

Annex 4

IMPROVING COASTAL LIVELIHOODS THROUGH SUSTAINABLE AQUACULTURE PRACTICES – THE CASE OF TUBIGON, BOHOL, PHILIPPINES

IMPROVING COASTAL LIVELIHOODS THROUGH SUSTAINABLE
AQUACULTURE PRACTICES

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Acronyms

BATFCA	Batasan Tropical Fish Collectors Association
BFAR	Bureau of Fisheries and Aquatic Resources
CBRMP	Community Based Resource Management Project
CLUP	Comprehensive Land Use Plan
CRM	Coastal Resources Management
CRMP	Coastal Resource Management Program
CSOs	Civil Society Organizations
CY	Calendar Year
DFID	Department for International Development (UK)
FAO	Food and Agriculture Organization of the United Nations
FARMC	Fisheries and Aquatic Resource Management Council
FGD	Focus group discussion
FNRI	Food and Nutrition Research Institute
FRMP	Fisheries Resource Management Program
FTC	Feed the Children
ha	hectare
HLURB	Housing and Land Use Regulatory Board
IMA	International Marine Alliance
km	kilometer
LGU	Local Government Unit
LHC	Live hard coral
LOGODEF	Local Government Development Foundation
MAC	Marine Aquarium Council
MAO	Municipal Agricultural Office
MDC	Municipal Development Council
MFARMC	Municipal Fisheries and Aquatic Resource Management Council
MPDC	Municipal Planning and Development Coordinator
MPDO	Municipal Planning and Development Office
NGO	Non-governmental Organization
mt	metric tonne
PCRA	Participatory Coastal Resource Assessment
PLA	Participatory Learning and Action
PNP	Philippine National Police
SEAFDEC	Southeast Asian Fisheries Development Center
SPARK	Sharing and Promotion of Awareness and Regional Knowledge
SSI	Semi-structured interview
STREAM	Support to Regional Aquatic Resources Management
SUML	Silliman University Marine Laboratory
SWOC	Strengths, Weaknesses, Opportunities and Constraints
VSO	Voluntary Service Overseas
USAID	United States Agency for International Development
USPC	United States Peace Corps

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1. Background and Objectives of the Study

1.1 Background

This case study is part of STREAM's four-country research project, which is exploring how recent advances in sustainable aquaculture have helped and can help improve coastal livelihoods and prevent unsustainable fishing practices in reef fisheries.

The research team chose the level of municipality¹ (30,000 to 100,000 people) as the unit of analysis for this study. This is because most of the responsibilities for coastal resource management have been devolved to municipal governments (Rivera et al., 2002). In choosing the study site, the research team used these criteria:

- a. Presence of a reef fishery at risk from unsustainable fishing practices
- b. Degree of willingness of the local government unit to address the issue
- c. Presence of civil society organizations (CSOs) such as non-governmental organizations (NGO) or social action centers of the Catholic church in the municipality, and
- d. Potential of linking possible sustainable aquaculture projects with the private sector.

The research team chose the municipality of Tubigon in Northwestern Bohol as the study site because it satisfies all the criteria above (see Appendix 1 for location map of Tubigon). Furthermore, there had been several projects related to reef conservation, aquaculture and improvement of coastal livelihoods implemented in the area where lessons can already be gained. The success of the local government and civil society organizations in Tubigon in dramatically decreasing the practice of dynamite, cyanide and other illegal forms of fishing in the municipal waters of Tubigon is a source of inspiration and lessons for many coastal resource management (CRM) groups in the Philippines and in other parts of the world. The body of literature about the projects in the area is starting to become extensive. This study builds on this and contributes its own insights, based on recent developments, into what has been learned by previous observers.

The research team learned about the aquaculture initiatives in Tubigon through its informal links with members of a coastal resource management network in the Philippines. Particularly helpful was Stuart Green, a former Voluntary Service Overseas (VSO) volunteer in Bohol who now works for the CRMP, and facilitated the research team's entry into the study site. Stuart introduced the team to Engineer Noel Mendaña, who is the concurrent MPDC and LOGODEF Mariculture Project Director. LOGODEF is the NGO that introduced grouper, mudcrab and lobster culture projects in the area.

The research team included:

- Ronet Santos, Regional Programme Coordinator of SPARK, a VSO project encouraging local groups in the Philippines, Indonesia and Thailand to learn from

¹ The Philippines has about 1,500 municipalities; 60% of these are located in coastal areas.

each other about community-based natural resources management. Ronet's educational background is in inland fisheries, environmental decision-making and environment and natural resources management. He has more than twenty years of experience of working in development in the Philippines and in the last three years in Indonesia and Thailand.

- Erwin Pador has done studies on *Artemia salina* (brine shrimp) production in salt ponds for the FAO Bay of Bengal Programme (1989). He organized and conducted training sessions on fish pond management, extension methodologies, fisheries research and group dynamics for BFAR in Region 6 (1990-95). Recently he has been active in coastal resources management with his involvement with the FRMP, where he coordinates efforts of community organizing and capability-building along a sustainable development framework. He is also a reviewer of fisheries research undertaken at the zonal center of the Western Visayas Region and this includes the Resource and Social Assessment of Sapijan Bay for the FRMP.
- Meddy de la Torre, a community development consultant and freelance researcher based in Cebu City, has over 15 years experience in community organizing and management of community development programs in the Philippines.

1.2 Objectives of the Study

The objectives of this study were to:

- a. Characterize the coral reef fisheries in Tubigon, Bohol, Philippines, and
- b. Derive lessons from the management interventions to eliminate unsustainable fishing practices and improve coastal livelihoods employed by various groups in Tubigon.

The key questions that this study is attempting to answer are:

- How can recent advances in aquaculture of grouper (including mudcrab and lobster) and reef fisheries help improve coastal community livelihoods and prevent unsustainable and destructive practices?
- Is there a role for the private sector in eliminating unsustainable fishing practices and improving coastal livelihoods?

2. Methods

2.1 Data Gathering

The data gathering methods used in the study were inspired by socio-economic assessment methods described in the socio-economic manual for coral reef management by Bunce et al. (2000). Other PLA-type methods that the research team is familiar with were also used. The research team focused on the “livelihoods” aspect of the projects in the area and did not conduct any form of technical resource assessment as other groups have done this.

The research team reviewed existing literature, conducted semi-structured interviews (SSI) and focus group discussions (FGDs), held informal talks with fishers who gave oral histories of fishing-related events in their villages, observed village activities and projects, and attended a workshop organized by one of the local groups in the area aimed at sharing their experiences. In most of the meetings with fishers, local government officials and NGOs, visualization techniques (such as resource mapping, matrices, ranking, seasonality diagrams and pie-charts) were used to assist in clarifying concepts and encouraging discussion to avoid the meetings becoming a one-way extractive exercise.

The research team interviewed more than 50 persons (see Appendix 2 for complete list) for the SSIs and the FGDs. The team tried to conduct SSIs and FGDs with as many groups with different perspectives within Tubigon as possible. This was, however, constrained by the non-availability of some of the people we wanted to interview during the time of our visits.

The members of the research team visited the area four times:

- 16-21 October 2002 (Meddy de la Torre)
- 24-27 October 2002 (Erwin Pador and Meddy de la Torre)
- 4-5 November 2002 (Erwin Pador, Meddy de la Torre and Dr Graham Haylor, STREAM Director)
- 17-22 November 2002 (Erwin Pador, Meddy de la Torre and Ronet Santos)

2.2 Data Collation and Analysis

The descriptive profile of the area is based on previous resource assessments. There was one done by the Silliman University Marine Laboratory (SUMML) in 1997 and there were several village-based participatory coastal resource assessments (PCRA) done with the assistance of CRMP consultants and US Peace Corps (USPC) volunteers who worked with Feed the Children (FTC). Most of the descriptive analyses in this report – such as livelihood strategies employed by fishers, main sources of income, percentage contribution of each source of income, and livelihood outcomes – are based on the results of the SSIs and FGDs. These were then triangulated with existing written and unwritten information (there is not much written information) at the office of the municipal agriculturist (who is also responsible for

fisheries) and triangulated on several occasions with the fisheries technicians of LOGODEF, the municipal agriculturist² and fishers from other villages.

The Sustainable Livelihoods Framework developed by DFID was used throughout this case study in analyzing management interventions and results. A modified force-field analysis tool was used during some SSIs and FGDs to determine hindering and facilitating factors in the implementation of specific projects. The results of initial SSIs and FGDs were crosschecked with those done in the latter stage of the study.

The study started with the view that a strategy to improve coastal livelihoods would be likely to deal with asset-building and strengthening policies, institutions and processes. The research team's thesis was that the asset-building component of the strategy would likely include:

- a. Building new skills, e.g., aquaculture (increasing human capital)
- b. Encouraging group-building and networking (increasing social capital)
- c. Providing alternative credit (increasing financial capital), and
- d. Securing entitlement to reef area (increasing natural capital).

The component of the strategy related to policies, institutions and processes would likely include:

- a. Formulating a clear policy with the participation of resource users
- b. Communicating this policy clearly
- c. Enforcement of the policy, and
- d. Building the capacity of local governments for resource governance.

The research team also got inspiration from the evolutionary approach to documenting learning (through "significant change" stories) developed by Rick Davies (1998) of the Centre for Development Studies of the University of Wales in Swansea, United Kingdom. Change stories of specific persons are presented in boxes throughout this report.

² The municipal agriculturist knows a lot about the area but does not have the information properly documented and filed for easy retrieval in his office, a clear case of non-separation of knowledge from people, which is common in the Philippines. This becomes a problem when the person leaves the organization, as the knowledge goes with him.

