

Evaluation of Fisheries Management Options For Visayan Sea, Philippines: The Case of Northern Iloilo¹

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Abstract

The paper examines the sustainability of fisheries and fishers' incomes in the Visayan Sea and identifies potentially viable options that could help achieve the dual goals of protecting the fish and helping fishers earn a living. The focus is northern Iloilo fisheries, which cover almost half of the Visayan Sea. Ten management options identified from various sources were presented to the different stakeholders: fishers, fishery scientists, and fishery managers. These consist of status quo, input controls (ban of commercial fishing, ban of commercial fishing with safety nets, marine protected area, closed season, reduction in the number of commercial and municipal fishers, localization, and rotational fishing regime), output control (quota), and the creation of a special management unit. These management options were evaluated at two stages where Stage 1 ruled out options with no or low impact on increasing fish stocks. Options that passed Stage 1 advanced to Stage 2 where each was evaluated using a set of criteria (impact on fishers, impact on resources, feasibility, cost to the government, and impact to the community). Feedback from the stakeholders was obtained through focus group discussions and in-depth personal interviews. The potentially viable options (fishing bans with and without safety nets, marine protected area, reduction in the number of municipal and commercial fishers, localization, and creation of a special management unit) were discussed. The use of a combination of options, rather than a single one, and the creation of a single management body, to be pilot tested in northern Iloilo, to implement any program of management in all portions of the Visayan Sea fishing ground and for all its fishers are recommended.

Key words: Evaluation of Fisheries Management Options, Fisheries Management Options, Visayan Sea, Northern Iloilo, Sustainable Fisheries

INTRODUCTION

The Visayan Sea in central Philippines covers an area of about 10,000 km² (Figure 1). It is located between 11° and 12° North latitude and 123° and 124° East longitude. It is bounded by 22 municipalities of the four provinces of Iloilo, Negros

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Occidental (Region 6), Cebu (Region 7), and Masbate (Region 5)³. It is relatively shallow, with water depths of 40 m or less predominating (Armada 2004). It is divided into municipal (8460.30 km²) and commercial waters (1539.70 km²) (NAMRIA 2001).⁴

The Visayan Sea has always been among the top three fishing grounds in the country (NSO 2001a; Hermes et al. 2004). While about two-thirds of the total fisheries production in the area comes from commercial fishing, the Visayan Sea is identified as the most productive municipal fishing ground in the country (NSO 2001a).

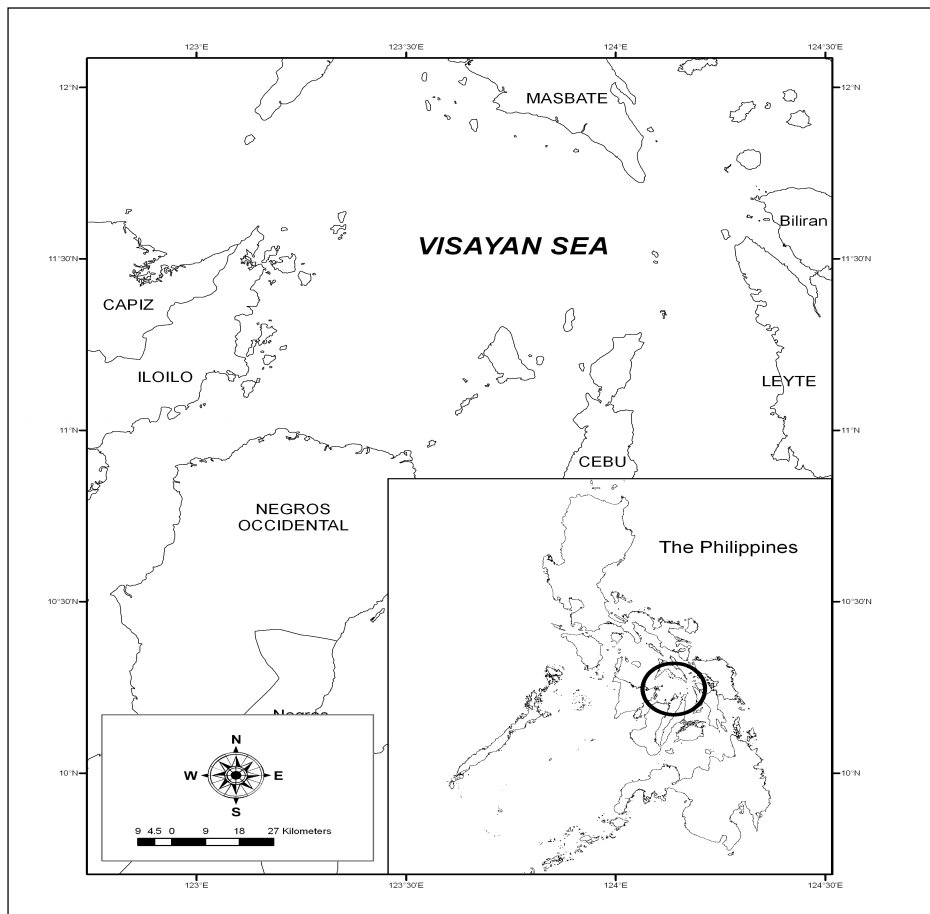


Figure 1. Vicinity map of the Visayan Sea, Philippines

In the early 1990s, signs of resource depletion in the Visayan Sea have emerged. The commercial fisheries production went down from approximately 165 million kg in 1992 to 120 million kg in 1995 (NSO 2001a). A trawl survey conducted in July 2003 showed that the standing stock biomass of trawlable fisheries resources was 2.23 mt/km² only (Armada and Campos 2004). In 1948, it was 6.03 mt/km². The

³Local government units in the Philippines are provinces (the largest unit), which are made up of several municipalities, which are in turn, made up of several barangays (the smallest unit).

⁴Based on the 1991 Local Government Code (RA 7160) and the 1998 Fisheries Code (RA 8550), local government units have jurisdiction over municipal waters; the national government through the Bureau of Fisheries and Aquatic Resources is in charge of resources outside the municipal waters.

equivalent estimate from the July 2003 survey is 2.58 mt/km² and in March 2007, 2.06 mt/km² (Armada and Campos 2004).⁵ This indicates a big reduction (57%) in the trawlable biomass over a period of 55 years and 20 percent over a period of three years. Meanwhile, low trophic level of demersal catch and increasing abundance of small pelagic species had been observed in the 2003 and 2007 trawl surveys. There had been a large percentage of squid, cuttlefish, jellyfish, and crabs in the total catch and a reduction in abundance of carnivores.

Supporting the biological data is the perception of fishers surrounding the Visayan Sea of declining catch, rising proportion of low-value species in the catch, and the increasing number of fishers and fishing pressure (Siason et al. 2005). After a review of reports and studies on the Visayan Sea, Vakily (2005) concluded that the Visayan Sea is “definitely not underexploited, most probably fully exploited, and very likely overexploited”. Hermes et al. (2004) directly links the decreasing trend in the volume of catch from the Visayan Sea during years 1992 to 1995 to overfishing, destruction of habitat, overcapitalization, and non-limitation of fishing effort within the fishing ground.

