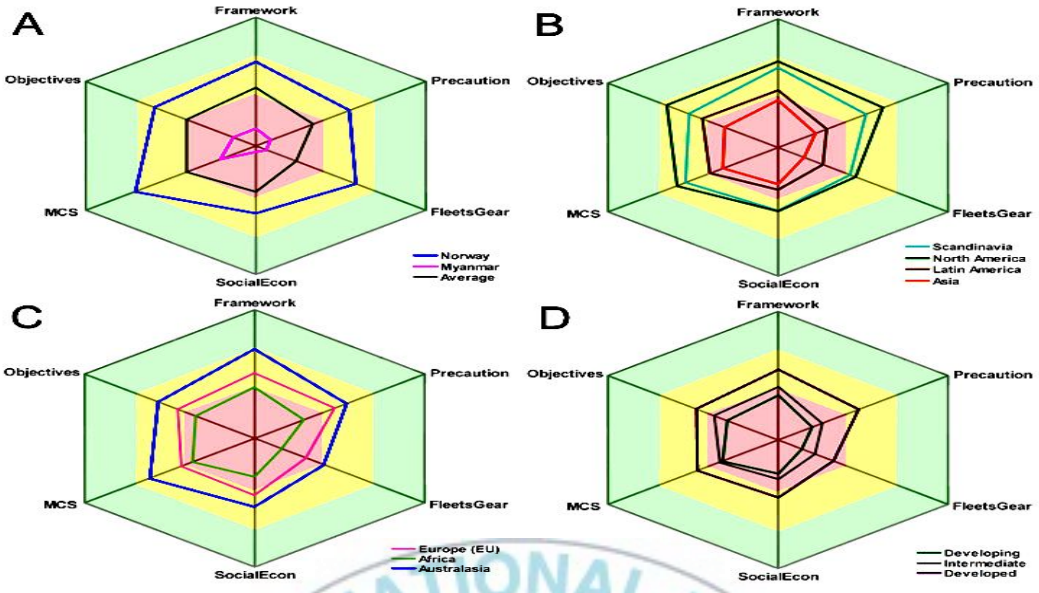


Figure 5. Evaluating evaluation performance FAO Code Conduct Surveyed (Article 7: Fisheries management of Code)

Source: Tony J. Pitcher, et al, 2008. Safe conduct? WWF, University of British Colombia

PHILIPIN: The Visayan Sea, which covers about 10,000 km^2, is a relatively shallow sea basin surrounded by five islands. It used to be one of the most productive marine ecosystems in the Philippines, with its inshore (municipal) fishing grounds providing 13.5% percent of marine capture fisheries in 1995. However, overfishing by both small scale and industrial fleets (i.e. vessels of more than 3 GT), with regular encroachment into municipal fishing grounds by the latter, and increasingly destructive fishing practices by small scale fishers have brought about massive habitat loss and degradation and stocks that are close to collapse. Severely depleted stocks led to increased levels of poverty among the small scale "municipal" fisher folk and arrested the steady influx of fishers recorded until the beginning of the 1990s (FAO 2000). Today, between 40 and 50% percent of the population of the Visayas are living below the poverty

threshold, and among the small scale fishing household, 80% percent are estimated to live below the poverty line (Munoz, J.C., in FAO 2004).

There are so many legal documents or legal framework is published; overall, conducive to sustainable fisheries at both level central government and local to deal with management issues and rights with regard to protected areas and local indigenous communities. However, these success stories are the exception rather than the rule and the critical mass of sustainably managed municipal fisheries necessary for sustainable management of the Visayan Sea ecosystem is far from being reached.

There are two evident constraints. One is the limited extent to which decentralization has resulted in local capacities to manage resources and to deliver services. The government had devolved more than 50% percent of its staff to LGUs by 1992, but respective budget provisions did not follow up devolution for example, it were not available (no gasoline or under repair) or not fast enough to pursue violators and funds to buy or replace delineation markers, e.g. for marine protected areas (MPAs), were lacking.

Another factor impeding effective management was the organizational structure of the LGUs. There are three levels of local government, with the province at the top. The second level consists of municipalities and component cities. Component cities and municipalities are divided into *barangays*, the smallest political unit in the Philippines. However, are not homogeneous socio-political entities and even where they consist mainly of fisher folk, there are conflicts of interest? This is illustrated by the different organizations (FARMCs on municipality and *barangay* level, commercial fishermen association, or multi-purpose cooperatives including

fishers) co-existing on LGU level and representing different interests. Although the Fisheries Code provides for a minimum of small-scale fishers to be included in the FARMCs, it was reported that groups not representing the interest of small-scale fishers often dominated the councils. Vertical communication and interaction, between line agencies, municipal and *barangay* FARMCs, were found to be limited by lack of funds and logistics.

Limited capacities of LGUs, low levels of organization and legitimacy of representation of FARMCs, heterogeneity of interest and little vertical and horizontal integration all contributed to the limited performance of the LGUs/FARMCs, both with respect to the decentralization process and the implementation of the legal framework of fisheries and CRM.

Conflicts between "commercial" vessels and small scale municipal fishers are of particular relevance for the Visayan Sea. Vessels are categorized "commercial" when they exceed 3 GT (gross tones) and for many of these boats municipal waters are the traditional fishing grounds.

In conclusion, the following factors are considered decisive for the unsustainability of present fishing practices in the Visayan Sea.

INDONESIA: In Indonesia, eight million people are exploited in the fisheries sector [2% GDP, US$3.7 billion]. Fish contributed 52% animal protein to diet. Many fisheries are small-scale, fish stocks are heavily exploited (DFID 2005). The fisheries sector is still expected to contribute to the increase of Indonesia's gross national product (GNP) through an in crease in total catches. Furthermore, the current practice of using catch-effort data and Maximum Sustainable Yield (MSY) models to inform Indonesia's fisheries policies is inadequate, putting sustainability and long-term profitability of Indonesia's fisheries at risk. The

concept of MSY has proven to be ineffective in guiding fisheries management, not only in Indonesia, but in many other of the world's fisheries. It is almost impossible expensive, to get the high quality data that are necessary for the estimation of MSY, especially in Indonesia's multigear and multispecies fisheries (P.J.Mous&J.S.PET et al. 2005). Meanwhile, traditional fisheries management systems (TMS) under strain influx of new fishers and the expansion of formal regulation and bureaucratic organization – particularly the Autonomy law which assigns rights and responsibilities for district and provincial authorities to manage coastal fisheries. However the regulation decisions are limited in practice (DFID 2005).

TANZANIA: Tanzania is one of developing country in Africa, the costal area have important role in community living along the coastal of Tanzania stretching from Mtwara in the south to Tanga in the north. At least 90 percent of the total marine catch comes from artisan fishing activities. It provides an important source income, food and employment opportunity.

Illegal fishing using fishing gear includes gill nets, baskets, traps, hand – lines, long lines, fence traps, spears, and trawlers. Trawl nets constitute the industrial fishing methods and are limited to coastal prawn trawling. Some of fishing gear threat to the resources, which include beach seine nets, which catch juvenile fish and destroy the habitat due to the dragging force. Another destructive fishing method is dynamite, which is practiced illegally. This method indiscriminately kills all living organisms and their breeding ground and destroying coral reefs. However, lack of enforcement of existing legislation banning the use of poisons and minimum mesh size and alternative sources of subsistence.

But because of a lot of different reasons to lead the depletion of fisheries resource, there is already overfishing in most of shore water. A major constraint is the inadequate institution and legal framework for coastal management, thus calling for policy intervention to rescue the stock from depletion. (Razack B.Lokina 2010)

II. THEORETICAL CONSIDERATION

1. General Concept of fisheries management

Fisheries management draws on fisheries science in order to find ways to protect fishery. Modern fisheries management is often referred to as a governmental system of appropriate management rules based on defined objectives and a mix of management means to implement the rules, which are put in place by a system of monitoring control and surveillance.

- **Definition (FAO)**

Fisheries management is defined (FAO 1997) the integrate process of information gathering, analysis, planning, consultation decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and accomplishment of other fisheries objectives (Figure 6).

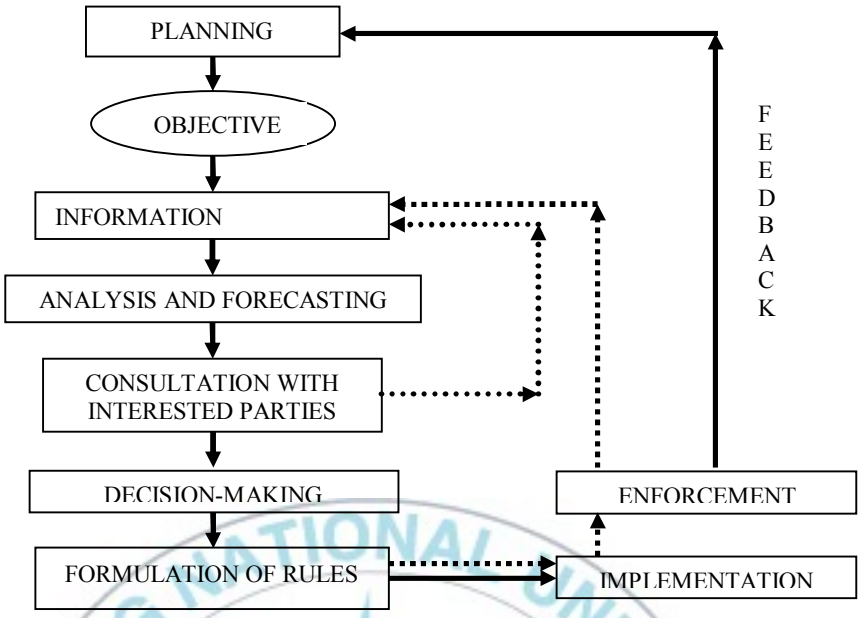


Figure 6. Diagrammatic representation of the functions and responsibilities of a fisheries management authority in relation to fishing, and the inter-relationships between the functions

Source: Kevernl. Cochrane, Fisheries Department, FAO

Base on a variety of activities as in figure 6, coastal States will choose the fisheries management tools and/or programs to be implemented, following their fisheries characteristics.

- **Classification of Fisheries management systems**

Armason (1990) suggested that fisheries management may be classified in two groups: biological fisheries management and economic fisheries management.

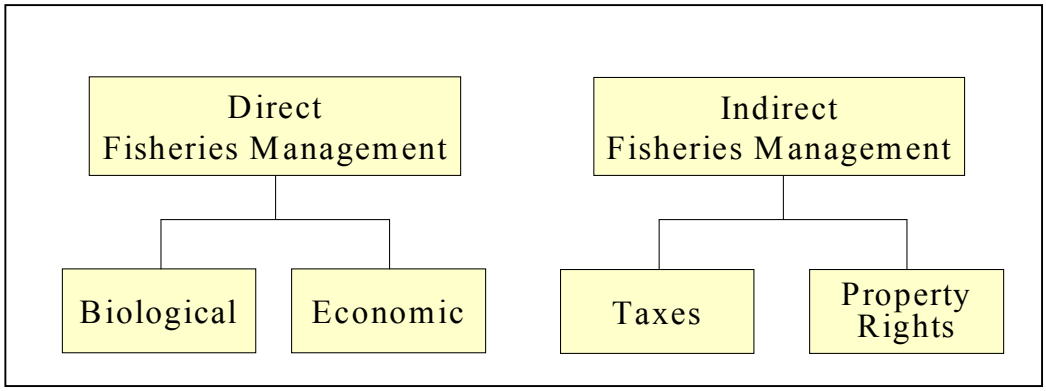


Figure 7. Fisheries management systems

Source: Ragnar Arnason. 2008. Department of Economics, University of Iceland

Armason (2008) stated that direct fisheries management attempts to control components of the fishing activity directly by commands or, more often, restrictions that must be adhered to. indirect economic fisheries management, by contrast, attempts to induce the fishing firms and/or fishermen to behave differently by modifying the operating conditions of the fishery without imposing direct constraints.

The difference between direct biological and economic fisheries management lies in what they seek to control. Direct biological fisheries management attempts to alter the biological yield of the fishery. Thus, under biological fisheries management, for instance, the sustainable yield curve is normally shifted. Direct economic fisheries management attempts to alter the behaviour of the fishing firms by direct restrictions on economic inputs, such as the allowable number of

fishing days, vessel size etc. Thus, direct economic management generally affects the cost structure of the fishery directly.

Indirect fisheries management alters the operating conditions of the fishing industry. There are, of course, many ways to do this. Most, however, belong to two main categories; (a) taxes (and subsidies) which basically alter the prices facing the fishing industry, and (b) property rights, which alter the nature of the external effects imposed by the fishing firms on one another.

Table 4. Classification of Fisheries management systems

Direct biological fisheries management	Direct economic fisheries management	Taxes	Property rights
Gear restrictions	Total allowable catch, TAC	Taxes/subsidies	Access licences
Area restrictions	Vessel restrictions		Individual harvest quotas
Time restrictions	Effort restrictions		Sole ownership
Minimum size restrictions			Territorial use rights

Source: Source: Ragnar Arnason. 2008. Department of Economics, University of Iceland

Another possible typology for fisheries management system is to divide fisheries management tools into (i) input controls, (ii) output controls and (iii) technical measures as in OECD (1997). Under this classification, the fisheries management tools listed in Table 4 would be classified as in Table 5.

Table 5. Fisheries management systems: Input/output classification

Input controls	Output controls	Technical measures
Access licences	Total allowable catch, TAC	Gear restrictions
Effort restrictions	Individual harvest quotas	Area restrictions
Vessel restrictions	Sole ownership	Time restrictions
	Territorial use rights	Minimum size restrictions

Source: Source: Ragnar Arnason. 2008. Department of Economics, University of Iceland

The technical measures are what were called biological fisheries management in the first classification. "Input controls" correspond approximately to direct economic restrictions and output controls include the property rights management from the first classification as well as the TAC restriction. In this input/output control system there is no obvious place for taxes and subsidies.

- **Sustainability in Fisheries**

Cunningham and Maguire (2002) summarized the modern concept of sustainability in the fisheries context as one with multiple objectives (focusing on both the ecosystem and the human system, and a balance of resource conservation and human concerns). The FAO guidelines (FAO 1999) on fisheries sustainable development establish five main components: the multiple resources in its environment; social and economic human needs; the technology; and the institutions. While the first two must be conserved, the others need to be respectively satisfied, controlled and established through the general management process.

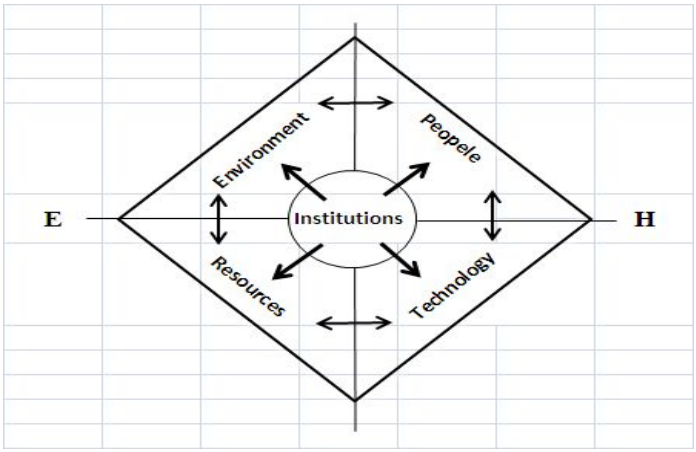


Figure 8. Schematic representation of FAO sustainability framework

Source: Garcia and Staples

It can be noted that such a framework addresses the two main concerns of sustainable development: environmental well-being (E, through both the environment and the resource *sensu stricto*) and human well-being (H, through the people, the technology and institutions).

- **Risk and Uncertainty (Precautionary measures)**

One practical implication of the complex systems view for the resource manager is the question of how to deal with uncertainty (Fikret Berkes, Robin Mahon, et al; 2001). Increasingly recognized as an issue to address, uncertainty reflects the probability that a particular estimate, piece of advice, or management action may be incorrect. Risk is the potential cost, in terms of societal benefits of adopting the estimate, advice, or management action.

Precautionary measures are those used to reduce risk in face of uncertainty. Fisheries scientists have tried to deal with uncertainty in several ways. One way

has been to attempt to quantify the variability in factors that contribute to uncertainty. This approach leads to explicit incorporation of uncertainty and risk in the conventional management models (Smith 1993), and often requires even greater amounts of data, information, and technical expertise than are required for the basic models. Another way of dealing with uncertainty has been to assume that it cannot be quantified or avoided, and instead to adopt a precautionary approach with ample margins for error. Several sources of uncertainty may affect the fishery management process.

These include (a) randomness (stochasticity or noise in the system), (b) structural uncertainties, which are fundamental uncertainties reflecting ignorance about the nature of the system and which include chaotic behaviour inherent to fisheries complex system in which a small change in one variable can affect the outcome to a significant degree, and (c) state and parameter uncertainties due to imprecise parameter estimates and unknown states of nature (Charles 2000). In addition to these items, there is also uncertainty due to implementation error, which is probably the most important type of uncertainty in fisheries.

2. Fisheries management objectives

Recognizing that long-term sustainable use of fisheries resources is the over riding objective of conservation and management, States and subregional or regional fisheries management organizations and arrangements should, inter alia, adopt appropriate measures, based on the best scientific evidence available, which are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements for developing countries.

A wide variety of social and economic benefits may be derived from fisheries through management. Any of these benefits can be an objective of fishery management. The list in Table 6, includes most of the objectives commonly stated for fisheries management. They appear to fall into three main groupings. The first relates to sustainability of the resource ensuring that its productive capacity is assured into the foreseeable future (termed biological by Clark 1985).

