THE ATTITUDES AND PERCEPTIONS OF RESOURCE USERS AND MANAGERS TOWARDS THE NHA TRANG BAY MARINE PROTECTED AREA MANAGEMENT, VIETNAM

By
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Picture: The Nha Trang Bay Marine Protected Area

Source: Taken by Kim Lan

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ABBREVIATIONS

DANIDA	**Danish International Development Assistance**
IUCN	**International Union for Conservation of Nature**
GEF	**Global Environmental Facility**
MPA	**Marine Protected Area**
MoF	**Ministry of Fisheries**
VND	**Vietnamese Dong (1 USD = 17,760 VND)**

ABSTRACT

Attitudes of local people and managers have become the emerging topic in marine protected areas management. Understanding about it is expected to contribute to the implement and the compliance of fishermen and managers after seven years of the Nha Trang Bay marine protected are foundation. This study aims to evaluate attitudes and perceptions of fishermen and managers towards MPA management; and to examine life satisfaction of the fishermen resulting from the Nha Trang Bay MPA designation. The primary stakeholders take vital roles in complying with the management regulations, fishermen and managers were surveyed by random selection. Their opinions were obtained by the face-to-face interview. Results were presented underlying the descriptive analysis and the logistic regression model. Managers expressed positive attitudes and perceptions towards the MPA management; meanwhile fishermen did not. Fishermen reluctantly accept the closed area. The management board has not caught the support from local people, poaching and conflicts in using fisheries resources still occur in the area. The cumulative logistic model was used to examine the effects of demographic and socioeconomic factors on fishermen's happiness. Per capita income and age have positive effects on the probability of fishermen life satisfaction.

CHAPTER 1

1 Introduction

Local people's attitudes in the neighboring of the marine protected areas widely become the emerging concern of marine protected area (MPA) management (Mcclanahan, 2005b) as the increasing pressure on resource demands causes by the increase of population (see Pomeroy *et* al 2006). Contributing to solve that problem, many studies have focused on understanding of local people's perceptions and attitudes towards conservation areas (Infield and Namara, 2001; Hans, 2003; Sekhar, 2003; Weladji *et al.*, 2003; Sesabo *et al*, 2006; Allendorf, 2007; and Mcclanahan *et al.* 2005 a,b). For example, Mcclanahan *et al.* (2005,a) investigate the perceptions of the managers and resource users on fishery management options in Kenyan coral reefs with expect that sharing positive attitudes towards MPAs and regulations can enhance their awareness and improve ability of management. According to research findings, their perceptions analyzed and compared lead to the management support and compliance. In order to obtain the factors effecting support or rejection to MPA and Tasmanian MPA strategy, Stump *et al.* (2006) do research on attitudes and perceptions of wild capture fishers in Tasmanian MPAs. Weladji *et al.* (2003), Sekhar (2003) and Allendorf (2007) also emphasize that attitudes and perceptions surveying on stakeholders towards protected areas is a key factor in effective biodiversity conservation management. Therefore, it is significant in the compliance and successful execution.

The marine protected areas, in one side, would conserve the marine resources and it in the other would strengthen economic benefits from the tourism activities and education for relevant stakeholders (Boersma and Parrish, 1999). Conflicts, however, have occurred between conservation agencies and local people being familiar with resources exploitation for a long time (McClanahan, 2005a, b and see Sesabo, 1999). Managers try to implement conservation regulations to protect resources and meet the MPA objectives; meanwhile fishermen are directly impacted in their livelihoods by accessible limitation to marine resources. Exploring attitudes and perceptions of users and managers on resource management takes a vital role for compliance of fishermen and management efforts.

Fishermen's perceptions have an influence on their attitudes. They may accept to be lost in a short term to gain benefits in the future, and their positive system of behaviors will be formulated towards management regulations, support or opposition. That topic has been done in several countries to investigate their reactions of rejection or compliance (see, for example, McClanahan, 2004; Stump *et al.*, 2006 and Sesabo *et al.*, 1999.)

Moreover, more than seventy percent of coral reefs in Southeast Asia including Vietnam are being threatened in forthcoming years (Pomeroy *et* al, 2006, see from Burke, Selig and Spalding, 2002). The growing population causes a pressure on exploiting coral reefs to serve human demands. Thu *et al.* (2004) and Nam *et al.* (2005) state likewise that most coral reefs in Vietnam are at risk. Thus, MPA aims at managing the risks. World Conservation Union, GEF/World Bank and DANIDA helped the Vietnamese Government to found Nha Trang Bay MPA in June 2001 (Thu *et al*, 2004 and Vinh, 2008). Then, People's Committee of Khanh Hoa Province has taken it over since 2005, thus the restraint in attitudes and perceptions of managers and users living in the Nha Trang Bay MPA adjacent can be found. Therefore, this subject research is considered as an important part in carrying out management work of managers and apprehending compliance amongst fishermen who utilize fisheries resources and participate in the marine resource management.

Besides, the outstanding research on life quality and living standard in which taking happiness as a subjective indicator has been emerging (see from Easterlin, 2001). Economic science proves that happiness can be measured and examined to define impacts from a certain policy on human satisfaction (Frey and Stutzer, 2002 and Graham, 2005). It assesses as if how the policy affects on their well-being. The MPA creation performs policy implementation through management rules banning local residents extracting marine resources. Yet attention to life satisfaction of local people living within the MPA as study in this field seems to be neglected in Vietnam. Exploring fishermen's satisfaction after seven years of Nha Trang Bay MPA foundation is also a key component of this study. Hence, the overall opinions gathered from local residents and managers become indispensable in doing research on the subject **"The attitudes and perceptions of resource users and managers towards the Nha Trang Bay MPA management."**

The goals of this study are as followings: (1) to evaluate the attitudes and perceptions of fishermen towards the existence of Nha Trang Bay MPA, (2) to evaluate the attitudes and perceptions of managers towards MPA management, and (3) to assess fishermen's satisfaction (or well-being) with life improvement. The first chapter indicates the need to study attitudes and perceptions of users and managers. The second chapter gives the general view of the study site, Nha Trang Bay, introducing the three basic activities that take place within the MPA and a brief introduction of the Nha Trang Bay MPA. Beside concept and source of happiness, data description, the theory of cumulative logistic model and sampling method are also mentioned in the third chapter. In chapter 4, the socio-economic status overview of fishermen and managers, attitudes and perceptions of fishermen, attitude and perception comparison of these two groups are obtained through descriptive statistics; and regression model examining the satisfaction on life of fishermen within the Nha Trang Bay MPA also includes in result part. Chapters 5 and 6 give the brief discussion and fruits of this research.

CHAPTER 2

2 Background

2.1 The overview of the Nha Trang Bay Marine Protected Area

The focal function of marine protected areas is to protect the aquatic organisms with their habitants, ecosystems and functions in specific location, nowadays under human impacts (Sumaila and a.t. Charles, 2002). It enhances also the socio-economic situations of local residents through spillover effects on fisheries (see Pomeroy et al., 2005). Fifteen MPAs are calculated in Vietnam since 2002 within the Marine Protected Areas' Management Capacity Strengthening Project (Thu et al, 2004). A great deal of essential ecosystems such as coral reefs, sea-grass and mangrove areas facilitate the Nha Trang Bay MPA, which was established in 2001 and lasted for 4 years under the name of The Hon Mun MPA Project, to become the first pilot project on marine protection in Vietnam "*to improve livelihoods of local island communities and together with stakeholders to protect and manage marine biodiversity effectively as a model of marine protected areas management based on communities in Vietnam"* (Tung, 2002; Yen and Bernard, 2002). The project was sponsored by Global Environmental Fund – World Bank and IUCN, and implemented by MoF, Khanh Hoa Province's government and IUCN. As a result of that, the Temporary Regulations of the Hon Mun MPA management, found in the decision No 26/2002 o March 11th 2002, were promulgated by the People's Committee of Khanh Hoa Province. The Temporary Regulations pointed out three main zones: core zone, buffer zone and transition one in which fishing activities are strictly forbidden in the core zones. The core zone including Hon Mun, Hon Noc, Hon Vung and Hon Cau islands becomes a perfect habitat of the coral reefs for marine organisms to exist in and to restock themselves (**fig. 2.1)**. Moreover, the allowed activities of exploitation in specific zones within the MPA were also identified (Tung, 2002 and Thu *et al.*, 2004.)

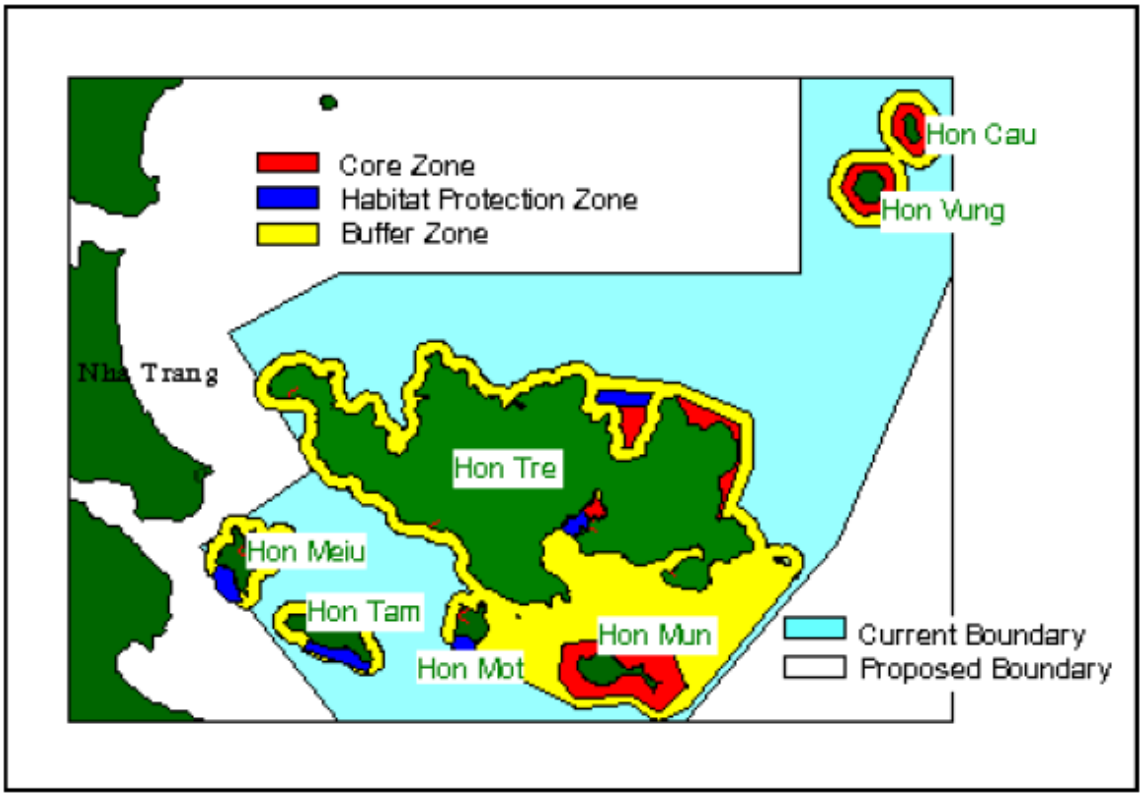

Figure 2.1. Map of the Nha Trang Bay marine protected area

Source: Cited from Michael and Tu, 2004

Located in the south of Nha Trang city, Khanh Hoa Province, on the central-south coast of Vietnam, the Nha Trang Bay MPA includes a group of nine islands such as Hon Tre, Hon Mieu, Hon Tam, Hon Mot, Hon Mun, Hon Cau, Hon Vung, Hon Rom, Hon Noc and surrounding waters. Its total area is approximately 160km^2, 38 km^2 of mainland and 122 km^2 waters surrounding those islands (Tung, 2002, Nam *et al.*, 2005 and Vinh, 2008).

Nha Trang Bay is considered as the highest biodiversity area in comparison with those in other costal areas in Vietnam. The most impressive biodiversity of Nha Trang Bay was counted with 350 species of reef-building corals - the important element creating Nha Trang coral reefs- taking around 40% of that in the world and equaling to the number of discovered coral species in the World Biodiversity Center, 220 species of demersal fish, 160 species of mollusks, 18 species of echinoderms, 62 species of algae and seagrass (Tuan *et al.*, 2002 and Thu *et al,* 2004). Thanks to its specific representative biodiversity, it nationally becomes the priority site for marine conservation and tourism development

as well as ecotourism activities (especially in Hon Mun island). Hon Mun Island considered the main dive site, together with other islands, takes an extremely important role to the tourism industry in Nha Trang city and attracts not only domestic tourists but also foreign ones with more than 18,000 “dive days” and approximately 52,000 “snorkel days” per year (Nam *et al*, 2005.)

Approximately 926 households live actually in five islands in which Tri Nguyen community comprises the densest population with 580 households but Vung Me has only 29 inhabitants. In conformity with the decision of the People’s Committee of Nha Trang city, some communities were requested to move to other areas for executing the provincial tourism development plan. Vung Me islanders must settle their lives in another place. Few households still live there because of unsatisfactory compensation (MPA Authority, 2008). There are in the islands the kindergartens and primary schools, so the school children reach a very low education level. In hope of further education realization, the kids have to travel to lands where they suffer difficulties of traveling and living far form their parents. Young men, once grown up, become fishermen as their fathers at the early age (from the age between 15 and 17). Young women after their marriage, meanwhile, have no chance to go out for working and take their roles as housewives. Therefore, most of fishermen just completed a primary school (Yen and Bernard, 2002). Relying mainly on fishery resources, 80% among them become fishermen, 36% of household heads participate in aqua-cultural operation in which 27% of households take aquaculture as their additional income, and the rest depends totally on aquaculture (Thu *et al*, 2004 and MPA Authority, 2008). In general, a large number of activities are taking place in Nha Trang Bay: fishing, aquaculture, tourism, researching and residential activities associated with shipping, military and bird’s nest management activities.

2.2 Fishing activities in this area

Only a small scale of fishery happens in Nha Trang Bay, the animate fishing activities run mostly in the core zone where operations have existed for several years such as anchovy purse seine, lift net, lift net with light, squid hook and line, push net with line, diving and some others. According to Nam *et al* (2005), fishing boats are at low power roughly 15 CV to 45 CV. In this area, there are 380 motorized fishing boats (averagely 90.3 m long and engine of 20CV, with the cost of 55.400.000 VND per boat). Most of

them have been bought in recent years and may be used in long time (Yen and Bernard, 2002.)