Both municipal and commercial fishers coming from the area and adjacent regions exploit the Visayan Sea.⁶ With the passage of the 1998 Fisheries Code by the Philippine government, the use of municipal waters was reserved for municipal fishers. The commercial fishers who were used to unrestricted use of the 7 km and up area, was pushed to waters beyond 15 km from the municipality’s general coastline.⁷

While there are regulations that separate the two fisheries, there is still an overlap between the two fishing grounds. The commercial fishers, who perceive that the zoning regulation is unfair and that most fish stocks are found inshore, continue to operate in the municipal waters (Ferrer 2005; Siason et al. 2005). A conflicting provision in the 1998 Fisheries Code allows LGUs to issue permits to commercial fishing vessels to operate starting at 10.1 km from the coastline.

The competition over space and resources between the municipal and commercial fishers has resulted in conflicts between and within sectors (Siason et al. 2005). The municipal fishers blame the highly efficient commercial fishing gears for their low catch and declining fish stocks. The commercial fishers, on the other hand, abuse the privilege of continued access by operating in municipal waters, (i.e., less than the minimum allowable area of 10.1 km from the coastline).

The poor enforcement of the zoning regulation exacerbates the situation. The local enforcement groups (*bantay dagat* or sea patrol) are beset by logistical and

⁵N. Armada and W. Campos are marine scientists who have been conducting trawl surveys in the Visayan Sea in recent years. The information for March 2007 trawl survey provided here is from their unpublished trawl survey report..

⁶The 1998 Fisheries Code defines municipal fishing as fishing within municipal waters using fishing vessels of ≤ 3gt , or fishing not requiring the use of fishing vessels, while commercial fishing is taking fishery by passive or active gear for trade, business or profit beyond subsistence, or sports fishing, using fishing vessels of >3gt. The policy on fishers’ classification into municipal and commercial has been in effect since the 1960s.

⁷Municipal waters were defined as the 15-kilometer area of marine water stretching out from the general coastline.

operational problems, thus hindering their ability to effectively carry out their enforcement functions (Ferrer and Defiesta 2005). The maximum penalty of PhP 2,500 (USD 52.63) for a violation as stipulated in the 1991 Local Government Code is too low to deter violation or encourage compliance to regulations. Therefore, the fishery is basically open access, with regulations that do not help sustain the fish stocks.

Meanwhile, the declining fish stocks resulting from excessive fishery activities translate to low fishing income. The municipal fishers basically fish for sustenance; any income earned from the surplus is barely enough for family survival. Their huge number continues to increase yearly, with more young people entering fishing (Ferrer et al. 2005).⁸ The commercial fishers, on the other hand, has been described in recent years as a “dying industry” in the face of the declining number of commercial fishing vessels due to losses from operation.⁹

For the small-scale commercial fishers (i.e., using active gears and vessels of 3-20 gross tons), who are the dominant players in commercial fishing, the chances of offshore fishing are poor. Their boats are too small, too poorly constructed (made of wood), and lack the necessary equipment (such as geographic positioning device) to fish farther offshore.¹⁰ The boats are designed for shallow fishing only. In Philippine waters, waters beyond 15 km are already deep and the fish are not as aggregated as near shore.¹¹ Similar to the municipal fishers, the crew members of commercial fishers have low educational attainment and lack employable skills, preventing them from moving into other employment. Given the level of economic development in the area, other employment opportunities are scarce. Farming is marginal in island barangays.

In view of the above, there is a need for a more robust regulatory environment that protects both the fish and the fishers, especially since there are only a few livelihood alternatives to fishing. Management measures have to be improved or implemented soon given the threat to the resources, fishers, and the larger community. In the next five years, if no intervention will be introduced to sustainably manage the Visayan Sea, most of the catch will be composed of organisms belonging to the low trophic level of the food chain.¹²

The policy problem is to examine the nature of the fishery and to identify policies that would help the dual goals of protecting the fish and helping fishers earn a living. This paper presents the results of an evaluation of the fisheries management options for the Visayan Sea, with focus on northern Iloilo. The goal is to identify potentially viable options and to recommend a future course of action.

⁸ No updated and accurate number of municipal and commercial fishers in the area is available.

⁹ Interview with key informants from the LGU and national agencies.

¹⁰ From the focus group discussions with the study participants.

¹¹ Personal communication with W. Campos (2007), a marine scientist who has done research on the Visayan Sea

¹² Personal communication with N. Armada, a marine scientist who has done research in Visayan Sea

FOCUSING ON THE NORTHERN ILOILO AREA

Northern Iloilo has a number of unique characteristics that pose as a challenge to fishery management. Seven of the 22 coastal municipalities facing the Visayan Sea are in the area (Ajuy, Balasan, Batad, Carles, Concepcion, Estancia, and Carles) (Figure 2).¹³ Almost half of the entire Visayan Sea comprises the municipal waters of these seven municipalities (Table 1). The municipality of Carles covers a little more than one-third of the entire Visayan Sea (3,577 km²). The vastness of the area makes it the most popular fishing ground for commercial fishers not only from local and neighboring municipalities but also for others in Iloilo Province and the neighboring provinces.