Table 6. Some objectives of fisheries management

Objective	Main purpose		
	Economic		
	SUSTAINABILITY	EFFICIENTY	EQUITY
1. Maximize catches		X	
2. Maximize profit		X	
3. Conserve fish stocks	X		
4. Stabilize stock levels	X		
5. Stabilize catch rates		X	
6. Maintain healthy ecosystem	X		
7. Provide employment			X
8. Increase fishers' incomes			X
9. Reduce conflicts among fisher groups or			X
10. Protect sports fisheries		X	X
11. Improve quality of fish			
12. Prevent waste of fish	X	X	
13. Maintain low consumer prices			X
14. Increase cost-effectiveness		X	
15. Increase women's participation			X
16. Reserve resource for local fishers			X
17. Reduce overcapacity	X	X	
18. Exploit underutilized stocks	X	X	
19. Increase fish exports		X	
20. Improve foreign relations		X	
21. Increase foreign exchange		X	X
22. Provide government revenue		X	

Source: adapted from Clark 1985

Broad statements of what fishery management will achieve are best used as mission statements, or, as the goal of management. An example of a mission statement is "To develop manage the fisheries of Country X in order to obtain the optimum sustainable yield for the benefit of the people of Country X." However, in order to approach the management of a single fishery, it is necessary to focus on the objectives that are desirable for that fishery (*Fikret Berkes, Robin Mahon,* et al; 2001).

However, another important factor of increasing the difficulty of dealing with overcapacity in many countries is the multi-objective nature of government fisheries policy. In many cases, maintaining employment in fisheries is an explicit objective of fisheries management. This is particularly the case in small-scale fisheries in developing countries where alternative employment opportunities are limited. Employment objectives of fisheries management are not limited to developing countries. For example, a stated goal of the International Baltic Sea Fisheries Commission is to manage the resource while maintaining fishing activity (in terms of a number of participants) as high as possible (FAO 2004). Mardle et al (2004) also found fishing and regional employment to be considered more important by fisheries administrators in UK fisheries that sustainability.

There are some ways to approach fisheries management, depend on management's objectives, and these objectives have changed over time (example: Larkin 1977 chose maximum sustainable yield (MSY), Roedel 1975 used Maximum economic yield (MEY) and optimal sustainable yield (OSY) (Berkes et al; 2001). It is shown in the illustrative diagram (Figure 9):

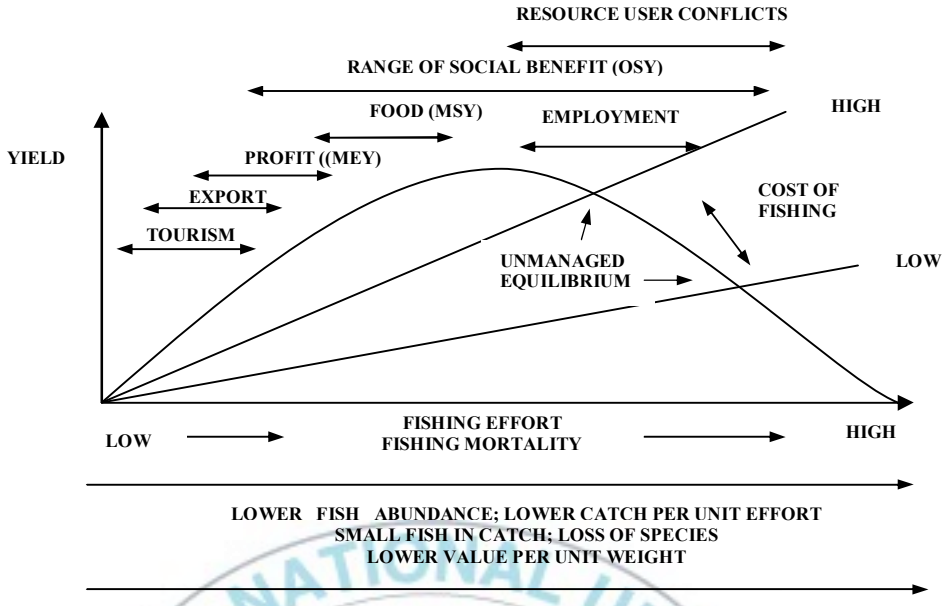


Figure 9. Fisheries yields and objectives

Source: adapted from Caddy and Mahon 1995 (Berkes et al; 2001)

MSY looks at the biological aspect to measuring harvested fish, based on information from stock assessment. MSY research still does not accommodate human predatory behaviour adequately. Berkes, et al. (2001) affirmed that MSY is a dominant approach, which is coordinated with command-and-control input regulations that the harvest sector seeks to circumvent, therefore, raising costs of administration and enforcement to obtain compliance.

MEY is biologically more conservative than MSY. Economic measures which include taxes and quotas, is used in fisheries management. Hardin (1968) said that MEY seeks rent maximization from the fishery and therefore the total economic benefit to society while preventing the "tragedy of the commons (Berkes, et al; 2001). It is showed in Figure 8 that increased fishing effort leading to erode both rent and biological viability. There is also

consensus that property rights are important in managing fisheries. Open access is undesirable and to ignore management at the communal level is a very important oversight. Managing fisheries using best available information relates not only to biology and economics but also to the cultural, social, and political components of the fisheries system (Berkes et al; 2001). Optimum Sustainable Yield (OSY) includes all components to arrive at yield targets depend on management objectives that are broader than MEY and MSY. Berkes et al. (2001) also said that the idea of optimal yield from a fishery revealed that the benefits are derived from fisheries could be measured in many ways other than simply the weight or the landed value of the catch (Roedel,1975). The trouble is that multiple objectives are messy and OSY rather vague. Maximizing a single objective may be much easier than optimization.

3. Management plans and strategies

The technical guidelines on fisheries management (FAO 1997) describe a management plan as a formal or informal arrangement between a fisheries management authority and interested parties which identifies the partners in the fishery and their respective roles, details the agreed objectives for the fishery and specifies the management rules and regulations which apply to it and provides other details about the fishery which are relevant to the task of the management authority. A well formulated management plan should be prepared for every fishery and the Code of Conduct (Paragraph 7.3.3) states that: Long-term management objectives should be translated into management actions, formulated as a fishery management plan or other management framework.

Fisheries policy is translated into goals and the goals into objectives that indicate precisely what is expected to be achieved from the fishery. The objectives are achieved through the implementation of a management strategy which will also be a central element of a management plan. The management strategy is the sum of all the management measures selected to achieve the biological, ecological, economic and social objectives of the fishery. It is possible that in a single species fishery a management strategy could consist of a single management measure, such as a specified total allowable catch (TAC), but in practice the great majority of management strategies consist of a number of management measures, encompassing technical, input and output controls and a system of user rights. An effective management strategy, however, should not contain so many management measures that compliance and enforcement become as difficult as to be practically impossible.

4. Management measures and constraints

- **Traditional fisheries management:** People Endeavour to manage fisheries and coastal regions exist long before modern concepts were established. For most of coastal people, fisheries regarded not only form economic perspective, but also socio-cultural of life (Kumar, 2010). it is also obvious that, for thousands of years, resource users have organized themselves to manage common resources such as fisheries, and have developed and maintained institutions to govern these resources (Ostrom *et al*; 1999). Findings from a large number of cases covering a diversity of resource types, geographical areas, and cultures have revealed the existence of local and traditional management systems and of commons institutions (McCay and Acheson 1987, Berkes, 1989, Bromley, 1992). These institutions - that is, local norms and rules - have been found to exist even in the

absence of any government regulations. Example is from Indonesia, where traditional systems combined rice and fish culture, with nutrient-rich wastes from this rice field fishery system flowing downstream into brackish water aquaculture systems *(tambak)* and on into the coastal area, enriching the coastal fishery (Costa-Pierce 1988).

The understanding traditional fisheries management with its traditional culture precious insight of Co-management model of fisheries such as a new approach in fisheries management of developing countries.

▪ **Conventional and new fisheries management:** There are six sets of possible management situation that seem to describe reasonably well the current management situation in many world fisheries and the process through which "modern" fisheries management passed in order to try to improve fisheries management (FAO No.672):

- Technical conservation measures
- Input controls
- Overall output controls (TACs)
- Use rights
- Market measures
- Co – management

The result of an empirical survey shows the frequency of regulation type when it was applied to 32 areas in the world (Table 7).

Table 7. Frequency of occurrence of traditional fishing regulations in 32 societies in the world

Type of regulation	Frequency
Areas (community controlled)	30
Limited access	16
Technology	12
Seasonal limits	10
Protect breeding stock	9
Protect young	8
Conservation ethic (of individuals)	6
Size limits	4
Overcrowding	3
Quotas (on catch)	1
Other	8

Source: Wilson et al. (1994)

▪ **Input controls:** Input controls generally aim to reduce or control the level of effort in the fisheries. The term "effort" is used as a proxy for the combination of inputs, including everything from the number of boats fishing, the length of time fished, the capacity of vessels such as tonnage, length, power. Given the multi-dimensional natural of "effort", controls on many the catching ability with higher cost may lead to a compensatory increase.

Input controls in fisheries take a variety of forms. A basis restriction that is applied in many fisheries around the world is a limit on the number of the boats allowed to operate in the fisheries. This is usually achieved by requiring licenses to fish and limiting the number of licenses. These restrictions have generally been found to be ineffective on their own sine fishers are able to substitute other inputs such as hours fished or boat capacity in attempt to increase their share catch. (Pascoe 1998). A further difficulty that has been experienced in many fisheries is

that license limitations are often introduced when excessive levels of capital are already in existence in the fisheries (Cunninggham et al; 1985). Hence, some additional policy is necessary to reduce the level of effort. Such a policy generally takes the form of buy-back or decommissioning programmed.

Restricting one input – the boat may encourage fishers to increase their use of other inputs, if the fleet size is reduced then the fishery may install a larger engine to enable them to tow more gear. This phenomenon has meet in many states such as Korea and China. A second common restriction is limit on the amount of time available for fishing. Fishermen have been able to respond through increasing boat capacity. For instance of input substitution in this case is the Pacific Haliput fishery, where increase in boat numbers and capacity saw the season reduced first to weeks, then hours (Hilborn and Walters, 1992).

▪ **Out put control:** Out put controls generally limit the quantity of fish that fisher may land. Several forms of out put controls are used in fisheries management. Restrictions on the amount of fish that can be landed each trip are imposed on some species in some fisheries. For other fisheries, limits on the quantity that can be landed over the year are imposed. These limits may be at the aggregate fisheries level or the individual level.

The first of output controls are trip limits imposing in the difference reasons. In some fisheries, trip limits to slow the rate of fishing and thereby extend the fishing season throughout the year.

The second form of output controls is aggregate total allowable catch. With aggregate quotas, the total quantity of fish that can be landed over the year (or

season) is limited. An annual total allowable catch (TAC) is determined based on a combination of economic and biological criteria. As under free and open access, fishers have the incentive to harvest as much as they can as quickly as possible before the TAC is reached and the fisheries is closed (Pascoe, 1998).
Aggregate quotas have been employed in a number of fisheries around the world.

However, it seems better suited to temperate regions with discrete single-species fisheries, and therefore calculable TAC, than to the multispecies, multi-gear fisheries of many tropical countries. These models have limited applicability to tropical fisheries because of the large amount of information that managers need to implement them, the wide variety of fishing gears used in the tropics, and managers' limited ability to control access of fishers, both full-and part-time, to the tropical fishery. Quotas, particularly individual transferable ones, have been promoted as appropriate rights-based management tools for several fisheries in developed countries. They are also being introduced to some developing countries, such as in the Jamaican conch fishery, but there are several reasons why quotas are problematic, especially for small-scale fisheries (Table 8). (Fikret Berkes, Robin Mahon, et al, 2001)

Table 8. Reasons why quotas are problematic for small-scale fisheries

Quota and fisheries features	**Issues that may confront many small-scale fisheries**
Quota busting	Poor enforcement resulting in quotas often being exceeded
Data fouling	Inaccurate catch reporting due to cheating or complexity
High variation stocks	Widely variable year classes, abundance, availability, etc.
Short-lived species	No clear relation between stock and next year's recruitment
Flash fisheries	Season too short to be monitored for management
Real-time management	Precise control of effort difficult with dispersed fisheries
High-grading	Market strategy of discarding low-value fish encouraged
Multispecies fisheries	Not possible to set optimal catch or effort for a complex of species
In-season variation	Declining abundance in-season resulting in a race at the start
Information for TAC setting	Information base inadequate for setting the TAC with precision
Transitional gains trap	Unpopularity of taxing the gains of initial beneficiaries
Industry acceptance	Low acceptance if initial allocations are seen as inequitable
Spatial distribution of effort	Overexploitation of high-yielding grounds due to patchiness
Quota concentration	A few companies or rich people buying out many small fishers
Social and economic change	Affecting society more than many other management tools

Source: Copes 1986

There are several constraints and challenges facing small-scale fisheries managers that have been previously identified, and the table above relates these to quota systems. Several of them are also problems for large-scale and developed fisheries, but in these cases the nature of either the fisheries resources or management capacity makes them less critical.

■ **Taxes:** The above management measures attempt to either control the level of inputs used in the fishing process or level of output from fishing. An alternative approach is to change the cost or benefits of fishing through imposing a tax on either inputs or outputs. The use of taxation to correct externalities is a common principle in welfare economics (Clark 1990).

The use of taxes to result in the economically optimal level of effort is attractive for a number of reasons. First, the production decision is still left to each individual fisher rather than regulated from above (Clark 1990). Each individual would act in the public interest (maximizing the resource rent) at the same time as they maximize their own profits (Hannesson 1993). Second, the introduction of such a tax would result in a rationalization in the fisheries so that excessive levels of capital would eventually exit. Thirdly, the resource rent that is extracted from the fisheries can be used to the best advantage of the owners of the resource – the community as a whole.

However, the use of taxation has a number of difficulties. Firstly, fishers are likely to be opposed to such a system as it increases their costs. In the short term, a number of less efficient fishers would experience financial pressure. With little alternative use of their boats and in many cases financial commitment to maintain (e.g. loan repayments and interest), less efficient fishers who are unable to immediately exit the fishery may be forced to increase their effort (Hannesson 1993). A second difficulty faced by managers is the estimation of the appropriate tax rate. As stocks fluctuate from year to year.

▪ **Co- Management:** Insufficient involvement of stakeholders in decisions concerning the management system has been linked to unsustainability. The term "co-management" is used to cover a wide range of possible institutional arrangements that might be used in fisheries management. The key element is the sharing of management responsibilities between the State and communities or more conventional fisher organizations (FAO No.672).

5. Monitoring, controlling and surveillance (MCS)

MCS has important role in implementing effective fisheries management, the concerns of MCS have been overlooked in the development of management strategies and plans. According to FAO technical guidelines, there are three linked components of fisheries management:

a. Collection of data on biological, economic, social aspects of the fisheries and basic information on the fishers, boats and gear;
b. Decision making or fisheries management planning; and,
c. Implementation, the MCS aspect of fisheries management involving both government officials and members of the fisheries community and industry.

The first component (data gathering) includes collection and analysis of biological/resource assessment data, basic fisheries information on fishers, boats and gear, fishing trends and patterns, and social and economic data for the harvesting, processing and marketing sectors of fisheries. The analysis of these data provides the input into the fisheries planning exercise.

The second component (decision-making), includes the entire process of consultation and negotiation with all parties which influence the decisions concerning a fishery. This should result in fisheries management plans for the harvesting, processing and marketing sectors. The key factor in this decision-making component which affects the entire process of fisheries management is the political will and its commitment to sustainable and rational fisheries management.

The last component, which is often the most difficult for governments to deal with due to potentially high cost or other government priorities or arrangements in the fisheries sector, is the implementation of these plans. It is represented by monitoring, control and surveillance of the fisheries and the fishers, and is an absolute requisite to the successful implementation of fisheries management plans. The most comprehensive and acceptable plan on paper will not result in successful fisheries management unless it is implemented through the use of monitoring, control and surveillance operations. Lack of attention or commitment to implementation of MCS activities often results in overfishing, collapse of resources and economic loss to future generations

6. Approach direction for fisheries management in developing countries

As the result of presentation at the previous chapter, it is possible to identify major factors which affect fisheries management in developing countries. The challenge is how to address these factors in order to improve fisheries management.

There is some management approaches that have emerged in recent years are available for use by managers of small-scale fisheries and for the fishers themselves to use. These include methodological approaches that emphasize

fishery and ecosystem management objectives and participatory decision processes rather than focusing, as is usual, on fish stock assessment and population dynamics and paying less attention to the human dimensions of the fishery. Included here are new governance regimes such as community-based management and co management that have the potential to address community and economic development as an integral part of fishery resource management. Interdisciplinary and social science methodologies, including versions of logical framework analysis, the use of fishers' local ecological knowledge, and participatory rural appraisal, feature prominently. The management process itself has become more adaptive.

Traditional command-and-control regulatory measures have been supplemented by property rights-based approaches. Ecosystem-based measures, such as marine protected areas, provide alternatives for protecting local fish populations. Integrated approaches seek solutions to the problems in the fishery sector in other economic sectors. Integrated coastal area management may incorporate fisheries issues into the total scheme of coastal economic development using a geographic information system (GIS), thus providing powerful visual information for decision-making and conflict management. Information is becoming more readily available through computer sources. The list of available approaches goes on and on. It is increasingly important for the fisheries manager to be creative and innovative. There is no blue print formula for managing a fishery or an ecosystem: each area or community is different. Different approaches will need to be tried and integrated together. There may be failure. There will be learning and adaptation. The community of resource users and the resource manager will need to work together to decide the best combination of approaches to their situation (*Fikret Berkes* et al; 2001) According to the result research of Fisheries

Management Science Program (FMSP) of Department for International Development (DFID) has published “new knowledge on approaches to improving fisheries management”, which need to focus the main findings: the first approach focuses on Management information and applying knowledge; the second approach focuses to encouraging participation in fisheries management by local level stakeholders, fishing communities; the third approach highlighted concerns the formalization and allocation of property rights for fisheries; the fourth approach focuses on institutions and organizations for fisheries management; the final approach focuses on Political will and changes in governance.