3. Characterizing the Reef Fisheries of Tubigon

3.1 Coastal Resources

Silliman University Marine Laboratory (SUML) did the latest documented assessment³ of the coastal resources in Northwestern Bohol⁴ in 1997. The CRMP and FTC also conducted several municipal-wide and village-level PCRAs, some results of which appear in portions of this case study.

Tubigon has a coastal area of 133.3 km², which is much bigger than its land area of 81.87 km². Apart from coral reefs, the other coastal resources and marine habitats found in Tubigon are shown in Table 1.

Table 1 Status of Marine Habitats in Tubigon (based on participatory mapping)

Habitat	Area (ha)	Area (sq km)
Sandy Beaches	33	0.33
Rocky Shoreline	110	1.10
Inshore Flat	27	0.27
Seagrass Beds	219	2.19
Coral Reef	156	1.56
Estuary	7	0.07
Passes/Channels	82	0.82
Mangrove	335	3.35
Mudflat	59	0.59
Offshore Sandbar	14	0.14
Total Area - Terrestrial (including islands)	6,195	62
(excluding islands)	6,148	61
Length of Shoreline	13,273 m.	133 km
(including islands)	22,072 m.	220 km

Source: LOGODEF in Calara (2001)

3.1.1 Coral Reef Resources

The coral reef area of Tubigon is 156 ha (Calara, 2001). The specific location of the reefs is shown in Appendix 4. The live hard coral (LHC) cover of Tubigon was placed by SUML in 1997 at 40%, considered fair condition. The mean LHC cover in the Northwestern Bohol area, where Tubigon belongs, is 31.35%. SUML identified 63 coral species; this number is considered low by Philippine standards. The relatively low coral diversity and the high coral

³ A group called Reef Check, an NGO, did the latest assessment in October 2002 but they had not come up with their report yet.

⁴ Northwestern Bohol is composed of seven municipalities: Buenavista, Calape, Clarin, Jetafe (sometimes Getafe), Inabanga, Loon and Tubigon. See Appendix 3 for map of Northwestern Bohol.

rubble indicate physical destruction of the reef from various destructive fishing methods and other natural factors such as typhoons. (See Appendices 5a and 5b for a more detailed description of the coral reef resources of Northwestern Bohol.)

3.1.2 Mangroves

Tubigon has a mangrove cover of 335 hectare (SUML, 1997). The area has mean sampling densities of 5,520 and 9,375 stems of *Avicennia marina* and *Rhizophora mucronata* respectively per ha (SUML, 1997). Tubigon shares with the neighboring town, Clarin, the distinction of having the densest overall mangrove saplings reported by Silliman University Marine Laboratory (SUML). Of the 27 mangrove and mangrove-associated species found in Northwestern Bohol, eight are found in Tubigon.

Table 2 Mangrove and Associated Species in Tubigon
(SUML, 1997, as cited in Green et al., 2002)

Families/Scientific name	Common Name	Present in Tubigon
1. RHIZOPHORACEAE <i>Rhizophora mucronata</i> <i>Ceriops decandra</i> <i>Bruguiera gymnorrhiza</i> <i>Rhizophora apiculata</i> <i>Rhizophora stylosa</i> <i>Ceriops tagal</i>	<i>bakhaw baye</i> <i>hangalay, lapis-lapis</i> <i>busaing</i> <i>bakhaw lake</i> <i>bakhaw tigre</i> <i>tungog, tangal</i>	x x x
2. AVICENNIACEAE <i>Avicennia marina</i> <i>Avicennia officianalis</i> <i>Avicennia alba</i> <i>Avicennia lanata</i>	<i>piyape baye</i> <i>piyape lake</i> <i>piyape lake</i> <i>piyape</i>	x x x
3. SONNERATIACEAE <i>Sonneratia alba</i> <i>Sonneratia caseolaris</i>	<i>pagatpat</i> <i>pedada</i>	
4. COMBRETACEAE <i>Lumnitzera littorea</i> <i>Lumnitzera racemosa</i> <i>Terminalia catappa</i>	<i>mayoro</i> <i>sagasa</i> <i>talisay</i>	
5. MYRSINACEAE <i>Aegiceras corniculatum</i>	<i>saging-saging</i>	
6. PALMAE <i>Nypa fruticans</i>	<i>nipa</i>	x
7. EUPHORBIACEAE <i>Excoecaria agallocha</i>	<i>alipata, buta-buta</i>	x
8. MELIACEAE <i>Xylocarpus granatum</i> <i>Xylocarpus moluccanensis</i>	<i>tabigi</i> <i>piyagaw</i>	
9. LYTHRACEAE <i>Pemphis acidula</i>	<i>bantigi</i>	
10. MYRTACEAE <i>Osbornia octodonta</i>	<i>tualis</i>	
11. BIGNONIACEAE <i>Dolichandrone spathacea</i>	<i>tui</i>	
12. LECYTHIDACEAE <i>Barringtonia asiatica</i>	<i>bito-bitoon</i>	
13. FABACEAE <i>Prosopis vidaliana</i>	<i>aroma</i>	
14. GOODENIACEAE <i>Scaveola frutescens</i>		
15. PANDANACEAE <i>Pandanus sp.</i>	<i>pandan</i>	

3.1.3 Seagrass and Algal Beds

SUML (1997) identified six species of seagrasses in Northwestern Bohol at depths 0-3 meters and comprising approximately 555 ha. These species are *Cymnodocea rotundata*, *Enhalus acoroides*, *Halophila ovalis*, *Haloduli pinifolia*, *Halodule uninervis* and *Thalassia hemprichii*. *Sargassum* beds dominate at deeper depths with a biomass of approximately 37.25 g dry weight/m².

Forty-nine species of algae in 16 families also inhabit Northwestern Bohol. Twelve species are green algae (*Chlorophyta*), 20 are red (*Rhodophyta*), 15 are brown (*Phaeophyta*) and 2 blue-green (*Cyanophyta*).

3.1.4 Nearshore Areas

Sites on the mainland of Northwestern Bohol are primarily composed of fine-textured sand, while island sites are composed of coarse sand (SUML, 1997). The soft-bottom areas are dominated by polychaetes. Other organisms include crustaceans. Of the polychaetes, spionids are the most represented families in terms of number of species and density.

3.1.5 Open Waters

Plankton composition of open waters off Northwestern Bohol is dominated by zooplankton (SUML, 1997). The zooplankton community consists of tintinnids, nauplii, copepods, larvaceans, gastropods and bivalves. Other groups include diatoms (31.5%), dinoflagellates (7.13%) and other algae (0.24%).

The phytoplankton community is mainly made up of diatoms, blue-green algae and dinoflagellates. The diatoms are composed of 58 species. Forty-seven species of dinoflagellates belonging to 20 genera are present, including some species that cause red tide. Most of the identified dinoflagellates are not toxic, but their potential blooms can result to lowering of water quality.

3.1.6 Fish Diversity and Abundance

The visual census conducted by SUML (1997) in Northwestern Bohol yielded 130 species belonging to 26 families. All the species were reef, or reef-associated. Two families with the most number of species are *Pomacentridae* (Damselfish, 33 species) and *Labridae* (Wrasse, 20 species). These are not typically targeted as food by fishers. Pomacentrids belong to the lower trophic levels, feeding mostly on benthic algae and plankton. Larbrids also belong to the lower trophic levels.

The only large predatory species observed by SUML in 1997 was *Lutjanus decussatus* (Snapper). Its density was low (less than 1 per 500 m²), which indicates extreme over-fishing in the area. SUML did not find other large predators, such as families of grouper (*Serranidae*), bream (*Lethrinidae*) or jacks (*Carangidae*). They blamed this on the rampant practice of dynamite and cyanide fishing in the area. Other fish desired by fishers include 24 target species, most of which are reef-associated.

From the 1980s to 1999, specifically in Tubigon, there has been a decrease in yearly fish production from a haul of 1,075 to 824 metric tons in 1999 (Municipality of Tubigon, 1999).

3.2 Resource Use Patterns and Stakeholders

The different resource users and their activities that have an impact on the reefs in Tubigon are shown in Table 3. This section describes the different reef-related primary resource users and secondary stakeholders⁵ and reef-related resource use patterns in Tubigon. The relevant organizations that have a presence in the area are described in Appendix 6.

*Table 3 Reef-related Activities in Tubigon and Different Stakeholders
(source: SSIs and FGDs of the research team, November 2002)*

Reef-related Activities	Primary Stakeholders	Secondary Stakeholders	Relevant Organisations (at the Local Level)
Grouper fingerling collection and culture	Grouper fingerling collectors Grouper, mudcrab and lobster culturists	Buyer and supplier of fry and fingerlings Fish feed (trash fish) suppliers Hotels and restaurants who buy grouper (in the cities of Cebu, Tagbilaran and Manila)	LOGODEF Feed the Children Municipal government Village government
Fishing and gleaning	Fishers (The different gears used by the fishers in Northwestern Bohol where Tubigon is located are enumerated in Appendix 8) Gleaners (mostly women and children) Upland farmers who are part time fishers	Market vendors Fish eating public	Fishers associations Municipal government Village government FTC Haribon CBRMP
Aquarium fish collection	Fish collectors	Aquarium fish traders Aquarium fish buyers	MAC (Marine Aquarium Council) IMA Municipal government Village government
Tourism	Divers and snorkelers	Resort operators	Municipal government Village government

The 1999 CLUP of the municipality of Tubigon places the total number of marginal⁶ fishers in the municipality at 1,463. There is no systematic registry of marginal fishers in Tubigon. The MAO gave us original copies of the results of the fisher registration forms that they completed in 1997. We compiled these into Table 4, which shows that there are only 467 fishers who registered and most of them are men. Our SSIs and FGDs in the communities

⁵ This study used Bunce et al.'s (2000) definition of different reef management stakeholders. *Primary stakeholders*: people who directly depend on the reef for a living and who make direct use of the reef and its resources. *Secondary stakeholders*: people who do not use the reef and its resources directly, but make use of the products or services from the reef or whose actions may affect the reef. *Relevant organizations*: organizations with direct responsibility for managing activities affecting the reef or with an interest in the primary or secondary stakeholders.