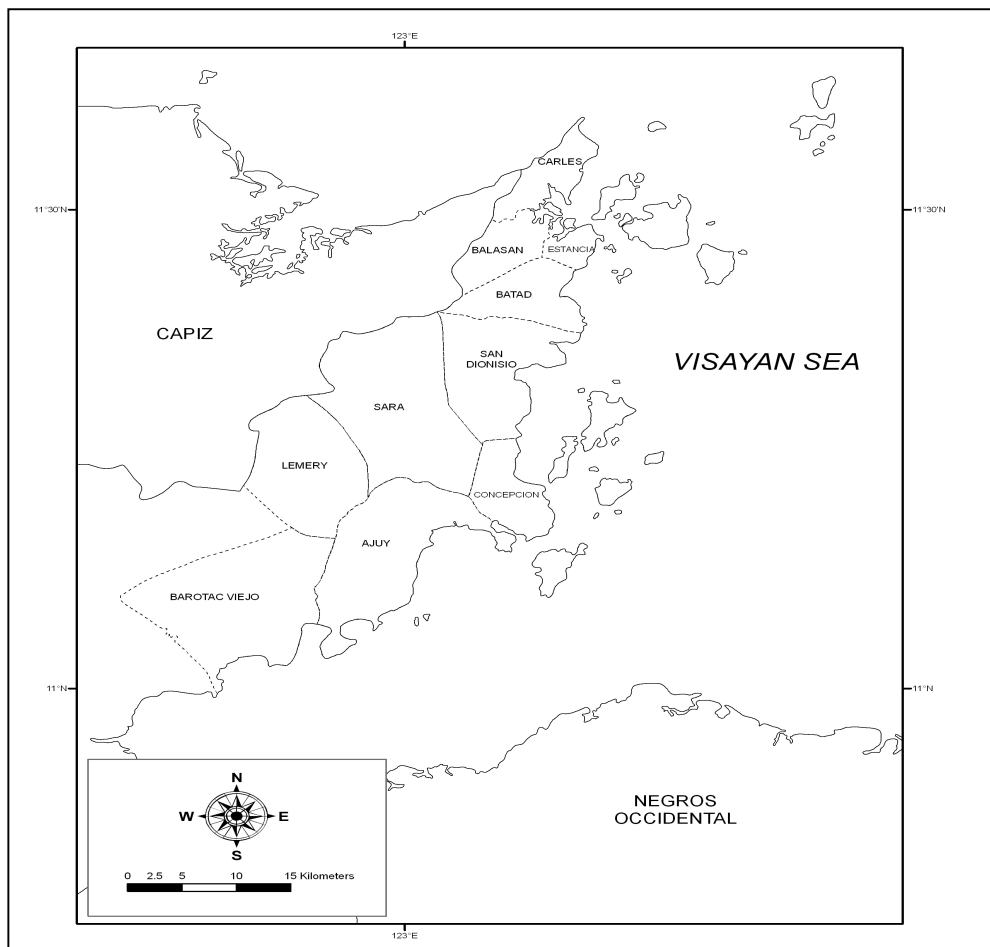


Figure 2. Northern Iloilo municipalities, Philippines.

¹³ The 15 other municipalities and cities are in the provinces of Negros Occidental (Cadiz City, Sagay City, Manapla, and Escalante City, also in Region 6), Masbate (Balud, Cawayan, Experanza, Placer, and Milagros, in Region 5), and Cebu (Bantayan, Daan Bantayan, Madrideojos, Medellin, Sta. Fe, and San Remegio, in Region 7).

Table 1. Area of municipal waters and number of islands in the Visayan Sea.

<i>Province</i>	<i>Number of coastal municipalities facing the Visayan Sea</i>	<i>Surface area of municipal waters (km²)</i>	<i>No. of islands within 0-10 km from the shoreline</i>	<i>No. of islands within 10-15 km from the shoreline</i>	<i>No. of islands farther than 15 km from the shoreline</i>
Iloilo	7	4258 ^a	41	8	12
Negros Occidental	4	900	5	2	1
Masbate	5	598 ^b	2	2	1
Cebu	6	1992 ^c	19	4	1
TOTAL	22	7748 ^d	67	16	15

Source of raw data: Visayan Sea Project Aquatic and Fisheries Resources Database, 2005

^a for Ajuy, Balasan, Carles, Concepcion, and Estancia. No data for Batad and San Dionisio.

^b for Cawayan, Balud, Esperanza, and Placer. No data for Milagros.

^c for Bantayan, Daanbantayan, Madridejos, Santa Fe, and San Remigio. No data for Medellin.

^d total for those with data only

The presence of 12 offshore islands farther than 15 km from the shoreline in the municipalities of Carles and Concepcion poses a big challenge for fisheries management. Two interpretations exist regarding the point of reckoning of municipal waters: the general coastline and the farthest island.

The area contains a large number of small-scale commercial fishing boats using different gears. Table 2 shows that a little more than half of the owners of commercial fishing boats covered in the latest commercial fishing vessel inventory conducted in January to July 2004 by the Bureau of Fisheries and Aquatic Resources (Central Office) were based in four coastal municipalities of northern Iloilo (Carles, Concepcion, Estancia, and San Dionisio).

Table 2. Owners and commercial fishing vessels in provinces facing the Visayan Sea

	<i>Iloilo^a</i>	<i>Cebu^b</i>	<i>Negros Occidental^c</i>	<i>Masbate^d</i>	<i>All</i>
Number of owners	77	38	24	8	147
Number of vessels	130	149	91	11	381
Gross tonnage (mean)	14.07	21.99	58.90	8.13	26.86
Classification of fishing vessel (number)					
Small (3.1 to 20 GT)	94	98	5	7	204
Medium (20.1 to 150 GT)	19	44	57	-	120
Large (> 150 GT)	-	1	1	-	2
Net Tonnage (mean)	9.28	13.91	31.53		15.87
Gear (number)					
Danish seine	44	137	2	9	183
Trawl	43	-	47	-	90
Ring net	37	12	-	-	49
Purse seine	1	-	14	-	15
Bagnet	-	-	-	2	2

^a Carles, Concepcion, Estancia, and San Dionisio; ^b Bantayan, Daanbantayan, Madridejos, and San Remigio

^c Cadiz City and Escalante City; ^d Balud, Cawayan, and Milagros

Source of raw data: Inventory of Philippine Commercial Fishing Vessels conducted from 21 January 2004 to 21 July 2004 by the Bureau of Fisheries and Aquatic Resources (Central Office).

Northern Iloilo commercial fishers are typical fishers in the Visayan Sea. Siason et al. (2005) found that the socio-demographic and economic characteristics of the fishers in Concepcion in Iloilo Province are not so different from those in other major fishing areas such as Escalante in Negros Occidental Province, and Daanbantayan in Cebu Province.

The population growth rate of 2.8 (for years 1995-2000) for the seven northern Iloilo municipalities is higher than the national growth rate of 2.32 for the same period, making them the fastest growing municipalities in the Visayan Sea area (Table 3). The municipality of Ajuy registered the highest population growth rate at 3.54. Moreover, northern Iloilo registered the second highest projected population density for 2008 at 456 persons/km², much higher than the projected national average of 301 persons/km² in the same year.

Table 3. Population growth, projected population and population density for 2008 in 22 municipalities in four provinces facing the Visayan Sea.

Province	Number of municipalities facing the Visayan Sea N=22	Population growth rate (1995-2000)	Projected total population for 2008 ^a	Estimated total land area (km ²) ^b	Projected population density for 2008 (persons/km ²)
Iloilo	7	2.87 ^c	276,559	606.4	456.07
Negros Occidental	4	1.26 ^c	442,805	1,102.7	401.56
Masbate	5	1.68 ^d	194,628	1,317	147.78
Cebu	6	1.69 ^e	310,857	383.6	810.37

Source of basic data: ^a NSO 1996; ^b NSO 2001b; ^c NSO 2001c; ^d NSO 2001d; ^e NSO 2001e

The seven municipalities are members of the Northern Iloilo Alliance for Coastal Development (NIACDEV) formed in 1998. The alliance aims to make northern Iloilo as Western Visayas' capital for fish and other marine products by addressing coastal resource management problems. Collaboration among member-LGUs has been achieved at the policy level but very minimally at the operational level of project implementation (Ferrer 2005). Member-LGUs agreed to open their respective municipal waters to municipal fishers coming from member-LGUs if they use legal gears and have secured the necessary permits. This policy is unique to northern Iloilo municipalities.