III. FISHERIES STATUS AND POLICIES OF VIET NAM

1. Overview

Vietnam, a peninsular country in Southeast Asia, has a coastline 3 260 km long and the Exclusive Economic Zone covers more than one million km^2, more than 4,000 islands, 120 river mouths, many bays and lagoons.

There are four main fishing areas: Gulf of Tonkin, shared with China; Central Vietnam; South-eastern Vietnam; and South-western Vietnam (part of Gulf of Thailand), shared with Cambodia and Thailand.

Fishing activities are classified as in-shore and offshore. There are two main fishing seasons – the south season (from May to October in the north and July to December in the south) and the north season (from November to April in the north and January to May in the south) corresponding to the SW and NE monsoons respectively (FICEN).

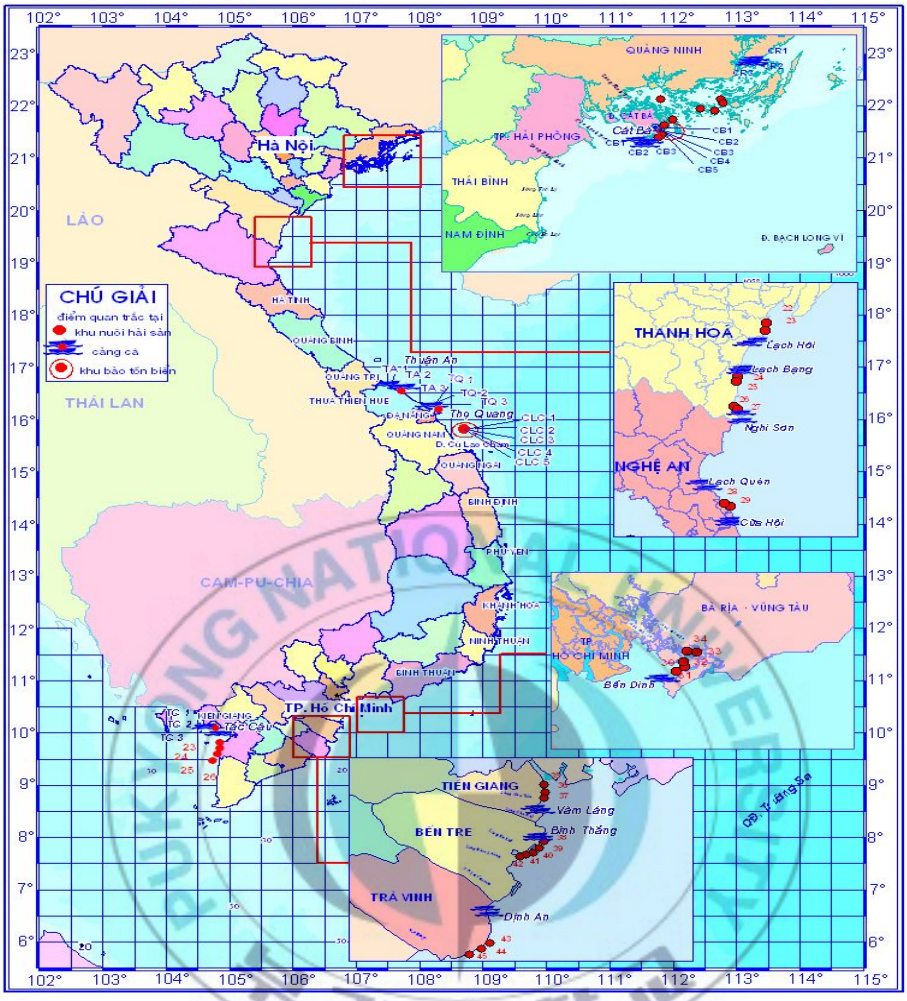


Figure 10. Viet Nam

Source: Research Institute for Marine Fisheries, Viet Nam 2010 (RIMF)

The total water surface potentially available for aquaculture, freshwater capture, or culture-based capture fisheries have been estimated at 1.7 million ha (FICEN). Of this total, around 120,000 ha are small ponds, lakes, canals, gardens; 340,000 ha. are large water surface reservoirs; 580,000 ha are paddy fields which can be used for aquaculture purpose, and 660,000 ha are tidal areas.

These figures do not include the water surface of rivers and about 300,000-400,000 ha of straits, bays and lagoons along the coast.

There are more than 2,000 fish species in the waters of Vietnam, 130 species have been identified for economic exploitation. The total standing biomass is estimated to be around 4.2 million tonnes and a total allowable catch (TAC) or the Maximum Sustainable Yield (MSY) is 1.67 million tonnes, which includes 850,000 tonnes of demersal fish, 700,000 tons of small pelagic fish and 120,000 tons of oceanographic pelagic fish.

In addition to marine fish, there are some 1,600 species of crustaceans (marine shrimps, lobsters, slipper lobsters, crabs, mud crabs, etc.) of which 50,000-60,000 tons may be caught each year. There are also over 2,500 species of mollusks (squids and octopus) for which the allowable catch each year is 60,000-70,000 tons.

Table 9. Biomass and estimation MSY

	Fish stock (tons)	TAC (tons)
Small pelagic	1,730.000	694,100
Demersal < 50 m	597,000	239,200
Demersal > 50 m	1,542,600	617,100
Deep sea pelagic	300,000	120,000
Total	4,180,200	1670,400

Source: Marine research institute, Hai Phong (RIMF 1997)

The big pelagic fishes are the main targeted species of Vietnam's offshore fisheries with high economic value. (tuna; Swordfish; Marlin; Mahi Mahi; Indo pacific Spanish mackerel; Wahoo; Narrow barred Spanish mackerel). The small pelagic fishes are abundant in three coastal areas of Viet Nam (the North, Centre, and South) (RIMF 2001). The demersal fishes also have high economic value. Most of them distributed in coastal areas and have small in size.

2. Fisheries production

Vietnam's fisheries sector experienced rapid growth, increasing more than 64 percent since 2000 and earning Vietnam the rank of fifth largest producer of fishery products globally, after China, India, Indonesia and the Philippines. The fisheries sector plays an important role in Vietnam's national economy, where it accounted for just over 6 percent of total GDP and 19.3 percent of agriculture, fish and forest products contribution in 2008. Total fisheries production: 4.58 million tones, with 2.13 million tonnes from catches fisheries accounted for 2. 45 million tonnes from Aquaculture. Export value: 4.5 USD billion.

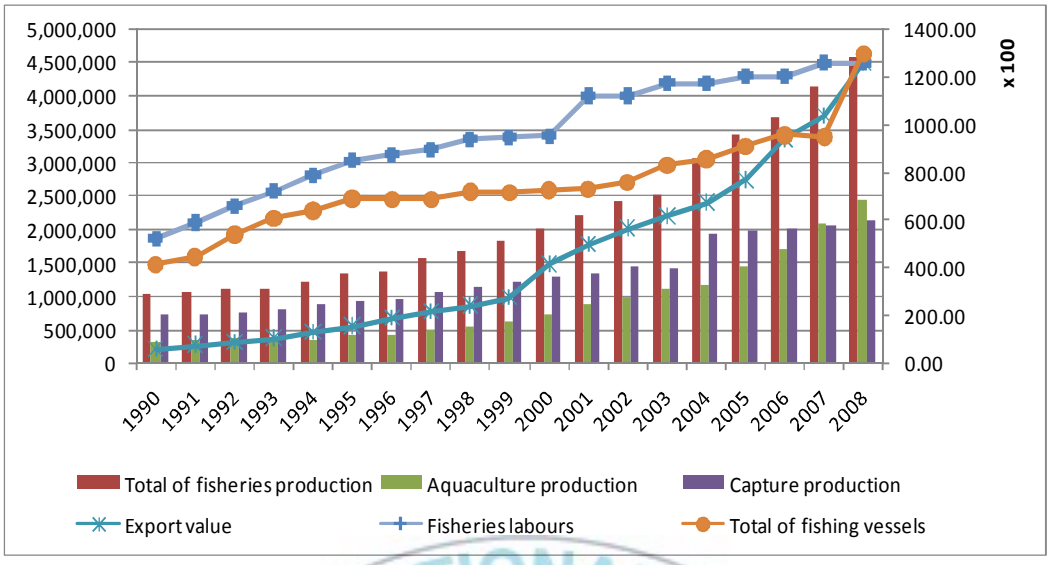


Figure 11. Viet Nam fisheries status during 1990-2008

Source: Viet Nam Institute of Fisheries Economic and Planning. 2010

Marine landings can roughly be divided into three categories: high value species for export, medium value species for domestic consumption, and low value species for fish meal for the animal feed industry. Although marine landings still have the larger share of production, but aquaculture has been growing at a much faster rate, having increased over 187.4% since 2000 at an average growth rate of 19.3% per year.

2.1. Capture fisheries

The marine fisheries sector in Vietnam has developed rapidly over recent years. Total landings increased from around 0.8 million tonnes in 1990 to 2.14 million tonnes in 2008. From 1995 to 2008, the total production from capture fisheries of Vietnam has doubled (Figure 12), accounting for about three-quarter

of total fisheries production in 1995, and around a half of that in 2008 (GSO, 2008). Vietnam's marine capture fisheries production has tended to increase gradually during this period of time. The marine catch amounted from 0.99 million tonnes in 1995 to 1.95 million tonnes in 2008 (GSO, 2008). It is a fact that the proportion of the marine catch was always high and increasing in total capture production, and reached more than 91% of total quantity of capture in 2008, and of which marine fish ratio often occupied three-fourths of marine capture fisheries production. Total inland catch ranges from about 200,000 - 250,000 tonnes per year.

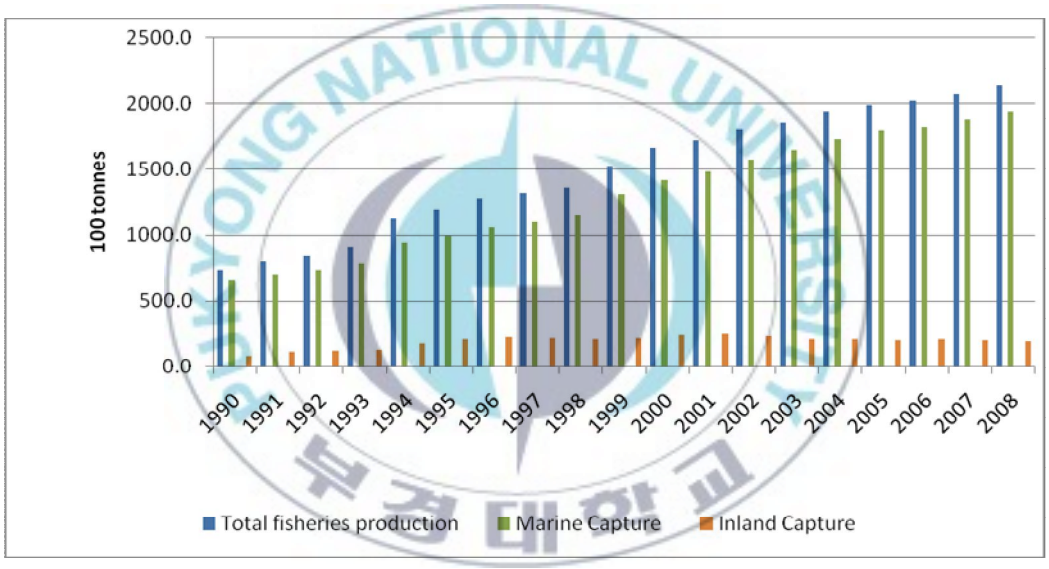


Figure 12. Total Capture fisheries produce during 1990-2008

Source: General Statistic Office (GSO) 2008.

A number of the fishing gears in Vietnam have high catches of trash fish. Edwards (2004) pointed that trash fish occupied about 33% of total marine fish landings. Southern fisheries had the highest proportion of trash fish (averaging around 60% of the catch), compared to 5% in central, and 14% in

northern regions. Fish quality is often low because salt is usually used for preservation as opposed to ice. Trash fish landings are likely to increase in the future, unless trawl net designs reduce catches of small fish. The species composition of catch depends on the fishing gears used, fishing areas and fishing year. In total catch production, anchovy, different mixed fish species and trash fish are dominant then followed by scads, tunas, mackerels, etc. The species/ group of species composition consisting of more than 1 % of total catch are shown in figure 13.

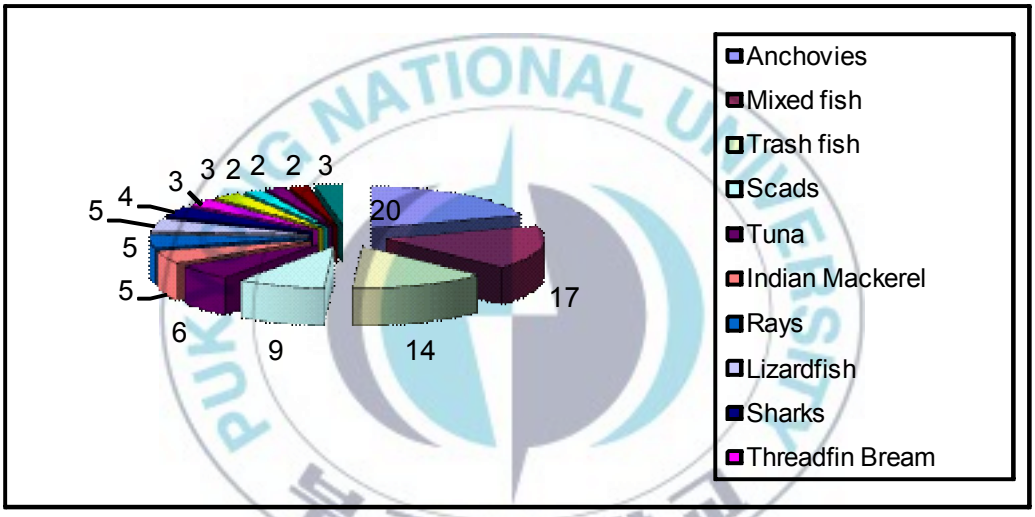


Figure 13. Species/group of species composition in total catch

Source: Chu Tien Vinh, 2006

In addition, because of the resource decline, excessive number of fishing boats, both fishing productivity and income of each unit have reduced constantly. The uncontrolled increase of fishing effort development has caused the marine resources to decrease and also the extinction of commercially important species, example: shrimp, giant tiger prawn, etc. The quality of fish

products has also decreased, the percentage of trash fish has increased and the proportion of valuable fishes has been declined, and the profit of fisheries has fallen (Dong, NV, 2001, Tinh, H.V, 2004). The increased catch leads to over-fishing, overexploitation and destroying the biodiversity and habitat.

2.2. Aquaculture

According to FAO (2003) aquaculture production has grown at 12%/year since 1990 with freshwater and marine production showing the highest growth rates (of 13 and 17% respectively). Aquaculture has made significant progress in Vietnam in recent years, increasing in market share from 26.2% of total fisheries' production in 2000 to an estimated 46% in 2006. The total aquaculture area in 2010 was 1.1 millions hectares with aquaculture products reaching 2.8 millions tones. The aquaculture sector can be divided in marine, brackish and freshwater aquaculture (D-Fish 2010).

- **Freshwater aquaculture**: Small ponds, seasonal flooded areas, lakes and low-lying paddy fields are the typical areas for fresh-water cultures. In these areas such fish species as grass carp, common carp, mud carp, silver carp, common silver barb, tilapia, catfish and crossbred catfish are raised. Highvalue targeted species such as "tra", "basa" catfish, and tilapia, grass carp, hybrid carp and rohu are raised in cages in rivers, streams and reservoirs (FAO 2003).

- **Brackish-water aquaculture**: Vietnam has a huge potential of coastal aquaculture with shrimp culture being dominant. The farming system of brackish water culture can be divided into traditional extensive, improved extensive, semi-

intensive and intensive culture. The cultured species are; shrimp, mud crab, bivalve and artemia. Brackish-water shrimp (*Penaeus* species) is the main species raised along the coast. The total area used for brackish-water shrimp culture in 2003 was 546, 757 hectares, an increase of 14.2% compared to 2002

The coastal provinces in south of Vietnam are producing most of the shrimp using 476, 582 ha. (87%) followed by 41, 372 ha. (8%) in the Northern provinces and 28, 803 ha (5%) in central Vietnam (FAO 2003).

- **Marine aquaculture:** Vietnam's primary marine culture species are shrimp, lobster, marine fish (grouper, cobia, snapper, sea bream and trevally) and mollusks (clam, granular ark, areola Babylon and pearl oysters). In Vietnam, marine aquaculture is farmed 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.

Aquaculture development in Vietnam also has significant environmental implications. Aquaculture can cause environmental impacts, both positive and negative and is also sensitive to changes in the environment. Natural and man-made environmental threats include typhoons and floods, pesticide use in agricultural areas and decreasing water quality (Phuong 2002).

- **Environmental concerns relating to aquaculture development in Vietnam include:** localized water pollution from concentrations of freshwater and marine cage farms and lack of consideration of carrying capacity; The need for more care to be taken with introduction of new exotic species, due to risks of disease and impacts on aquatic biodiversity; the significant loss of mangroves and wetlands from conversion of coastal areas and estuaries to shrimp farming; aquatic animal disease outbreaks, water pollution and

Stalinization caused by poorly planned and managed shrimp farming in sandy and agricultural areas; and the dramatic recent rise in the use of trash fish in marine and freshwater aquaculture. Such environmental interactions need careful consideration in the promotion of aquaculture in Vietnam, and should be addressed through better environmental planning and management practices and capacity (MOFI 2005).