Nevertheless, several villagers are typically seen fishing squids at night and trawling in inshore waters, in shallow area of less than 30 m in depth. The increasing number of boat presses on marine resources and decreases fish stocks and catch per unit effort (Nam *et al*, 2005). Many indigenes of strong boats have chosen other further fishing grounds, resulting from access restrictions of Temporary Regulations of conservation management. Meanwhile, poorer residents with small traditional fishing boats depend greatly on fishery resources in Hon Mun Island. As consequence, they become poachers sometimes. Hence, in order to improve the livelihood of local people and let them comply with the Temporary Regulations as the MPA's objectives, the project has introduced some other activities to create jobs for fishermen's housewives such as in handcraft jobs (snail curtain, rattan weaving), sport net manufacture and small-scale trading (Thu *et al.*, 2004.)

2.3 The aquaculture situation in Nha Trang Bay

Nha Trang Bay aquaculture existing for many years, before the establishment of Hon Mun Marine Protected area, has become an additional income source contributing to livelihood improvement of islanders. In other hand, it has diminished the pressure of fishery resources, especially within Nha Trang Bay MPA waters. Red snapper (*Lutjanidae*) and grouper (*Serranidae*) have been the major fish species of aquaculture. More local residents, however, have switched to lobster culture, cage lobster because of its huge benefits, and this kind of culture has developed rapidly since 2001(Yen and Bernard, 2004 and MPA Authority, 2008). And all aquaculture activity takes place surrounding Hon Tre island **(Fig. 2.2.)**

Local aquaculture is, actually, facing with environmental issues. Familiar with using by catch, indigenes possess out-of-date culture techniques, so they have not applied the optimal feed method for each species. It thus increases the culture fee for the reason of the waste food. Meanwhile the food change ratio is low, approximately 1/20 to 1/25. Accordingly, the waste food discharges directly to marine environment; the amount of waste feed is 6.650 tonnes per year (MPA Authority, 2008). Besides, a half of cages belong to people who live outside the group of these islands (Yen and Bernard, 2004).

Due to uncontrolled aquaculture improvement, polluted environment incites conflicts between islanders and outsiders in using water resources as well as disease spreading. For the last years, a large number of households got a total aquaculture lost because of diseases on shrimps. In short, the number of cages cultivating lobster and fish species within the MPA has increased since it needs the conservation program implementation and waste management for the purpose of clean environment.

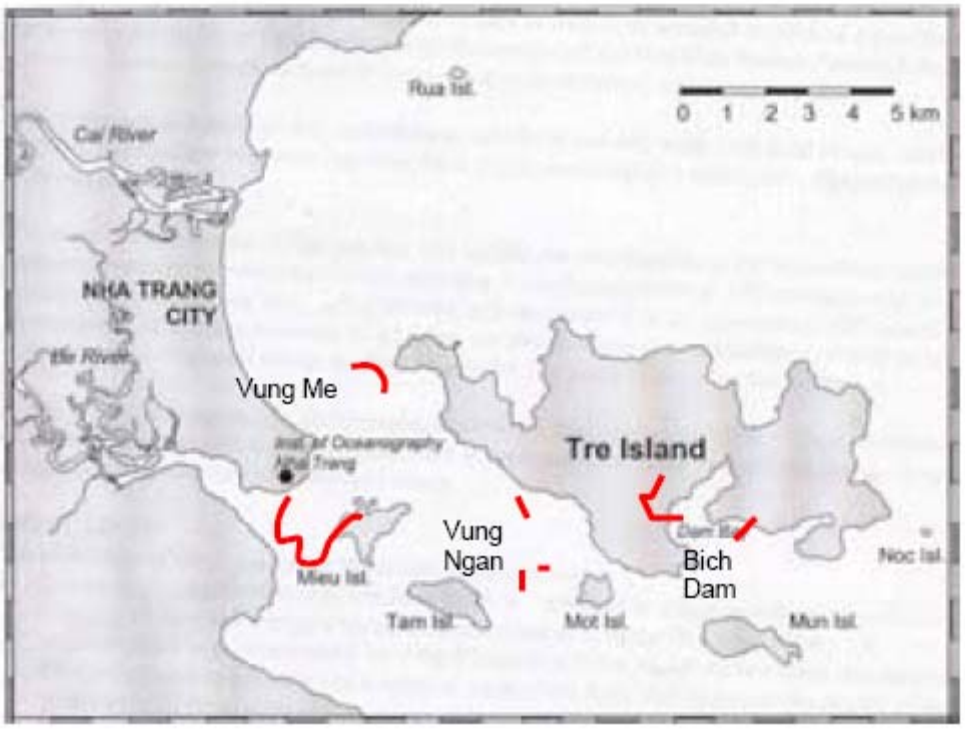

Figure 2.2. Existing aquaculture development (red lines) in Nha Trang Bay MPA

(Source: Cited from IUCN report, 2003)

2.4 The tourism activities in the area

Nha Trang Bay is the fresh and peaceful destination for both domestic tourists and international tourists. Nha Trang Bay tourism has been developing simultaneously with Khanh Hoa province tourism. It has attracted more domestic visitors than international ones. There are, annually, around 660,000 visitors, and most of them (600,000 persons) are domestic visitors (Michael and Tu, 2004.)

This area has a great attention to most tourists thanks to the convenient transportation and the tourism diversification as well as recreation services. Over 100 tourist boats are served for daily arrivals and most depart from Cau Da passenger port for all recreative activities in this area, except The “VinPearl” resort with its own port (Michael and Tu, 2005). Arrivals can join activities such as swimming and snorkeling, diving, fishing, visiting resorts, using glass bottom boats or some water sports with fast powered activities, including jet-skiing, parasailing and others. Diving and snorkeling attracting especially international visitors become main activities in the core zone area, Hon Mun island.

Tourism industry in Nha Trang city considered as a key activity within the MPA has many advantages. Thanks to the marine protected area designation, tourism within Nha Trang Bay in particularly and tourism of Khanh Hoa province in generally have been growing. Being the member of “the Most Beautiful Bays in the World Club” Nha Trang Bay catches the attention of a huge amount of visitors.

Actually, that natural property is not gratuitous for all and turns into financial source for the MPA operation under user fee. The user fee, charged since 2004 by Nha Trang Bay MPA, has been applied to visitors for diving, swimming or using a glass bottom boat within the Hon Mun Island. Moreover, a conservation fee charged for entering the whole Bay is under discussion and 12% of that would be extracted for community development fund (Michael and Tu, 2005.)

Besides, as a profitable industry highly, many stakeholders have participated in exploit the sea tourism. It, consequently, leads to many controversies in rights of access to natural resources, land and sea areas, and benefit sharing between them. Though the Nha Trang Bay MPA Authority has attempted to help residents’ livelihood by supporting glass bottom basket boat, hygiene and cookery courses, English phrase course, local communities gain from tourism an inconsiderable benefits. Most people living in Vung Me, Vung Ngan, Dam Bay and Bich Dam community can not reach to tourism areas, for example VinPearl resort locating in Hon Tre island –near by their habitat- because of being not allowed to access to military area. The English given is suitable for young people, not the old ones; thereby none of them can gain at that resort. Only two fishermen

in Hon Mot community operate glass bottom basket boats within the core zone in order to help tourists watch the coral reefs. According to them, they work total time in 3 months with the approximate income of 100 USD per month (the average per capita income in the area is 52.11 USD monthly – MPA Authority, 2008). Furthermore, many fishing villages were relocated in other places and many villagers reluctantly had to remove and rearrange elsewhere their fishing as well as aquaculture operations in order to keep up their livelihoods, resulting from tourism construction and tourism events (see from Michael and Tu, 2005.)

A giant infrastructure development could be noticed in Nha Trang city, and Khanh Hoa province proposed a strategy to improve the eco-tourism with collaboration of large resorts, "VinPearl" for instance. In another side, the principal programs were created to endeavor tourism development, many constructions have been built up in islands and land such as cutting mountains or filling in the ocean for expanding resorts, new roads, ports affecting not only tourism, local people life but also conservation work.

In general, though tourism plays a significant role and takes place mostly within the MPA, its development has lead to the pressure on environment in this area. The degraded marine environment may make visitors – especially international tourists - stop visiting Nha Trang Bay. Few local people can gain benefit from this industry and they have not much been involved in tourism because of some barriers and visible difficulties in earning their living.

2.5 Threats of the MPA

Coral reefs in Nha Trang Bay are facing with many impacts not only from nature but also from human being. Many human operations cause risky impacts to marine biodiversity in which the decreasing of fish stocks, over-fishing, harms the balance of ecological condition. Constructions in land and in island contribute to increase sediment accumulation in marine water, fishing boats anchor to the ground to coral reefs, tourists step on coral when swimming or snorkeling are considered in the Nha Trang Bay MPA. Moreover, discharges thrown into ocean become also the anxious problem as more and more tourism boats pass through this site. Tourism purposes, filling ocean for instance, are other ways to destroy directly ecosystems (see from

http://www.thesaigontimes.vn/Home/thoisu/doisong/17078/). And according to Vinh and Bernard (2001), the major threats of this marine conservation are resources' over-exploitation, illegal fishing such as explosives and cyanide, anchor damage; sediment accumulation from tourism development in building ports and resorts; pollution of aquaculture and tourism, household rubbish, waste water from rivers and residents in land.

2.6 The overview of the study site

Bich Dam community

Large boats in fishing zones for lift net and purse seine in Hon Mun Island are completely restricted and affected by the core zone and zoning. The number of households there reaches 176, in which 76% depend on fishing job, 36% on lift net, fishing net (12%) and 17% purse seine lowly affected by zoning. However, the low percentage of households relying on hook and line, 11.00%, is highly affected by core zone. Far from the land and difficult in transportation, this community has been prioritized most of alternative income programs as well as the credit scheme from the project (Thu *et al.*, 2005 and MPA Authority, 2008.)

Dam Bay community

There are 33 households with 160 people, 22% of households in Dam Bay community fishing by purse seine are the main economic activity affected by zoning. The rest relies on the other kinds of fishing gears. Neither alternative income program nor project supports give them favor (Thu *et al.*, 2005 and MPA Authority, 2008.)

Hon Mot community

With 58 households, approximately 299 people, most of Hon Mot community with its long history in this area relies greatly on the marine resources of the Hon Mun island. Their livelihood, however, is very poor. They just have small boats, or some small traditional boats for small scale fishing activities such as lift net (81.0%) and squid hook and line (13.0%). Local people in this island mainly operate in the Southeastern, around Mun island, completely restricted in fishing zones and affected directly by core zone and

zoning. Up to this year, 2008, this community has not received from any alternative income programs (Thu *et al.,* 2005 and MPA Authority, 2008.)

Tri Nguyen community

The Tri Nguyen community is differently presented to the other communities. Being the nearest and the most developed community, local people in Tri Nguyen using smaller boats for fixed nets and larger boats for push net, 59.0% has push net with light and fish at other fishing grounds far from Nha Trang Bay. However, their livelihood has still been affected by zoning but with a smaller percentage of households operating in diving (6.0%), lift net (7.0%) and fishing net (4%). With 560 households, this is the largest community in the MPA in which 29% operating in fishing (Thu *et al.,* 2005 and MPA Authority, 2008.)

Vung Ngan community

There are 99 households living in this community with approximately 480 people, of which 84.0%, their livelihoods mainly rely on fishing activities (Thu, 2005). Hence, zoning of Hon Mun Island has affected their livelihood, especially poor people. Using larger boats, their main activities are purse seine, trammel net and diving in the Southeastern of Hon Mun Island. In which diving (13.0%) and fishing net (2.0%) are the most affected by core zone. Purse seine and trammel net accounting for the greatest ratio , 48% and 21% respectively are less affected and also directly restricted in fishing zones (Thu *et al.,* 2005 and MPA Authority, 2008.)

CHAPTER 3

3 Methods and materials

3.1 Conceptual framework: Concept and sources of happiness

Study of happiness seems to be a part of psychological field for a long period but it has also started attracting the majority of economists (Frey and Stutzer, 2001 and 2002). Research of economics and happiness has been one of the hot topics in recent years, especially focusing on the quality of life (Eastern, 2001). It has been carried out not only at macro but also at micro level (Coughenour and Swanson, 1992; Di Tella, 2003; Welsch, 2005; and Veenhoven, 2005) and several study results have turned to be standard views (Frey and Stutzer, 2002.)

As mentioned by Veenhoven (2005), happiness is characterized as "*the degree to which an individual judges the overall quality of his own life as-a-whole favorably*". In other words, an individual will consider himself whether his life is favorable or unfavorable, i.e. his statement shows his self-satisfaction and he is recognized happy. Happiness is illustrated as satisfaction with life as-a-whole, not with any specific life aspects (Veenhoven, 2005). Furthermore, Easterlin (2001) uses the terms of happiness, subjective well-being, satisfaction, utility, well-being, and welfare as the interchangeable ones. The basic method to measure subjective well-being is that the respondents reveal directly their life satisfaction. It means that respondents' satisfaction with life as-a-whole will be asked, not exactly their happiness (Easterlin, 2001; Frey and Stutzer, 2002 and Veenhoven, 2005). They will respond with a point scale of satisfaction with life (Coughenour and Swanson, 1992; Frey and Stutzer, 2002, Di Tella *et al.*, 2003 and Veenhoven, 2005.)

Happiness functions help to demonstrate an econometric relationship between the happiness and other explanatory variables (Frey and Stutzer, 2002 and Graham, 2005). That means overall happiness depends on three sets of factors. Those are demographic and socioeconomic factors (e.g. age, gender, family circumstances, and education), economic factors (e.g. unemployment, income, and inflation) and political factors. It is said that economic circumstances are considered as a source of happiness (see e.g

Easterlin, 2001). Consequently, if any change in one's circumstances occurs, it effects on his subject well-being. In addition, many other factors also influence an individual's happiness such as marriage and other social relationships, working conditions, leisure activities (Argyle and Martin, 1991.)

It is said that a positive relationship exists between happiness and income (Lykken and Tellegen, 1996; Frey and Stutzer, 2001 and 2002; Di Tella *et al.*, 2003 and Welsch, 2006). At a given time, people with high income feel happier than those with lower income (Easterlin, 2001). Higher income leads to higher utility and happiness since that individual gets more opportunities in undertaking what he wants (Frey and Stutzer, 2002), as stated "money does buy happiness". Otherwise, Easterlin (1974) confirms "money does not buy happiness". Lee (2005) also adds that life improvements arise from earning more money or from other sources, but the increase in happiness does not last in several decades.