⁶ The Philippine government classifies fishery activities into three sectors: municipal, commercial and aquaculture. The term "marginal" here refers to municipal fishers. These are fishers who use boats with a displacement of not more than three gross tons. Fishers using boats beyond three gross tons are classified as commercial fishers.

clearly showed that there are more fishers and that there are more women fishers, although most of those who attended the SSIs and FGDs were men.

Table 4 Population of Tubigon Coastal and Island Villages⁷ and Number of Fishers (based on MAO records)

Village	Population (2000)	Number of Fishers ⁸ (1997)		
		Total	Men	Women
Coastal villages				
<i>Macaas⁹</i>	2096	25	25	
<i>Panaytayon</i>	2316	25	25	
<i>Matabao</i>	1037	30	30	
<i>Pandan</i>	1103	26	26	
Cabulihan	1890	25	25	
Centro Poblacion	2438	46	46	
Guiwanon	893	23	23	
Pinayagan Norte	1853			
Pinayagan Sur	2194	23	23	
Pook Occidental	1272	16	16	
Potohan	1397	23	23	
Tinangnan	2032			
Island villages				
<i>Batasan</i>	954	25	18	7
<i>Bilang-bilangan</i>	561	32	32	
<i>Panggapasan</i>	710	47	47	
Ubay	352	42	28	14
Mocaboc	394	34	34	
Bagong Banwa	728	25	25	
Totals	24220	467	446	21

Source: National Statistical Office (2001), MAO record of fishers

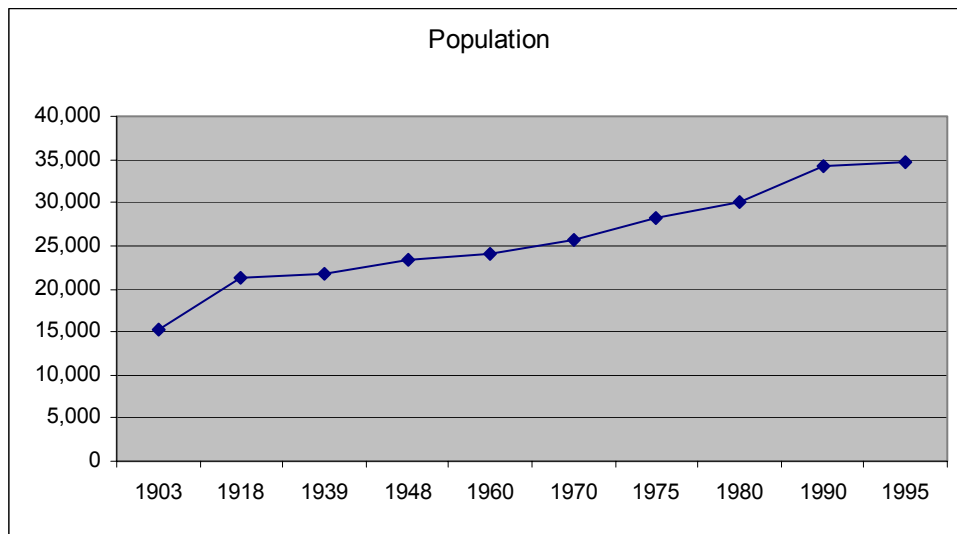
Based on the CLUP, the number of fishers declined from 1,773 in the 1980s to 1,463 in 1999. It is difficult to ascertain whether indeed the number of fishers is decreasing. The total population of Tubigon has steadily increased since 1900 (see Figure 1). A possible reason for the decline in the number of fishers, despite the steady increase in total population, is that the offspring of fishers chose to go into other lines of work. Many of the fishers we met had no offspring engaged in fishing; most of the men and some women are in Manila working in industrial parks (export processing zones) and most of the women have married non-fishers and have gone to other places.

About one-fourth (329 out of 1,463) of fishers have motorized *bancas* (boats), and another one-fourth (389 out of 1,463) have non-motorized boats, while about half do not own any *banca* at all. Fishers with motorized boats have an average production of four kilograms per day, while fishers with non-motorized boats have an average production of 1.5 kilograms per day.

⁷ Tubigon has a total of 34 villages; the upland and non-coastal and island villages are not included in the table.

⁸ From the MAO registration records.

⁹ Villages in italics are LOGODEF project sites.



Source: Municipality of Tubigon CLUP 1999-2008

Figure 1 Population Growth in Tubigon from 1900 to 1995

3.2.1 Grouper Fingerling Collection and Culture

Green Grouper (*Ephinephelus sp.*) fingerlings are caught within Tubigon municipal waters, but the number is not enough to supply the needs of the present grouper culturists. Grouper culture in Tubigon was introduced by LOGODEF in 1998 as an alternative to unsustainable fishing methods such as the use of cyanide and dynamite in fishing. Red Snapper (*Lutjanus sp.*) is grown in the same cage together with groupers. Apart from grouper and snapper, mudcrab and lobster are also being grown, although there are no sources of seeds for these species in the area. Mussel and oyster culture were also tried but these trials failed. See Appendix 7 for background of grouper culture in the Philippines.

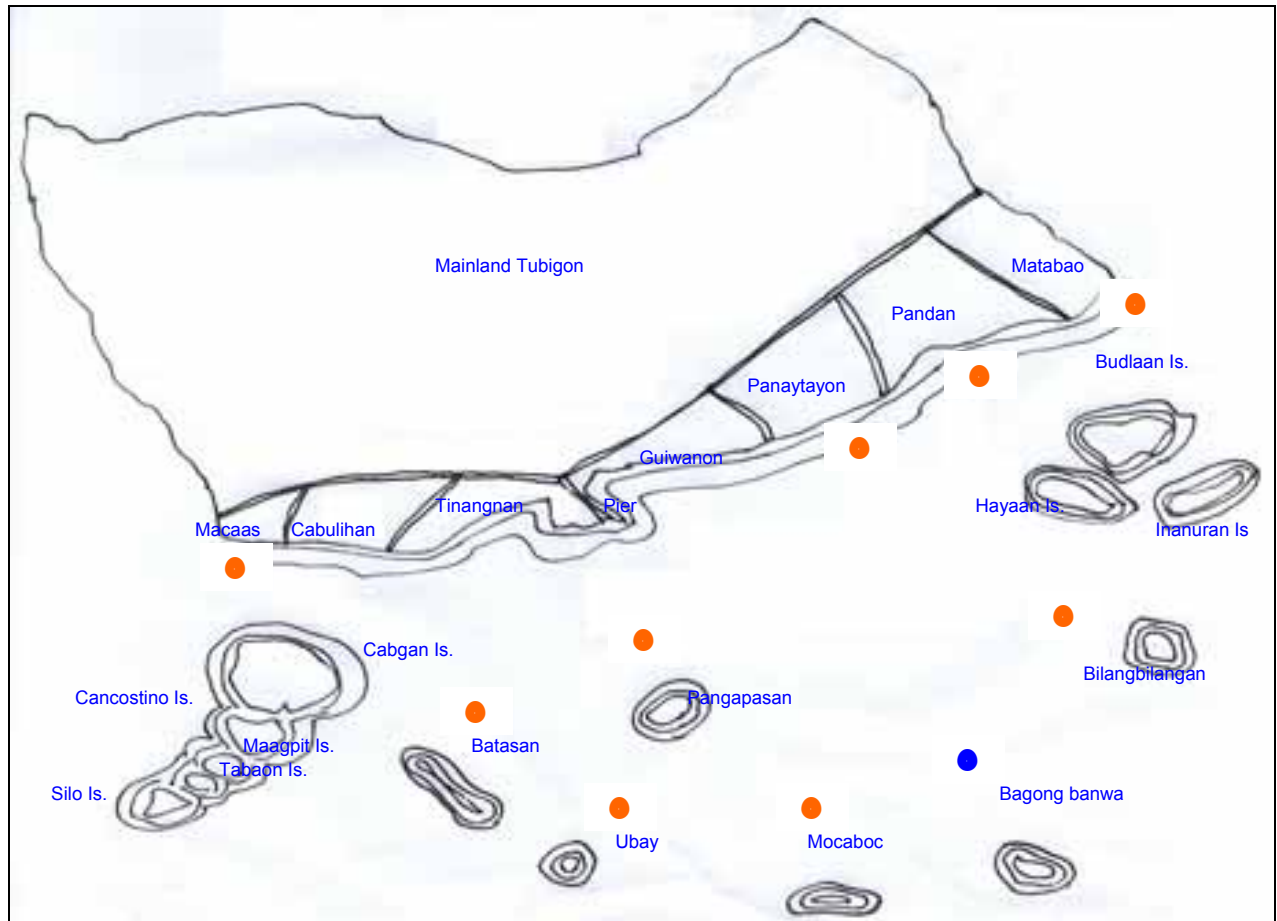
3.2.2 Grouper Fingerling Collectors

Fishers in Tubigon catch grouper fingerlings in the course of their major fishing activity; there are no full-time grouper fingerling gatherers in Tubigon. Only a small amount of grouper fingerlings are sourced from within Tubigon itself. Most fingerlings grown by culturists are caught in nearby municipalities, in other areas on the island of Bohol and as far as Bais City on the island of Negros (see map in Appendix 1). Grouper fingerling collectors sell a small number of fingerlings to “suppliers” who put the fingerlings they get from several collectors together in cages until they reach a marketable number. In their report, LOGODEF (Calara, 2001) listed 11 suppliers of fingerlings to their project, two of whom the research team was able to interview.