3. Fishing vessels and gears

In 1990 there were around of 41,000 engine boats with a total capacity of 724,301 Horse Power (HP), but the total of fishing boats reached 123,000 In 2008; the total capacity was around 6.2 million HP. The average grow of fishing fleets 5.6 % per year, it corresponds with 4,555 boats per year. (Figure 14)

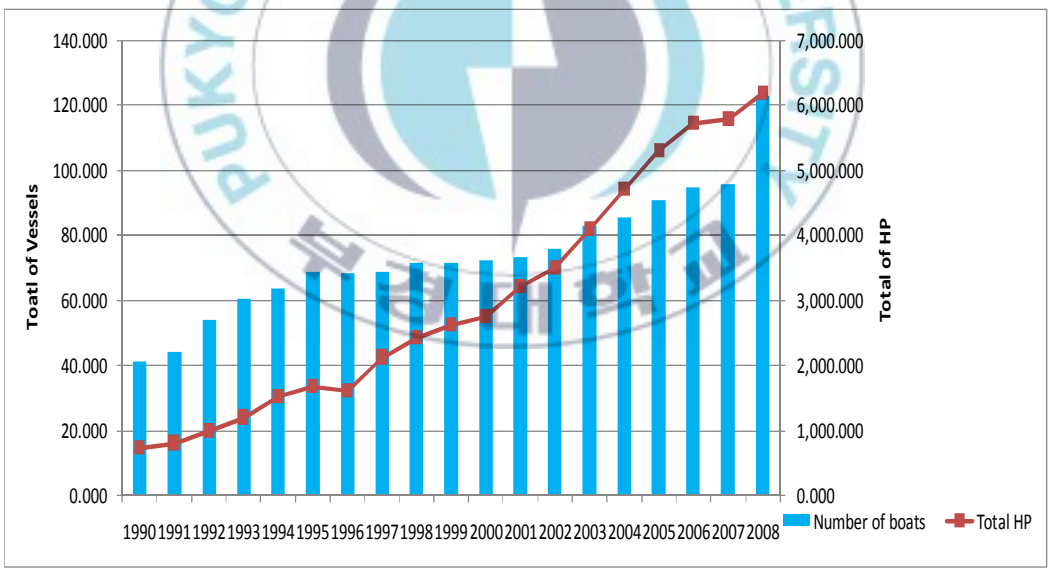


Figure 14. The number of fishing fleets of Viet Nam

Source: Department of Capture Fisheries and Resource Protection, Viet Nam. 2008

Almost of fishing vessels were small, approximately 76 % of the total mechanized boats in the country are less than 45 hp, and 86% less than 90 HP (table 10). The majority of those boats operated in near shore areas up to 4-5 nautical mile and in less than 50 m depth. Approximately 82% of the total catch in the country is caught at a depth of less than 50m. There were more than 90% boats under 20 meters in length. In addition, the engine capacity and the speed of fishing boats are low, making them unable to withstand high waves and strong winds. In fact they are vulnerable to bad weather.

Table 10. The distribution of vessels with engine of over 20 HP in Viet Nam, 2008

Fishing areas	Engine capacity	Nuber of vessels	Rate (%)
Inshore fishing	<20 HP	68,199	52.2
	20-50HP	32,417	24.8
	50-90HP	11,895	9.11
Offshore fishing	90 HP upward	17,969	13.77
	Total	130.480	100

Source: Department of Capture Fisheries and Resource Protection, 2008 (DECAFIREP)

The primary type of small- scall fisheries gears in use are small gillnet (mackerel, shrimp, cuttlefish), small trawl (shrimp), longline, push net, small liftnet with lights (juvenile) and traps.

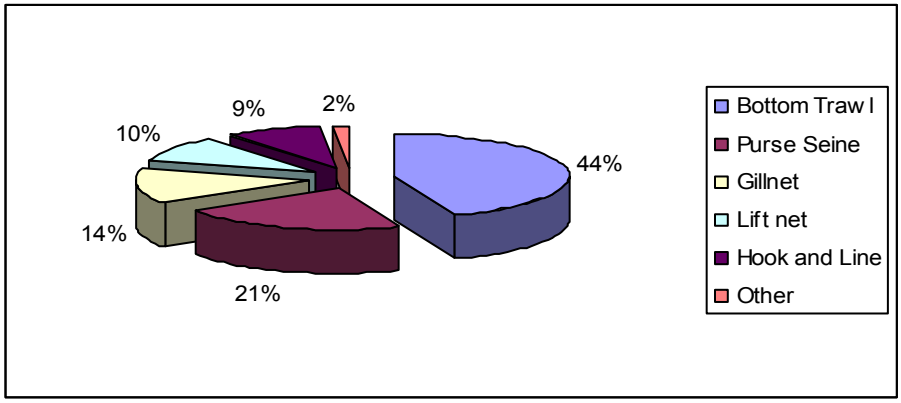


Figure 15. The classification of fishing gears in Viet Nam

Source: Chu Tien Vinh, 2006.

Trawling threatens to damage marine resources, fishing grounds, and marine ecosystems (Jennings et al. 2001, Kaiser et al). Vietnam has about 44% bottom trawls. The trawlers often operate in coastal areas lead to damage to the seabed where many species dwell. The small-sale trawlers (about 70% of fishing boats) often capture fish inshore and large scale one exploits offshore (Le Xuan Sinh, 2007), Trawling is also major factor of degradation marine environment (Dong, N.V. 2000). In some other countries, like China, the Government banned trawling in inshore waters. However, this is still a big problem in Viet Nam, which is difficult to solve because most of fishers and millions of people are very poor and they fish for subsistence. Thus, it is difficult to ban this effective fishing method.

4. Catch per unit of effort of marine fisheries

Reports indicated that the catch per unit of effort (CPUE) has decreased from 1.11 ton/hp in 1985 to 0.89 ton/hp in 1991, to 0.34 ton/hp in 2005 and continued to

reduce to 0.31 ton/hp in 2008. Total engine capacity of fishing fleets has risen rapidly with 0.72 million HP in 1990 to 6.2 million HP in 2008.

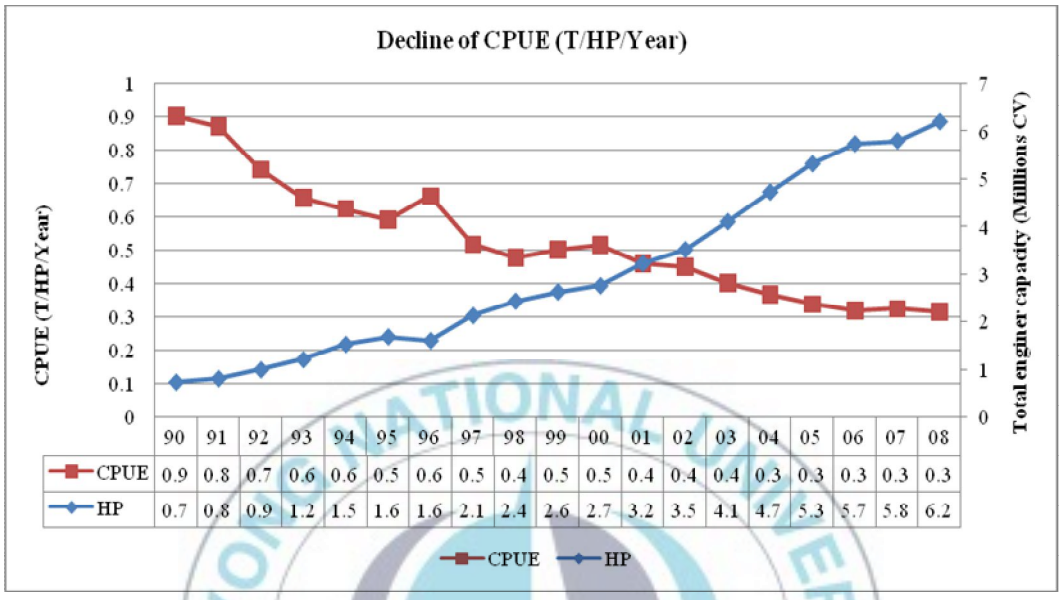


Figure 16. The catch per unit of effort (CPUE) during 1990-2008

Source: Department of Capture Fisheries and Resource Protection, 2008 (DECAFIREP)

Results of an assessment of marine resources by Marine Research Institute in Viet Nam showed that the MSY yield in the area of 50 m depth is about 582,212 tons, where that catch in practise has exceeded this level since 1986, up to twice time higher, this means that overfishing in waters of less than 50m depth fishing press has been still increasing year to year. The number of full-time fishers in the coastal districts was 550,000, accounting for about 93% of the total full-time fishers in the country, increasing by 25,000/year.

5. Fishing Households and Fishermen

The coastal areas in Viet Nam comprised of 28/64 towns and cities directly under central government, 14 cities under provincial government, 28 towns, 273 suburban districts, 38 urban districts, 68 wards, 243 towns and 4.134 communes. The total area, including 28 provinces, is appropriated 41% of Viet Nam. The main causes of poverty: The coastal area has high population growth, both in terms of natural growth (particularly in fishing communities) and mechanical growth (mainly in fast developed area and services areas). The coastal area has a large scale population with high density, 396 persons/km^2 average. Absence of employment opportunities is widespread in the coastal area, causing poverty. Access to farming land per head is low but agriculture still constitutes the largest part of employment.

The employment level in industries and services is still limited, except in cities. Increasing urbanization and new tourist sites in the coastal are are factors leading to resettlement and reallocation of employment between urban and rural areas. Other reasons for high incidence of poverty include sole dependence on agriculture, unfavourable natural conditions and slow economic development generally. There are constraints in opportunities for diversification of livelihoods. The education level is low to lead having more difficulties than in accessing paid employment opportunity. More specifically, the illiteracy rate among women is still high; hence women lack production knowledge as well as in accessing information useful for their livelihoods.

Degradation of environment and resource constrain the incomes of the poor significantly since their livelihoods are dependent on natural resources: near shore

fishing used to be the main livelihood and over exploitation of these marine resources has exhausted the potential of this form of livelihood. The poor people use small boats and facilities for near-shore fishing, although pursuant to Fisheries Law is not encouraged. Poor fisherman is difficult to invest money to build modern boat and equipments for catching offshore sea. For inland production and fish farming, the poor communities use their land that has been converted to ponds or lagoon shifting of low-efficiency agriculture land into aquaculture area is also a good approach which can help poor people to move out of poverty.

However they don't have sufficient initial capital (World Bank 2006). Fisheries represented the main source of income for 4.3% of households in the country and the primary employment of 5.1% of the national labour force. Levels were highest in the South Central area (9.9% and 11.3% respectively) and the Mekong Delta (9.1% and 9.8% respectively). The fisheries sector created a lot of jobs with more than four millions labours, both directly through employment on boats and farms, and indirectly activities such as processing. The total labours act as fishermen, 73% were of small-scale fisheries and 27% of offshore fisheries. Education level in most fishing community is low, only 20% has finish primary school and nearly 10% has finish secondary schools and 0.65% having certificates/diploma from vocational schools or universities. In general, the poverty rate in coastal regions is lower than in Viet Nam's mountainous interior. However, in some areas; poverty in coastal communities is increasing as a result of overexploitation of fish stocks and degradation of habitats.

6. Institutional arrangements and supporting for fisheries management

6.1. Fisheries acts

In Vietnam, government policies are defined in laws, decrees, ordinances, circulars and regulations, the last often at provincial level. Provinces are the lowest level at which regulations can be drafted, consistent with national legislation. Since 1986, the Government has emphasized development of the market economy under the Doi Moi (renovation) policy.

Fisheries Law was adopted by the National Assembly in December 2003. It provides a much-improved basis for management of the capture fisheries and aquaculture sectors, including the potential for the involvement of stakeholders.

Fisheries Law comprises ten chapters and 62 articles, including the contents the following: i) Protection and development of fisheries resources regulates the protection of aquatic habitats, the protection, conservation, enhancement and development of fisheries resources, protected inland areas and marine parks, financial sources for rehabilitation of fish stocks. ii) Fishing regulates fishing operations conducted at sea, in rivers and lagoons. It lays down the fishing rights of organizations and individuals, as well as the granting and withdrawal of fishing licenses. iii) Aquaculture lays down the legal status for aquaculture activities, especially the allocation and lease of aquaculture land and marine areas for aquaculture purposes. iv) Fishing vessels and services of fisheries activities lays down the management of fishing vessels, fishing ports, fish landing sites and fish wholesale markets. v) Processing and trade of fishery products regulates the processing of fish, preservation of fish materials, quality and hygiene and

safety of fishery products, import and export of fishery products. vii) International cooperation on fisheries activities includes the "fishing operations of Vietnamese fishing vessels beyond the waters under jurisdiction of Viet Nam" and "foreign fishing". The management objective is conservation, enhancement and development of fisheries resources and protection of the environment, biodiversity and landscape while meeting economic needs. To this end, the development of fisheries activities shall follow a master plan covering the sector both nationwide and locally.

The Law leads policies that call for the allocation of land and marine areas for aquaculture purposes, and guidance, training and financial assistance for employment alternatives when the fishers move to offshore fishing activities. The policies also call for: measures to assist fishers living inside inland protected areas or marine parks (Article 9); regulations on management of fishing grounds and demarcation of marine areas and fishing routes (Article 15); licenses for all vessels conducting fishing operations as well as conditions for granting and revocation of fishing licenses (Articles 16, 17 and 18). In an effort to avoid excess fishing capacity and to ensure proper fishing efforts, the management authorities offer policies to develop the fishing fleet in accordance with the master plan of the fisheries sector (Article 37).

Relevant regulations on vessel construction and upgrading shall be approved by the competent agencies to ensure quality and technical performance (Article 38). Regulations of Articles 39 and 40 address issues of fishing vessel registration, inspection, crewing, etc. The Government and Ministry of Fisheries have published a lot of legal normative documents regulating the technical and professional issues related to the protection and development of fisheries resources,

and aiming at creating an integrated legal framework for sector management purposes. However, it was weak to monitor the implementing the regulation of documents, many normative document published but overlapping and ineffective.

6.2. Fisheries Management structure of Viet Nam

Ministry of Agriculture and Rural Development (MARD) is the central focal point for state management of fisheries sector as well as the main government body responsible for protecting and developing fisheries resources, MARD has duty to defining (i) total allowable catch and fishing capacity; (ii) proclaims lists of prohibited species for capture; closed seasons and areas, prohibited fishing gear; and measures or information on the rehabilitation and conservation of aquatic resources and their habitat; (iii) Monitoring Controlling and Surveillance; (iv) The demarcation of marine areas and fishing routes and the decentralization to the local authorities of the management measures is essential to avoid conflict among fishers when fishing operation. It has the relevant office assistances (as the Figure 17) including the five fisheries research institutes, in which includes: Research Institute of Marine products; three Institutes of Aquaculture Research and Research and Institute of Fisheries Economy and Planning, focusing on policies research and fisheries economic development strategy.

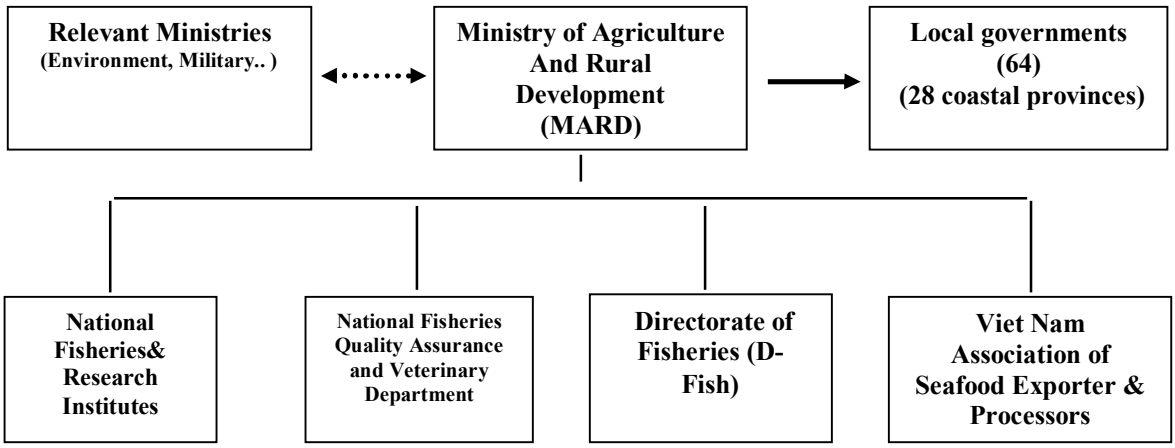


Figure 17. Fisheries management organizational mechanism of Viet Nam

D-Fish is the important office that has the State management function (D-Fish has just been established in 2009 after Ministry of Fisheries (MOF) moved to MARD), specializing in the capture fisheries and aquiculture sector, it has about more than 100 staffs with a system of institutes as in Figure 18.

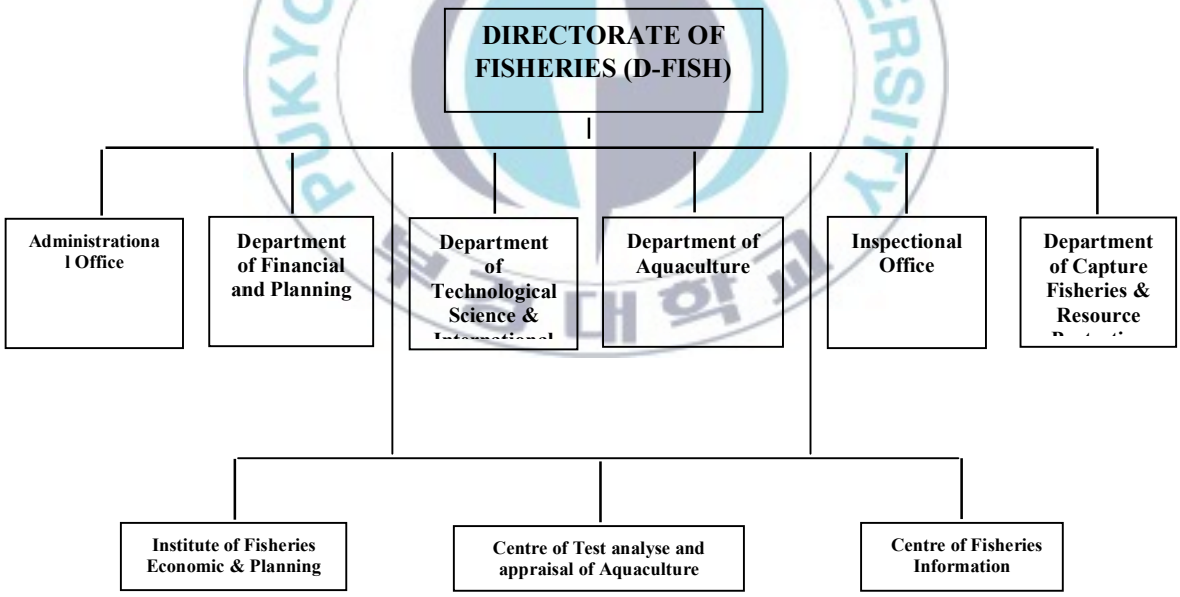


Figure 18. The organizational mechanism of Directorate of Fisheries

Source: Directorate of Fisheries (D-FISH)

Beside that National Fisheries Quality Assurance and Veterinary Directorate (NAFIQAVED) has a head office six branches located in key fisheries areas of the countries. It has responsibility for fisheries food safety and quality control. To assist provincial authorities to manage their fisheries and aquaculture sectors, most coastal provinces have set up departments of fisheries (DOFis). DOFis are line agencies assisting the provincial people's committees in the implementation of state management over fisheries at the provincial level under guided technically by D-Fish. DOFis typically have a 15 staff to 25 permanent offices belong to the role and important position of fisheries and aquaculture of provinces.