The commercial fishers of Northern Iloilo

The information presented here is based mostly on the 27 focus group discussions conducted and participated in by 166 participants: 36 owners, 22 boat captains, 16 chief machinists, and 92 other crewmembers of commercial fishing vessels based in Concepcion, Estancia, and Carles.

In every 10 fishers who participated in the FGDs, nine were natives of the municipalities in northern Iloilo (Table 4). Most of the non-natives were fishing crew

members from the provinces of Capiz, Negros Occidental, and Cebu. The owners were in their late 40s and older by six years than the boat captains, 10 years than the chief machinists, and 16 years than the other crew members. It was observed, however, that young people were on board the fishing vessels as ordinary crew members. Although child labor is illegal, this is tolerated by the boat owners because they cannot refuse the young people who insist to offer their services in exchange for food and a small amount of money -- a life survival strategy. This usually happens during lean months in the area.

Table 4. General profile of commercial fishers who were study participants.

Characteristic	Owner n=36	Captain n=22	Chief n=16	Crew n=92	All N=166
Native resident (%)	97.14	100.00	100.00	86.95	91.57
Age (mean)	47.22	41.15	38.93	31.33	36.74
Years in school (mean)	10.00	5.00	6.74	6.79	7.24
Married (%)	94.28	95.45	75.00	59.78	72.89
Household size (mean)	6.33	5.86	6.12	5.57	5.83
Number of children (mean) ^a	3.88	4.28	4.08	3.41	3.75
Number of years in fishing	24.62	26.91	23.25	13.46	18.60

^a Only for those with children

In general, the level of education across types of fishers is low. The owners are relatively better educated having completed high school than the crew who reached or graduated elementary. Seven in every 10 participants were married. A higher percentage of the ordinary crew members were single.

The household size of all types of participants was higher than the national average of 5.5 persons. The households of owners and chief machinists were bigger by one person than those of boat captains and fishing crew members.

The fishers, except for the other crewmembers, have spent at least half of their lives in fishing. The boat captains have the longest fishing experience (27 years), followed by owners (25 years), and machinists (23 years). Most owners inherited the business from their parents or have put up their own business after having enough funds, either from savings or from loan, to buy a commercial fishing vessel.

Most crewmembers started at a young age (9-10 years old) as an apprentice to their parents who were also fishers. Most were engaged in fishing on a part-time basis as they were still in elementary school. By teenage (14-17 years old), they become full time fishers helping their parents or as crew of commercial fishing vessels. As crew of fishing vessels, they start at the lowest position (as “*bodegero*” or utility worker). For the young crew members in commercial fishing, they normally do not stay in one vessel; they move from one commercial fishing vessel to another. The boat captain and the machinist learned their skills through experience and not by any formal training. Having spent most of their lives at sea and in fishing, their labor and skills are locked in this occupation.

METHODOLOGY

Data collection methods

Multiple field data collection methods were used from September 2007 to April 2008 to generate information used in the analysis. These include the focus group discussions (FGDs), key informant interviews, secondary data collection, and observation.

Although the FGD is neither objective nor representative, it was the main method used to collect data from the fishers. It permitted the researcher to elicit a multitude of honest views that cannot be obtained as easily through individual interviews, and the participative nature of the discussion permitted the researcher to explore and contrast the views of different participants. A total of 27 FGDs with 166 participants were carried out in three municipalities. Separate FGDs were held with the owners (36 participants), boat captains and machinists (38 participants), and crew members (92 participants).

Gatekeepers helped in organizing the FGDs. It was the first time for commercial fishers in the area to participate in a research project of this nature. Proper timing in the schedule and holding the FGD as close to the residence of the participants were observed. To promote constructive group dynamics and active participation, the participants invited were from different commercial fishing vessels and were not informed in advance of the groupings and members of the discussion group. Within-group status homogeneity was achieved by separating the owners, boat captains and machinists and the crew, thereby creating conditions for open discussion. Each session was conducted in the local dialect, lasted approximately two to three hours, audio recorded, and fully transcribed.

The information mainly included a description of fishing operation, perception of the state of fishery resources, and the perception of the likely impacts of the different management options on fishing activities, fishery resources, and the larger community. The FGD participants were asked to rank the management options qualitatively reflecting their acceptance or preference.

Twenty six key informants were interviewed on various topics.¹⁴ The purpose was to generate information on fishery management, alternative fishing grounds for Visayan Sea commercial fishers, enforcement and monitoring capabilities, readiness of commercial fishers in the Visayan Sea for offshore fishing, the possible alternative jobs and livelihood for the fishers, insights on the different fisheries management options, among others. Similarly, all interviews were transcribed as is, providing a full record of each of the interviews. The fishery managers ranked the management

¹⁴ They included 15 fishery managers (4 local chief executives, 2 municipal agricultural officers, 3 Agriculture Technician in fisheries, 1 coastal resource management officer, 2 municipal legislative council members, 2 municipal administrators, 1 municipal planning and development officer), six marine scientists, heads of three law enforcement teams (regional superintendent of the Philippine National Police Maritime Group, regional chief of the Philippine Coast Guard, and team leader of the provincial sea watch group), Bureau of Fisheries and Aquatic Resources personnel (Head of Fishery Resource Management Project, Region 6; provincial field personnel). The interviews were conducted person-to-person and through questionnaires sent through electronic mails.

options in terms of enforceability/feasibility, susceptibility to corruption, and prevalence of illegal fishing, and overall preference using the same process as in the FGD.

To complement data from methods mentioned above, an assessment of relevant secondary data was conducted. Secondary data were collected from official and unofficial documents, statistical reports, reports of previous assessments and surveys, research reports, documentation of previous or on-going projects, experiences in other areas on fish ban, among others. The sources of information included local government units, Bureau of Agricultural Statistics, National Statistics Office, Maritime Industry Authority (MARINA), Philippine Coast Guard, Bureau of Fisheries and Aquatic Resources (main office), university libraries and other sources.

The observations were limited to the characteristics of the households and barangays where the crew members of commercial fishing vessels were residing, the characteristics of the commercial fishing vessels, and the fish landings at Estancia, Carles and Concepcion fishing ports. The information derived from this method were used to validate information gathered from other methods.

The management options

The options range from the continuation of the present management regime to complete ban of commercial fishing. These management options were identified from various sources (newspapers, previous studies, and during preliminary consultation with commercial fishers, fishery managers and marine biologists in September to October 2007). The list of management options was presented to the fishers during the focus group discussions and to the key informants during interviews, adjusting the language and format to be appropriate for each, in December to April 2008.