Grouper Culturists

There are 141 grouper culturists in Tubigon, organized into nine groups in seven villages. Seven groups are financially and technically assisted by LOGODEF while two groups are assisted by FTC. Many of the grouper culturists we interviewed were involved in some form

of illegal fishing in the past (use of dynamite, cyanide and banned active gears). Many of them are naturally hesitant to admit this, but made the admission when we promised that we would not divulge their names if they did not want us to, and midway through our informal conversation, realizing perhaps that admission does not really make a difference as the local government seems to know who the illegal fishers were in the past anyway.



Legend: ● = grouper culture areas, ● = where grouper are usually caught in the wild
 Note: The distance between Pangapasan and the pier is approximately 7 kilometres, which should give a sense of distance and size of the islands. Source: SSIs and FGDs with fishers, CRMP resource maps in Green et al. (2000)

Figure 2 Map of Areas Where Grouper is Being Cultured

Fish Feed Supplier

The groupers are fed with trash fish (usually slipmouths, *parutpot* in the local language, *Leiognathus sp.*). LOGODEF identifies nine suppliers of fish feed (trash fish), eight from Bohol and one from Bais City.

Where does the trash fish come from? “*Sa mga ilegal, lagi,*” Elsa Bulasa, from the village of Clarin and a mother of 11, whose son, Paulito, is one of the fish feed suppliers in the LOGODEF report, tells us. She said she buys her trash fish from illegal fishing operators (*liba-liba* operators, see Appendix 8 for description of fishing gears used in Tubigon) from outside Tubigon. What she seems to be suggesting is that the trash fish are caught by commercial fish operators from other municipalities who encroach in municipal waters. Such

encroachment is a big issue, not only in Tubigon and nearby areas in Bohol, but also in many areas in the Philippines; although encroachment is difficult to prove.

Noel Mendaña, project director of LOGODEF and concurrent MPDC, admits that the source of trash fish is a problem, not in the sense that it may be coming from illegal fishing, but because there is just a lack of it from within nearby waters. Trash fish suppliers outside the municipality sell the fish feed to the LOGODEF fishery technicians. The technicians in turn take care of transporting the fish feed from the centre of Tubigon, where it is delivered by motorcycle to coastal villages and by boat to island villages.

Table 5 Grouper and Lobster Culturists in Tubigon

Name of Fishers Association*	Location (Village)	Contact Person	Number of Culturists	Number of culture Cycles and Status	Source of Financial and Technical Assistance
United Batasan Fishermen Association (UBFA)	Batasan Island	Mr. Cosicol Rodrigo or Mr. Fortunato Salomon	20		LOGODEF
Bilangbilangan Fishermen Association (BFA)**	Bilangbilangan Island	Mr. Rolando Obguia	18		LOGODEF
Macaas Fisherfolk Association (MFA)***	Macaas	Mr. Rolando Caba	18		LOGODEF
Pangapasan Fishermen Association**	Pangapasan	Mr. Wilfredo Millomeda and Mr. Federico	27		LOGODEF
Panaytayon Fishermen Association	Panaytayon	Mr. Estanislao Cervantes and Mr. Felix Cervantes	14		LOGODEF
Matabao Fisherfolk Association	Matabao	Mr. Polinga Martino	10	1/operation stopped	LOGODEF
Pandan Fisherfolk Association	Pandan	Mr. Melecio Renato	18	1/operation stopped	LOGODEF
	Pandan		8	1	FTC
	Panaytayon		8	1	FTC
Totals			141		

* =all the groups grow red snapper together with the grouper

** = these groups also grow lobster

*** = this group also grow mudcrab in an enclosed mangrove area

Live Grouper Buyers

Most of the live grouper are shipped to restaurants in Cebu City such as the Grand Majestic Seafood Restaurant, Seafood City and Maribago Bluewater Restaurant. The LOGODEF report (Calara, 2001) enumerates three buyers of groupers. The grouper culturists do not deal with the buyers directly. It is the LOGODEF fishery technicians who contact the buyers, negotiate the price and arrange delivery. As far as the technicians know, the buyers of their live fish have not shipped the live groupers abroad, and this is confirmed by our phone conversation with the biggest buyer of the live groupers from Tubigon (see section on the possible role of the private sector).

Table 6 Sources of Income of Selected Fishers in Batasan before Introduction of Grouper Culture Project

Source of Income	Tony ¹⁰	Edward	Paning	Felipe	Mesiah	Dodong	Victor
Gleaning	✓	✓	✓	✓	✓	✓	✓
Gill net (<i>catching lambay</i>)	✓	✓	✓	✗	✓	✓	✓
Fish pots (<i>timing</i>)	✓	✗	✓	✗	✗	✗	✗
Fish corral (<i>bungsod</i>)	✓	✗	✓	✗	✗	✗	✗
Use of <i>tubli</i> ¹¹	✓	✓	✗	✓		✓	✓
<i>Manulo</i> (gas-fueled gauze lamp with spear)	✓	✓	✓	✓	✓	✓	✓
Dynamite fishing	✗	✗	✗	✗	✗	✗	✓
Micro-bakery (making <i>pan Bisaya</i>)	✓	✗	✗	✗	✗	✗	✗
Fish drying	✓	✓	✓	✗	✓	✓	✓
Carpentry	✗	✓	✗	✗	✗	✗	✓
<i>Barangay tanod</i> ¹²	✗		✓	✗	✗	✗	
Aquarium fish collection using cyanide	✓	✓	✓	✓	✓	✓	✓
Pig raising	✓	✓	✓	✓	✓	✓	✓

Source: FGD with fishers in Batasan, November 19, 2002

3.2.3 Fishers and Gleaners

The coastal resource map done by CRMP through PCRA in 1997 and 1998 gives an overview of the Tubigon coastal habitats, resources, uses and issues that the local government and civil society organizations in Tubigon confront. A copy of the map is provided in Appendix 4.

Fishers

The 1997 SUML profile of Northwestern Bohol reported that, based on interviews at various landing sites, 161 species are caught in the municipal waters in the area¹³, composed of 133 species of fish, 16 species of mollusks, nine of crustaceans and three of echinoderms. Of the different species caught, 28.8% are reef-associated, 54.5% are non-reef (mostly pelagic) and 16.7% are unclassified¹⁴.

A single fisher uses different gears, sometimes all at the same time or a single fishing gear depending on a particular season, so it is difficult (if not impossible) to disaggregate the number of fishers who catch reef-associated species. Fishers in different villages do specialize in a specific gear. For example, the fishers in the island villages of Batasan and Pangapasan (see map in Figure 2) are known gill net users catching portunid crabs, *Portunus*

¹⁰ The names belong to the head of the family but the fishing activity that yields income includes those done by the wife and the children.

¹¹ A kind of poison derived from the root of the derris plant. Its use in fishing is considered illegal.

¹² Person responsible for maintaining peace and order in the village. They are paid about US\$ 2 per month by the village government.

¹³ According to the SUML report, all the surveyed fishers in the area used non-commercial fishing gear, so it is assumed that all the fish in the landing sites were caught in municipal waters.

¹⁴ A complete listing of the fish species captured in Northwestern Bohol can be found in Green et al. (2002).

pelagicus (called *lambay* in the Boholano language); the fishers in the coastal village of Panaytayon are known lift net (cast and scoop net) users catching anchovy, *Stolephorus sp.*

In an FGD on sources of income before the introduction of the grouper culture project in the island village of Batasan, some fishers mentioned as many as seven gears that they use in different fishing-related activities that contribute to their income (see Table 6). Take note that some of these gears are illegal (use of *tubli*, cyanide and dynamite), but they all have stopped engaging in these illegal fishing practices. Most of the fishers who joined the FGD owned motorized boats (see Table 7).

The complete list of the different types of fishing gears used by the fishers in Northwestern Bohol is shown in Appendix 8.

Table 7 Type of Fishing Boat Owned by Selected Fishers in Batasan

Type of Fishing Boat Owned	Tony	Edward	Paning	Felipe	Mesiah	Dodong	Victor
Motorized	✓	✓		✓	✓		✓
Non-motorized			✓			✓	

Source: FGD with fishers in Batasan, November 19, 2002

Gleaners

Gleaning is an important source of income, although this seems to be hugely under-valued by government and NGO planners and by the fishers themselves. In all five villages we visited, gleaning, usually done by women and children, was mentioned as a source of income. Gleaners collect shellfishes, crustaceans and seaweeds at daytime (called *panginhas*) usually done by women and children and at night (*panulo*, aided by kerosene-fueled gauze lamp and spear gun), usually done by men. Gleaning is usually done on tidal flats and along the shore and not exactly on or near the reefs, although *panulo* may be done near the reef, according to some fishers.

One gleaner we met on our way to the village of Batasan was Manang Elpidia, mother of 12. She told us she usually gets one to five *kaltek* (a one-liter capacity motor oil can reused as a container) of different sorts of shellfishes from one gleaning operation. A *kaltek* would fetch her 15 pesos (US\$ 0.28). She reckons she gleanes 20 days in a month, which gives an additional income to the family of 300-1,500 pesos (US\$ 6-28). She then listed the shellfishes she collects, most of which are not even listed in the SUML profile of the area in 1997. The names she mentioned were *amumpong*, *aninikad*, *litog*, *saang*, *tambayang* and several others we were not able to list down. She says when she goes gleaning there are usually around 50 other women and children with her. On our way back to the mainland from the island village of Batasan, we saw six women on their way to the tidal flat as the tide was receding.

Part-time Fishers

This seems to be a totally neglected stakeholder group. We did not have time to interview a single farmer who is engaged in part-time fishing primarily to catch fish for food. The MAO does not have a record of them, although he is fully aware of their existence. The fishers we met in the coastal villages told us that it is the part-time fishers from the uplands who use

tubli, electricity and other forms of illegal fishing. We assume that these part-time fishers do not have boats, so their fishing activity may be confined to the near-shore areas and therefore their impact on the reefs is negligible. Although some fishers told us that some part-time fishers go fishing with full-time fishers who fish near the reefs.