However, the main problem of Viet Nam fisheries mechanism is to lack training/education and staffs, especially in the district and commune level. The lack of professional management capacity at the district and commune means that data collection and monitoring activities are limited (MOF, Annual Report 2005). Viet Nam is a member of several regional intergovernmental organizations involved in fisheries and aquaculture development, including SEAFDEC, NACA, and Mekong River Commission (MRC). Cooperation also provides opportunities for Viet Nam to work with other regional countries to sharing experiences such as FAO and Asia Pacific Economic Commission (APEC), CITES.

Viet Nam Fisheries has received little bilateral or multilateral agency support over the past decade compared to other natural resources sector. Given the sector's urgent need for improved management and its capacity to alleviate poverty and improve the coastal environment. ODA resources in the sector are limited, providing 36% of public resources, concentrating on investment related to technical assistance with 12 projects in 2003. Significant contributors include DANIDA, NORAD.

Concerning education institutions of fisheries sector, Viet Nam has three universities training courses including: fish technology; marine safety; fisheries engineering; fisheries economic, aquaculture and fisheries resource management with thousands students and labor force. However, some difficulty has been experienced in attracting students to participate studying in fisheries sector; it has few students, having a job in this field.

IV. FISHERIES SUSTAINABALITY ASSESSMENT: VIET NAM

1. Methodology and data sources

1.1. Methodology

The qualitative approach was employed to assess the fisheries sustainability in Viet Nam as in the Figure 19. It is an effective way to find and analyze and synthesize the information as well as to link the logical research process to the model. It is commonly used for policy and program evaluation because it can answer important questions in understanding how and why certain outcomes were achieved.

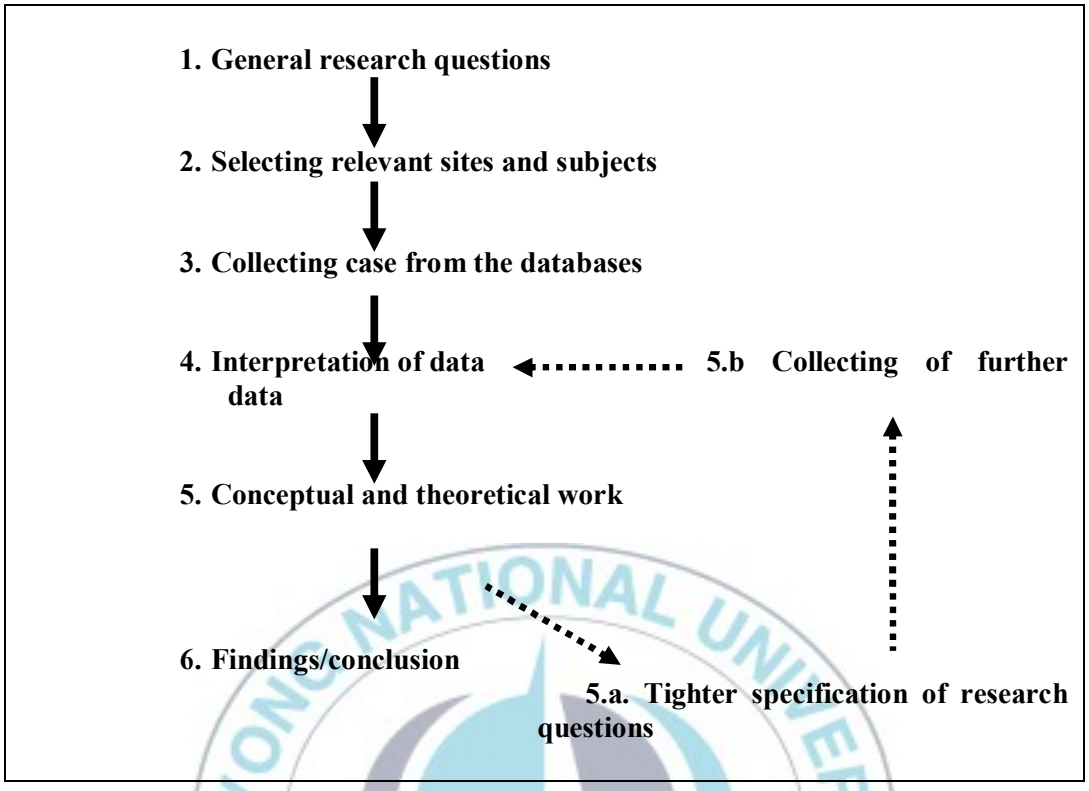


Figure 19. Research steps outline

Source: Bryman (2004) as a adapted by Tu (2009)

Quantitative approaches have the advantage of allowing for more diversity in responses as well as the capacity to adapt to new developments or issues during the research process itself. (en. Wikipedia.org). The process of the study will be implemented as the following main steps

Step 1: Determine the specific research questions from research issues (fisheries management assessment) to find out the criteria or indicators to evaluate "sustainability of fisheries management. What is the criteria and indicator be using to assess?

The criteria and indicators are applied to evaluate the fisheries sustainability, based on FAO code conduct for fisheries responsible (Article 7, Fisheries management) that Pitcher (1999) is author of Rapfish method. (RAPFISH is a new multi-disciplinary rapid appraisal technique for evaluating the comparative sustainability of fisheries based on a large number of easy-to-score attributes of covering six evaluation fields of fisheries management with 44 questions.

Each question is scored on a scale of 0 to 10: 0 to 4 represent 'fail' scores; 7 and above are considered as 'good' scores. Status results expressing sustainability in each of these fields are reported on a scale from zero to 100%. Status scores from several fields are combined in kite diagrams to facilitate comparison of fisheries, or fisheries constructed to represent alternative policies) (Figure 20, 21).

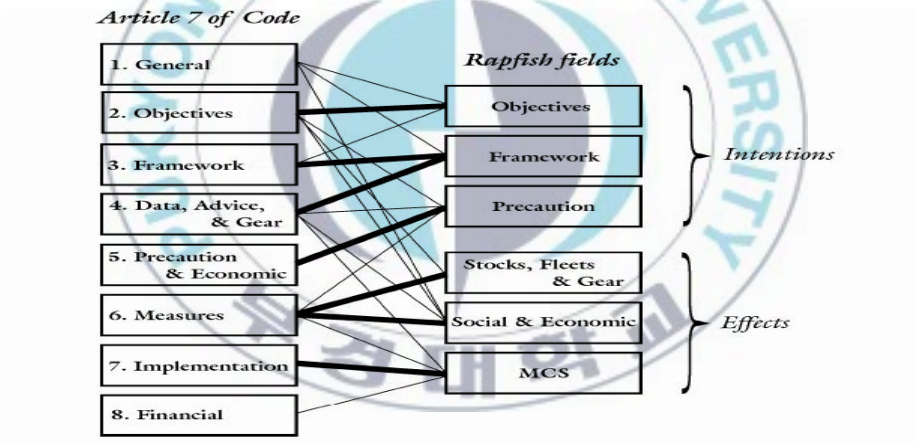


Figure 20. Illustration of how subsections of Article 7 of the Code are mapped onto RAPFISH fields. Thick lines show main linkages and thin lines minor linkages (from Pitcher, 1999)

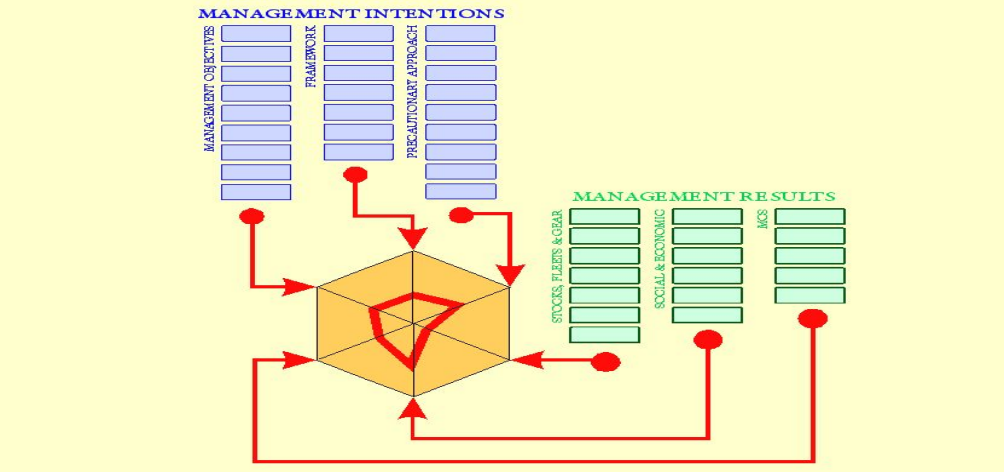


Figure 21. Depiction of Raffish results using a kite diagram. Axes in the diagram represent the scale of each management attribute (here referring to the management intentions and results (effectiveness) according to the attributes of the CCCF). The thick red line inside the diagram represents the scores of a country in each field (from Pitcher et al., 2006).

Source: Fao/Fishcode Review No. 21

Morris Inequality Index was used for data analysis and assessment of sustainability. This index is among the newest formal models used in world (Mohammad 2010). It can be calculated using the formula:

$$Y_{ij} = \frac{Xij - Xij(\min))}{Xij(\max) - Xij(\min)} \times 100 \quad (1)$$

Where $X_{ij(min)}$ and $X_{ij(max)}$ are the lowest and highest values the variable X can attain, respectively. Y_{ij} is Morris Inequality Index for each variable and X_{ij} is amount of variables in each evaluated indicators. The six evaluation fields of fisheries management will be calculated through this formula:

$$D.I = \frac{\sum_i^n = Y_{ij}}{n} \quad (2)$$

Where, n is the number of the studied indexes and D.I. is the main developmental index is higher as it is closer to 100. In addition, for further analysis, descriptive statistics like frequency and percentage were used.

Step 2: Collecting case from the databases: Colleting information and data as well as relevant documents to verify and make clearing the problems need to study in case of Viet Nam; (who are approached or has done in this studying areas? What things are unclear and need to more interpreter and supplement adjustment for this studying?

Step 3: Analysis to find out the appropriate answer on the question of objective of studying: analysis and syntheses the information as well as linkage the logical process of problem research to make sure the accurate information and adequate as well as evidences for conclusion and recommendation.

1. 2. Data source

Data used to analysis and fisheries sustainability assessment in this dissertation is mainly from secondary sources, those data and information was combined and comparative. The main data source from to the result of survey questions to estimate the compliance of the Viet Nam fisheries with Article 7 – Fisheries management of UN of Code Conduct for Responsible fisheries (FAO 1995) that was implemented by Tony J Pitcher (2006), at website (ftp://ftb.fisheries.ubc.ca/codeconduct).

The thesis took other data sources such as: journals, articles, official and unofficial documents, statistics such as from FAO, Vietnamese experts… Those material and data sources will provide more information to analyse and show the evidences in assessment for Viet Nam Fisheries management.

2. Analysis and sustainability appraisals

Synthesizing again the result of survey question of author Tony J Pitcher from website address open (ftp://ftb.fisheries.ubc.ca/codeconduct) base on using 44 questions following Article 7 – Fisheries management of UN of Code Conduct for Responsible fisheries (FAO 1995) and adjusting the surveyed score to ensure the evaluation process is more accurate and objective with Viet Nam fisheries management in practical from 2006-2010. The surveyed Score of UN will be adjusted base on the empirical information and concrete evidences of fisheries management status of Viet Nam until 2010 (see Appendix 1) that the evidences will be indicated detail in analysis process to explain why it has adjustment score positively or negatively (Figure 22). This adjustment is completely suitable with authors' viewpoint "An open protocol has therefore been adopted for all country compliance evaluations, and the team remains open at any time to comments, corrections or adjustments. Updated version is made available online as necessary (ftp:ftp.fisheries.ubc.ca/Codeconduct)."

Figure 22. An estimation of compliance of the Vietnam fisheries (article 7, Fisheries management of UN code of conduct for responsible fisheries)

The red column is UN surveyed scores 2006 and the green column is adjustment scores 2010 (Figure 22). The questions in the evaluations are divided in two parts, the first representing the intentions of a country to follow the Code, the second part assessing the actual performance achieved. Six evaluation fields,

include management objectives (9 questions), regulatory framework (7 questions); precautionary approach (9 questions); the regulation of stocks, fleets and fishing gears (7 questions); social and economic factors (6 questions); and monitoring, control and surveillance (MSC) (6 questions).

From the data of surveyed scores and adjustment scores (seen Figure 22 and appendix 1), using formula (1) and (2) in the item 1.1. The six evaluation fields of fisheries management will be represent in the diagram of the scale of each management attribute.

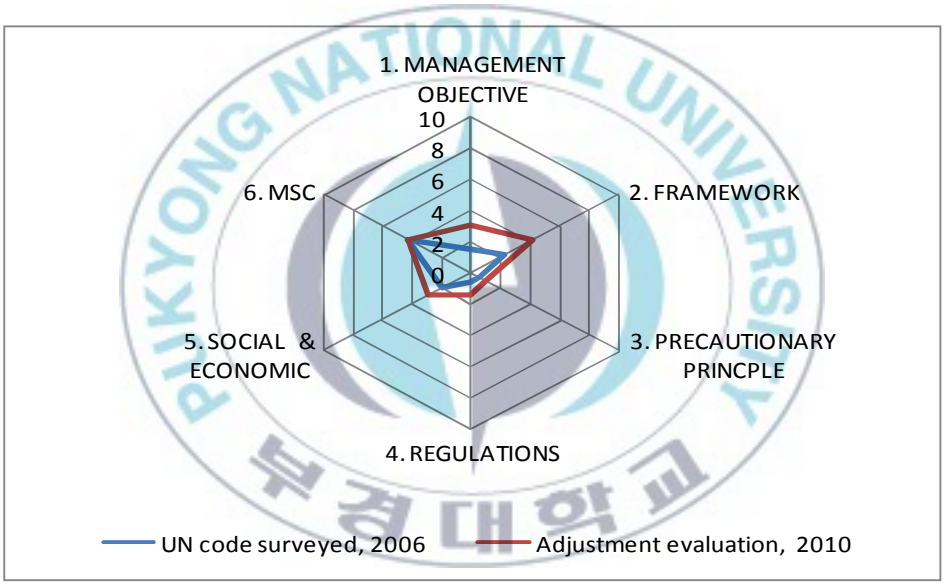


Figure 23. The evaluation result of Code compliance of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010

As seen in Figure 23 shown, overall Viet Nam fisheries are not in sustainability. For both of in case of evaluation: UN code surveyed, 2006 and adjustment evaluation, 2010. The evaluation scores has get fail scores with less than 4/10 scores for five indicators are Objectives, framework,

Precautions, regulations and social & economic. However, after four years UN code surveyed from 2006 to 2010, Viet Nam State has improved in some of aspects as management frameworks or management objectives. Nevertheless, the effectiveness of compliance management seems to be limited. So, what are the main reasons of these problems? We will review the detailed aspects of each dimension that may be lead to unsustainability in Viet Nam fisheries.

2.1. Management objective dimension

UN code conduct for responsible fisheries (FAO 1995) stated "Recognizing that long term sustainable use of fisheries resource is the overriding objective of conservation and management, States and subregional or regional fisheries management organizations and arrangements should, inter alia, adopt appropriate measures, base on the best scientific evidence available, which are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements of developing countries". So, assessing fisheries management objective focusing on management measures, how to avoid excess fishing capacity or protect biodiversity of aquatic habitats; endangered species that States should be insert in management intentions.