3.2 Cumulative logistic model

Simplified utility U by income Y, there is a simple function of utility U = U(Y) in which U' > 0 (e.g. Frey and Stutzer, 2001; Di Tella *et al.*, 2003). Graham (2005) also counts the standard function $W_i = \alpha + \beta x_i + \varepsilon_i$ to measure happiness. Where W is level of happiness responded by individual i, x is a vector of predictor variables including demographic and socioeconomic characteristics. Happiness - an unobserved characteristic- is represented as ordinal numbers in happiness or satisfaction surveys; so logistic or probit equation is suggested (Frey and Stutzer, 2002; Di Tella *et al.*, 2003 and Graham, 2005). For that reason, the cumulative logistic model is used to examine the effects of demographic and socioeconomic factors on fishermen's satisfaction with life quality (see e.g. Duc, 2008.)

With utility level U, a vector x of predictor variables and individual respondent i, utility of fishermen can be demonstrated by a random utility model: $U_i = \alpha^* + \beta^* x_i + \sigma\varepsilon_i$ where utility level is a type of choice sets (Allison, 1999 and Greene, 2002). Because U, an unobserved variable, difficult to measure, a set of *thresholds*, $z_1, \ldots, z_{J-1}$ aims at transforming U into the observed variable *Z*. The presentations of thresholds are:

$Z_i = 1$ if $z_1 < U_i$

$Z_i = 2$ if $z_2 < U_i \leq z_1$

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.

$Z_i = J$ if $U_i \leq z_{J-1}$ (Allison, 1999.)

The probability chosen by an individual respondent i at less than or equal category j*th* of dependent variable is assumingly denoted by F_{ij}. Allison (1999) suggests that *cumulative probabilities* is defined by the equation $F_{ij} = \sum_{m=1}^{j} p_{im}$ and *the cumulative logistic model* is

$$\text{Log}\left(\frac{F_{ij}}{1-F_{ij}}\right) = \alpha_j + \beta x_i \qquad (j = 1, \ldots, J-1) \text{ where } \alpha_j = \frac{\alpha^* - z_j}{\sigma};\ \beta = \frac{\beta^*}{\sigma}$$

Error ε_i is understood as a standard logistic distribution and follows dependent variable Z which is given by the cumulative logistic model mentioned above (Long, 1997, Allison, 1999 and Graham, 2005).

In other words, if Z is level of response, i is number of respondents and j is number of categories of responses (for example in this study j = 1,.., 5 demonstrating from "*strongly agree"* to "*strongly disagree*") x is the predictor variables and x_{ij}' is the transposed of x, using all cumulative logits simultaneously, a model is rewritten as:

logit $[P(Z \leq j|x)] = \alpha_{ij} + \beta x_{ij}$' (Duc, 2008)

Allison (1999) emphasizes that "*the coefficients* β *do not depend on the placement of the thresholds"* and the effects of independent variables are the same on dependent variable. That means each cumulative logit has the same coefficient and its own intercept increasing in j. Moreover, the response curve demonstrated by the coefficient β is a logistic regression curve for a binary response with outcomes $Z \leq j$ and $Y>j$ with fixed j (Agresti, 2002.)

To estimate this logistic model, the maximum likelihood method is used (Long, 1997, Allison, 1999 and Greene, 2002). After estimating the logistic model, the probability p for a level of response is obtained by following steps:

The cumulative logits are written as

$$\text{logit } [P(Z \le j|x)] = \log \frac{P[(Z \le j \mid x)]}{P[(Z \succ j \mid x)]} = \log \frac{P[(Z \le j \mid x)]}{1 - P[(Z \le j \mid x)]} \qquad (j = 1, \ldots, J-1)$$

Simplified $\alpha_{ij} + \beta x_{ij}$' by g(x), then the cumulative logistic model becomes

$$\text{Logit } [P(Z \le j|x)] = g(x)$$

The transformation of this model is $\frac{P[(Z \le j \mid x)]}{1 - P[(Z \le j \mid x)]} = e^{g(x)'}$

Then the probability at the level of response is estimated by equation:

$$P(Z \le j|x)] = \frac{e^{g(x)}}{1 + e^{g(x)}}$$

According to Greene (2002), marginal effects in the logistic model can be computed by the equation

Marginal effect = $\hat{P}\ (1 - \hat{P}\ )\beta$ where $\hat{P}$ is estimated probability and β is chosen to obtained by average weight way.

3.3 Data description

Expectation of positive attitudes and perceptions towards protected areas augments compliance and management participation of local residents (see from McClanahan *et al*, 2005, e.g Jacobson and Marynowski, 1997; David *et* al, 2000; Hans, 2003; Suman, 2000; Sekhar, 2003; Sesabo, 2006). Sekhar (2003) and Hans (2003) affirm a significant linkage between local people's attitudes and their perceived benefits. Their positive attitudes towards protected areas result from what brings back from the conservation program. It confirms their contentment with their livelihood gradually improved. As a result of that, villagers' better attitudes towards Nha Trang Bay MPA management indicate their perceptions about benefits, life improvement achieved by MPA creation.

Subjective well-being are able to give a favor to a proxy for "utility" (Frey and Stutzer, 2001) interpreting the satisfaction of fishermen to life improvement offered by MPA creation. Fishermen's feedbacks remark their satisfaction to visible life quality improvement as-a-whole, a proxy for subjective well-being. The respondents were

questioned “do you think there has been an improvement in your life quality since Nha Trang Bay MPA was set up?” and they responded by a five-scale satisfaction from “*strongly agree*” (first scale) to “*strongly disagree*” (fifth one). Therefore, the cumulative logistic model is required to describe their well-being in life.

In order to examine the effects of demographic and socioeconomic variables on fishermen’s satisfaction, the following logistic model is demonstrated:

Logit[P(*happy* ≤ j)] = (*Capinc, fishinc, aquainc, otherinc, age, edu, men, fish_exp*)

Where:

+ *P*: probability of the fishermen’s response getting the value less than or equal j.
+ *Happy*: categorical variable of improvement on fishermen’s life quality
+ *j* = 1,…,5 is fishermen’s responses from *“strongly agree”* to *“strongly disagree”*
+ *Capinc:* per capita income of households in year 2008
+ *Fishinc:* income from fishing job relative to total household income
+ *Aquainc*: income from aquaculture relative to total household income
+ *Otherinc:* other income relative to total household income
+ *Age*: age of respondents
+ *Edu:* education level of respondents
+ *Men* is the number of men in household
+ *fish_exp:* Household head fishing experience

Although rich people expose higher subjective well-being, the relative income explains happiness better than the absolute income (Frey and Stutzer, 2002; Frank, 2003 & 2004, and Lee, 2005). A vast majority of studies has focused on per capita income as an important variable in identifying as well as predicting the relationship between income and happiness (see Frey and Stutzer, 2002 e.g Blanchflower and Oswald, 2002; Welsch, 2007 and Duc, 2008). In this study, the main income of households is derived from fishing, aquaculture and others including handcraft, hired labor and small trade. Then per capita income obtained by the total income dividing household size is expected to be a key variable in the model and raises higher subjective well-being. Relative incomes (the ratios of absolute incomes from fishing, aquaculture and others contributing to total household income) play meaningful roles in regression model to explore their effects on

fishermen's satisfaction of life. Additional relative incomes have a positive influence on their well-being.

Contrary to the opinion that higher income yields higher happiness, some researchers argue that happy people can earn more (see Frey & Stutzer, 2001 and 2002). Their creativity goes after their contentment of life, becoming a strong motivation to carry out their economic activities. Yet this argument is not discussed in this study so far.

According to Frey & Stutzer (2002), age and education take an important part into happiness affection, so these variables should be mentioned in the model. Old people are expected to be more satisfied with their life improvement resulting from MPA establishment and high education obtainers feel pleased with their current life. Fisherman, who accumulates more fishing experience and understands fishing grounds, will show no doubt their non-satisfaction about life because of his declined catch. Thus, fishing experience element must be added to model. Moreover, number of men in a household also presents an important position due to their ability in earning income and improving livelihood (Duc, 2008.)

In addition, the interaction between variables such as age, education level, number of men in family, fishing experience of respondents and others should be posed into the model clarifying their interaction effects on life satisfaction of the fishermen.

To achieve the pleasure with life improvement of the fishermen, j will be chosen at the scales of j = 1, 2. The response curve is therefore a logistic regression curve for a binary response with outcomes $Z \leq 2$ and $Z > 2$ with fixed j = 2 and the estimated cumulative probability p of fishermen satisfaction is obtained to get values of marginal effects.

The cumulative logit demonstrates fishermen satisfaction with life improvement

$$\text{Logit [P(satisfaction)]} = \text{Logit [P(happy} \leq 2)] = \log\left(\frac{P(happy \leq 2)}{1 - P(happy \leq 2)}\right)$$

Estimated probability at satisfaction level is calculated by equation

$$\text{P(satisfaction)} = \frac{e^{\log it[P(happy \leq 2)]}}{1 + e^{\log it[P(happy \leq 2)]}}$$

SAS - Statistical Analysis Software - is used to procedure this logistic model. Through the procedure, the best fit model for fishermen's satisfaction with life quality will be chosen by the backward selection.

3.4 Sampling method

This study utilizes both quantitative and qualitative methods in which the semi-structure questionnaires captured the socio-economic information from both managers and households with their perceptions and attitudes towards MPA management. The primary data collected through a face-to-face interview by which the interviewer visits each household head in the morning, after their fishing. The survey had been done by the random selection in five communities from February to March, 2009.

Besides, issues on satisfaction of the fishermen were interrogated. The fishermen's attitudes performed their opinions by sticking one of five scales given (strongly disagree, disagree, neutral, agree and strongly agree). Following questions such as "do you think that there have been improvements in quality of life since the MPA was established", "do you satisfy the zones that you are allowed to fish?" and "do you satisfy your current fishing catch in these current years?" were disposed.

Some researchers have recently investigated attitudes of the users towards the existence and management of the MPA by asking the reasons about the MPAs establishment with its compensation policy (Irene, 2002; Mc Clanahan *et al.*, 2005 and Stump, 2006) as well as their problems concerning their career (Abdurhman, 2002). Those factors are also figured out in this study under such questions as do they believe that a closed area is a good way to maintain fish catch, do fishermen have conflicts with others in using fishery resources, what types of conflicts and what kinds of fishermen are involved in conflicts, have conservation efforts affected their livelihoods, do they know what are the basic reasons for the MPA establishment, have they received any compensation under any forms since MPA established, have they had more job opportunities and if they had any chance, would they keep their current occupation as well as do they have any difficulties in finding job.

In order to demonstrate managers and users' perceptions comprising the perceived benefits which achieved from the existence of the MPA, the 10-cm line is used to scale

the benefits that fishermen, community or government got. Described from 1 to 10 as from the less to the greatest benefit of each level, both fishermen and managers will scale themselves who would benefit most from the MPA establishment. This kind of questioning is also mentioned in Mc Clanahan *et al.* (2008.) In order to compare the perceptions between them, their scales were taken by average values at each level.

According to HA (2001), the MPA consists of not only direct values but also indirect values in which fishery and tourism are of indirect values and indirect ecological services including nutrient storage and cycling, atmospheric gas and climate regulation, waste treatment and assimilation, biological control, habitat, biodiversity maintenance and protection of habitat are indirect use values. Moreover, close areas bring positive benefits such as spillover effects, helping to provide stock enhancement (see Mc Clanahan *et al.*, 2004). So, in order to get the well understanding of fishermen and managers, the awareness of them about those values will be questioned.

The last part pointed out the trust of fishermen to the Temporary regulations associated with the effectiveness of Nha Trang Bay MPA management board and the trust between their communities through asking the statement "if you had a problem and needed help, are there people in this community besides your family members that would help you?" and the statement "do you think that people believe in management regulations overall?"

Table 3.1. Number of sample

	Number of households fishing directly in this area (*)		**Sample(**)**		**Percent of sampling**
Name of communities	Households	Percent	Households	Percent	
	(1)		**(2)**		**(2)/(1)**
Bich Dam	88	44.44	34	41.98	38.64
Dam Bay	22	11.11	8	9.88	36.36
Hon 1	58	29.29	19	23.46	32.76
Tri Nguyen	17	8.59	8	9.88	47.06
Vung Ngan	13	6.57	12	14.81	92.31
Total	198	100.00	81	100	40.91

Source: (*)From MPA Authority, 2008 and (**)collecting and classifying data

In order to identify the attitudes and perceptions of users and managers, fishermen who are directly fishing in Nha Trang Bay and government officials who are working with marine resources in MPA were surveyed. The total sample size is 90 in which 9 managers of 21 and 81 fishermen of 198 were visited. **Table 3.1** describes the percentage of sampling households in each community is equivalent that of current ones who are fishing directly in this area. In general, the sample took 40.91% from needed population of local people, 81 fishermen.

CHARPTER 4

4 Results

The work includes following details: socio-economic status of fishermen and managers, the overview perceptions and attitudes of fishermen, understanding perceptions and attitudes of two groups through the comparison between them, local people and management officials, and life satisfaction of the fishermen living around MPA through the regression analysis.

4.1 The overview of samples: Socio-economic status of fishermen and managers

4.1.1 The Socio-economic status of fishermen

Most of the respondents are male with the youngest individual being at the age of 30 and the oldest 69 years, the average age is 47.21. Number of people being able to earn income in family is 2.33 averagely with the range from 1 to 7; more than 40% family has 2 people being able to earn income. In which 53.08% has 1 man can earn money in family, number of men being 1.81 in average.

Table 4.1. The overview of sample

Variables description	Mean	Standard Error	Minimum	Maximum
Number of people earning income in family	2.33	0.14	1	7
In which, number of men	1.81	0.12	1	5
Number of people in family	4.69	0.17	2	9
Age of household head	47.21	1.15	30	69
Education of households	4.37	0.29	0	10
Household head fishing experience	28.24	1.14	10	54

The family size ranged from 2 to 9 with the average of 4.69 members, and more than a haft of the household heads (53.10%) completed a primary school. Most of them highly experience in fishing, averagely 28.24 years, with the shortest fishing years being 10 years and the longest 54 years. Those descriptions are illustrated in **table 4.1**.

In the sample, a majority of household heads participates in fishing activities as their key job; meanwhile aquaculture counts the secondary job of 25.92% households. Therefore, their main income is derived from fishing, 74.49%, and a small percentage (1.92%) achieves from aquaculture. Income from small trade together with that from handcraft, hired labor and others is also a significant role adding to total income of households. Other incomes contribute 14% to total income including incomes from animal husbandry, support of their relative and official salary. **Figure 4.1** shows that their income is from fishing, small trading, handcraft, hired labor, aquaculture and others.