The ten options are: status quo ('business as usual'), a 5-year ban on commercial fishing, a 5-year ban on commercial fishing years with safety nets for the affected fishers, establishment of marine protected areas, creation of a special management unit (with the authority to manage, regulate, and enforce laws), quota/ITQ (limitation to total harvest allowed during a fishing season in a fishing ground, where commercial fishers will be assigned quotas of fish or limits on their catch and, to allow more flexibility, the quotas can be traded among the fishers), closed season (a geographic closure requiring four months of no commercial fishing and the next eight months of open commercial fishing in municipal waters), localization (the preferential access given to local fishers of a certain municipality over the defined waters of the municipality), reduction in the number of municipal and commercial fishers, and rotational fishing regime (requires dividing the municipal waters 7 km from the shoreline into several sectors; each year, a decided upon number of sectors is opened to commercial fishing after a stock assessment finds the area sustainable for fishing).

Evaluation procedure and the criteria

The evaluation focused on the likely effects on the “bioeconomics” (fish stocks and the fishers) under possible fishery management options. The evaluation procedure involved two stages. In Stage 1, the goal was to rule out options with no or low impact on significantly increasing the fish stocks. Options that passed Stage 1 advanced to Stage 2 where evaluation was done in terms of likely impact on fishers, enforceability, likely cost of implementation, and likely impact on the community. A qualitative analysis was done.

Table 5 presents the criteria and the specific indicators under each criterion that were used in evaluating the options. Each criterion was evaluated using a simple three-point scale (high, moderate, low), where the definition differed for each criterion. In Stage 1, the expected number of years an option can demonstrate recovery of resources (increase fish stocks) became the basis of evaluation. In Stage 2, to highlight similarities and differences of the options in terms of their likely impact on fishers, cost of implementation, and likely impact on the community, one point was assigned whenever an option is not likely to meet an indicator. In terms of enforceability, one point was assigned whenever an option is likely to meet an indicator (even in the most lenient sense). The information was based on data collected from fishers, fishery managers, fishery scientists, and secondary data.

Table 5. Criteria in evaluating the options involving two stages

<i>Stage 1</i>	<i>Stage 2</i>			
<i>Impact on resources</i>	<i>Likely impact on fishers</i>	<i>Enforceability</i>	<i>Likely cost of implementation</i>	<i>Likely impact on the community</i>
Recovery of fish stocks	Income loss	Supported by law	High enforcement and monitoring cost	Worsen poverty
	Investment Loss	Preferential ranking by fishers	High cost of data collection	Higher unemployment
	Labor displacement			Worsen peace and order situation
	Intensify conflict between municipal and commercial fishers	Preferential ranking by fishery managers	High political cost	Contribute to food insecurity
	Intensify conflict within types of fishers	Implemented in other areas in the country	High cost of coordination and collaboration among LGUs	Encourage migration
Can be implemented by national and local agencies				High cost of coordination and collaboration between the national government and the LGUs

Preference ranking of options

The 10 management options were subjected to collective ranking by fishers during the FGDs (22 of the 27 FGDs) and by fishery managers during interviews with them. Each FGD group or fishery manager was requested to rank the options based on their preference, with the most preferred option given Rank 1 and the least preferred option given Rank 10. The procedure allowed the participants to provide direct ordinal judgments and placed minimum demands on their memory. The rankings were tabulated and the ranks given to each option were summed up. The overall ranking (with the most preferred option having the lowest sum of ranks and the least preferred option having the highest sum of ranks) was determined and converted into a qualitative description using the schedule: rank 1-2, very high; rank 3-4, high; rank 5-6, moderate; rank 7-8 low; and rank 9-10, very low.

EVALUATION OF THE OPTIONS

Stage 1: The options on their likely impact on resources

Four fishery management options were identified to have no or relatively low impact on increasing fish stocks; hence, they did not advance to the next stage of evaluation. These were status quo, quota, closed season, and rotational fisheries management.

Under the status quo option, no improvement in the biological condition and productive capacity of stocks is expected. Trawl surveys conducted at different times in the past show a continuous decline in the fish biomass. Testimonies of fishers during the FGDs and of fishery managers during interviews point to the “overexploited” status of the Visayan Sea and, in particular, of the northern Iloilo fisheries: declining catch, smaller fish size, disappearance of high-value species and dominance of low class fish, longer fishing time than before, and increasing number of fishers.

On the other hand, the quota option will not work. Data on Total Allowable Catch (TAC) and Maximum Sustainable Yield (MSY) for the Visayan Sea and for other seas in the country are not available. They are difficult or impossible to generate in a multispecies fisheries. Even when feasible to implement, the quota option is expected to have minimal effect. The time of recovery would depend on the amount of the quota, but likely well over five years.

The option, rotational fishing regime, is expected to likely encourage wasteful expansion of effort as the fishers attempt to make the best of the open areas. Moreover, this is practical only in municipalities with large municipal water areas like Carles and Concepcion.

Similarly, closed season will likely encourage wasteful expansion of effort as the fishers attempt to make the best of the open seasons (8 months open and 4 months closed). The adverse consequences of the increased fishing intensity and

the resulting increase in overall fishing costs may more than offset any beneficial effects of the four-month closure on the productivity of the stocks.

On the other hand, six fishery management options (referred to hereafter as the six options) were identified to have relatively moderate to high impact on resource recovery: (1) ban of commercial fishing for five years, (2) ban of commercial fishing for five years with safety nets, (3) marine protected areas, (4) localization, (5) reducing the number of municipal and commercial fishers, and (6) establishment of a special management unit. They advanced to Stage 2 for more evaluation.

Banning commercial fishing for five years is expected to likely arrest the continuous decline in the quality of resources in the status quo. Although the resources are expected to improve within the first two years, it would not be to their levels before being overexploited (presumably in the mid-1970s to 1980s, when catches in most fishing grounds seemed to have breached sustainable levels). Catches will likely increase within the first two years but will likely be short-lived if heavy fishing effort from the municipal fishers will still be there, and perhaps even take up the slack left by the commercial sector.

Meanwhile, the positive impacts on resources of a fishing ban are well documented. Campos et al. (2003) found that the banning of shiner and fish cage accompanying high enforcement increases production by 9 mt per year in Lamon Bay. Adams et al. (2000) found also a positive impact of the net ban on the resources in Florida, USA: stock size of finfish improved. In contrast, in Newfoundland, cod fishing has been banned for more than 15 years and yet no significant rebound on cod fisheries has been observed.

If the ban is accompanied by safety nets, a similar impact on the resources is expected; however, the scenario after the five-year ban may be better if those previously displaced were successful in other livelihoods. This would mean a less rapid return of commercial fishing pressure to pre-ban levels (after the five-year ban).

If properly sited and managed, marine protected areas (MPA) are expected to deliver desired results within two years according to fishery managers with experience on MPAs. Many experiences with MPA show positive results in the Philippines and elsewhere, particularly of increasing fish stocks (White et al. 2006; Hilborn et al. 2004; De Guzman 2004; Alcala et al. 2004; Adan 2004; Gell and Roberts 2002; UP-MSI et al. 2002; Dalby and Sorensen 2002).