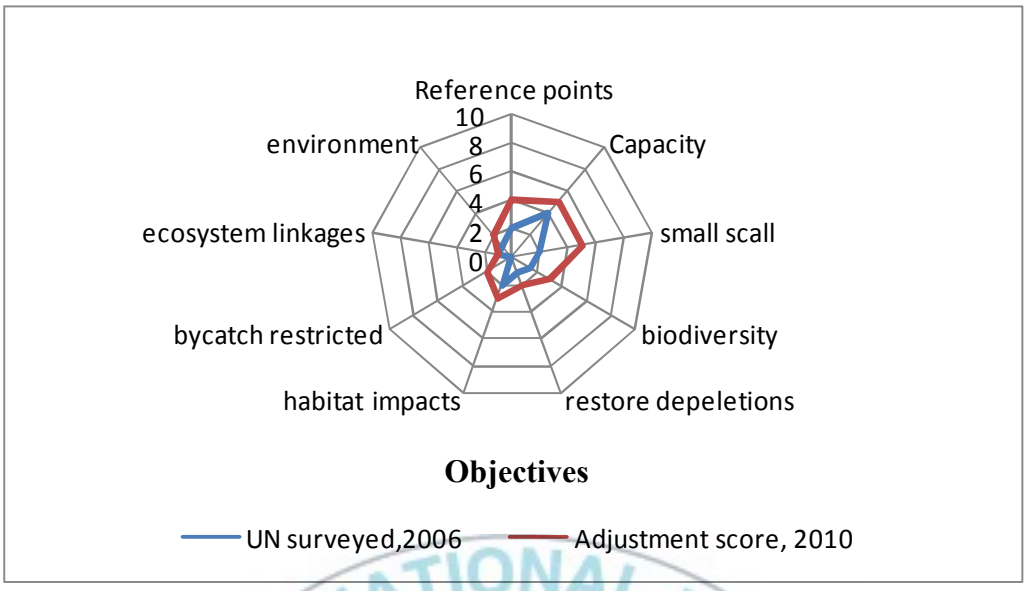


Figure 24. The evaluation result of Management objective of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010

The evaluation result (Figure 24) shown that these management objectives of Viet Nam Sates from 2006 to 2010 has obtained a progress. Viet Nam government has recognized the problem of overfishing, small scale fishing need to limited as mentioned in Decision 10/2006/TTg-CP Master plan of Viet Nam fisheries sector by 2010 and its orientation by 2020. The main tasks are "the number of fishing vessels shall be kept at 50,000 by 2010". However, the overall evaluation result achieved the fail score in almost indicators with less than 4/10 score.

i) Considering to the reference points for the fish stocks in Vietnamese fisheries, identified by using the best science available or not? Picher (2006) sated that there is a little detailed information is available to apply to Viet Nam Fisheries management. There are few resource assessment projects that has been carried out through some surveys and basic resource assessment, which was done by

Research Institute of Marine, Hai Phong (RIMP). Overall, although the cited survey and assessment work have provided some crude valued for groups of species, the results have not been used in any formal stock assessment aimed at management and, as consequence, there do not appear to be any formal reference points for Vietnamese fish stock (Picher 2006).

Table 11. The demersal stock and TAC of Vietnamese marine waters

Region	Stock (tons)	TAC (tons)	Researchers, year
Tonkin Gulf	440,000 290,000 446,000 800,000	280,000 145,000 223,000 40,000	Gulland, 1970 Shindo, 1973 Ayoama, 1973 Le Minh Vien, 1973
Central	160,000 52,000 193,000	89,000 26,000 96,000	Shindo, 1969 – 1970 FAO, 1969 – 1971 Van Huu Kim, 1971
South-East	643,000 371,000 874,000	481,000 185,000 437,000	Shindo, 1971 FAO, 1971 – 1972 Ayoama, 1973
South-West	900,000 528,000 1,223,000	450,600 264,000 611,000	Isarankura, 1971 FAO, 1969 – 1971 Ayoama, 1973

Source: Thao,N.T, 2005

The problem is that comparison with the results of historical survey that was carried out in 1970s and 1980s is difficult because they were different areas and use different gears.

However, Research Institute for Marine Fisheries of Viet Nam (RIMF 2009) indicated that it has already assessed the standing stock and potential yield of fisheries resources for each individual seawater area of Viet Nam (RIMF 2009).

The assessment result of Viet Nam stock is used for Maser plan and strategy of Viet Nam fisheries development. However, its results are different and inconsistent.

ii) Relating to present fleet capacity and the plan to reduce them: As the result of subsidy policy that is supplemented by the State expenditure and preferential bank loans, fishermen have spent thousands of billions of VND building and refurbishing vessels and purchasing modern fishing equipment recent years is a 100% increase in the numbers of fishing vessels and their engines since the 1980s. (Picher 2006).

However, Viet Nam government has signed Decision 10/2006/TTg-CP Master plan of Viet Nam fisheries sector by 2010 and its orientation by 2020. The main tasks are "the number of fishing vessels shall be kept at 50,000 by 2010". Fishing capacity calculated and plan reduced small vessels more than 40.000 units, but the state has subsidized fuel and upgrading engine of vessel with thousands of billions of VND, in 2008. The fleet capacity has not been reduced; meanwhile catch volume has continued to increase.

iii) Small-scale fishers considered in plan and are there institutional structures for ongoing consultation: Small-s Small-scale inshore fishers make up more than 80% of the Vietnamese fishing fleet. According to survey for poor fishing community (World Bank, 2006) only better-off fishing households are able to access to offshore resources. Poor fishing households in surveyed hamlets/communes are unable to do so, since they cannot afford adequate fishing equipment and vessels. Although the fisher folks still use explosive fishing method which damages species, the near-shore resources have decrease.

Some households access inshore resources mainly, for example, by diving to catch lobsters and sea snails, using fishing nets close to shore (Ninh Binh, Ha tinh), alga and glacilaria picking (in Ninh Thuan), and fish and squid catching (in Ha Tinh, Quang Ninh, Ninh Binh). Poor households have little or no capacity for exploitation of areas for aquaculture such as: farming of shrimp/prawn, fish, snail, seaweed, cultivation, due to limited capital stock, techniques and management skills. The Master Plan for Fisheries to the Year 2010 aims to ensure food security for Vietnamese people and the production of export commodities. In most provinces, aquaculture extension services are directed at poor farmers with adequate resources for aquaculture.

However, Viet Nam fisheries Law, 2003 has mentioned the intention of offshore fishing development, reducing small scale fishing in coastal. In fact, in during the time of building Fisheries Law, Viet Nam had the consultant of fisheries experts. At the present, Viet Nam State does not allow new boat constructing that it has small engine less than 20 HP, prohibit fishing license and register. (Decree 66/2005/ND-CP 19/5/2005).

iv) Concerning impacts of fishery on biodiversity allowed for in plan and mitigation measures. UN code surveyed 2006 indicated that Vietnam has many unique and endangered tropical species (for example, five species of threatened primates – Conservation International). In 1994 UNEP wrote, “Whilst hunting was until recently a matter of getting meat for the kitchen, it has now become far more a matter of gathering items for trade. The small province of Ha Tinh alone exports three tones of tortoises a year to China. In marine ecosystems Vietnam has a number of populations of dolphins, turtles and dugongs (e.g., the 14 islands of the Con Dao National Park 200 km south

of Saigon). Populations of dugong here and elsewhere have hardly been surveyed (Cox, 2002), and are under threat from fishing activities (Picher 2006).

For marine turtles the situation is serious: Traffic (2004) says, with the exception of Con Dao, all populations of marine turtles in Viet Nam are in serious decline. Traffic (2004) states, "Five marine turtle species occur in Vietnamese waters: the Hawksbill, Green, Loggerhead, Olive Ridley and Leatherback. Over-exploitation, particularly for trade, has caused major declines and reduced populations to very low levels. Indeed, there is evidently an official awareness of the problem, since Nguyen Chu Hoi (2003) states that, "Hundreds of fish species have been listed as endangered, threatened species and in the Vietnamese Red Book." But it is not clear that listing in the Vietnamese Red Book had led to the implementation of effective restrictions on fishery catches.

Nevertheless, There are some of research and assessment reports of Fisheries policies of Viet Nam has indicated these negative impact to ecosystem and biodiversity because of State policy about encouraging rapidly fisheries development that lack of MCS (VIFEP 2008). Recently, Decision No: 1960/QD-TTg of Viet Nam government, 2010: master plan of fisheries sector has mentioned (item IV.5) "prohibit capture the species in breeding seasons; using destructive fishing; protect mangrove ecosystem and new planting.

v) The management plan aim to restore depleted stocks in the fisheries is not explicit. The literature suggests the attitude that the best that may be hoped for is that inshore stocks remain at the same level, while aquaculture and offshore

fishing expand. FAO (1990) says, “Due to the increase in human population, there is an enormous pressure on these resources. Exact data are not available, but estimates can be drawn from behavioural analysis. According to these estimates, in addition to the 8 million people whose livelihood depends on these fisheries as the household primary income source, there are an additional 12 million who get part of their income or subsistence from fisheries.” Intensive exploitation of inshore resources in Vietnam has evidently led to a large amount of inshore depletion, which is rather poorly documented (Pitcher 2006).

Decision No 31/2004/QD-TTg of Viet Nam government “Approving the Aquatic Resource Protection and Development Program till 2010” The main objective: Restore aquatic resource in shore sea areas, rivers, reservoirs and submerged regions for sustainable aquatic resource development.”

vi) Human impacts (pollution, waste) on the fishery habitat are identified as a serious problem in Viet Nam. In 1994 UNEP wrote, “Coral habitats are threatened by pollution, including siltation from land; over exploitation of fish and invertebrates, use of explosives for fishing, and coral breaking and mining and collection of items for the souvenir trade”. Ten years later, Nguyen Chu Hoi (2003) states, “Coastal areas, where there is a high concentration of fisheries production activities, are suffering from various natural disasters such as floods, typhoons and erosion, as well as the increasing impacts from sea-based and land- based pollution, such as oil-spills, waste discharge and algae blooms (Tony J Pitcher). Pollution in the Dong Nai River has killed 36 tons of fishes in Thong Nhat Ward of southern Bien Hoa city, the farmers association said in a report sent to authorities**.** Hoang Van Thong, head of the province’s

Environmental Protection Department, said the fishes were killed by the increasing pollution in the Dong Nai River.

These areas even suffer from negative environmental impacts caused from fisheries". Vietnam Business Forum (Dec 22 2004) states, The most urgent issue of Khanh Hoa in fisheries is environmental pollution in both fishing and aquaculture. The development of areas and techniques for aquaculture, which cannot meet the conditions for a safe environment and water treatment, has broken the ecological balance, resulting in a fall in economic effectiveness. Rambaldi *et al.* (2001) relate that, Freshwater and marine habitats are threatened by siltation, industrial and domestic pollution, over-fishing, destructive fishing methods, pollution from agricultural pesticide run-off, land reclamation, physical disturbance, and introduction of exotic species. Habitat fragmentation also has major impacts on biodiversity (Tony J Pitcher). It has mentioned in Master plan of fisheries sector as well as relevant documents of others Ministries. However, it lacks MCS in practical.

vii) Relating to the management plan of fishing gear to avoid by-catch of non-target species, environmental and habitat damage: Nguyen Chu Hoi (2003) states, "The reasons for this problem result from the use of destructive fishing methods such as dynamic, toxic chemicals, small mesh size net, fishing in breeding and prohibitive times; destroying important coastal and marine habitats such as coral reefs, sea grass beds and mangroves…1998-2000, there was 843 case using explosive; using electric was 19.685 case. Viet Nam fisheries are small scale with 80% fishing fleets in the inshore areas leading to overfishing; fisheries species composition and fish size are reducing. A number of the fishing gears in Vietnam have high catches of trash fish. Edwards (2004) pointed that trash fish

occupied about 33% of total marine fish landings. Southern fisheries had the highest proportion of trash fish (averaging around 60% of the catch).
Recently, Decree: 33/2010/ND-CP Viet Nam Government regarding the management of fishing operations conducted by Vietnamese Organizations and individuals in all marine areas. The decree has published with management objectives is reducing conflict between inshore fishing and offshore fishing, managing the fishing methods, gears.

ix) Environmental influences on this fishery made explicit in the management plan and are adverse effects minimized: Environmental influences (seasonal monsoon changes, temperature, salinity, tidal and current flow) have been quite well measured (e.g., Thuoc and Long, 1997), but do not appear to be explicitly allowed for in fishery management plans.

From this point as mentioned can see that common objective of fisheries management are recognized in some of Master Plan of Viet Nam fisheries, but management measure was not rational as a consequence of the ambiguity of scientific information and social values.

2.2. Framework (data& procedures) dimension

To be effective, fisheries management should be concerned with whole stock unit over its entire area of distribution and take into account previously agree management measures established and applied in the same region, all removals and the biological unity and other biological characteristics of the stock. The best scientific evidence available should be used to determine, inter alia, the area of

distribution of the resource and the area through which it migrates during its life cycle (FAO 1995). The management framework should be included the sustainability evaluated considering; statistic system and data gathering.

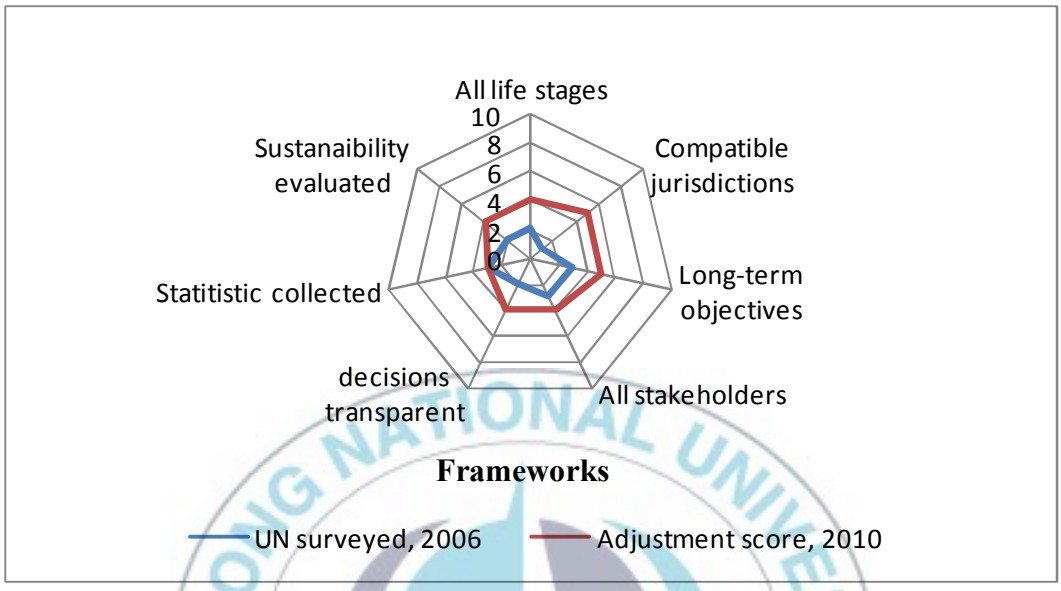


Figure 25. The evaluation result of Management Frameworks of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010

There is a significance progress in building the management framework programme of Viet Nam Fisheries comparing between surveyed results of UN code 2006 with adjustment scores 2010. These indicators as long term objective; compatible jurisdiction; sustainable evaluation and the role of stakeholders are concerned and indicated in management plan. However, overall score of all evaluation indicators are still in the fail score with less than 5/10 score.

i) Considering the survey question: are total and complete removals from the stocks over the whole stock area and over whole life cycle accounted for in

assessment? Pitcher (2006) indicated that Fishery catches, especially from the inshore sector; do not appear to be well-reported in Vietnam. Independent assessments suggest that marine catches are substantially higher than the official statistics. Van Zwieten *et al.* (2002) write that, "The effective usage of the present fisheries information of Vietnam is constrained by (1) its low categorical resolution and (2) the non-transparent aggregation of data, some of which is secret and never examined for trends and warning signs". The Research Institute of Marine Products (RIFM) through its Assessment of Marine Living Resources program, with technical and financial assistance through Danish aid (Anon, 2001) recently estimated marine capture to be 4 million tones. A slightly earlier estimate, also from RIFM, of uncertainty relating to the accuracy of fisheries statistics gave a figure of 3.2 million tones (Houng and Christensen, 2001).

Recently, RIMF (2009) has declared the results of the standing stock assessment and potential yield of fisheries resources for each individual seawater area of Viet Nam (i.e. the Gulf of Tonkin, the Central, the Southern and the southeast-regions). However, it still has a controversial sceptical about the much different biomass estimation as well as TAC of each Viet Nam sea regions comparing with previous results.

ii) The problem disputes sea jurisdiction between Viet Nam and countries in East Sea are very sensitive. Viet Nam is a member of the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, Asia Pacific Fishery Commission, the Indo-Pacific Fishery Commission, and the Southeast Asian Fisheries Development Centre. However, relationships with neighbouring countries are not very good, especially with China and Thailand,

both of which appear to be sources of illegal fishing vessels and which are also characterized by lack of enforcement or effective management of their fisheries. Rating here is low because of a serious lack of management measures that might be evaluated for international compatibility (Pitcher 2006).

In contrast with Pitcher' information's are almost Viet Nam fishing vessels is small, fishing operating in territorial jurisdiction of Viet Nam Sea. Viet Nam state has effort to resolve the dispute of sea jurisdiction with neighbouring countries in peaceful negotiation. For instance: Convention on delimitation of Tonkin Gulf and cooperation of fisheries between Viet Nam State and China, it was singed and has effect in 2004. However, Eastern Sea is one of sensitive areas of international dispute.

iii) These objectives for fishery management in Viet Nam are very broad and generic, and some reveal the present situation of the almost complete absence of management. The score is low with 3/10 score, because, while the broad policy goals are clear, the specific objectives of fishery management are not made explicit. For example, the paper omits any mention of over-capacity, impacts on biodiversity or gear regulations, uncertainty (which must be large), or of how these may be reduced or brought under control (Pitcher 2006).

However, if like in the preceding master plan of Viet Nam fisheries sector has developed quickly with objectives such as high productively, increasing daily consumption demand, export with high value export; develop the fisheries sector in a rapid and sustainable manner Ex. Decree: 10/2006/TTG-QD of Viet Nam government. But according to Decree 1960/QD-TTg 2010, objective of fisheries development of Viet Nam has changed be transferring from quickly develop to

quality and sustainable development. Obviously it has improved in the vision of Viet Nam fisheries development.

iv) The role of stakeholders in the fisheries resource management are identified and considered in some official documents. while it does mention coastal fishing communities in relation to community-based management, does not suggest that most groups such as small-scale fishers, crew, skippers, owners, investors, processors, managers, trades people, family or fishing community members are identified explicitly (Tony J Pitcher). But recently, there are some documents that were published by government and local government guide lining with involving of fisheries communities taking part in the role of management.

v) According to Van Zwieten *et al.* (2002) clearly set out some major issues with fisheries statistics in Vietnam: The effective usage of the present fisheries information of Vietnam is constrained by (1) its low categorical resolution and (2) the non-transparent aggregation of data, some of which is secret and never examined for trends and warning signs (Picher 2006).