Market Vendors

Most of the captured reef-associated fish are sold in the local market of Tubigon. The wives of the fishers are usually the ones who bring the fish to the market. However, we met Tony (see Table 6) at the Tubigon pier on his way to the market with a basket containing a few *lambay* (crab) and some reef fish. The fishers' wives sell the fish to market vendors who in turn sell the fish to the public. The local fish and meat market in Tubigon is quite small, with less than 20 market vendors.

Fish-consuming Public

Tubigon had a population of 40,385 in 2000. In 1999, using per capita food requirements recommended by the Food and Nutrition Research Institute (FNRI), and fish production (fish ponds and municipal fisheries) during that year, the MPDC reported a deficit of 280 mt in fish production against total demand. The number of fishers may be decreasing, but fishing pressure will continue to increase due to improved fishing methods to feed the growing population of Tubigon.

3.2.4 Aquarium Fish Collection

Aquarium Fish Collectors

Most of the aquarium fish collection is happening in the island village of Batasan, although this is not the only area where aquarium fishes are found. According to Monique Piquero, project staff of the Marine Aquarium Council (MAC), there are more than 100 fishers in the village (population in 2000 was 954, with 193 households) who are engaged in aquarium fish collection.

Before the entry of IMA and MAC in the island, aquarium fish used to be predominantly caught by the use of *kuskos* (cyanide) that stuns the fish, making it easier for the fisher to catch. IMA and MAC have introduced the use of barrier nets. Twenty-seven (27) of the aquarium fish collectors are certified by the MAC and organized into the Batasan Aquarium Fish Collectors Association (BATFCA).

Aquarium Fish Traders

According to Monique Piquero, most aquarium fish traders are not certified; they do not really care if fish are caught using cyanide or not (see Box 1). She reckons that only 2% of fish traders are certified by the MAC.

Box 1 Eliminating the Use of Cyanide in Aquarium Fish Collection

Monique Piquero, Marine Aquarium Council (MAC) project staff in Tubigon, recalls the first time she visited the island village of Batasan, where fishers then were notorious for using cyanide in aquarium fish collection. In 1998, the International Marine Alliance (IMA), the group that helped organize MAC, sent her to look at the situation of aquarium fish collection in Batasan, a well-known source of aquarium fish. She was shocked by what she saw. All the aquarium fish collectors, numbering close to a hundred, were using cyanide, and they seemed to be earning a lot of money from the practice.

She recalls the first time she and her colleagues at IMA organized a seminar on the negative impact of using cyanide in aquarium fish collection. The government officials of Tubigon and the local officials at the village were supportive of IMA's activities. But the fishers who were getting a lot of money from the practice naturally did not like to have anything to do with IMA and the LGU. No one wanted to admit that they were using cyanide, for fear that they would be imprisoned if found out. Some fishers even threatened Monique and her colleagues.

Monique and her colleagues persevered, explaining to the fishers that there are alternatives. Their perseverance paid off. Since 1998, she reckons they have trained about 70 fishers in the use of barrier nets, a sustainable alternative in catching aquarium fish. Of the 70, however, only 31 are "serious" about shifting. The MAC has certified these 31 fishers as sustainable aquarium fish collectors. MAC markets their catch through certified aquarium fish exporters in Manila, ensuring a fair price for the fish collectors and ensuring quality for the buyers. Their fish are sold as far as the United States and France. The group, called Batasan Tropical Fish Collectors Association (BATFCA), is the first certified fish collectors group in the Philippines.

One of the fishers trained by Monique's group is Tito Sitoy, a 29-year old notorious former user of cyanide. Tito told them he learned about the practice of using cyanide from Zambales in Luzon. The practice caught his attention because it was bringing in a lot of money to the fishers in Zambales. When he went back to Tubigon, he started using cyanide. He was using a compressor to stay longer underwater (the government is thinking of banning the use of compressors because of its negative impact on the health of the fishers who use it).

Now, Tito is one of the IMA and MAC trainers in the use of barrier nets and other sustainable forms of aquarium fish collection. He has been invited to other places such as Guiuan, Samar, another island in the Visayas notorious for cyanide use, to conduct training activities on sustainable aquarium fish collection.

Monique admits that cyanide use has not been totally eradicated even in Batasan. There are still some fishers who practice it. She says that there are only six certified exporters in the Philippines, accounting for a mere 2% of the total number of tropical fish traders in the country. She says that as long as there are exporters who continue to buy tropical fish caught through the use of cyanide and there are buyers who do not really know how the tropical fishes in their aquaria are caught, the use of cyanide will persist.

3.2.5 Diving and Snorkeling

Divers and Snorkelers

During the entire time we were in Tubigon, we only saw one white 20-foot dive boat at the pier. The boat most likely came from the beach resorts in Tagbilaran City or Cebu City. There are resorts in Tubigon but not as many as in Tagbilaran and Cebu where the quality of accommodation and services are better. The few divers and snorkelers who go to Tubigon therefore do not stay in the resorts there. As far as we could gather from interviews, there are no user fee systems in place for diving on the reefs, perhaps because the number of divers is not really that high.

Resort Owners

The beach resorts in Tubigon are found in Inanuran, Mocaboc, Matabao and Tinangnan (see map in Figure 2). At present, the resorts are mainly catering to local tourists and not yet to foreign divers and tourists like the ones frequenting Tagbilaran and Cebu. But the potential of the area as an alternative (to Tagbilaran and Cebu) tourist site is huge. Tubigon is nearer the central city of Cebu, where there is an international airport, than Tagbilaran. There are 12 one to two hour boat trips between Tubigon and Cebu daily. The LGU of Tubigon therefore plans to boost the tourism industry in the area and it is not farfetched to think that in the near future the number of divers – who supposedly are not using the reef in an extractive manner – will increase.

3.3 Resource Governance and Management Interventions

The management of the coastal resources in Tubigon is shifting away from an open-access regime, although this is proving to be difficult. The characteristics of open-access regimes (DENR/DA-BFAR/DILG/CRMP, 2001) – i.e., no exclusivity in use, no limits to use, and indeterminate physical boundaries – are still present in Tubigon, but to a lesser degree compared to other coastal municipalities. The physical boundaries of the Tubigon municipal waters are in the process of being delineated. Only 10% of non-Tubigon residents are allowed to fish within its municipal waters (difficult to enforce), and limits to use are being imposed, although almost anyone can just catch fish in Tubigon municipal waters. Nevertheless, Tubigon is advanced in coastal resource management (CRM) compared to other municipalities in the country. (See Appendix 9 for a more detailed discussion on the history of fishery management in Tubigon.)

3.3.1 Coastal Resource Management Policy

The policy framework that guides coastal resource management in Tubigon is the municipal ordinance called “Tubigon Coastal Resource Management Code of CY 2000¹⁵” passed by the municipal council on 11 July 2000. The code was formulated through a series of consultations with fishers, NGOs, private groups and local government, which means there is a wider ownership of it compared to other formally written policies in the Philippines that are usually formulated only by experts. The code, however, is written in English. So while those fishers (mostly members of the FARMC) who participated in its formulation are aware of its provisions, it is doubtful if the essence and content of the code is widely communicated and understood among all resource users.

Based on our interviews, it appears that many of the code’s provisions are not yet implemented. For example, Section 10 of the code provides for the maintenance of a registry of all municipal fishers. Our meeting with the MAO gave us the impression that their office is having a hard time putting together this registry, much more its regular annual updating. Section 14 designated a closed season for the catching of siganids. We were told that it has been difficult to implement this particular provision. Section 30 of the code describes the schedule of license fees for all fishery activities. Again, our interviews with government

¹⁵ The full text of this code is contained in Calara (2001). The Tubigon LGU received a lot of assistance from LOGODEF in the formulation of this code.

officials tell us that the revenue generated from these fees is negligible. Section 31 explains the coding of motorboats with a “green patch at the bow” with an inscribed letter code specifying the village from which the boat comes. The boats we used in visiting the island villages did not have this green patch.

Many groups in the Philippines regard policy formulation as an end result rather than the beginning of a process. It seems that Tubigon has not been exempted from this malady. Nevertheless, awareness of issues and concerns in policy formulation and enforcement places Tubigon in a better position to implement the code. The code will be reviewed in its third year of implementation (July 2003).

Table 8 Responsibilities of LGUs in CRM

Aspect	Responsibility
Protection and conservation	Establishing closed seasons, fish refuges and sanctuaries
Regulation	Issuing licenses and permits (except for commercial fisheries), registry system, granting of fishery privileges, establishing mechanisms for inclusion, prioritisation, etc.
Enforcement	Setting up patrolling and enforcement mechanisms through <i>bantay dagat</i> (sea wardens) and other means that involve <i>barangay</i> (village) officials and communities
Legislation	Formulating and passing ordinances that reflect the needs of improved coastal resources management
Extension/Technical assistance	Providing appropriate technology and research, credit, and production assistance to municipal fishers and communities

Source: DENR/DA-BFAR/DILG/CRMP (2001)

3.3.2 Institutions Responsible for Resource Management

The Local Government Code of 1991 (RA 7160) and the Fisheries Code of 1998 (RA 8550) devolved responsibility of managing municipal waters from the national agency, the Bureau of Fisheries and Aquatic Resources (BFAR), to the LGUs.