Similarly, reducing the number of municipal and commercial fishers would mean less fishing pressure and is expected to show positive impact within a year. Even just having a cap (i.e., no further increase) may arrest further decrease in catch rates within three to five years.

Under the special management unit (SMU) option, the present decreasing trend in catch rates is expected to be arrested within the five-year period. This is probably the least that can happen, since this would likely be the minimum target for any management body.

Under the localization option, some fishing effort will be removed, which would mean less pressure on the resources. This option is highly favorable to local government units with wide water areas. The opposite is true for those with small fishing grounds. Compared with the ban options, localization is expected by fishery scientists and fishery managers to take longer (3-5 years) to become effective, although this may be good for the stock on the whole and in the long term.

Stage 2: detailed evaluation of the options

Likely impact on fishers

A complete departure from the status quo option, a commercial fishing ban will deprive commercial fishers of access to the fisheries, which, in turn, would threaten their livelihood and economic survival. The negative impacts would be huge, with the fishing crew (boat captain, machinist, and utility workers) shouldering more of the burden.

For the fishing crew, the ban would likely result in labor dislocation and loss of income. This is a concern given that fishing has been their main or sole source of livelihood, their options are limited because of lack of employable skills, and chances to diversify income sources are very limited in the area. Also, their exit from commercial fishing may mean entry to municipal fishing for sustenance. With their transfer to municipal fishing, the competition for space and resources in the municipal waters would intensify.

Aside from income loss, the owners were concerned with investment losses. Others were optimistic that they move their operations elsewhere. This would mean increased fishing pressure in other fishing grounds.

Meanwhile, discussions with key informants and fishers elicited comments that commercial fishing ban may become acceptable if there are accompanying safety nets for the affected fishers. That is, a superior alternative has to be put in place before the fishing ban becomes acceptable. Under this option, labor displacement is expected but the likely economic impact on the fishers' income and investment is ambiguous given the accompanying safety net program. Some fishers may be able to use the assistance programs to leave fishing and move to other livelihoods or diversify sources of income.

MPAs, usually established in municipal waters (within 15 km from the shoreline), pose no threat of displacement and income loss among commercial fishers. However, MPAs intensify the competition for space and resources among municipal fishers. There is also the attraction of encroachment into the "no-take" zones. However, relative to status quo, the fishers during the FGD and the fishery managers expect that their catches and their income will likely increase with the establishment of MPAs. The fishers understood that fish breed and grow near the shore before migrating offshore.

Under a special management unit (SMU) option, the welfare of fishers is expected to be promoted. However, only legal fishing activities are expected to remain. Those using illegal gears may shift to using legal gears or may exit from fishing. Conflict within types of fishers will likely intensify, particularly between legal and illegal gear users.

It is highly favorable to local fishers if they are given priority in the use of municipal waters, especially to fishers in municipalities with wide water areas. This, however, will intensify conflict among transients (who are used to fishing in the area) and local fishers (who are given the preferential right) and between municipal and commercial fishers (now denied to fish at 10.1 km from the shoreline).

Both commercial and municipal fishers function as central drivers in Philippine marine habitat degradation and resource extraction (Green et al. 2003). Banning commercial fishing but allowing an increase in the number of municipal fishing is similar to the status quo condition. Reducing the number of municipal and commercial fishers by restricting new entrants to the fishery or by providing income diversification opportunities for existing fishers will not negatively affect the current fishers. Overtime, the number of fishers will decline with the retirement of old fishers.

Enforceability

Having MPAs, the only highly enforceable option (also very highly preferred by fishers), poses the least threat to commercial fishing operation. Section 81 of the 1998 Fisheries Code stipulates that every municipality in the country should reserve at least 15% of its municipal waters for fishery refuge or sanctuaries. In the country, an area where fishing is not allowed is popularly called marine protected area (MPA). The Philippines has more experience in MPAs and has a larger number of community-based MPAs than any other country (Pollnac 2002).

In northern Iloilo, MPAs are found in four municipalities (Ajuy, Carles, Concepcion, and Estancia). The areas established as MPAs are far below the suggested size of the 1998 Fisheries Code (i.e., 15% of municipal waters). Most are not managed sustainably and are MPAs on paper only. During the FGD, some fishers reported ignorance about the existence or location of the MPAs. The local fishery technicians expressed that they have the capability to manage the MPA but are constrained by the lack of resources (personnel and financial) for enforcement and monitoring.

The localization option is only moderately enforceable even when very highly preferred by fishers. It is to the advantage of local fishers if they have preferential access to their municipal waters as stipulated in Section 7 of the 1998 Fisheries Code. As members of Northern Iloilo Alliance for Coastal Resource Development (NIACDEV), however, the seven municipalities of northern Iloilo are bound to share their fishery resources among fishers in the alliance. Municipal fishers can fish anywhere in northern Iloilo for as long as they use legal gears and secure the necessary permits. The reason for such policy of granting access rights to outsiders within an exclusive sea territory of a municipality was to afford fishers from

municipalities with small or resource-poor territories access to better fishing grounds (Ferrer 2005). Moreover, the municipalities are viewed not to have the capability to implement the localization option given the state of their local law enforcement teams.

Similarly, the special management unit (SMU) option is moderately enforceable only although it may offer a better arrangement and can reverse the self-destructive course to one of conservation and sustainable management of coastal resources. A special law can be created granting a particular body the authority to manage, regulate, and enforce environmental laws in the Visayan Sea. This is not impossible given that there are examples of special bodies much like the concept of the SMU that have been working in other parts of the country with support from the national government such as the Palawan Council for Sustainable Development (created in 1992) the Laguna Lake Development Authority (established in 1966).

The fishers only moderately prefer this option because they doubt the sincerity and capability of the SMU to bring about improvement in the fishery resources and their livelihood. On the other hand, the option is highly preferred by fishery managers. This reflects the managers' perception of the failure of the local government units to properly manage and protect the fishery resources. Moreover, they do not oppose the proposal to temporarily take away from them the responsibility of managing the resources. Some key informants also expressed that the SMU is a better alternative to the LGUs because the former can be held accountable, unlike the local chief executives who come and go every three years. They, however, expressed their reservation that the option can only be effectively implemented if the national government has the will to do so. It has to be credible and have the necessary logistics and clear functions and responsibilities.

While Section 9 of the 1998 Fisheries Code supports banning commercial fishing, no such attempt has been made in any sea in the country. The economic and political costs accompanying this option could be the reason. This can be mitigated by safety nets. As observed, the safety nets make a difference in the preference of the fishers and in the overall evaluation as regards the enforceability of the commercial fishing ban. With safety nets, banning commercial fishing is moderately preferred by the fishers; without safety nets, it is the least preferred option.

The fishers, however, were skeptical about the sincerity and capability of the government to provide safety nets. Experiences with government assistance program have bred mistrust among fishers. In contrast, the fishery managers highly preferred the option of banning commercial fishing with or without safety nets. This reflects their belief that the resources are "overexploited" and need rehabilitation.