Develop the informational technology system is improved significant, the fisheries offices have equipped and open access. For example: it can find out fisheries data's at website of (Viet Nam General Statistic Office (GSO)). However, effective usage of the present is constrained in the transparent

vii) Fisheries statistics systems is weakness, it caused difficulty exactly estimation of total catch, catch by fishing fleets, gears, catch by species by time, spaces (Chu Tien Vinh 2006). Example: before 2007, statistic report of total national fishing fleet was about 95.000 units but 2008, after Viet Nam government has subsidized

fuel for fisherman, the total number of fishing vessel was reported 123,000 units, increasing 28,000 units.

viii) There are some evaluation projects roles of social, economic and institutional factors, which are implemented by research institutes or other international organization, however the data and documents seems just formalism, it is rarely used in the fisheries management.

2.3. Precautionary approach dimension

FAO technical guideline for responsible fisheries No.4 indicated that important role of precautionary approach in fisheries management "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

In the six evaluation fields, precautionary approach get lowest sore for both in case of evaluation. There are no evidence is indicated in all of evaluation aspects in management planning of Viet Nam such as uncertainty quantified; limited reference point for stock specific; restrict fishing plan in the event of environment emergency; the viable contingency plans to restrict fishing in case of excess fishing.

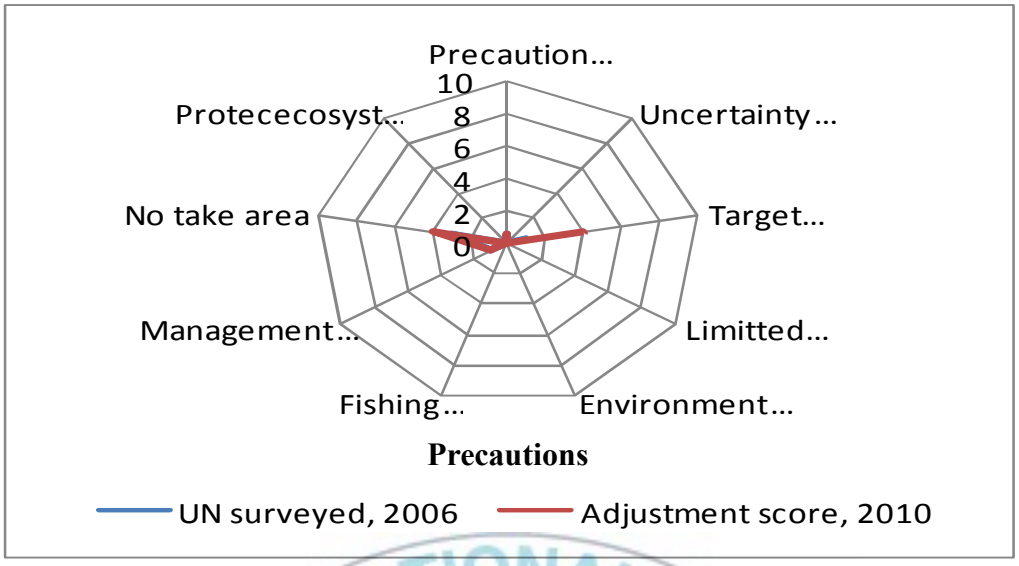


Figure 26. The evaluation result of Management Precautions of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010

There is no explicit mention of precaution in any of the documents relating to fisheries management in Viet Nam. The country has signed two international instruments that embody the precautionary approach (the Convention of Biological Diversity and the UN Convention on Climate Change), but there is no evidence of this being reflected in national policy or procedures (Tony J. Pitcher).

Are stock-specific target reference points estimated and employed? One paper has published an approximate MSY from a surplus production assessment based on surveys and CPUE (van Zwieten *et al.*, 2002), but there is no evidence of its findings being adopted in Viet Nam. Older Gulland-style estimates of sustainable yield have been around for many years, but even there, the reference points are not being used in management.

RIMF (2009) has declared the results of the standing stock assessment and potential yield of fisheries resources for each individual seawater area of Viet Nam resources. The assessment result of Viet Nam stock is used for Master plan and strategy of Viet Nam fisheries development. However, its results are different and inconsistent.

No-take areas less than 1% of EEZ (1.5), plus 1.5 for attempts at monitoring attainted 3/10 score (30%), MPAs in Vietnam amounting to 935 km^2 or 0.06 of the EEZ area. There have been important regulatory, institutional and political reforms. Despite these achievements, most protected areas remain "paper parks", with little conservation management taking place on the ground...The challenges facing protected areas managers go deeper than inadequate funds – often there has been no improvement in habitats and species conservation even where resources have been allocated to specific nature reserves and national parks. Protected areas, even those supported by costly donor-funded projects, continue to suffer" (UNEP, 2003).

2.4. Regulations (Stocks, fleets and gears) dimension

The overall of evaluation result of management implementation of stocks, fleets and gears get fail score with six indicators in seven surveyed questions. It has not much progress in actual performance of fisheries management in Viet Nam when comparing with surveyed result of UN code conduct, 2006 with score adjustment evaluation implementing until 2010. The effectiveness of compliance of of regulation documents of State are not improved or enforcement in practical. Even

though State has published a lot of guidelines and documents such as Viet Nam fisheries law, Master plan of fisheries development.

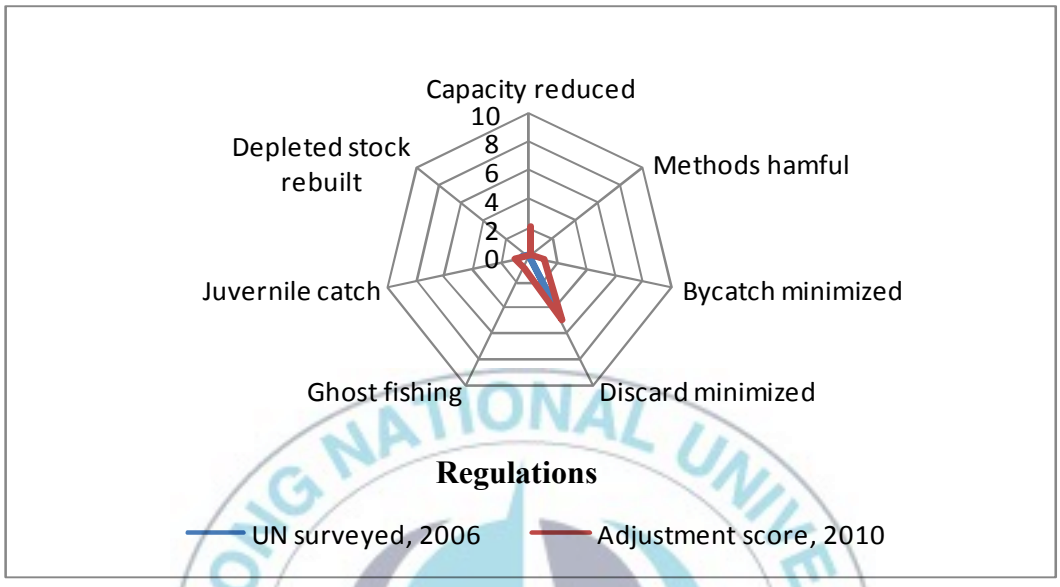


Figure 27. The evaluation result of Management regulations of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010

The evidences can show relating to : i) excess fleet capacity is not being reduced; FAO (1999) identifies this as a major issue in Viet Nam, "Overcapitalization (increased fishing effort/number of vessels and fleet horsepower combined with decreased catch per unit effort) is a common feature for coastal, inshore and shallow water offshore fisheries. The fishing fleet has been growing fast for more than a decade". The catch per unit of effort (CPUE) has decreased from 1.11 ton/hp in 1985 to 0.34 ton/hp in 200. Catch per unit (CPUE) has decreased to 0.31 ton/hp in 2008.

Table 12. Trend in catch per unit of effort (CPUE)

Year	CTB (kg/hp/year)	Year	CTB (kg/hp/year)	Year	CTB (kg/hp/year)	Year	CTB (kg/hp/year)
1989	0.99	1994	0.623	1999	0.501	2004	0.367
1990	0.9018	1995	0.59	2000	0.516	2005	0.3369
1991	0.8693	1996	0.662	2001	0.46	2006	0.3179
1992	0.7413	1997	0.517	2002	0.449	2007	0.3235
1993	0.6561	1998	0.476	2003	0.402	2008	0.314

Source: Department of Capture fisheries and resource protection, Viet Nam (DECAFIREP)

From 2006 until now, Viet Nam State does not allow constructing of small boats that it has small engine less than 20 HP, prohibit fishing license and register. (Decree 66/2005/ND-CP 19/5/2005).

ii) Concerning to fishing method known to be harmful to habitats, fishing capacity is difficult control. Viet Nam fisheries law has regulated and prohibits fishing method and using fishing gear to damage habitats, however there are so many difference reasons leading to above situation. Trawls damage bottom-living invertebrates; turtles and cetaceans are highly susceptible to by-catch in both commercial and artisanal fisheries. As the mesh size of gear is so small, the percentage of “trash” fish often amounts to 60 - 80 percent of the total catch in shrimp trawls or 40 - 80 percent in fish trawls, 90 percent in fixed nets, and 90 - 93 percent in push nets. Coral reefs and and sediment rocks have been degraded and damaged by improper activities. Harmful fishing gear like stow nets (in estuaries) and push nets are till are being utilized and depleting juvenile fish. An analysis of species composition of push nets in the Hai Minh province showed that 70-90 percent of shrimp in the catch are juvenile pink prawns, white prawns and cat prawns. The body weight of a pink prawn juvenile was 7-5g/individual, of white

prawns 2.6-9.6kg/individual. Obviously, there types of fisheries have not only caused very bad effects on the resources, but also result in a low income for fisher folk because the catch composition is mostly small-sized fish and shrimp (Nguyen Long).

iv) Discards are very low because trash fish are retained for differences purpose such fish meal; dried fish produced; fish sauces. v) There is no published information on this for fish traps or lost nets in Viet Nam, but it is likely nothing is done (Tony J Pitcher).

vi) In Viet Nam many small-mesh purse seine fisheries target schools of juveniles. Nguyen Chu Hoi (2003) mentions "destructive fishing methods such as dynamic, toxic chemicals, small mesh size net, fishing in breeding and prohibitive times; destroying important coastal and marine habitats such as coral reefs, sea grass beds and mangroves".
Twelve saltwater species of shrimp and fish, seven mollusks and eight fresh water shrimp were given some minimum size protection in 2006; catch below the minimum size must not exceed 15% of the total output (Vietnam net, 2006).

vii) Decision No. 131/2004/QD-TTg approving the Aquatic Resource Protection and development program still 2010. The 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, also with the education of the fishermen community, however it seems that the

activities performances only focus on disseminating information. it has not seen some evidences can see about depleted stocks being rebuilt in Viet Nam.

2.5. Social and Economic dimension

The social and economic dimensions consider the effect of the fishery on people and how to optimize the benefits for the interested parties or interested groups and the society in general (FAO, Technical guideline for responsible fisheries, No 4). Social and Economic dimension is one of important evaluation in fisheries management. Six characteristics were considered in Social and economic dimension (Figure 28). The overall score is fail.

However it has changed positively in the evaluation indicator of conflict minimized comparing with surveyed score in 2006. The reason is Viet Nam government has signed Decree 33/2010/ND-CP Viet Nam Government regarding the management of fishing operations conducted by Vietnamese Organizations and individuals in all marine areas. The decree has published with management objectives is reducing conflict between inshore fishing and offshore fishing, managing the fishing methods, gears; demarcation of fishing ground, remark to fishing vessels. Do not permit offshore vessels operating in coastal

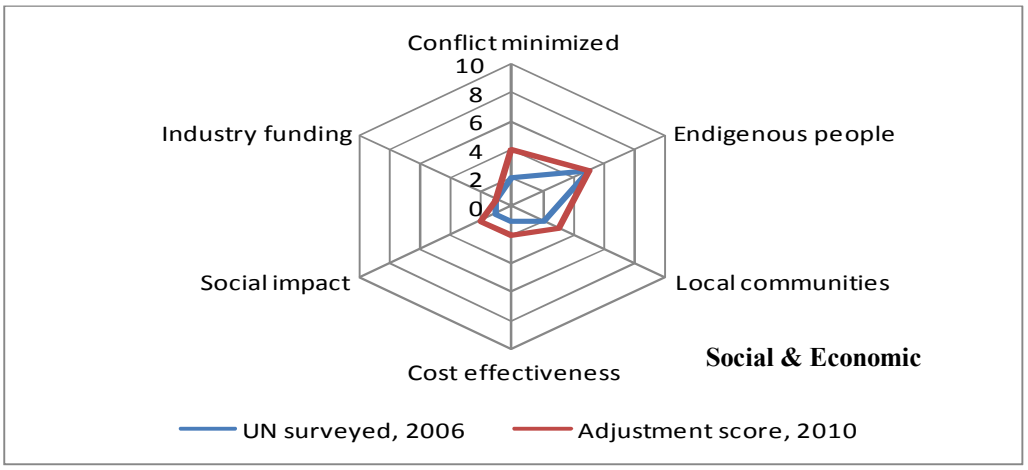


Figure 28. The evaluation result of Management social and economic of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010.

However, there are some evidences shown reasons why at social and economic dimension reached fail score in evaluation index of fisheries management: regarding to management responsibility: i) Is the fishery managed so as to minimize conflict among different sectors? Viet Nam government launched subsidized program to develop offshore fishing fleets from 1997, so far Viet Nam has more than 18,000 vessels operating in offshore.

Those big fishing boats then often fish in coastal waters, creating a hard competition with small fishing boats active in here and causing many collisions at sea. The observations of big pair trawlers (>200 HP) in Nam Dinh province and Hai Phong city in 1998 showed that, there was 71% of the total gear operations were made in waters of 10-30 m deep, and in Nghe An 100% of trawl hauls made in waters <10 m deep. Activities of big fishing fleets in coastal waters have caused very bad influences to small-scale fisheries, when

they fishing near shore, the percentage of small fish in catch are rather high (Picher 2006).

ii) Considering to the issues of indigenous Peoples rights and needs in fisheries being met? Although Vietnam is ethnically the most diverse country in Southeast Asia, and there are dozens of small indigenous tribes, most of these Peoples live in the highlands and are not involved in fishing. There have been almost no indigenous coastal peoples in Vietnam since a southward expansion of Viet peoples in the 1600s. The Vietnamese government has a reputation for trying to eradicate indigenous cultures (of the Degar, for example: see http://www.montagnard-foundation.org/history1.htm), but the score is the default value since there are no fishery implications.

iii) Concerning to the issues of the needs of local fishing communities being met: recently, Viet Nam government has published some documents to show that the necessary of community base management. However, it seems this new approach and need take time to propaganda, training as well empower to stakeholders.

iv) When a change to the management of the fishery is made, is its cost-effectiveness evaluated? According to Pitcher (2006) the management assessment directs to cost – effectiveness was no information on this issue for Viet Nam.

v) When a change to the management of the fishery is made, is its social impact evaluated? Viet Nam has some research institutes and training; therefore States also funds to implemented survey and assessment of effective projects. However, the projects evaluate directly to cost-effectiveness when a change to the management of the fisheries, it is rarely mentioned.

2.6. MCS dimension

MCS is the implementation of a plan or strategy. In the case of oceans management and fisheries, it includes the implementation of operations necessary to effect an agreed policy and plan for oceans and fisheries management. MCS is key to the success of any planning strategy. The absence of a strategy and methodology for implementation of monitoring, control and surveillance operations would render a fisheries management scheme incomplete (FAO). Six characteristics involved in sustainability fisheries management (Figure 29):

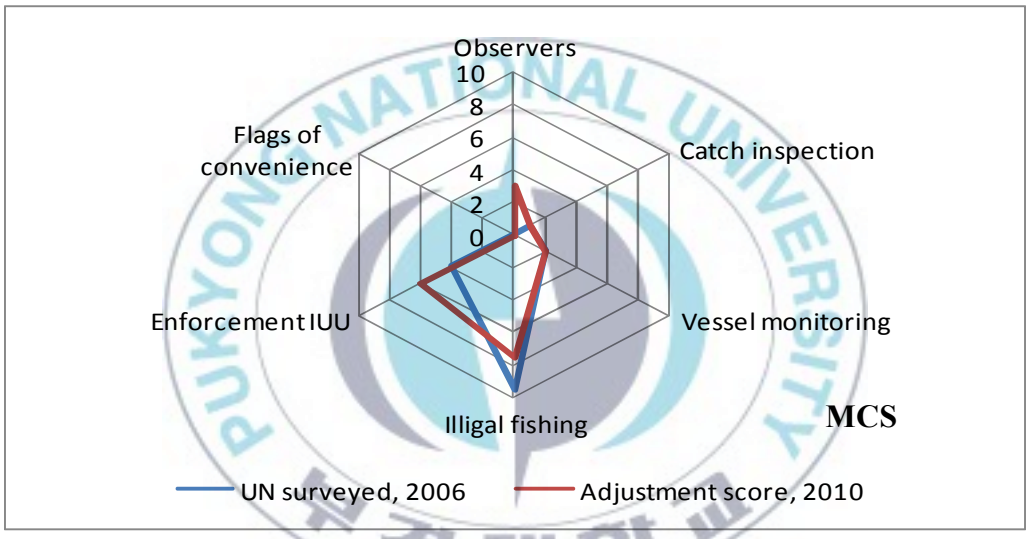


Figure 29. The evaluation result of Management MCS of Viet Nam fisheries base on UN code surveyed, 2006 and adjustment evaluation, 2010

Overall score of evaluation result of MCS of Viet Nam attained fail score. Observers indicators only reached score (3/10) compare with 2006 score (0/10), it means that the degree and types of observations required maintaining compliance with the regulatory controls imposed on fishing activities is very poor in Viet Nam practice. Vessel monitoring had score (2/10); enforcement IUU were highest

score 4/10. Illegal fishing with bad score (8.5/10) (best score 0/10). Last indicator is flags of convenience, Viet Nam gained highest score (0/0) with best reference score (0/0).