The specific unit within the Tubigon LGU that is primarily responsible for coastal resource management is the Municipal Agricultural Office (MAO), although the MPDO (2000) is also much involved. The MAO of Tubigon at the moment does not have a CRM section¹⁶. Its fisheries technician, Victor Boligao, a fisheries education graduate specializing in marine fisheries from one of the fisheries schools in Bohol, is on detailed assignment to the LOGODEF project. The LOGODEF project is wrapping up in December 2002. Its team of four fisheries technicians will be reintegrated into the MAO and will form the CRM section of this office. Victor Boligao will head this section. The project director of the LOGODEF project will return to his previous job as MPDC.

¹⁶ The creation of the CRM section within the MAO is Section 42 in the Tubigon Coastal Resource Management Code.

Table 9 Anatomy of the Management Strategy to Eliminate Destructive Fishing in Tubigon

Component	Specifics	Results
Policy reform	Changes in national policy	Devolution of resource governance to local government units
		Declaration of municipal waters (15 kilometres from the shoreline) as exclusive zone for small fishers
	Formulation of a local policy on coastal resource management	Clear local agreements on access rights and responsibilities of various stakeholders (see table 10)
		Zones for different resource uses are established
Institutional strengthening	Capacity building for local government units	A more responsive local government delivering resource management services - such as regulation, protection, extension - to resource users
	Training policy enforcers	Greater chances that national and local policies enacted are enforced
		Near total eradication of illegal fishing practices
Asset building	Increasing resource users' human capital by introducing new skills	Diversified sources of income that now includes sustainable aquaculture activities
	Enhancing resource users' social capital by encouraging group building and networking	More confident fishers to articulate needs and represent interests in resource management bodies such as the FARMC and MDCs.
	Increasing resource users' financial capital by providing alternative credit	Ability to engage in diverse livelihood activities than before
	Increasing resource users' natural capital by securing entitlement to the area where the resource is found	Wider fishing area which leads to increase in fish catch
		Absence of competition from commercial fishers which leads to increase in fish catch
	Increasing resource users' natural capital by rehabilitating the resource	Establishment of protected areas that allow the regeneration of the resource

3.3.3 Resource Management Interventions

The resource management issues confronted by Tubigon through the years are varied, but the biggest one relates to destructive fishing. The PCRA done by CRMP in 1997 specifically locates the problem of destructive fishing in the middle of the islands of Bilangbilangan, Bagong Banwa and Pangapasan. We were told by people we interviewed that if the PCRA was done ten years ago, the key (legend) specifying the issue of destructive fishing would dot the entire map. Stuart Green, a former VSO volunteer and now CRMP consultant, who has lived in Bohol for more than eight years, told one of the authors of this report in a phone conversation that the problem of destructive fishing in Tubigon is 95% solved. Noel Mendaña agrees with this assessment, although he emphasized the fact that the problem is still there.

Many CRM-related groups in the Philippines have been struggling with the issue of how to eliminate the practice of destructive fishing. Will the practice die out only when the fisheries have totally collapsed? The experience of Tubigon shows that it is possible to eliminate destructive fishing through some management interventions. The management strategy to eliminate the practice of destructive fishing in Tubigon evolved from the myriad initiatives of several actors (such as international development agencies, local NGOs, local and national government and people's organizations). The convergence of these initiatives, seen from the

lens of the Sustainable Livelihoods Framework, seems to contain the components enumerated in Table 9.

Such a strategy is of course more easily written on paper than it is implemented. The lessons derived from the implementation of these strategies shall be discussed in later sections.

Table 10 List of Marine Protected Areas (MPAs) in Tubigon

Village	Area (ha)	Management Organization	Date Approved	Legal Basis
Macaas	12.70	Macaas Fisherfolk Organization	5 September 1999	Municipal Ordinance No. 02, s. 1999
Pangapasan	6.75	Pangapasan Barangay Council and Fisherfolk Organization	December 1998	Municipal Resolution No. 98-102A
Batasan Island	21.00	Batasan Barangay Council and Fisherfolk Organization	24 February 1999	Barangay Ordinance No. 1, s 1999 Approved by Sangguniang Bayan
Bilangbilangan Island	10.50	Bilangbilangan Barangay Council and Fisherfolk Organization	June 1999	Barangay Ordinance No 1, s 1999 approved by the Sangguniang Bayan
Matabao Pandan Panaytayon	110.00	Matabao, Pandan and Panaytayon Marine Sanctuary Management Council	October 1999	Resolution No. 1 of the Joint Barangay (Matabao, Pandan and Panatayon) Council meeting.
Total	161.00			

3.4 Results of Management Interventions

In this section we will provide evidence for some of the results enumerated in Table 9 that we observed and gathered from our interviews. In terms of the livelihoods framework, these changes relate to:

- a. Changes in livelihood strategies of fishers (near total eradication of illegal fishing practices and further diversified sources of income)
- b. Changes in policies, institutions and processes (more responsive local government unit in terms of delivering CRM as a service to the fishers), and
- c. Changes in human and social capital (more confident fishers who can articulate their needs and represent their interests who have links with various networks).

3.4.1 Dramatic Reduction in Illegal Fishing Practices

The majority of fishers we interviewed were engaged in some form of illegal fishing in the past (e.g. see table 11). All of them informed us that they have shifted to sustainable forms of fishing and many of them are now members of *bantay dagats*. Several people told us that the practice of dynamite fishing, using cyanide in collecting tropical fish and the use of *tubli* still exist, although confined to a few areas. The island of Mantatao, in the neighboring town of

Calape, according to many, remains a haven of dynamite fishers. Nevertheless, the consensus is that lots of former illegal fishers (as shown by the case stories presented in boxes) have shifted to sustainable forms of fishing.

Table 11 Sources of Income of Selected Fishers in Macaas before and after the Ban on Liba-liba (a type of pull net) until the Present

Fishing activity before	Boy	Claro	Rodel	Teodoro
Liba-liba	✓	✓	✓	✓
Hook and line	✓	✓	✓	✓
Gleaning	✓	✓	✓	✓
Fishing Activity after	Boy	Claro	Rodel	Teodoro
Palangre	✗	✓	✓	✓
Grouper culture	✓	✓	✓	✓
Mudcrab culture	✓	✓	✓	✓
Gleaning	✓	✓	✓	✓
Patrol (seaborne)	✓	✗	✗	✗
Type of boat	Boy	Claro	Rodel	Teodoro
Motorised	✓	✓	✓	✓
Non-motorised				

What made them change? We got varied answers, but many agreed that the biggest factor in their shift is the fear of being caught¹⁷, which seems to mean the policy enforcers in the area are doing their job. Mayor Paul Lasco told us that a lot of confiscated fishing gears are now rotting in their warehouse but illegal fishing has not been totally eradicated. The remaining illegal fishers have become smarter. They have lookouts, so while the patrol boat approaches, they just cut, leave their fishing nets and escape, which is all the patrols get. The dynamite fishers now operate in teams consisting of a thrower and lookout-cum-dead fish retriever. The thrower leaves the fishing area once the dynamite has been thrown, leaving the retriever to “harvest” the dead fish. When questioned, the retriever argues that he just happened to be in the place and does not have any paraphernalia that would link him to having thrown the dynamite. Usually, the mayor adds, the dynamite fishers do not operate in their own areas. As the illegal fishers are getting smarter, the law enforcers need to think of better ways to enforce the law.

3.4.2 More Responsive Local Government Unit in Terms of Delivering Services Related to CRM

The municipality of Tubigon is considered to have the longest experience in CRM (Green et al., 2000). Its programs in the early 1990s and have been sustained by two municipal government administrations, which seems to suggest that the CRM programs in the area have been impervious to changing political leadership. Experiences elsewhere in the Philippines have shown that incumbent administrations usually disregard and do not build on the gains of programs implemented by past administrations, especially when there is no related legislated policy.

¹⁷ The penalty for fishing with explosives and cyanide is imprisonment ranging from 5-10 years.

Box 2 A Big Shift

Wilfredo Mellomida, 39, married with five children, is the vice president of the Pangapasan Fisherfolk Association. He only finished elementary education and got married at the age of 18. In his youth, his island was noted as a haven of the dynamite fishers. Fredo, as he is fondly called by friends, became one of them. He was a member of a team of four where he acted as the compressor diver and fish retriever after each blast. Eventually, he did the practice on his own and only stopped some seven years ago.

Fredo recalled that he was scared at first but it became a habit and eventually he became an “expert” at it. He confessed fear of losing limbs, even his life, every time he was about to throw lighted dynamite. But he thought he had no choice, he does not know of any other way to feed his growing family.

He was not aware or concerned with the adverse effects of dynamite on the marine habitat then. All he was thinking was to have plenty of catch and he dreamed of owning a motorized fishing boat someday. The practice went on for ten years, and finally he acquired his dream boat. His income doubled but the massive campaign against illegal fishing activity started, and so he slowed down for fear not just for his life, but also of the penalty of imprisonment if caught.

Different programs of government agencies and NGOs on the management of coastal resources led to the delineation and declaration of a portion of the island as a protected area. The fishers were organized and, together with the Barangay Council, manage the sanctuary. These had a positive effect on Fredo: he became an active participant of the many seminars and fora in the municipality and in the province. He adopted the alternative fishing practice suggested by the programs: gill net for catching crabs. He acquired the fishing gear through a soft loan extended by the Department of Agriculture.

When the mariculture (grouper and lobster) project of the LOGODEF and the LGU was introduced, he saw this as another opportunity to augment their income. He sees the project as a part-time activity that they can do even with their usual crab gathering and anchovy fishing.

Fredo is proud to say that he helped the FTC marine biologist volunteer in the conduct of resource assessment in their area, so he knows the techniques in doing fish visual census, transects and quadrats. In October 2002, he was tapped by Reefcheck, an NGO specializing in reef assessments, as one of the team members who conducted the coral assessment in Tubigon.

Today, Fredo says he is a happy and contented man: no more fear of imprisonment or premature death, and he feels fulfilled that somehow he is helping leaving a healthier coastal environment to his children.