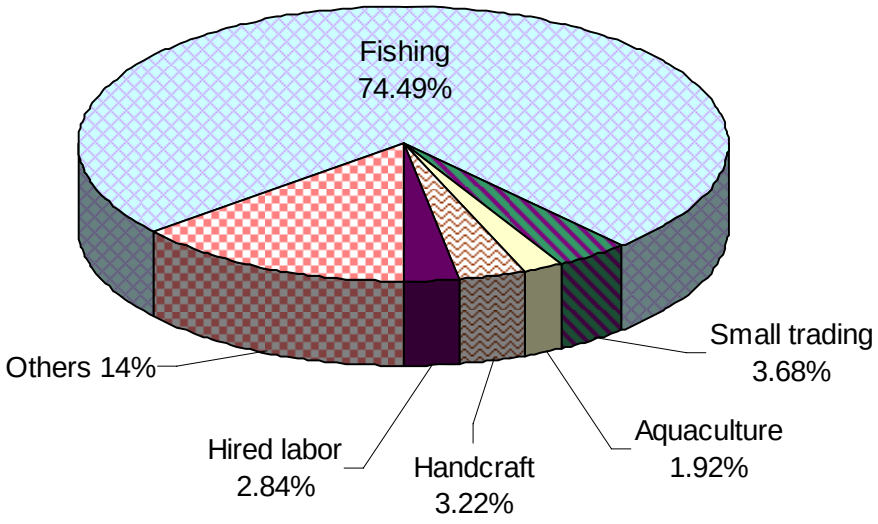

Figure 4.1. Distribution of households' income

4.1.2 The Socio-economic status of managers

The Hon Mun MPA Pilot Project ended in 2005 and a majority of management board is new recruits. Current Nha Trang Bay MPA has a staff of 43, including 16 members of patrol staff, 5 members working for community development section, 4 members of ecotourism and environmental education center, and the rest working a part of collecting

and planning. Amongst them, only staff of community development group and staff of patrolling are directly working with the marine resources and have a well understanding about marine conservation management, 9 of them surveyed. Patrol staff guard, monitor, co-operate closely with relevant agencies and local communities in patrolling and controlling within the area and prevent actions breaking the Temporary Regulations of MPA management. Besides, the group of community functions of planning community development within MPA such as propagandic and educational activities in order to enhance islanders' perceptions to protect marine natural resources and environment.

Though people dealing with community improvement have the Bachelor degree, the patrol staff however has a low level of education. Only 5 members completed senior high school and the rest just finish the primary school or junior high school. Most of asked people have a short time of working in this office in which two of them have the longest time of working in this staff, 6 years, 3 members working from 4 to 5 years, 2 members experiencing from 2 to 3 years, and the rest with less than 1 experience year. Undertaking those positions are considered as their primary occupation, but the amount of salary they received normally is not much high. Consequently, the working staffs are unstable, they are temporary officers causing by low salary.

4.2 The overview perceptions and attitudes of fishermen

With the question "have you known about MPA project?" a large majority of the respondents, 89.77% answered "yes", corresponding with 82.72 % of them giving affirmative responses for the question "have you received any information from MPA project". In which, 59% explained that through previous meetings between management board and islanders, relevant information that they have got is "MPA creation is to protect marine biodiversity, protect coral reefs and inhabitants are thus not allowed to fish in the core zones". Most of them, 66.67% stated that they are involved in the meetings of fishing groups or conservation groups. Meanwhile with the question "are you involved in decisions about marine resource use or management?" 60.49% said that they are involved in negotiations about the large of closed area as well as zoning. 82.87% responded that there is the trust amongst them in their community. Accordingly, with the question "if you had any difficulty in life and needed help, are there any people in this community

besides your family that would help you?" was answered "yes" by 75.31% of the respondents in which 62.56% and 10.45% respectively showed that their neighbors and head of community would help them. 50.62% concluded "yes" with the question "overall do people trust in MPA management as well as the Temporary Regulations?" and the rest gave the negative answers. Few people added more that is because "the alternative income program is inefficient, the patrol staff does not implement their duty effectively, conservation regulation is not suitable."

The following parts demonstrate fishermen's perceptions and attitudes towards the MPA creation. First part shows how the respondents perceive the basic reasons for the existence of conservation area, how they know the limitation of the restricted area and how is their acceptance regarding to the area. To know how the MPA designation impacts on local people livelihood, the pleasure with life improvement, fished catches and fishing zones are examined in the second part. Besides, the next flows include the knowledge of catch trends, compensation and job opportunities, impacts of MPA project, management effectiveness of MPA management board and their statement about problems of using marine resources.

4.2.1 General overview of fishermen's perceptions towards the MPA establishment

A. The main reasons for the establishment of MPA

Figure 4.2 indicates that the majority of respondents have knowledge about basic reasons setting MPA. It however seems not to be complete. In which only 40.91% asked people recognized that it offers the closed area restricted fishing, maintains the habitat for marine species and increases fisheries through spillover effects. The MPA aims to reserve the coral reefs, the habitat, for marine organisms and to maintain marine biodiversity environment, 28.41% of respondents stated that, a common understanding of villagers towards existing MPA. Finally, 20.45% of them perceived a primary reason simply that it is the closed area, banning fishing boats operating in this place.

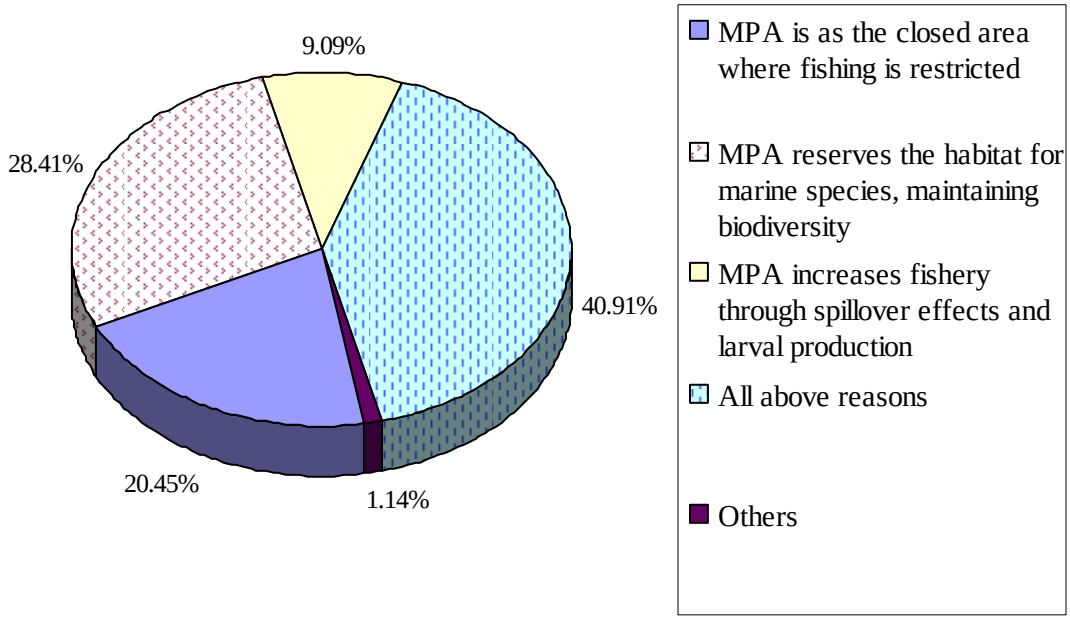

Figure 4.2. The main reasons for the establishment of the MPA

B. The views of fishermen on the limitation of the closed area

It is necessary to understand fishermen perceptions towards the limitation since their knowledge lead to their acts in fishing within the MPA.When asked about the limitation of exclusion zone, a haft of respondents expressed that they do not know from where. Meanwhile the rest could describe with inexact numbers. Amongst those, just only 9.88% stated that the limitation of the closed area is 300 metre from edge of Hon Mun island correctly as Temporary regulation of MPA management. Besides, 22.22% of questioned people answered with the largest area that is 500 metre far from Hon Mun island edge. **Figure 4.3** clearly shows the proportion of respondents' perceptions towards the limitation of the exclusion area.

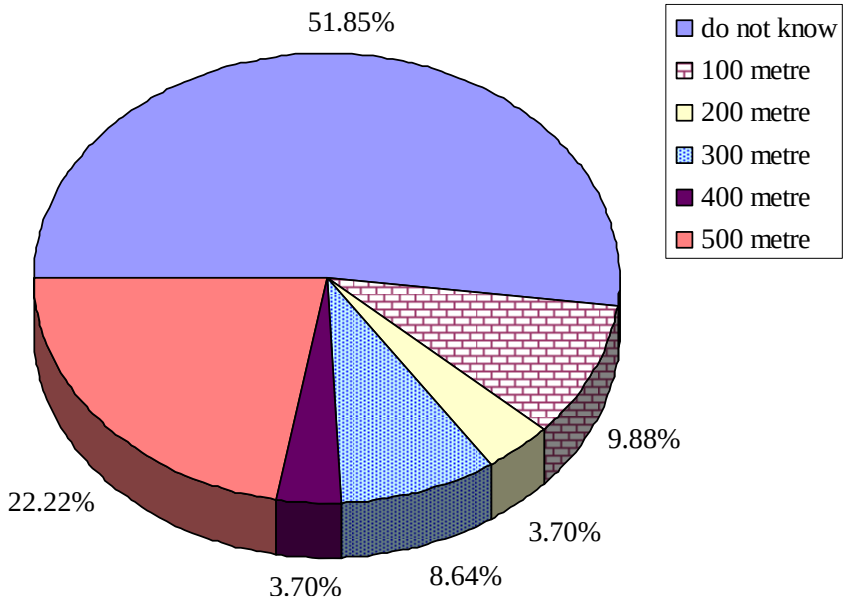

Figure 4.3. Respondents' views on the limitation of the closed area

C. The acceptance of fishermen towards the closed area

The fishermen's acceptance the closed area demonstrates their attitudes towards the MPA existence. More than a half of respondents did have negative attitudes regarding to the exclusion area, in which 38.27% and 23.46% respectively disagreed and strongly disagreed to it (**fig. 4.4)**. However, some of them, 20.99%, revealed that they must agree to restricted area because of their responsibility for following the management regulation. Thus, local people have no choice whether it impacts on their life or not. Finally, a small percentage of surveyed people gave neutral responses. They explained if not allowed to fishing in this area, they would move to other fishing grounds. Because the area of core zones is quite small for all local people, some choose not to operate there. In general, the residents reluctantly agree to the closed area.

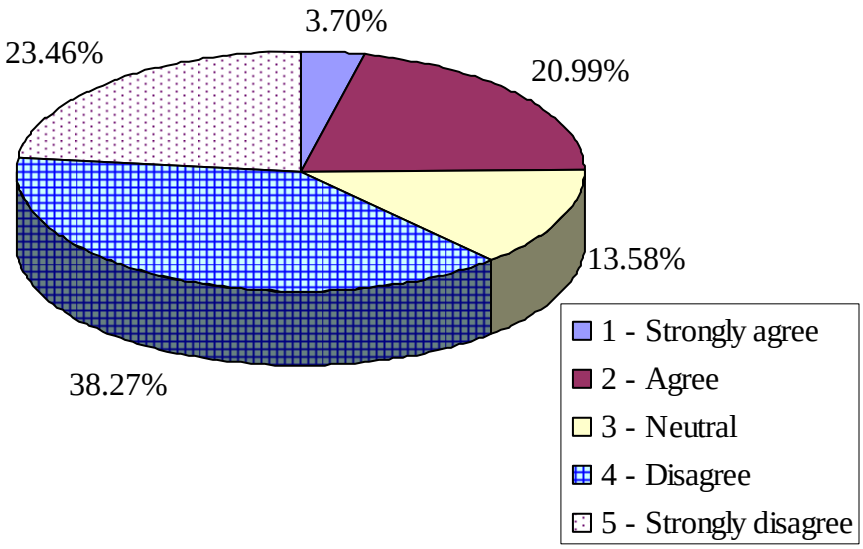

Figure 4.4. The acceptance of the fishermen towards the closed area

4.2.2 Respondents' satisfaction with life, fishing zones and fish catches

Generally people had different opinions about their satisfaction with current fish catches and fishing zones as well as life quality improvement. First, questioned that whether they satify with the current catches, they showed the negative views. Though a low percentage of respondents described pleasing with their catches, 14.81% and 25.93% of household heads strongly disagreed and disagreed with that statement, respectively. In which, fishermen in Hon Mot community strongly do not please with their catches. Their livelihoods very much reply on Mun Hon island with squid line and hook activity as the main operation. However, because of the stipulation setting in this area, they can not fish as before. As a result, respondents explained that their income has decreased from 30 % up to 50% as the fishing catches lower.

Second, regarding to satisfaction of fishing zones, **figure 4.5** illustrates satisfactory and unsatisfactory opinions amongst fishermen. Less than a half of them (43.21%), who buy new modern boats to fish in further grounds with high catches, strongly please; meanwhile those having no capability to operate in other places instead of the traditional area - where is restricted - with low catches and more operators feel unpleased with their fishing zones. Moreover, the high percentage of respondents had negative perceptions towards the improvement of their life. 29.63 % of people surveyed did not agree that their

life quality has improved. And 18.52% of them stated that there is not any life quality improvement resulting from the decision of marine conservation established. In which, local people in community Bich Dam and Hon Mot mostly do not feel that their life have any improvement. Lastly, the percentage of agreeable opinion almost equals that of neutral towards consideration of life quality improvement.