The main common reasons why MCS system of Viet Nam are ineffective in fisheries management: the objective cause is characteristic of Viet Nam sea as well geographic factor, fishing area scattered belong to long coastline and large fishing areas. All most of fishing vessels are small and not meet equipments to make sure statistic reports as well as connecting to MCS system of Viet Nam. Viet Nam State has just started to support funds and set up MCS system for little amount offshore fishing. The other reasons are the fisheries organizational mechanism not stable and changing. Lack of observer official, fishing inspection, especially not enough equipment and funding, each province has only 1 to 2 inspection ships above large area.

It can see some more detail evidences as: How effective is the catch inspection scheme: Flewelling (2001) states, “Vietnam is a country with a large fishing sector that is increasing its influence offshore. Considerable effort is being made to enhance the capability of the fishing fleet, but the government management capability and control mechanisms do not appear to be expanding at the same rate. Vietnam’s management and MCS capability is focused on the coastal areas with the offshore areas being monitored, mainly for border incursions, and not for sustainable management purposes. Training in sustainable management and MCS techniques and supporting legislation appear to be areas of greatest need and interest in Vietnam.” Offshore catches are recorded and inspected according to a frame survey design. The small-scale sector lands on

beaches (FAO, 1999) and not at fixed landing sites. The frame survey method in use to estimate catches has been criticized by van Zwieten *et al.* (2002).

Relating to the issues of vessels fishing illegally in Vietnamese fisheries: There are number of reports of specific instances of illegal fishing, e.g., Saigontourist Travel Service Co. (2004) states that Hon Mun (Black Island) Ocean Preserve in Nha Trang Bay "...is coming under increasing pressure as anchor damage and illegal fishing continues". The official newspaper, *Nhan Dan,* Aug 16-17, 2003 reports that, "The last two of Thailand's 11 fishing vessels illegally operating in Vietnam's waters have been released by the People's Committee of southern Soc Trang province and the Command of the provincial border guard force. Moreover, MRAG (2005) identifies Vietnam as one of 37 countries known to be involved in IUU fishing, and a number of statements that suggest that illegal fishing is widespread.

Evaluating how effective is control of access in stopping illegal fishing in Viet Nam: Recent improved surveillance and greater penalties may be reducing illegal fishing in Viet Nam. In 2004 the Vietnamese Government promulgated Decree No. 137.2004/ND-CP Jun 21, " Foreign fishing ships operating in Viet Nam's territorial waters will be fined between 10-20 million VND if they fail to take back their nets and fishing equipment after use. Illegal fishing in Viet Nam's territorial waters and continental shelf by foreign nationals and organizations will be fined from 10 million up to 500 million VND and the material evidence may be confiscated." However, with the reasons as mentioned, MCS system evaluated ineffective taking part of Viet Nam fisheries management.

V. CONCLUSIONS AND POLICY IMPILICATIONS

The research results showed that Viet Nam's Fisheries management is failing in all categories of six evaluation dimensions of management such as management objective, framework or precaution, regulation and MCS dimensions. Fisheries management of Viet Nam has a little progress, comparing the surveyed results of fisheries management of Viet Nam by UN code 2006 to the adjustments evaluation implemented until 2010 (Figure 23). These results indicated that the progress has just referred to the management intentions such as management objective and frameworks but its management effects are very weak in terms of three dimensions: socks, fleets and gears; socio-economic and MCS in assessing the actual performance.

Viet Nam does not have any information about precautionary dimension that is mentioned in management plan. The main reasons of unsustainability in Viet Nam fisheries management is: i) Long term management objective has not been translated into management actions, that is, the specific objectives of fisheries management are not made explicit, ii) lack of good scientific evidence available to support fisheries management organization, iii) data base and fisheries information as well as fisheries science are insufficient and/or inaccurate, iv) controlling, monitoring and enforcement are much insufficient at both central and local levels, v) open access fisheries are resulting in overcapacity and/or overcapitalization, vi) conflicts between inshore and offshore fisheries are frequently taking place, and vii) government financial transfers tend to increase overall fishing effort.

The Viet Nam State should urge to find out integrates solution to resolve those problems. Have policies training and encourage investing for development of traditional jobs and local tourism advantage to reduce the pressure of inshore fishing as well as having development of offshore fishing. Avoiding the race of fishing that mean we will make sure the alternative income sources of fishing households, this is required take more time in long term planning of Viet Nam government.

There would be some key factors that Viet Nam government may apply to designing and implementing more effective fisheries management policies:

1. To renovate fisheries governance system

- Development social and economic for suitable, well-managed fisheries
- To develop and adapt responsible fisheries accordingly to the FAO Code of Conduct for Responsible Fisheries and other related international and national regulations.
- To stop the bad subsidy policy for fishermen.
- To transform gradually "Open access fishery "to "Limited fisheries" and adapt the "Participatory management approach" and/or "Co-management".
- Incentivizes for sustainable fishing, such as the Marine Stewardship Council (MSC); Eco-friendly aquaculture activities. Rehabilitating the value of traditional culture, education in coastal communities links with role of Co-management.

2. To develop models for effective exploitation and protection of resources and implement recovery plans for depleted species. Enforcing fisheries operational inspection; MSC should be important factors of effective management.

3. To develop human resources Promoting fishermen's awareness and skills in order to implement responsible fishing operations and sustainable fisheries development.

- Building up fisheries science capacity.

4. To strengthen science-technology and fisheries extension activities

- Capacity building for research and survey on fisheries resources and ecosystems.
- Establishing a systematic extension machinery of disseminating research and survey results to fishermen.

5. To build the report system of fisheries

- Collecting catch report from fishermen
- Analysis and process database

6. To strengthen and extend international cooperation:

- Development of the effective cooperation with other countries in the region for environment and resources preservation
- Continuing the effort to resolve the dispute of sea jurisdiction with neighboring countries in peaceful negotiation

Use of the Rapid appraisal method is more effective for assessing the fisheries sustainability and suggesting fisheries.

However, there is some limitations in this study mainly due to using the secondary data sources that was surveyed in 2006. In fact, fisheries situation of Viet Nam for the last 5 years has changed a lot. Further study is necessary to be conducted by new surveys, based on the questionnaires of FAO code of conduct for fisheries management.

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APPENDIX

Synthesize the estimation of compliance of the fisheries of Viet Nam with Article 7 (Fisheries Management) of the UN code of conduct for Responsiple fisheries (Pitcher 2006)(ftp://ftp.fisheries.ubc.ca/codeconduct) and Adjustment score 2010

Evaluation Field Field 1: **Management Objectives** **Score Intentions of Management**	**Possible Score (UN surveyed, 2006)**	**Evaluation of compliance (Scored)**		**Reference Points**	
Attributes		UN scored	Adjusted	Worst	Best
1. Are formal reference points for the fish stock in this fisheries identified using best science available? No (0); partially (5); completely (10). **Adjustment Reasons:** Assessed the standing stock and potential yield of fisheries resources for each individual seawater area of Viet Nam (RIMF 2009). The assessment result of Viet Nam stock is used for Maser plan and strategy of Viet Nam fisheries development. However, its results are different and inconsistent.	1-2	2	4	0	10
2. Is present fleet capacity calculated and are there plans to reduce it? No (0); Partially (5); Completely (10) **Adjustments reasons:** Decision 10/2006/TTg-CP Master plan of Viet Nam fisheries sector by 2010 and its orientation by 2020 The main tasks are "the number of fishing vessels shall be kept at 50,000 by 2010". Fishing capacity calculated and plan reduced small vessels more than 40.000 units	3-5	4	5	0	10
3. Are small scale fishers considered in plan? No (0); considered but not consulted (2.5); consulted informally (5); institutional structures for ongoing consultation (7.5);	1-3	2	5	0	10

plus extra points if small-scale fisher's opinions are often included in plan (10). **Adjustments reasons:** Viet Nam fisheries Law, 2003 has mentioned the intention of offshore fishing development, reducing fishing in coastal. In fact, in during the time of building Fisheries Law, Viet Nam had the consultant of fisheries experts. At the present, Viet Nam State does not allow new boat constructing that it has small engine less than 20 HP, prohibit fishing license and register. (Decree 66/2005/ND-CP 19/5/2005)					
4. Impacts of fisheries on biodiversity allowed for in plan? No (0); some impacts assessed (3.5); most impacts assessed and mitigated (7); Full impacts mitigated in management plan (10) **Adjustment score:** There are some of research and assessment reports of Fisheries policies of Viet Nam has indicated these negative impact to ecosystem and biodiversity because of State policy about encouraging rapidly fisheries development that lack of MCS. Recently, Decision No: 1960/QD-TTg of Viet Nam government, 2010: master plan of fisheries sector has mentioned (item IV.5) "prohibit capture the species in breeding seasons; using destructive fishing; protect mangrove ecosystem and new planting.	1-3	1.5	3	0	10
5. Does the management plan aim to restore depleted stocks in this fishery? No (0); slowly (5); rapidly (10) **Adjustment reasons:** Decision No 31/2004/QD-TTg of Viet Nam government "Approving the Aquatic Resource Protection and Development Program till 2010" The main objective: Restore aquatic resource in shore sea areas, rivers, reservoirs and submerged regions for sustainable aquatic resource development."	0-1	1	2	0	10
6. Are human impacts (pollution, waste) on the fisheries habitat indentified? No (0); partially indentified (3.5); indentified and plan includes measures to mitigate (7); complete mitigation in plan (10) **Adjustment reasons:** It has mentioned in Master plan of fisheries sector as well as relevant documents of relevant Ministries. Strengthening MSC and punishment and inspectional activities.	1-3	2	3	0	10
7. Is fishing gear mandated by the management plan to avoid by – catch of non-	0-1	0	2	0	10

target species, environmental and habitat damage? No (0); in part (5); totally (10). **Adjustment reasons:** Decree: 33/2010/ND-CP Viet Nam Government regarding the management of fishing operations conducted by Vietnamese Organizations and individuals in all marine areas. The decree has published with management objectives is reducing conflict between inshore fishing and offshore fishing, managing the fishing methods, gears.					
8. Are ecosystem linkages with the fishery made explicit in the management plan? No (0); identified (3.5); made fully explicit (7); adverse ecosystem impacts minimized (10)	0-3	1	1	0	10
9. Are environmental influences on this fishery made explicit in the management plan? No (0); identified (3.5); made fully explicit (7); and adverse impacts minimized (10).	0-3	1	2	0	10
Evaluation Field 2: Framework (data&Procedures). Score Intentions of Management	Possible Score (UN surveyed, 2006)	Evaluation of compliance (Score)		Reference Points	
Attributes		UN scored	Adjusted	Worst	Best
1. Are total & complete removals from this stock over the whole stock area and over whole life cycle accounted for in assessment? No (0); somewhat (3.5); mostly with a few omissions (7); almost completely (10) **Adjustment reasons** : Assessed the standing stock and potential yield of fisheries resources for each individual seawater area of Viet Nam (i.e. the Gulf of Tonkin, the Central, the Southern and the southeast-regions) (RIMF 2009)	1-3	2	4	0	10
2. Are management measure compatible with those of other jurisdictions concerned with this stock? No (0); in part (5); almost completely (10). **Adjustment reasons**: Almost Viet Nam fishing vessels is small, fishing operating in territorial jurisdiction of Viet Nam Sea. Viet Nam state has effort to resolve the dispute of sea jurisdiction. For instance: Convention on delimitation of Tonkin Gulf and cooperation of fisheries	1-3	1	5	0	10

between Viet Nam State and China, it was singed and has effect in 2004. However, Eastern Sea is one of sensitive areas of international dispute.					
3. Does the management plan have clearly stated long-term objective? No (0); in part (5); absolutely clear (10). **Adjustment reasons:** Viet Nam fisheries sector has developed quickly with objectives such as high productively, increasing daily consumption demand, export with high value export; develop the fisheries sector in a rapid and sustainable manner (Decree: 10/2006/TTG-QD, master plan). However, according to Decree 1960/QD-TTg, 2010, objective of fisheries development of Viet Nam will be quality and sustainable.	1-4	3	5	0	10
4. Are all the stakeholders in this fishery resource identified and considered? **Adjustment reasons:** There are some documents that were published by government and local government guide lining with involving of fisheries communities.	2-4	3	4	0	10
5. Are data, management processes and decision – making open and transparent, including any international aspects? **Adjustment reasons:** Develop the informational technology system is improved significant, the fisheries offices have equipped and open access. For example: it can find out fisheries data's at website of (Viet Nam General Statistic Office (GSO). However, effective usage of the present is constrained in the transparent.	1-3	2	4	0	10
6. Are timely, complete and reliable statistics collected and verified?	1-4	3	3	0	10
7. Are social, economic and institutional factors related to sustainability evaluated with data? **Adjustment reasons:** There are some reports of evaluation about impacting of policy of fisheries development (economic, social, and institutional) that relating to sustainability by Institute of fisheries economic and planning, Viet Nam)	0-4	2	4	0	10
Evaluation Field 3: Precautionary Approach **Score Precautionary intentions and actions Score**	**Possible Score (UN**	**Evaluation of compliance (Score)**		**Reference Points**	

Intentions of Management	**surveyed, 2006)**				
Attribute		**UN scored**	**Adjusted**	**Worst**	**Best**
1. Is precaution explicitly enshrined in legislation, or is precaution implicitly applied to management of the fisheries?	0-0	0	0	0	10
2. Is uncertainty, including lack of appropriate information, quantified and used to reduce fishing that might otherwise occur?	0-0	0	0	0	10
3. Are stock-specific target reference points estimated and employed? **Adjustment reasons:** Assessed the standing stock and potential yield of fisheries resources for each individual seawater area of Viet Nam (RIMF 2009). The assessment result of Viet Nam stock is used for Maser plan and strategy of Viet Nam fisheries development. However, its results are different and inconsistent.	1-3	1	4	0	10
4. Are stock- specific limit reference points estimated and employed	0-0	0	0	0	10
5. Are there viable contingency plans to restrict fishing in the event of environment emergency?	0-0	0	0	0	10
6. Are there viable contingency plans to restrict fishing in the event of an unforeseen emergency caused by excess fishing?	0-0	0	0	0	10
7. Are management instruments under continuous review?	1-2	1	1	0	10
8. Are no-take areas of sufficient size to work, established, policed and monitored?	2-5	3	4	0	10
9. Are plans in place to restrict fishing if species linked through the ecosystem (predators, prey or competitors) to the target (s) of these fisheries become threatened?	0-0	0	0	0	10
Evaluation Field 4: Stocks, fleets and gear **Scores Results of Management**	Possible Score (UN surveyed, 2006)	Evaluation of compliance (Score)		Reference Points	
Attribute		UN scored	Adjusted	Worst	Best
1. Is excess fleet capacity being reduced? **Adjustment reasons:** From 2006 until now, Viet Nam State does not allow constructing of small boats that	0-0	0	2	0	10

it has small engine less than 20 HP, prohibit fishing license and register. (Decree 66/2005/ND-CP 19/5/2005).					
2. Are fishing methods known to be harmful to habitats, to create by-catch problems, or whose high fishing capacity is difficulty to control, being phased out?	0-0	0	0	0	10
3. Is by-catch of non-target species minimized?	0-1	0	1	0	10
4. Are discards minimized?	3-5	4	5	0	10
5. Is the gear designed to minimize ghost fishing if lost?	0-1	0	1	0	10
6. Is the fishing of juveniles and spanners restricted to safe levels	0-1	0.5	1	0	10
7. Are depleted stocks being rebuilt?	0-0	0	0	0	10
Evaluation Field 5: Social & Economic Scores Results of Management	Possible Score (UN surveyed, 2006)	Evaluation of compliance (Score)		Reference Points	
Attribute		UN scored	Adjusted	Worst	Best
1. Is the fisheries managed so as to minimize conflict among different sectors? **Adjustment reasons:** Decree: 33/2010/ND-CP Viet Nam Government regarding the management of fishing operations conducted by Vietnamese Organizations and individuals in all marine areas. The decree has published with management objectives is reducing conflict between inshore fishing and offshore fishing, managing the fishing methods, gears; Demarcation of fishing ground, remark to fishing vessels. Do not permit offshore vessels operating in coastal.	1-3	2	4	0	10
2. Are indigenous people's rights and needs being met?	5-5	5	5	0	10
3. Are the needs of local fishing communities being met? **Adjustments reasons:** Viet Nam state has promoted to develop Co-management: Ex. Implementing the conferences contributed opinions of experts; consultants and inserted in documents.	0-2	2	3	0	10
4. When a change to the management of the fishery is made, is its cost-effectiveness evaluated?	0-4	1	2	0	10
5. When a change to the management of the fishery is made, is its social impact evaluated?	0-3	1	2	0	10
6. Is funding for the research, observers and MCS programme for this fishery	0-3	1	1	0	10

obtained by cost recovery from the industry?					
Evaluation Field 5: MCS **Scores Results of Management**	Possible Score (UN surveyed, 2006)	Evaluation of compliance (Score)		Reference Points	
Attribute		UN scored	Adjust	Worst	Best
On a scale of 0 to 10, how effective is observer scheme? **Adjustments reasons:** Viet Nam government has decided sporting equipments and setting up Monitoring system for offshore fishing.	0-0	0	3	0	10
2. How effective is the catch inspection scheme	1-3	1	1	0	10
3. How effective is the vessel monitoring scheme?	1-4	2	2	0	10
4. Are vessels fishing illegally in the are of this fisheries?	7-10	9.5	9.5	10	0
5. How effective is control of access in stopping illegal fishing?	2-6	4	6	0	10
6. Are vessels that really derive from this jurisdiction re-flagged in States of Convenience to avoid reporting or other fishery regulations?	0-1	0	0	10	0