Similar to banning commercial fishing, the option of reducing the number of municipal and commercial fishers is least enforceable. This is politically unpopular. Both fishers and fishery managers least preferred this option. This option is a direct threat to fishing; this would mean temporary or permanent exit from fishing for those currently in fishing or no entry for those who are planning to enter. For fishery managers, it is not the number of fishers that is the problem but the kind of gears they use.

Cost of implementation

Hilborn et al. (2004) warned that MPAs require careful planning, evaluation, and appropriate monitoring. Without these, there is a “risk of unfulfilled expectations, the creation of disincentives, and a loss of credibility of what is potentially a valuable management tool.” Relative to the status quo option, the implementation of MPAs will increase management costs because of the need for additional monitoring and enforcement. If there is little or no monitoring of the MPAs, then the expected biological benefits might not be realized. There is a strong incentive to poach, especially when the area is remote. In addition, the monitoring and enforcement costs are likely to depend on factors such as size, location, local fishing practices and customs, among others.

The option to reduce the number of municipal and commercial fishers is highly costly in terms of enforcement and monitoring, data collection, and political cost. The LGUs have to make sure that those who have exited from fishing do not return or those who plan to enter are blocked from entering. The cost of data collection to determine the optimal number of fishers to fish would be high. Political cost would be high as this is not a popular option.

The enforcement and monitoring costs of a commercial fishing ban would be high. Ferrer and Defiesta (2005) showed the need for large annual budgets (up to PhP 1 million or USD 21,280) to be set aside by a municipality for a regular *bantay dagat* operation. Similarly, Campos et al. (2003) found that an annual budget of about PhP 614,000 (USD 13,060) is required to ensure compliance of regulations in Lamongan Bay. Moreover, the required concurrence of the 22 municipalities around the Visayan Sea would be difficult to achieve for this may mean loss of political support from the commercial fishing sector.

Financing a safety net program would increase the cost of a commercial fishing ban. The realization of this safety net program would depend on the government’s ability to carry off a big budget or find funding source. If one component of the safety net is income compensation, then the minimum budget required would be PhP 172.5 million (USD 3.7 million) annually or PhP 862.5 million (USD 18.35 million) in five years for northern Iloilo (Table 14). The amount of compensation would depend on the gear used and on the position held in the fishing boat. The compensation would be largest for the crew given their number. If the boat buy-back scheme will be employed, this would require a minimum budget of PhP 169.71 million (USD 3.61 million) for fishing boats based in northern Iloilo. The breakdown would be PhP 48.13 million (USD 1.02 million) for Danish seine, PhP 12.38 million (USD 0.26 million) for trawl, PhP 2.00 million (USD 0.04 million) for beach seine, PhP 3.60 million (USD 0.08 million) for purse seine, and PhP 103.60 million (USD 2.20 million) for ringnet.

In Newfoundland, the cod moratorium in 1992 cost the Government of Newfoundland about CAD 4.5 billion to assist about 19,000 families displaced by the moratorium. The safety nets made people stay in the fishery and looked forward to the opening of the cod fishery again. Fifteen years have passed with no clear signs of the reopening of the cod fishery.

Meanwhile, the special management unit (SMU) option may promise a quick and straightforward solution to different problems in the Visayan Sea. However, it is highly likely to encounter significant resistance and insufficient support from the local government units who are mandated to manage municipal waters. The experience of the VisSea Project in promoting a Joint Management Plan in the 22 municipalities in the Visayan Sea (but which failed at the implementation stage) could provide a lesson on the difficulty of soliciting the support from the LGUs (VisSea Final Report 2005; Vakily 2005).

Similarly, implementing the localization option would be costly in terms of enforcement and monitoring and data collection. Although it is highly favorable for LGUs with large territorial waters, this option would likely disrupt the harmonious relationship among municipalities in northern Iloilo. Such was observed in 2008 when one municipality decided to pursue local revenue measures requiring fishers to land catches in their own and newly established fishing port. This created conflict between the two local chief executives. The strong culture of sharing in the area runs counter to this option; moreover, the area has no tradition of tenure.

Likely impact on the community

The MPA option was seen to likely have good impact on the community in general. It is not likely to worsen poverty or peace and order situation in the community or increase unemployment. Available studies also show the positive social impacts of MPAs. According to White et al. (2006), the likely benefits of MPA include cash income from tourism. Gell and Roberts (2002) identified positive social impacts of marine reserve to include: a) increased environmental awareness among the locals; b) educational opportunities for the locals; c) increased community harmony; d) reduced conflict between user groups and managers as they work together and make decisions; and e) venue where fishers, tourist business operators, and local politicians interact.

The impact of the special management unit (SMU) option on the community will depend on how acceptable it is to the stakeholders, particularly the LGUs. Failure to enforce and maintain the SMU in the face of resistance from local government units would likely result in a complete lack of regulation or revert to status quo, perhaps for a significant period.

Effort reduction schemes (banning and reducing the number of fishers) will likely result in higher unemployment in the coastal area. No work means no income and more hunger. That is, the municipal fishers and the crew of commercial fishing boats will be further impoverished. This will further breed social and economic problems and thus, the peace and order situation will be threatened. Illegal fishing activities and other criminal activities like theft and robbery are expected to increase, according to the FGDs. The possibility of outmigration by the young people is high in order to find employment to support their families.

If accompanied by safety nets, the social problems accompanying the fishing ban may not be as worse as without safety nets. The local government units need

national government support in providing safety nets to the fishers. Under the condition of working safety nets, the communities are expected to be in same situation or better. Under the condition of non-working safety nets, the communities will be worse off.

Similarly, the implementation of the ban will not only affect the livelihood of the fishers but also several stakeholders: fish middlemen, fishing input suppliers, fish processors, and consumers. The ban is expected to hurt not only northern Iloilo but the whole island of Panay. With low fish supply, prices are expected to go up.

Potentially viable options

Table 6 presents the evaluation summary matrix for the six management options. There is no ideal option or an option that fully satisfies the criteria. An ideal option is one with high (which means good) impact on the resources, fishers, and community, and highly enforceable at a low cost of implementation.

Among the six options, the MPA closely approximate the ideal option with the only difference of being moderately costly to implement. At the other end is the option to ban commercial fishing, which only meets the goal of protecting the resources but fails in the rest of the criteria.

Table 6. Summary evaluation matrix of the six options.