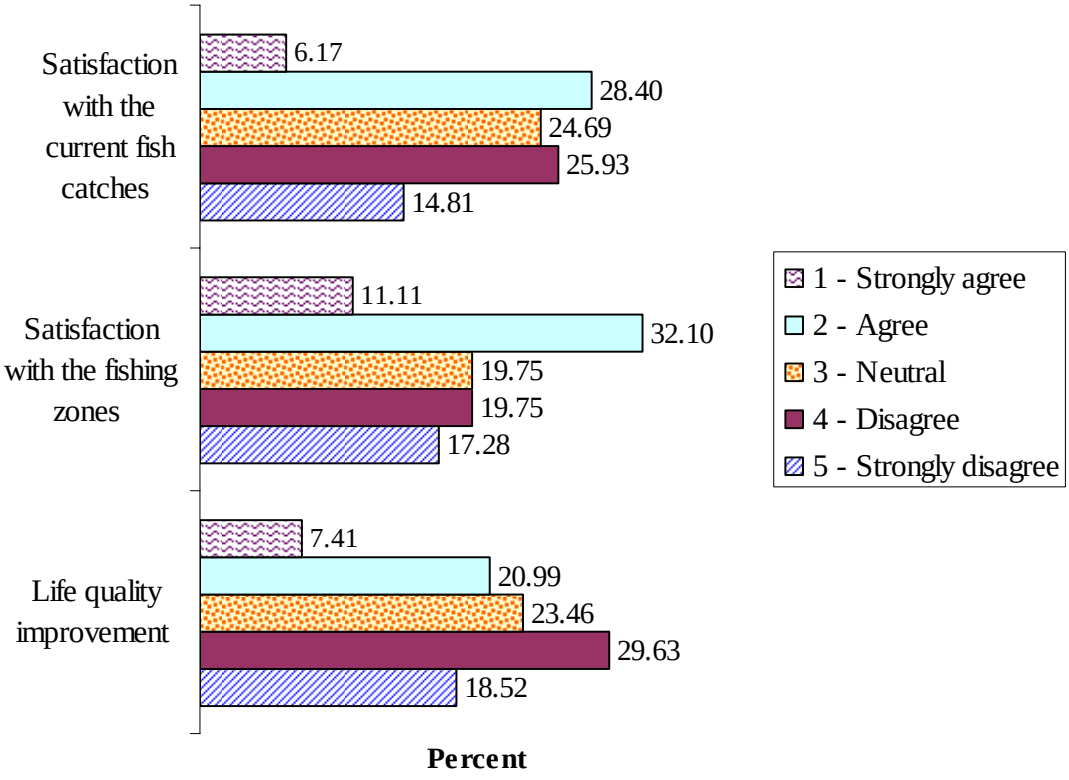

Figure 4.5. Respondents' satisfaction with life, fishing zones and fish catches

4.2.3 The fishermen's perceptions to the fish catch trend

In order to get general perceptions of fishermen towards resources, the trend of catches in this recent time and in next 5 years need to be investigated deeply. Their judgments of catches impact to their behavior towards marine resources in this current time and further years. All of respondents (69.14%) believed that catches in Nha Trang Bay have lowered in this period of years **(fig.4.7)**. When asked reasons of decreased catches, 37.50% of them asserted because more and more fishermen who have large – modern fishing boats operate within this area. In consequence of the modern fishing means, fish are scared of

the noise from strong engines of those, then moving to the offshore waters instead of in the inshore area, they explained. Besides that, not less percentage, 28.57% responded that the prohibition of fishing in the core zone, Hon Mun island, is as a reason for decreasing their catches. The fish density in that place is very much high but the residents have not been allowed to operate there. In addition, 8.93% perceived marine water environment has been changing causing of noise and sediment accumulation from built infrastructures for tourism resorts, waterways, and ports and that leads to dismissing fish stocks. Finally, amongst respondents recognized the reducing of their fish catches, 25.00 % could not state the reasons why. **Figure 4.6** indicates those reasons.

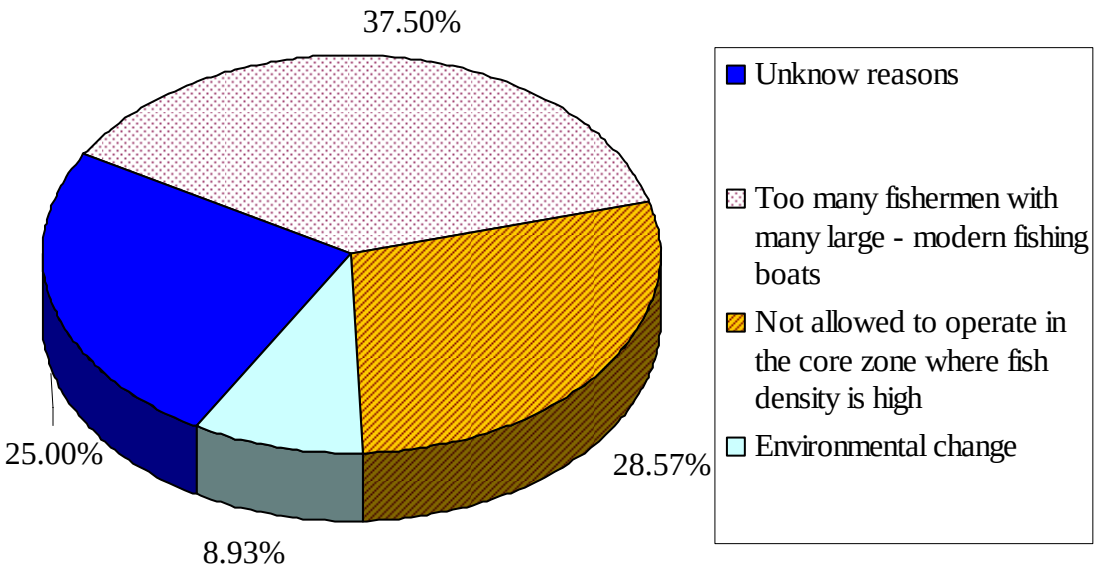

Figure 4.6. Reasons cited for catch decrease comparing with that of before MPA establishment

Moreover, some had different perceptions towards the trend of fish catches. According to them, the illegal operations such as explosives and cyanide do not exist within the area as the result of marine conservation efforts, the fish stocks increase leading to the increase in their catches. 17.28% of respondents pointed out that opinion. A small percentage of them (8.64%) stated that the catches are stable and they had no idea about their recent catches lastly (4.94%). The following figure depicts all those arguments.

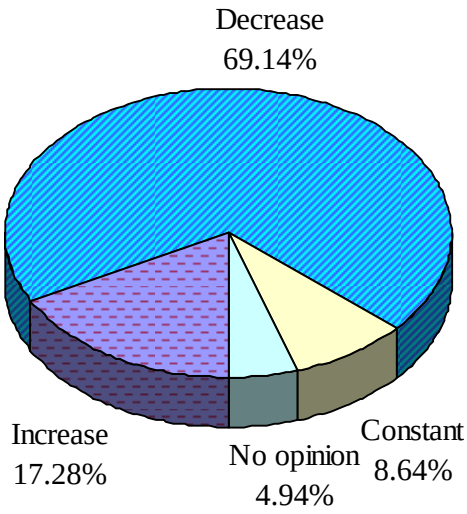

Figure 4.7. Recent fish catch trend in comparing with that of before the MPA establishment

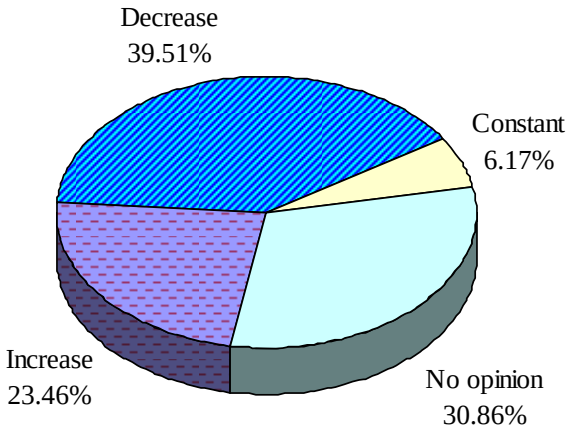

Figure 4.8. Fish catch trend in next 5 years

Figure 4.8 shows that the respondents had positive perceptions when asked about the fish catch trend for next 5 years. The catches will increase contributing to improve local people livelihoods as a result of marine conservation purpose, 23.46% of them stated that. Besides, they still recognized under the pressure of fishing activities, increasing number of fishermen with modern fishing means, the catches in next five years will decline but

perceived percentage is less than that in the recent years. 39.51 % of surveyed household heads judged that their catches will diminish in further years. Finally, a large number of them gave uncertain opinions, whether the catch will increase or decrease or be constant because of its dependence on the weather.

4.2.4 The fishermen's opinions on compensation and occupation

Overall gained benefits lead to positive attitudes of local people towards MPA management (Infield and Namara, 2001**)**. In the Nha Trang Bay MPA situation, compensation and job creation are such forms of benefits that they can gain from the MPA designation. Thus, investigating islanders' compensation and their occupation helps to understand their attitudes.

All of asked islanders, 88.89%, informed their families have not received any compensation from MPA management board (**table 4.2**). A small percentage (11.11 %) stated that they have got the compensation under the small loan, 112.94 USD per year, for doing handcraft manufacture, small trading and others. 25.93% of them thus agreed they have more occupational opportunities than before, especially for female labors. When asked whether they have any difficulties in finding job, a half of respondents showed that they do not. And mentioned "if having any chance do you want to change your current job to other ones?" surveyed people responded the negative answer. Being familiar with their job, they prefer fishing job to the alternative one. Even if got any chance, residents added that they are not able to touch other jobs because of some barriers such as age and education level. Most of household heads, the main labors, are male depending very much on fishing activities, not others. As a result, especially poor families feel difficult in their livelihoods, fishing ground is limited. According to them, though some very poor families face with finance issue, others can buy modern boats moving to further areas to fish. In short, conservation efforts have affected their livelihoods, 51.85% of them recognized that.

Table 4.2. Perceptions of respondents about compensation and occupation

Statement	Yes	No	No opinion
Have you received any compensation under any forms since MPA established?	11.11	88.89	
Have you had more occupational opportunities	25.93	72.84	1.23
If had any chance, would you keep your current occupation	58.02	30.86	11.11
Do you have any difficulties in finding job	38.27	54.32	7.41
Have conservation efforts affected your livelihood	51.85	48.15	

4.2.5 The views of fishermen on MPA project impacts

Exploring respondents' opinion about the impacts of the Nha Trang Bay MPA project is important in understanding perceptions and attitudes of local people. Most respondents recognized that the project has benefited for Nha Trang Bay and surrounding waters **(fig.4.9**). More than sixty percent of surveyed people expressed the project has positive effects on recovering coral reefs, increasing the fish density, enhancing biodiversity as well as improving water quality. Contrary to that, almost the same percentage did not agree that livelihoods of local communities and perceptions of relevant stakeholders improved.

Villagers perceived that water environment has significantly improved. They please the most with a clean environment surrounding their habitats. This has raised positive perceptions of not only the old residents but also the young. People never discharge into the marine water or do anything harmful to coral reefs.

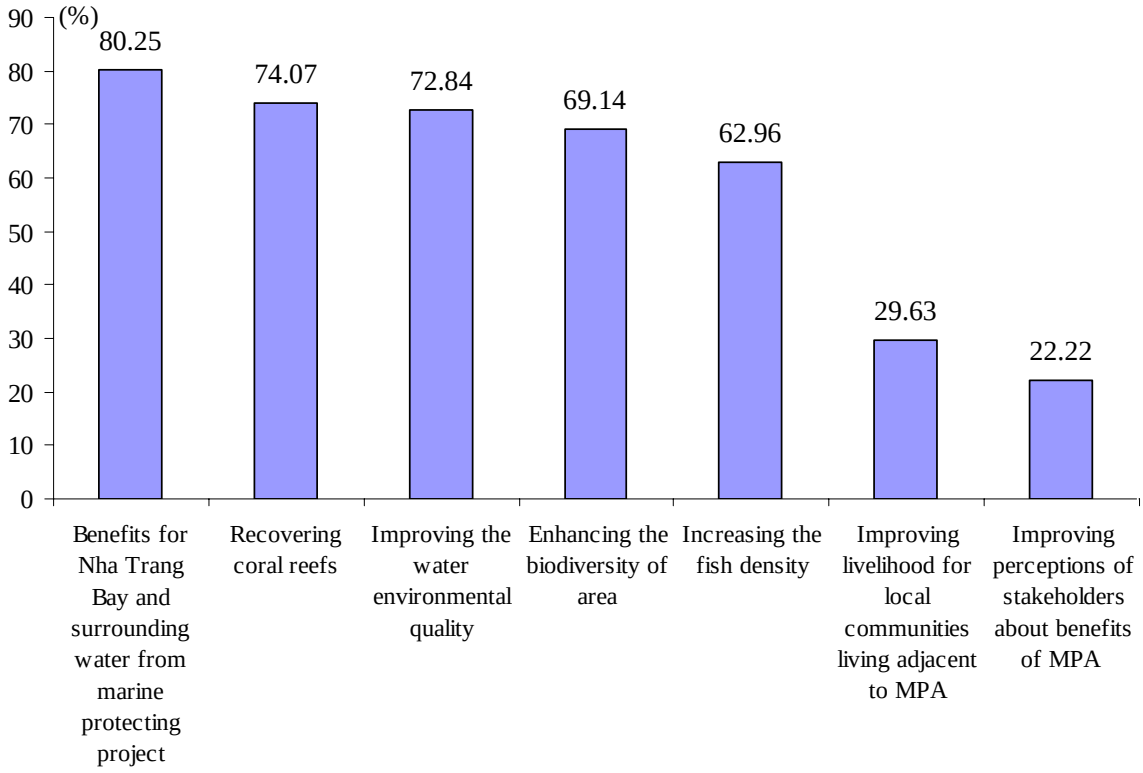

Figure 4.9. Impacts of the MPA project

Asked local people did not believe that the MPA project has improved their communities' livelihoods. They revealed the negative views on this point, because the alternative income program seems to work inefficiently. According to them, the project had created some jobs in the short period of time for villagers such as handicraft activities, animal raising, tourism service and trading. In which handicraft activities were attracted a large number of residents, especially the old people and female, but they were stopped without any reasons after 5 to 6 months, approximately. Some explained that animal can not be raised because of geographical features of this area. Or others stated that because people can not survive though those activities since the income from those are usually small, not enough for their daily expenditure.

Besides, the remained opinion stated other negative impacts of MPA projects, not improving perceptions of relevant stakeholders. Local people have to cost more to buy new larger boats and move to other fishing grounds. Besides, some poor fishermen living within Nha Trang bay sometimes have still poached in core zones, especially Hon Mun island, and complained very much about the ban. Some perceived that only tourism gains

benefits from Hon Mun island, but they do not. Meanwhile Michael and Tu (2005) mention Nha Trang Bay MPA Authority has charged a user fee to arrivals visiting and participating to dive, swim or use a glass bottom boat in Hon Mun area and 12% of the Conservation Fee has planned to be extracted to a village development fund.