The local government of Tubigon is like a conductor that brings harmony to the diverse ensemble of CRM initiatives in the area. Crucial to this coordination role are the incumbent mayor, Paul Lasco; the MPDC, Noel Mendaña; the MAO, Eпитacio Mumar; the four fisheries technicians who are on loan to LOGODEF; the members of the FARMC; and the eight full-time *bantay dagats* (called “sea borne patrols”) and two Philippine National Police (PNP) officers who are assigned to provide support to the *bantay dagats*.

The Tubigon CRM corps, so to speak, may be a small one compared to the size of the resource that it is responsible for managing (133.3 km² of coastal area). Support comes from NGOs such as LOGODEF, Feed the Children, fishers associations at village level, and the volunteer *bantay dagats* at village level. The municipal government has an annual budget of 400,000 pesos (US\$ 7,600) for CRM, and according to Noel, the CRM annual budget will be increased by another 400,000 pesos when the LOGODEF project has been handed over to the municipal government in January 2003. The municipality has six patrol boats, three of which were donated by FTC to the coastal villages of Panaytayon, Matabao and Pandan.

While it is clear that Tubigon is advanced compared to other Philippine municipalities, there are still some areas where we think Tubigon could improve in delivering CRM as a service to its fisher constituency. These are in:

- a. Keeping and maintaining a registry of fishers and implementing a licensing system
- b. Institutionalizing simple ways of resource monitoring like what the volunteers of FTC have taught the fishers of Pangapasan and Batasan, and
- c. Ensuring that funds for maintenance and servicing of patrol boats are available.

These persons have attended training courses and seminars on CRM organized by the likes of CRMP; they have joined study tours to other areas, including foreign countries, which according to those who went, such as Noel, has broadened their perspective. The *bantay dagats* have received specialist training on apprehension and coastal laws from BFAR.

Box 3 Thinking of Solutions

Before we took the boat to his island (Pangapasan), Victor Boligao passed by the market. I took a picture of him buying assorted small fishes in one of the fish stalls. When I asked him what the fishes were for, he answered, "I'll test them as feed for the grouper."

Victor is trying to find a solution to the problem of lack of trash fish to feed the groupers and lobsters being grown by the fishers they are helping. He knows that some of the trash fish they buy may be coming from commercial fishing operations that are encroaching on municipal waters. It is difficult to prove this, but they need a constant supply of trash fish to sustain the mariculture project. Some fishers have suggested that they get trash fish from the fish corrals and lift nets in their own area, or they operate their own lift nets to have a constant supply of trash fish. There are suggestions that they link with commercial fishing operators in Cebu who they know are observing the law. Victor waits for more suggestions.

This is just one of the issues that he has to deal with every day as a fisheries technician of the LOGODEF project. He is responsible for providing technical support to grouper culturists in two sites. For example, he helps them source feeds, monitor the growth of the fish and seek out buyers.

Victor's father died in an accident when he was only one year old. The dynamite that his father was holding exploded before he could throw it into the water. His older brother became a fisherman like their father, but Victor persevered to become a teacher. So he took a course in fisheries education, specializing in marine fisheries. He ended up teaching not in a formal four-walled classroom but in a bigger classroom that is the fishing community of Tubigon.

Next year, when the LOGODEF project is handed over to the municipal government and when the CRM section of the municipal has been created, Victor will assume responsibility for coordinating its activities.

3.4.3 Further Diversifying Sources of Incomes

Table 5 in the previous section shows that the sources of income of fishers in Tubigon are already diversified. They are engaged in different sorts of fishing activities, and some of them also derive income from non-fishing-related activities. The introduction of aquaculture projects by LOGODEF and FTC has further diversified the sources of fishers. The fishing-related activities of many fishers of course also changed from one where the dominant source was illegal fishing to one that is diversified.

Box 4 A Changed Man

Estanislao “Tani” Cervantes is now a changed man. He grew up knowing that the food on their table came from the dynamite fishing activities of his father. Naturally, as a young man, he became a fisherman himself like his father and did the same things that his father did (being involved in dynamite fishing), but this time he was just supplying bottles to contain the ingredients for dynamites (or was he just trying to hide something from us?). He also bought and sold fish caught with dynamite.

His wanderlust brought him to many places in the country such as Palawan, Masbate and Manila Bay. In these places, the only job he could find was as a boat-hand on big commercial fishing boats, a job that is not much different from the simple fishing activity in his village. In his travels, he saw dynamite fishing everywhere!

Working with commercial fishing boats satisfied his itchy feet but it did not bring enough food to his family’s table. He was already married with children when he started traveling. So he went back to his family in Panaytayon and contented himself with *pamasol* (hook and line fishing), using his small boat (until now he still uses the same non-motorized boat). Sometimes he would sell his catch to the few tourists in the resorts near his village. The tourists paid more for his fresh catch.

Manong (uncle) Tani likes to talk and is curious about anything new just like he is curious about far away places. He joined the discussions of the local government and the NGOs about CRM in their area and eventually became a *bantay dagat* that patrolled a fish sanctuary established through the Feed the Children in the middle of the three villages of Matabao, Pandan and Panaytayon. He is proud to say that the presence of the *bantay dagats* has drastically brought down illegal fishing activities.

Manong Tani is one of the grouper culturists in Panaytayon. He reckons that he spends about an hour a day for the project, but it has added about 20 percent to his income. Not bad, he says, for an additional hour of extra work, as he has not abandoned his other fishing activities. Apart from the additional income, the platform at the shed near the fish cages has provided him and his grandchildren a nice place to take *siesta* (afternoon nap) and offered him tranquil moments alone to ponder life’s challenges, he jokes.

Table 12 shows the sources of income of fishers in Panaytayon who are members of the LOGODEF-assisted grouper culture project. They told us that none of them have non-fishing sources of income, which is a bit surprising for fishers living in coastal villages, where there are more opportunities to engage in non-fishing activities.

Table 12 Sources of Income of Selected Fishers in Panaytayon at Present (2002)

Sources of Income	Tani	Ricardo	Junior	Eduardo
Anchovy fishing	✗	✓	✓	✓
Squid jigging	✓	✓	✓	✓
Hook and line	✓	✓	✓	✓
Gill net (pukot)	✓	✓	✓	✓
Gleaning	✓	✓	✓	✓
Torch/kerosene-fueled gauze lamp spear gun	✓	✓	✓	✓
Grouper culture	✓	✓	✓	✓

The percentage contribution of different sources of income (fishing-related) to one fisherman in Batasan, who was open enough to share the information with us, is shown in Figure 3. Getting information on income is difficult, but one fisher in Pangapasan, *Manong* Macario, who is one of the village councilors, told us that he gets an average gross income of 5,000

pesos a month (US\$ 94) from gill netting *lambay* (blue crab) and this, he estimates, constitutes 70% of his total income. He owns a motorized boat, so the net income is less after expenditures have been deducted. *Manong* Macario is not a member of the grouper culture project, but he supports it.

The income situation of fishers engaged in gill netting (mostly from island villages) who own a motorized boat may be similar to *Manong* Macario; we estimate that they are earning 60,000-70,000 pesos (US\$ 1,122-1,308) a year. If they are a family of six (*Manong* Macario has five grown children), they are just under the poverty threshold.¹⁸

It therefore seems safe to assume that fishers with non-motorized boats and the gleaners who catch less fish and who constitute about 50% of the fishers in Tubigon live below the poverty line¹⁹. The municipal profile of Tubigon estimates the monthly income of anchovy fishers at 4,500 pesos (US\$ 84). Fishers seem to invest a big portion of their income in housing. In the island villages of Pangapasan and Batasan, many houses are made of concrete, although unpainted and always under construction. The reason we were given for this is that these islands are perpetually visited by typhoons. Houses seem to be continually under construction because they are constructed in installments, i.e., the basic structure first, then the next room when more money has been saved.

Figure 3 Percentage Contribution of Different Fishing Activities to the Income of Tony Salomon (based on Table 6)

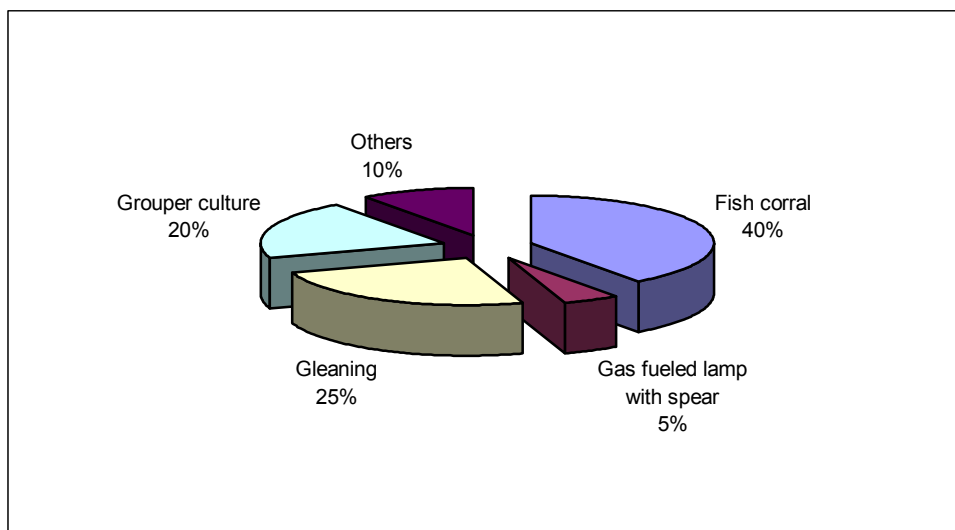
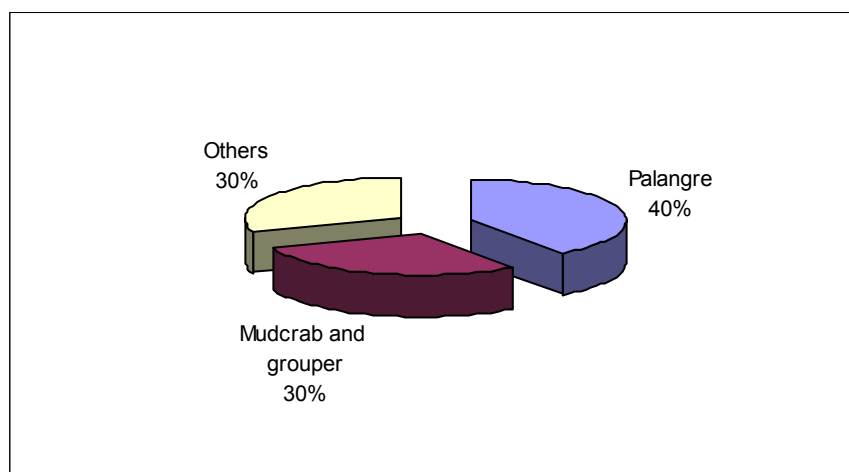


Figure 4 shows the percentage contribution of fishing activities to the income of some fishers in the coastal town of Macaas. They have not stopped or decreased their other fishing activities, so the 30% contribution from mudcrab and grouper culture is additional income, although they found it difficult to estimate their total incomes.