<i>Option</i>	<i>Impact on resources</i>	<i>Impact on fishers^a</i>	<i>Enforceability</i>	<i>Cost of implementation</i>	<i>Impact on the community^a</i>
Establish marine protected area	High	High	High	Moderate	High
Reduce the number of municipal and commercial fishers	High	Moderate	Low	High	Low
Create a special management unit	Moderate to high	High	Moderate	High	High
Ban commercial fishing for five years with safety nets	High	Moderate	Moderate	High	High
Implement localization	Low to moderate	Moderate	Moderate	High	Low
Ban commercial fishing for five years	High	Low	Low	High	Low

^a high means good

Tradeoffs accompany the options. For instance, reducing the number of fishers will have high impact on resources and moderate impact on fishers but is low in terms of enforceability and impact on the community and highly costly to implement. The special management unit option has moderate to high impact on

resources, high impact on fishers and the community but costly to implement and only moderately enforceable. Banning commercial fishing with safety nets has high impact on resources and the community, with moderate impact on fishers but highly costly to implement and only moderately enforceable. Similarly, the localization option has high impact on fishers but only low to moderate impact on resources, low impact on the community, and only moderately enforceable at a high cost of implementation.

The presence of tradeoffs suggests the need to use a mix of options rather than a single option. The weakness of an option in one criterion can be balanced by its strength in another criterion or can be offset by the effect of another option. The use of a mix of options is in order given that the current status of the Visayan Sea fisheries, specifically northern Iloilo, requires a wide array of interventions.

It is expected that the impact of the MPA option on the resources would be more extensive in space when it is accompanied by other measures than when it would be just alone. For instance, a five-year commercial fishing ban combined with a reduction in the number of municipal fishers and establishment of MPAs whose size and location are meant to ensure improved recruitment could result in bigger improvements in the productive capacity of local stocks and likely of the entire Visayan Sea. Moreover, catches would increase shortly after implementation and would likely continue. If accompanied with safety nets, this combination of options would lead to a much better scenario when commercial fishing resumes after five years. Those who have become successful in other livelihood are expected no longer to return to fishing. The creation of the SMU to implement these options may be a better option than the LGUs.

Possible implementation

The LGUs can be encouraged to establish and sustainably manage MPAs. Scientific biological surveys are needed to generate the needed biological information that will guide the siting of MPAs. For MPAs already sited but not managed sustainably, management practices can be improved. The support of the community must be mobilized for the long-term sustainability of the MPAs.

At the same time, efficient fishery registration and licensing must be conducted at the LGUs. This is a necessary requirement when the plan to reduce the number of municipal and commercial fishers is to prevent the entry of more fishers in the area, particularly by the young people and those using illegal gears or practices destructive fishing methods. Income diversification will also ease fishing pressure by removing some fishing effort.

With regards banning commercial fishing or reducing their number, the national government has to decide on this but with concurrence of the LGUs. Banning commercial fishing is a potential option if accompanied by a credible safety net program. The need to protect the resources must be balanced with the needs of the people. Opposition to the ban is likely because it threatens the survival of the people. To most fishers, fishing is their only option. A safety net program must be

responsive to the needs of the fishers and leave them with same level, if not improved, welfare as before any intervention. The first to be directly affected by a fishing ban or any effort reduction management scheme would be the owners and crew of commercial fishing vessels.

Two possible support for the owners are buying back their vessels or providing support for offshore fishing. The owners are willing to surrender their fishing vessels if they will be paid of their investments. Some of them claimed that they borrowed money to put up their business.

On the other hand, the 1998 Fisheries Code (Section 35) states that fishing vessel operators are encouraged to fish farther into the Exclusive Economic Zone (EEZ) and beyond by granting them incentives for improvement of fishing vessel and the acquisition of fishing equipment in addition to incentives already available from the Board of Investment. During the FGDs, the owners of small-scale commercial fishing vessels expressed unawareness of any support program for vessel upgrading. Some are willing to go offshore if given the needed support, while others are reluctant given their beliefs that fishing offshore is difficult, especially during the typhoon season. They also believe that fish concentrate in shallow waters.

If they stop fishing, the crew members are worried about their daily source of income. They indicated that they will leave fishing only if everyone does and when there are support available for them to move out of fishing. The support may be in the form of alternative livelihood, income loss compensation, education and skills training program, provision of credit and land to till, among others.

For boat captains and crew, only an alternative employment that will enable them to earn as much as they earn in fishing will persuade them to get out of fishing. Most of them entered fishing because of their limited skills and knowledge for other jobs. To many, fishing is a dangerous and tedious work. If they can find work on land, they would be willing to go out of fishing. Some boat owners encourage their crew to look for better jobs than fishing and are willing to let them go if they found one.

The current state of the fishery resources reflects the poor state of management regime led by the LGUs. A special management unit (SMU) with authority to manage, regulate, and enforce laws can be created by the national government and pilot tested in northern Iloilo. It must be a credible body with allocated budget, capable personnel, and clear framework of functions, programs and activities. Under such regime, the SMU would conduct the science, implement proper licensing and registration of fishers, effort control, implement and administer a conservation-based management system that would include monitoring and enforcement. The safety nets will also be more credible when their implementation is delegated to a special body rather than to the LGUs. This is to avoid politicalization of the program and corruption.

CONCLUSIONS AND RECOMMENDATIONS

The current state of the Visayan Sea calls for immediate intervention to arrest further decline in the quality of the resource. The future of the people and the communities surrounding it rests on its sustainability. The sea is an important source of livelihood, income, and food for thousands of people. Delay in intervention may only mean that the difficult situation many fishers are in now will worsen, particularly when the sea collapses.

The need to protect the fishery resources must be balanced with the needs of the fishers. This study aimed at identifying potentially viable options. Management options were recommended by some sectors that have to be ruled out at the beginning because they failed to meet the crucial criterion of improving the resources. None of the potentially viable options can fully satisfy the criteria set. There are tradeoffs. For instance, effort reduction schemes like banning commercial fishing and reduction in the number of fishers (municipal and commercial) can help the stocks recover fast but will displace a number of fishers, resulting in loss of income. Localization will protect the local fishers but compared with fishing ban, this would take longer to become effective. An MPA, when not properly managed, will not bring about any improvement in the condition of the habitat and fish stocks. Having a special management unit may provide a better alternative than the current management regime but would be expensive to implement. A combination of options is expected to have more beneficial impacts than any single option.

Opposition to fishing effort reduction schemes (like fishing bans and reduction in the number of fishers) is likely because such schemes threaten the survival of the people. To most fishers, fishing is their only option. A safety net program that is responsive to the needs of the fishers and leave them with same level of, if not improved, welfare as before any intervention, must accompany any fishing effort reduction management option. Short-term support to the fishers can be in the form of income loss compensation, credit assistance, or boat buy-back schemes. Any income support, however, may encourage the fishers to wait to return to fishing, thus perpetuating the cycle. A solution to break the cycle must be found. Long-term solutions that deal with community issues, such as education to expand employment opportunities, must be considered.

The persistence and the intensification of the problems in the Visayan Sea and in northern Iloilo in particular are manifestations that the current management arrangement is not capable of solving the problems. The current management regime is clearly not responsive to the needs of the resource and the people. Having a special management unit for the Visayan Sea may offer a better arrangement and can reverse the self-destructive course to one of conservation and sustainable management of coastal resources. The implementation of a pilot program in northern Iloilo may be considered.

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