4.2.6 Fishermen's assessment of the MPA management effectiveness

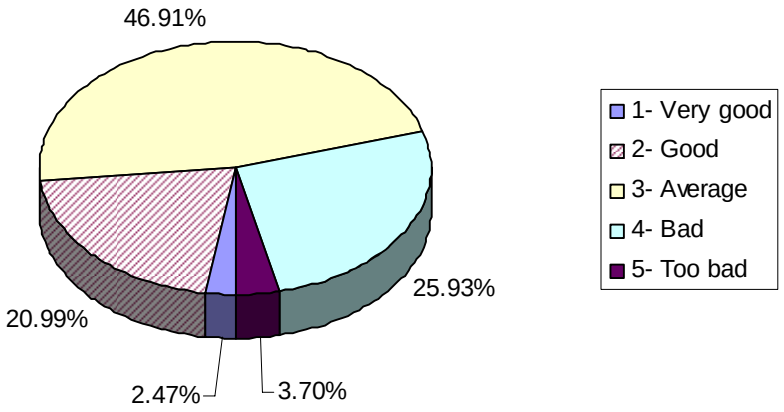

Figure 4.10. Fishermen's assessment of management effectiveness

Most of villagers seemed to be less aware of the Nha Trang Bay MPA management effectiveness and judged both effective and ineffective level similarly. 46.91% of respondents rated the MPA Projects' effectiveness at average level as a whole. Besides, 25.93% rated management at bad level and 3.70% at too bad; meanwhile their judgments are 20.99% of good and 2.47% of very good level, respectively (**fig. 4.10)**. They perceived that MPA management board in previous times visited villagers and operated meetings frequently as well as created alternative jobs and supported loans. However, those activities have not existed much since the new board has run. Islanders achieve income from those jobs and loans unfavorably, quite small returns comparing to their daily expenditures. Among those who stated the project was ineffective, most of them complained about the role of MPA's patrol. They seemingly do not make all of their efforts to enforce poachers. Outsiders' boats thus can come to core zones and occasionally operate there.

Perhaps they have experiences in the fishing ground, especially in the core zones, and have the negative view to management board - the patrol staff. According to them, some very poor fishermen who face with no income in a long time may earn approximately 6 - 12 USD per night by poaching squid hook and line in this area, but they have nothing if detected by the patrol staff. Local inhabitants thus complain very much about inefficient works of the patrol, for example having not good behaviors to old fishermen. Besides that, some presume that there may be collusion between few members of the patrol staff and poaching boats. They have sometimes seen some strange-large poaching boats coming from other regions in Hon Mun Island, but there is no any patrol boat to arrest them. Meanwhile small or traditional poaching boats of fishermen living in these communities would be arrested immediately.

4.2.7 The fishermen's perceptions on conflicts of using marine resources

40.74% of respondents judged that there are conflicts amongst fishermen within MPA area and outsiders in exploiting the marine resources. In which the percentage defined that conflicts happen regularly, occasionally and rarely are 33.33%, 54.55 % and 12.12% respectively. Conflicts occur because big boats with modern equipments fight over small boats or many boats detect the place with density fisheries at the same time and then fighting happens. In addition, respondents also stated that there are conflicts of water surface using between people who are cultivating in this area.

4.2.8 The fishermen's perceptions on problems of using marine resources that need to be solved

Marine resources have suffered with many certain problems (**Fig. 4.11)**. The very high percentage of respondents, 80.25%, perceived that polluted marine water has become a big problem now because of uncontrolled aquaculture development. The increasing number of fishermen associated with more and more modern technology in fishing cause of overexploitation. 48.15% opinion believed that resource overexploitation problem needs to be solved by the MPA Authority. Other emerged problem is the pollution by household waste in land and by tourists. Besides, 12.35% household heads considered degraded coral reefs also should be the concern since few poachers, outsiders or villagers, come and fish in or nearby the core zone and damage coral reefs. Filling ocean and

cutting mountains on islands to construct tourism resorts, ports and other infrastructure are in warning of both Khanh Hoa government and the Nha Trang Bay MPA Authority. Lastly, the small percentage stated that the Authority should be aware of following problems: tourism development, exterminative exploitation and pollution by agriculture.

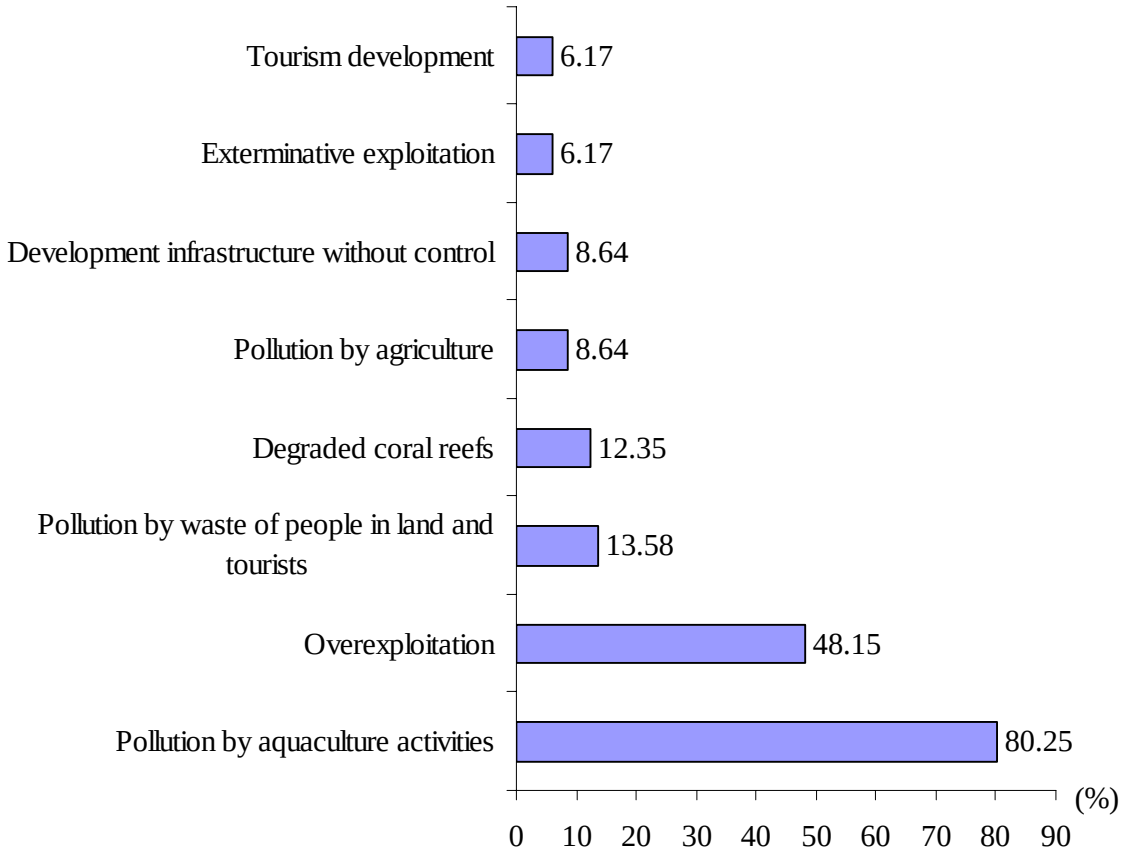

Figure 4.11. Resource using problems needed to be solved

4.3 Difference of perceptions between managers and fishermen

4.3.1 The views of two groups on the MPA establishment

Figure 4.12 implies that the difference between perceptions of managers and that of fishermen towards MPA establishment. Managers gave a better perception than fishermen did. Nearly all of managers, 70%, accepted that the basic reasons to design MPA is to reserve the biodiversity, thus to increase fishery through spillover effects and it is patently a restricted area. Meanwhile, less than 50% of residents considered the general reasons. They just cited a very simple idea that it maintains marine biodiversity.

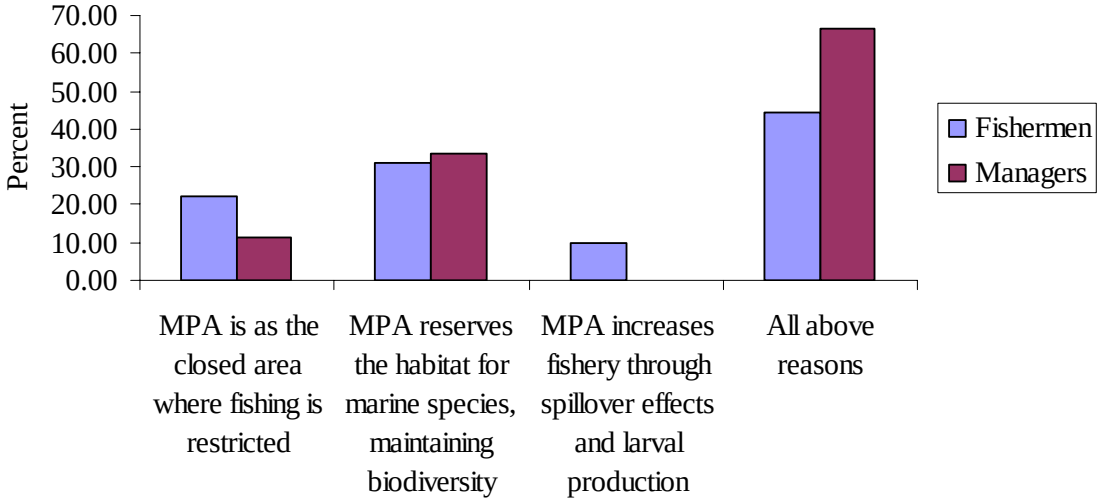

Figure 4.12. Two groups' views on the main reasons for the MPA establishment

Generally people perceived and recognized the MPA benefit maintaining fish catch, the perceptions of two groups are, however, so much different. The high percentage of residents had a positive perception towards the exclusion area, the best way to maintain the fish catch. Amongst them 38.27% and 22.22% respectively stated that they strongly agree and agree with that statement (**fig. 4.13)**. Except local people in Hon Mot community (89%) did share their negative opinions with the statement. According to them, the closed area in Hon Mun island is just for maintaining coral reefs and ornamental fish which live in reefs, not fish for catching. Their catches come from offshore fish, not the reef-fish. Meanwhile nearly 80% of managers strongly supported that MPA is the best way to maintain the fish catch.

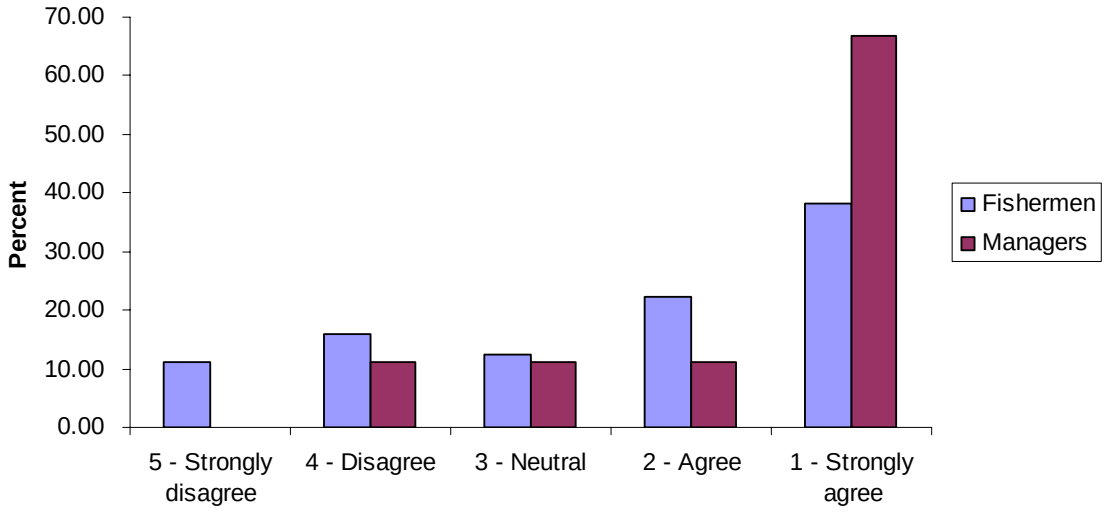

Figure 4.13. Two groups' perceptions towards the statement that MPA is the best way to maintain fish catch.

4.3.2 The views of managers and fishermen on values from the MPA creation

Both groups recognized that MPA brings not only direct values but also indirect values, ecological services. Most of them highly agreed that the area gain economic values from tourism and fisheries, however, less percentage of them perceived the indirect values. Those are creating tourism values from beautiful coral reefs and a green-clean marine environment and increasing fish stocks for fisheries from the closed area. **Figure 4.14** depicts the comparison of perceptions between those two groups.

Surveyed fishermen agreed that MPA brings benefits including the direct values rather than indirect. More than a haft of them stated that MPA have created tourism values mostly and increased the fish stocks. Fishermen generally could perceive ecological benefits from this marine conservation in which nearly 50 % of them accepted that the closed area is the habitat for fish and other marine organisms to live and restock themselves. In general, respondents identified that the waste treatment and assimilation, habitat, biodiversity maintenance, nutrient storage and cycling as well as protection of habitat are achieved from MPA but with lower percentage of agreement comparing to that of fisheries and tourism values.

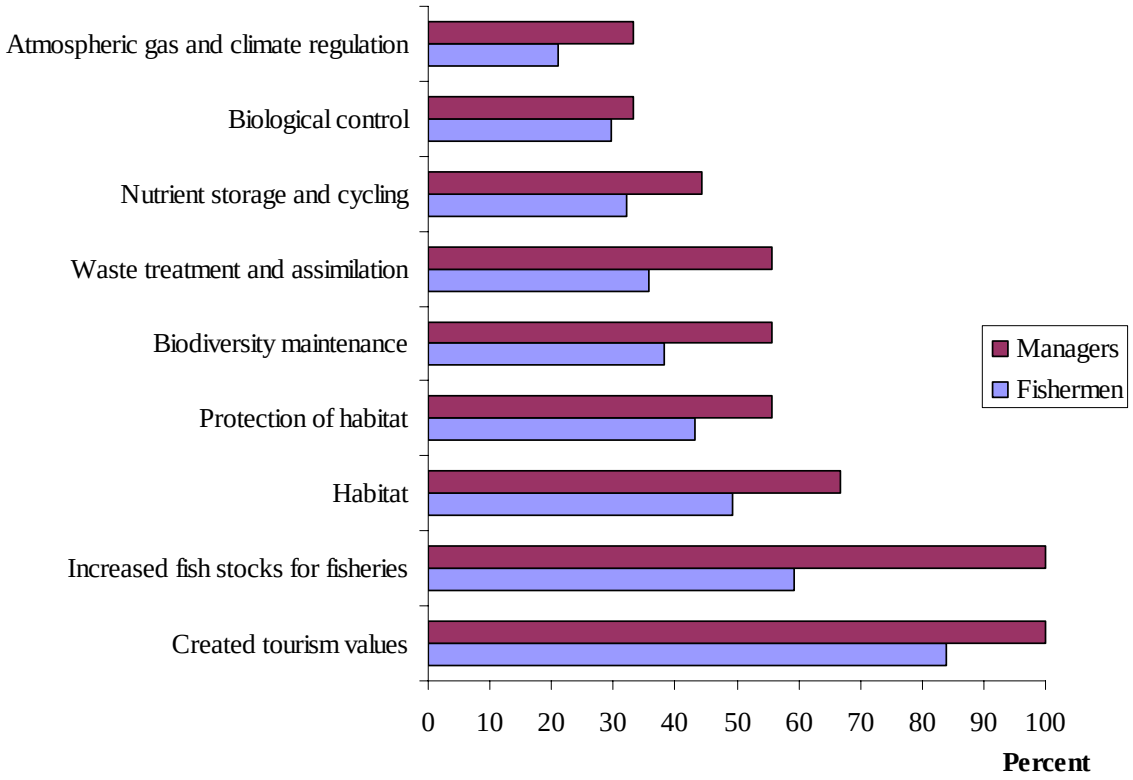

Figure 4.14. The views of managers and fishermen on values from MPA creation

In side of managers, other beneficial functions supported from marine conservation area such as protect habitat, maintain marine biodiversity, and others also were considered but with the diminishing percentage. Though there is less consideration for indirect contribution of MPA, managers had higher perceptions towards ecological values than fishermen did.

Further more, the large amount of fishermen were aware of direct use values, 37.03% and 3.70 % respectively in increasing the fish stock for fisheries and tourism values from beautiful coral reefs. In contrary, only 16.04% of them responded that MPA brings indirect ecological services, waste treatment and assimilation; and the value of habitat for fish is 13.58%. Meanwhile all asked managers said that they mostly have the awareness of fishery (77.78%) and tourism (66.67%) and less awareness of indirect values as following: habitat (7.78%), biodiversity maintenance (55.56%) and waste treatment and assimilation (44.44%)

4.3.3 Managers and fishermen views on stakeholders benefiting most from the MPA creation

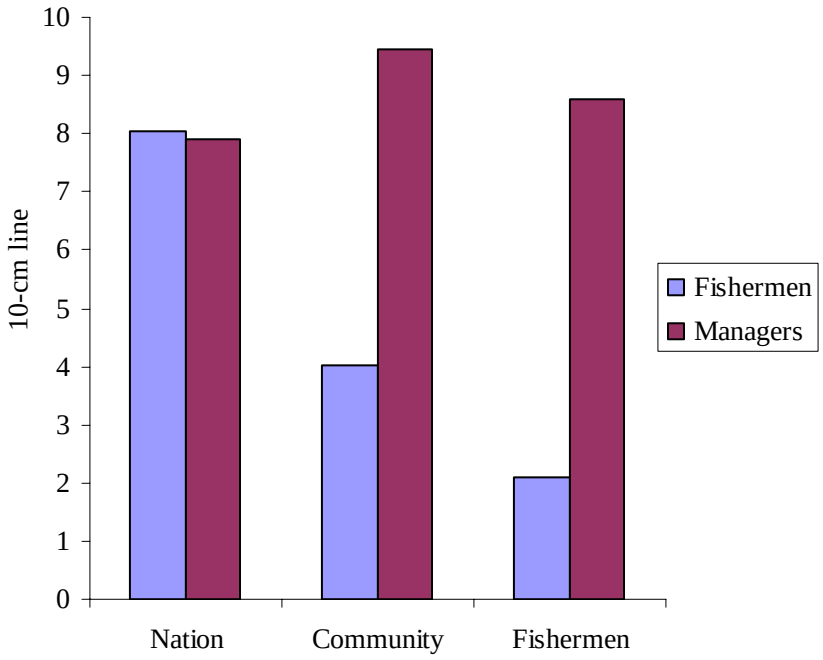

Figure 4.15. The evaluation the gained benefit by 10-cm line (in average)

Both fishermen and managers agreed that MPA establishment benefits for their nation. Most fishermen, however, have negative perceptions towards area excluded than managers. They explained that only government are benefited from closed area, from tourism activities, not their family or their community; meanwhile managers stated that government, communities and fishermen benefit from the closed are, especially local people and their communities.

4.3.4 Managers and fishermen views on benefits of the MPA project

Figure 4.16 depicts that both managers and fishermen had positive perceptions towards existing of MPA project. That is it has brought benefits for Nha Trang Bay and surrounding water as well as local communities' livelihoods and stakeholders' perceptions. Fishermen highly agreed that most coral reefs in Nha Trang Bay have recovered as the outcome of marine conservation management. More than 70% of them gave a good view that counting on marine conservation program the environment quality of marine water and surrounding their habitat has been improving remarkably. According

to them, though there are some uncomfortable in their lives resulting from MPA designation, the most agreement of them is that they have not seen the bad smell from polluted marine water and their villages have become much cleaner than before.

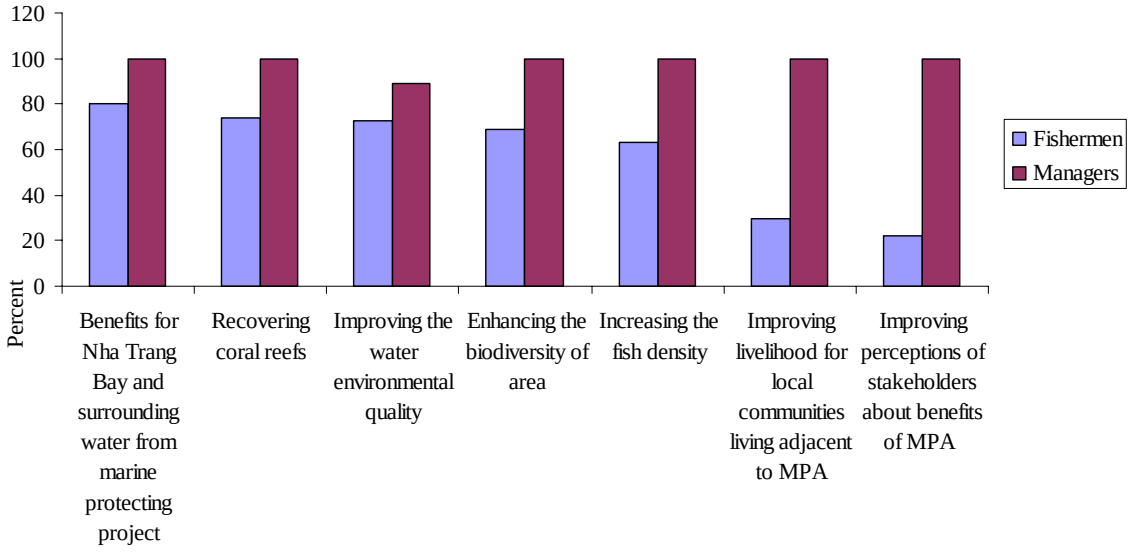

Figure 4.16. Views of managers and fishermen on benefits on the MPA project

Addition, through the conservation efforts of project, stocking water with young fish for instance, there is an enhancement of biodiversity and fish density. The good evidence is more than a haft of them accepted that. Contrary to that, very low percentage surveyed people agreed that the project had improved livelihood of local residents and raised perceptions of stakeholders. Meanwhile managers completely supported these statements with the percentage of agreement much higher than that of fishermen.

4.4 Fishermen views on life satisfaction: regression analysis

The backward selection supports the logistic procedure draw out the results proving that the model below is the best one (**table 4.3)**. By that, the regressed parameters are the same across logits, and the cumulative logistic model, therefore, values the effects of independent variables (per capita income, relative incomes from fishing, aquaculture and others to total income, number of men in family, age, education level, fishing experience) on the dependent variable, the cumulative probabilities of fishermen's satisfaction on life improvement resulted from MPA designation (χ^2 = 39.4134, p = 0.0581 in the

proportional odds test). Moreover, the Chi-square tests for Goodness-of-fit of the model indicate the significance of regression results (**Appendix 1.**)

Table 4.3 Estimates and marginal effects for life satisfaction of the fishermen

	Regression Estimates		Pr > Chi-Sq	Marginal effect
Parameter	Coefficient	Error		Weight average
Intercept 1	-8.7836***	3.3210	0.0082	
Intercept 2	-6.9545**	3.2637	0.0331	
Intercept 3	-5.7803*	3.2323	0.0737	
Intercept 4	-4.0677	3.2104	0.2051	
Fishinc	0.0009	0.0008	0.2864	
Capinc	0.0028***	0.0009	0.0045	0.0004
Age	0.1857**	0.0899	0.0388	0.0318
fish_exp	-0.0814	0.0755	0.2809	
Men	1.5757	1.5238	0.3011	
Fishinc.age	-0.00006***	0.00002	0.006	-0.00001
Age.men	-0.0876**	0.0443	0.0478	-0.01502
Fishinc.men	0.0003***	0.0001	0.0074	0.00005
fish_exp.men	0.0865**	0.0452	0.0557	0.01483

, ** and *: significant at 90%, 95% and 99% level.*

Model rescaled R-Square = 0.2740

The best fit model for fishermen' satisfaction with their life resulting from the MPA establishment is obtained as following:

Logit [P(*happy*≤ 2)] = - 6.9545 + 0.0028 *capinc* + 0.1857 *age* - 0.00006 *fishinc*age* - 0.0876 *age*men* + 0.0003 *fishinc*men* + 0.0865 *fish_exp*men* + ε

There is, significantly, a positive relationship between per capita income of the fishermen, *capinc*, and the probability of their life satisfaction gained from the MPA establishment. The more money fishermen earn the more they become happy in life at the level of 99%. The positive effect of per capita income on the cumulative probability of happiness implies that when per capita income of a household increases yearly by 100 USD, the probability of satisfaction with life quality improvement raises by 0.04 %. Frey

and Stutzer (2001) and Duc (2008) also mentioned that per capita income plays an indispensable role in happiness and income studies.

The aquaculture offers one of the essential solutions in reducing the pressure on coral reefs (see from Pomeroy *et al.*, 2006) and an alternative income source from MPA project (Thu *et al.*, 2005). Unfortunately, its effect was eliminated out of the regression model, from the backward procedure. Aquaculture, by consequence, does not influence on fishermen's life satisfaction. Because of polluted marine environment, most of local people did not gain from their lobster cages. A vast majority of cages in Nha Trang Bay suffers diseases in these recent years. This urgent problem requires immediate resolution by MPA management board (**fig. 4.11**). As aquaculture is the secondary job of an inconsiderable percentage of respondents and contributes to households' income only 1.92 % (**fig.4.1)**. The insignificance of fishing income variable in the regression model indicates no effect of it on the probability of happiness in fishermen's life. Therefore its marginal effect becomes zero.

At level of 95%, the variable *age* is highly significant in the regressed model. This result fits with findings of Coughenour and Swanson (1992). Moreover, Frey and Stutzer (2002) confirm the positive effect between age and life satisfaction. The regression result shows that the marginal effect of age on the probability of the fishermen's satisfaction in life improvement is 0.03. Older fishermen satisfy with their life concerning MPA creation more than younger ones.

Besides, the interactions between fishing income and age, between age and men, and between fishing income and men are counted in the regressed model, despite the insignificance of the fishing income, number of men and fishing experience in the regressed model. A significant relationship can be recognized between the interaction of relative income from fishing and the age, and the probability of satisfaction with life improvement. However, the negative coefficient of this interaction, *fishinc*age*, implies that the older fishermen with higher fishing income do not satisfy with the life quality improvement. They maybe experience in fishing grounds and recognize fishery resource reduction in recent years. The result shows that in spite of their countable fishing benefits, the older fishermen are still less satisfactory due to the fishery resource

exhaustion (**fig. 4.6 and fig. 4.7**). In other words, the more income earned from fishing activities, the happier the young fishermen become. This view point is appropriate to Easterly's (2001) that young people with higher income are happier because their material desires are quite similar amongst them.

In contrary to that, households with more men enhancing in fishing income feel more satisfied with life quality improvement. The positive interaction coefficient of *fishinc* and *men* in regression model indicates that more men in family participating to fishing and earning more money from that relative to total income will judge higher satisfied with their life quality improvement at level 1 %. However, this interaction influences the probability of fishermen life satisfaction at a quite small value, 0.00005.

Being familiar with free fishing in Nha Trang Bay generally, around Hon Mun island particularly, older fishermen with many men in working age do not please that they have a happier life. Confirmed by the regression result, the interaction between *age* and *men* variables significantly have a negative effect at level 95 percent on the probability of fishermen satisfaction with life improvement. Operating fishing activities surrounding Hon Mun island has become the habit of local inhabitants having a long history of living in adjacent islands, the ban disorders their life. More than a half of asked fishermen believed that conservation efforts have affected their livelihood (**table 4.2**). In the other aspect, that may be because of the old person psychology, they do not want any changes in life. Though having more men who can participate in fishing and contribute to total income in family, the old fishermen perception lowers the probability of life satisfaction.
The lastly, the coefficient of the variable that indicates the interaction between *fish_exp* and *men* is positive and significant at level 5 %. It denotes that amongst surveyed fishermen who have more experience in fishing years, household heads with more men in working age likely please with their life.

In sum, per capita income plays a significant role in fishermen satisfaction with life improvement. Though fishing income is not significant statistically, its interactions with age and number of men in family take valuable results in the regression model. Amongst fishermen who have higher income from fishing, the olders do not satisfy with the improvement of life quality since establishment of the MPA.

CHAPTER 5

5 Discussion

5.1.1 Attitudes and perceptions of fishermen towards to MPA management

The MPAs' establishment encompasses many various reasons containing economic, scientific, cultural and ethical factors in which protection of marine environment and maintain biodiversity have become the most crucial ones (Boersma and Parrish, 1999). Fishermen, nevertheless, had less perception about the reasons for the MPA establishment and the limitation of the closed area after seven years of its existence (**fig. 4.2, fig. 4.3 and fig. 4.13)**. This is in line with expression mentioned in McClanahan *et al.*, (2005 a) that the low percentage of people recognized the objectives of MPA designations.

Together with lightening illegal fishing by the economic element enhancement, the compliance level highly depend on the trust amongst individuals to comply the management rules (see Nielsen and Mathiesen, 2003). Unfortunately, indigenes living within the Nha Trang Bay MPA do not support the MPA establishment and reluctantly accept the closed area. Because they perceived less improvement in their life since the MPA has existed. Poaching still occurs within the MPA. The MPA management as well as regulation implement have not caught beliefs of local people. Though recognized that the project has benefited for Nha Trang Bay and surrounding waters, they are unpleased with MPA project because of receiving less compensation from MPA management board. They expect to touch new jobs, tourism activities, but they can not because of barriers such as age and education level. Additional, the alternative income program does not run efficiently and they also hope to receive more compensation from the MPA Authority. Conflicts are therefore existed amongst fishermen within the MPA area and outsiders in exploiting the marine resources. These conflicts happen occasionally.

On the other hand, fishermen shared negative attitudes about the Nha Trang Bay MPA Project because they perceived fewer benefits from the MPA designation. Infield and

Namara (2001), Sekhar (2003) and Hans (2003) confirm that attitudes are significantly related to perceived benefits of local people. Local people in Nha Trang Bay received less compensation and job opportunities as alternative income program did not create job for them effectively. Though both fishermen and managers agreed that the nation benefited most from MPA, they had contrary opinions. This is appropriate to studies of Mcclanahan *et al.* (2005 a, b). Fishermen thought that only the nation gained from the closed area under the tourism revenues. Meanwhile managers stated that both fishermen and their community benefited most from the area.

The major threats such as fisheries overexploitation, coastal development and pollution pressurize into the coastal environment (Boersma and Parrish, 1999). Fishermen shared their awareness to those threats. It states that some problems still remain in the Nha Trang Bay MPA. Those are water polluted by aquaculture activities, over-fishing, pollution by waste in land and tourism and by agriculture, as well as uncontrolled infrastructure development (**fig.4.11)**. It harms to coral reefs (Dung, 2007). In which polluted marine waters now become the big problem because of uncontrolled and unplanned aquaculture development. Still now the MPA authority collaborating to other relevant agencies attempt to solve this problem. Local people also took more awareness to this emerging problem, pollution by aquaculture, than they did in year 2005 in comparison with results of Thu *et al* (2005). It indicates that mariculture in Vietnam lacks of regulations in management (Pomeroy, 2006.)

Fishermen perceived that the fish catch has decreased causing by stock declined (**fig. 4.6, fig. 4.7**). This is confirmed in findings of previous study that the fish density and fish diversity in Nha Trang Bay MPA have declined (Dung, 2007). However, a perception towards to enhancing the biodiversity of area is positive and increased in this study (**fig.4.9)**. All local people highly recognized the positive impacts of the MPA comprising coral reefs recover, fish density increase and water environment improvement, corresponding with the survey results of Thu *et al.* (2005). In this recent time, people did not agree that livelihood for local communities and perceptions of stakeholders about benefits of MPA have improved. It implies that during the pilot project, they received supports and awareness from the MPA management board. By contrary, the project changes into the new staff, local people do receive less than as before. This is reliable that

with supported fund from other sources, the project ran in 4 years meanwhile now only People's Committee of Khanh Hoa Province is undertaking it.

The primary values brought from MPA establishment include economics (direct values) from tourism and enhanced fisheries through protection or management, and environmental services (indirect values) (Boersma and Parrish, 1999). Managers had positive perceptions towards to indirect and direct values of MPA creation than fishermen did (**fig. 4.14)**. Both two groups were aware of the direct use values rather than ecological values. Fishermen were, however, less aware to those values than managers did. McClanahan *et al.,* (2005) also conclude that both management personnel and fishers mostly focused on direct use values but were not aware of indirect values, even stated there were not value. Most surveyed groups perceived that the project has benefited for Nha Trang Bay and surrounding waters. But managers had more positive perceptions than fishermen did. In side of fishermen, they recognized more knowledge about environmental improvement of water quality, comparing with the result of Thu *et al* (2005). It suggests that perceptions of local people have improved with the positive impacts of the project at this point.

The involvement and the support of relevant stakeholders contribute to achievement of management objectives (see McClanahan *et al.*, 2005b e.g. Hough, 1988). Managers expressed more positive views on main reasons to create MPA than fishermen. Fishermen believed the MPA project did not improve their livelihood for local communities and enhanced perceptions of relevant stakeholders. Meanwhile managers supported the benefits brought from the MPA project (**fig.4.16)**. Fishermen shared the positive attitudes that they had participated in discussion and negotiation with MPA Authority. In hope of achievable objectives, the involvement of local people, the primary stakeholder, in marine resource using and management offers the meet of the successful management (see McClanahan *et al.,* 2005b.)

Examining community attitudes and behaviors towards protected areas, a crucial method, offers to assess biodiversity conservation program (Infield and Namara, 2001). As communities have become an indispensable element in fisheries management (Jentoft, 2000), not only managers and users, and their positive attitudes regarding to supports the

MPA establishment relate to perceived benefits (Infield and Namara, 2001). The further study should investigate the attitudes and behaviors of communities towards Nha Trang Bay MPA management.

5.1.2 Limitation of the descriptive analysis and regression model

Though the chosen sample size of managers is significant, the comparison between two sample sizes of managers and fishermen are quite different statistically. The MPA management staff is fairly thin and most patrol staff undertakes their duties 3 days per time surrounding Hon Mun Island. It's tough to visit them all as time and finance are constrained.

The involvement and support from the primary stakeholder offer the successful management objectives and the compliance with conservation regulations (see McClanahan *et al.*, 2005b, e.g Hough, 1988). Local people are, therefore, the most important subject in investigating their attitudes and perceptions towards the MPA management.

Though per capita income and age play essential roles in exploring their effects on the fishermen's satisfaction with life improvement, other variables also impact life satisfaction such as family status and other social relationships, job satisfaction, leisure satisfaction (Argyle and Martin, 1991). Thus those factors need to add to the model for further research favorably. A larger sample should be conducted in order to get significant effects of relative income from fishing job to total income, education level and fishing experience on the cumulative probability of fishermen's happiness. The potential studies focus on job satisfaction, fishing or culture job, subjective to well-being of fishermen or fishermen's judgment the MPA management effectiveness in this area

CHAPTER 6

6 Conclusion

All respondents are male with highly fishing experience. Besides aquaculture, fishing job contributes to their main income. Managers are, however, the young recruits with a low level of education and less working experience.

Fishermen shared that they are involved in decisions about marine resource use or management and the meetings of fishing groups or conservation groups. A majority of them could describe their knowledge about reasons of the MPA establishment as well as limitation of the closed area, the MPA project impacts, direct use and ecological use values of the MPA and the threats of using marine resources. However, they are still reluctant to accept the closed area and unsatisfied with their current catches and fishing zones as well as with life quality improvement. They still expressed negative attitudes towards MPA management and managers. Thus, the MPA authority receives less support from local people.

It did not show that local people were more positive perceptions towards to the MPA management. They complained the management effectiveness. The MPA Project has not brought back benefits to their livelihoods and their communities and the implementation of conservation regulations does not work well.

Two groups perceived direct use values of the MPA designation, tourism and fisheries, but had less positive perceptions towards indirect use values achieving from the MPA. Therefore surveyed groups shared the views that they were aware of direct use values rather than indirect used values.

The cumulative logistic model is useful in exploring the pleasure of local people. Capita per income and age have positive effects on fishermen satisfaction with life improvement resulting from the MPA establishment. Old fishermen having high income from fishing job feel unsatisfied with life since the MPA was created.

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APPENDIX 1

TABLE 3. Results of Statistical Tests for Model Appropriateness and Goodness-of-fit

Test	Chi-Square	Pr> Chi-Sq
Proportional Odds Assumption	39.4134	0.0581
Likelihood Ratio	24.5302	0.0035
Score	18.3383	0.0314
Wald	20.5776	0.0147

APPENDIX 2

Questionnaire for Attitudes and perceptions of local fishermen and managers

(Using for both fisherman and manager staff)

Section 1:

1. How long have you been a fisherman/a park service staff?_____

   Year_____

Do you agree with the following statements?

2. Have you ever heart about Hon Mun MPA project? (1- yes, 2- no)
3. Have you received any information about Hon Mun project? (1- yes, 2- no)
4. In your opinion, the basic reason to establish MPA is?
   - MPA is as the closed area where fishing is restricted
   - MPA reserves the habitat for marine species, maintaining biodiversity
   - MPA increases fishery through spillover effects and larval production
   - All above reasons
   - Other reasons……..

Do you agree with these below sentences?

5. Do you think there has been an improvement in your life quality since Nha Trang Bay MPA was set up? (mark ✓ in your choice)

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

6. Do you satisfy with the allowed fish zones?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

7. Do you satisfy with your current fish catch output?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

8. Is that a good way to maintain the fish catch?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

9. Has the current fishing catch increased in comparing with that before founding MPA?

Increase	Decrease	Constant	No idea

Reason of the changing is….

In your opinion, the fishing catch consumption next 5 year will be?

Increase	Decrease	Constant	No idea

Reason of the changing is….

10. In your opinion, who will most benefit from the establishment of restricted area?

(mark from 1 to 10, lowest is 1, highest is 10)

	1	2	3	4	5	6	7	8	9	10
1. government										
2. community										
3. l fishermen										

11. How big should the closed area be? (meters, hectares, kilometer?)

12. Do you think other fishers would follow a full closure?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

13. What kind of fishermen can catch in closed area?

    Why?

14. Since the establishment of MPA, have you received any compensations forms from not catching in closed area?

    If yes, how much is it per year and which form?

15. Since the establishment of MPA, have you received more job opportunities?

    ☐ Yes ☐ No ☐ No opinion

16. If you have any chances, will you keep your current job?

    ☐ Yes ☐ No ☐ No opinion

    If no, which job do you want to do?.....

    Why?.....

17. Since the establishment of MPA, have you received any difficulties in finding job?

    List: …….

26. The direct values brought by MPA are:

Increased the fish stock for fisheries from the closed area	Agree	Disagree	No opinion
Increased tourism values from beautiful coral reefs			
other values			

27. Indirect ecological services brought by MPA are:

	Agree	Disagree	No opinion
Nutrient storage and cycling;			
Atmospheric gas and climate regulation;			
Waste treatment and assimilation;			
Biological control;			
Habitat;			
Biodiversity maintenance;			
protection of habitat			

28. In your opinion, which values are you aware of?

29. a. Are there any conflicts in using marine resources?

b. What types of conflict?

What kind of fishermen (hired labor, catching, cultivate) usually has involved in conflicts?

Reason why?.....

30. Have conservation efforts affected your livelihood? (1-yes, 2-no)

How?

31. Do you know any member of MPA Authority? (1-yes, 2-no)

If yes, what kind of that relationship?

32. Have you participated in any community organizations? (1-yes, 2-no)

What kind of organization?

33. Has your family joined in any below MPA activities? (mark ✓ in your choice)

1. Aquiculture cultivation (mytilus smaragdinus..)	
2. Breeding (goat, rabbit, chicken..)	
3. Handicraft and art fine (snail shade, sport net..)	
4. Tourist (glass bottomed basket)	
5. Others	

Explain why you chose or not?

34. Has your family joined in any activities of this project? (mark ✓ in your choice)

a. create income activity	
b. training course	
c. sightseeing (inbound/outbound)	
d. organize/invite from project organization	
e. activities of cluster	
f. garbage collection activities	
g. attending sexual activities	
h. other activities	

If not, why?

In your opinion, are there any benefits for NT Bay and neighboring nations of this project?
(mark ✓ in your choice)

a. Improve coral	
b. Rising fish density	
c. Enrich diversified biology area	
d. Improve quality of water	
e. Improve residence living condition	
f. Enhance knowledge for concerned people about MPA benefits	
g. other	

If not, tell the reason why?

35. Are there any threatens/ problems or conflicts in using marine resources that need to be solved?
(mark ✓ in your choice)

Coral exhaustion	
Over exploiting	
Destroyable exploiting	
Pollution by garbage	
Pollution by aquiculture cultivation	
Pollution by agriculture	
Tourist activity development	
Uncontrollable infrastructure	
Other problem	

36. In your opinion that did residence have a chance to join in plan forming and carry out MPA management?
37. If no, do you have any opinions about enhance participating public in plan forming and carry out MPA management?

38. What kind of MPA activities should be carried out in order to improve NT bay and life of residence community? (mark ✓ in your choice)

1. infrastructure	
2. education activities / enhance knowledge	
3. other income activities	
4. patrol activity	
5. credit	
6. cultural information	
7.other	

39. Are you involved in conservation groups or discussing groups?

40. In your opinion are people in general trustworthy? (1-yes, 2-no, other opinion)

41. In your opinion, do people believe in MPA management or current regulations of management?

(1-yes, 2-no, other opinion)

42. If you had a problem and needed help, are there people in this community besides your family members that would help you?

(1-yes, 2-no, who?

43. Consider the effectiveness of MPA management, how do you rank?

Very bad	Bad	Normal	Good	Very good

II> FAMILY INFORMATION

A. GENERAL INFORMATION

44. Have you lived here or just moved to here?

45. If you live here, how long have you lived here?

46. If you have just moved to here, tell the reason why you move to here?

Catching	Aquiculture cultivation	Living with family and friends	For health
Other reason:			

47. How many people have income in your family?

48. Sure name of householder:……..

49. Basic information of each member in your family

Member	Householder	2	3	4	5	7	8	9
Name								
Year of birth or age								
Sexual								
Relationship with householder								
Knowledge								
career								
Main job								
Auxiliary job								

B. ECONOMIC ACIVITIES

Catching or marine jobs

Junk, machine	Length (m) Power (cv)	Year of buying	Value when buying	Current value	note
Junk 1					
Machine 1					
Equipment (net, fishing rod..)					
Other equipments 1					
Junk 2					
Machine 2					
Other equipments 2					

50. Which was activity joined by members in your family?

Catching activity (occupation)	Time (which month)	Work for your family	Work for other people

56. Family Aquiculture cultivation activities in 2008

Object keeping	**Cost**	**Amount of sales**	**Interest / loss**	**reason**

56. Other activities besides aquiculture and seafood business of your family in 2008?

occupation	Whom member?	What to do	How many days/year	Profit (VND million)	Loss (VND million)
Till the fields					
Breeding					
Trading					
Wage earner					
other					

57. Is your family income enough to adapt basic cost of living?

a. enough b. not enough c. usually loan

58. Income general status.

Family income estimation in 2008	Real revenue
1.family jobs (seafarer)	
2. work for other people	
3. Wage earner	
4. Trading	
5. Aquiculture cultivation	
6. breeding	
7. handicraft and fine arts	
8. government earn wage	
9. government support money	
10. money from relatives	
11. interest rate saving/ loan with interest rate	
12. hiring or transfer land	
13. cultivation	
14. other income	

59. Family expense information

Expenses	**Spend**	**Sum of spending**	**Note**
1. food (rice, foodstuff..)			
2. moving (ship, car..)			
3. studying expense			
4. fuel (gas, coal, wood..)			
5. activities water			
6. electric cost, telephone cost			
7. clothes			
8. big repairs (fence, toilet..)			
9. interior shopping			
10. exam and treat medically			
11. feast (wedding, death anniversary..)			
12. wine, beer, tobacco..			
13. house renting expense			
14. entertainment			
15. others			
Total:			

Thanks for your time and sharing information. Best wishes to you!