¹⁸ The annual per capita poverty threshold in 2000 was 13,916 pesos or US\$ 247.

¹⁹ The national poverty incidence (proportion of families with income below the poverty line) in 2002 was 34.2%.

Figure 4 Percentage Contribution of Fishing Activities to Incomes of Some Fishers in Macaas Who are Mainly Engaged in Multiple Hook and Line Fishing (palangre) (2002)



The price of fish obviously fluctuates, but there seems to be no specific time of year when fishers are highly vulnerable due to adverse periods. A seasonality map drawn by fishers in the villages of Batasan and Panaytayon is shown in Tables 13-15.

Table 13 Seasonality Map for Some Selected Fishing and Other Livelihood Activities in Batasan

Fishing and Other Livelihood Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gleaning	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Peak	Peak
Use of gill net (blue crab)	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Peak	Peak	Non-peak	Non-peak	Non-peak
Use of fish and crab pots	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Peak	Peak	Peak	Non-peak	Non-peak
Harvesting from fish corral	Peak	Peak	Peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Peak	Peak
Carpentry	Non-peak	Non-peak	Non-peak	Peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak
Use of lights	Non-peak	Non-peak	Non-peak	Peak	Peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak
Aquarium fish collection	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak
Grouper culture	Non-peak	Peak	Peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak	Non-peak

Legend: ■ = peak season; ■ = non-peak season

Table 14 Important Events and Occurrence of Typhoons in Batasan²⁰

Event/Typhoons	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Village feasts												
Typhoons												
Groupers prone to disease ²¹												

Table 15 Seasonality of Important Fishing Activities in Panaytayon

Fishing Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anchovy fishing												
Squid jigging												

Legend: ■ = peak season; ■ = non-peak season

We estimate that the aquaculture projects introduced by LOGODEF and FTC bring in a net total extra income of at least 2,000,000 pesos (US\$ 39,000) annually²². This amount is small if we consider that the support mechanisms (e.g., salaries of fishery technicians, networking with markets) to ensure the success of these aquaculture projects, in our estimate, would cost 400,000 pesos (US\$ 7,477) annually. To be economically sustainable (net proceeds from aquaculture projects sustaining the operations of the mechanisms that support it), the project needs to expand. The aquaculture projects therefore are still partly subsidized by LOGODEF, FTC and the municipal government. There is, however, a big area for expansion as the projects right now occupy a small space, although there is a problem with supply of trash fish and fry and fingerlings.

3.4.4 More Confident Fishers to Articulate Their Needs and Represent Their Interests

A key thing that happened in Tubigon is that fishers' needs, perspectives and interests are represented in discussions on how the coastal resources on which they depend for their livelihood are managed. The creation of the municipal FARMC (as spelled out in RA 8550 of 1998 and Article 8 of the Tubigon CRM Code of 2000) made this possible. The FARMC is a body composed of fishers, government officials, NGOs and commercial fishers that advises and assists the municipal government in the implementation of its CRM program (see Appendix 10 for a list of the members of the FARMC).

²⁰ Based on Batasan grouper culturists

²¹ Based on Panggapasan grouper culturists as told to the researchers

²² 15,000 pesos estimated net income per individual per year multiplied by 141 individuals

The effectiveness of the FARMC in Tubigon to represent the interests of fishers was tested last year when the municipal government received a proposal from commercial fishers for them to be allowed to operate between 10.1-15 km in the Tubigon municipal waters (RA 8550 states that this is possible as long as the municipal government agrees) even if they are asked to pay higher fees. The FARMC in Tubigon, according to MAO Eпитacio Mumar and FARMC chair, discussed and voted on the matter. The side against allowing commercial fishers in Tubigon waters won the voting.

The FARMC as a structure in itself does not really guarantee that fishers', especially poor ones, needs, perspectives and interests are properly represented in coastal resource management planning and implementation. What seems to have made it work in Tubigon is that the area has been a "learning site" for many CRM groups for almost a decade, which seems to have enhanced the overall human capital (knowledge and skills in CRM²³) and social capital (trust in their government officials, trust between NGOs and government, networking with outside groups) of the area making it more equipped to deal with CRM issues in a more constructive sense.

Box 5 Shifting to More Sustainable Forms of Fishing

Before, the only form of fishing that Roland "Boy" Caba knew was the use of *liba-liba* (a kind of pull net). But in 1984, *liba-liba* was banned because it was considered an active fishing gear that catches even juvenile fish. It was therefore rather hard for *Manong* Boy to shift to using another fishing gear. Besides, he does not really have the money to invest in buying new fishing gears.

Many of his fellow fishers were forced to leave fishing and went into farming; there were only 55 of them left, he remembers. The 55 were already organized into a fishers association. Together they sought an audience with the mayor to explore options. The mayor referred them to Representative Agana, who promised them a loan of 375,000 pesos (US\$ 7,009) through the Department of Agriculture for them to buy gill nets. They were also given a loan of 60,000 pesos (US\$ 1,121) to buy pump boats for their members who did not have this.

He says that their income dropped dramatically – from 2,000 to 5,000 pesos (US\$ 38-93) individual share (*liba-liba* requires about 30 people) per fishing trip to 100 to 400 pesos (US\$ 1.80-7.50) per day. But they were encouraged by the support from the government. So whenever there was a government project in their area they participated in it. In 1990, through the CVRP, they joined a mangrove reforestation program, installed artificial reefs, attended training courses to become *bantay dagats* and they helped in the establishment of a marine sanctuary. Presently they are involved in the LOGODEF mariculture project.

Manong Boy even invited representatives of the Social Security System (SSS) to come to his village so that fishers in their village could become members of the system and be entitled to pensions in their old age and to medical insurance. They may be the only fishing association in the Philippines whose members make contributions to the SSS.

Today, they have been given tenure to the mangrove area they have rehabilitated through the Community-based Forest Management Agreement (CBFMA) programme; *Manong* Boy is now a full-time *bantay dagat* earning an extra 150 pesos (US\$ 2.80) a day. Most importantly, for their efforts, the association was awarded the Presidential *Gawad Saka* Award. *Manong* Boy received the certificate and the cash award from President Gloria M Arroyo herself at the presidential palace!

²³ The fishers in villages where FTC operates, for instance, have billboards showing results of the PCRA that they conducted themselves with the help of volunteer marine biologists. They told us they can now do resource assessments by themselves, but there is a need for support from government for this activity to become embedded in the systems of village governments.

4. Lessons from the Experience of Tubigon

In this section, we describe the lessons derived by the project implementers, the fishers themselves and our own interpretation of the lessons from Tubigon's experience in introducing sustainable aquaculture practices that replaced illegal fishing practices. The specific questions we are attempting to answer in this section are:

- What are the most suitable methods for the introduction of sustainable aquaculture practices?
- What is the possible role of the private sector in this?

4.1 Methods for the Introduction of Sustainable Aquaculture Practices

Our interviews with key informants point to four key lessons²⁴:

1. The introduction of sustainable aquaculture practices should be part of a coherent wider program of intervention in coastal resource management
2. The participation of resource users in the design of the intervention is key, along with partnerships with relevant organizations
3. Adequate social preparation and technical support help ensure success, and
4. Programs should invest in embedding a culture of responsible resource governance.

4.1.1 Coherent Wider Program of Intervention

The failure of past programs, Noel Mendaña, Tubigon MPDO, told us, was largely due to the singular focus on regulation, without considering any other aspect. It was thought then that if an illegal fishing practice were banned, it would lead to the elimination of that practice. The story of Boy Caba (see Box 5) shows otherwise. It was the mix of financial support to engage in alternative fishing methods given by the government then and the awareness-raising programs of NGOs that made them abandon illegal fishing.

The LOGODEF mariculture project was not introduced in isolation, with the sole objective of just giving fishers an alternative and additional source of income. The mariculture project had three elements: environmental management and protection, livelihood and employment generation, and local economic development and promotion (Calara, 2001).

The first element consists of a mix of interventions that at first glance have no direct bearing on the introduction of aquaculture practices. These are policy formulation, coastal resource assessments, zonation, and coastal resource management planning. Apart from just increasing the human capital of poor resource users (by giving them knowledge on how to culture groupers, mudcrab, oysters and mussels), the project also invested in improving the local policy environment, enhancing local processes in CRM (resource assessments and zonation)

²⁴ A *lesson* is defined here simply as doing something differently in the light of experience.

and strengthening the capacity of local institutions (primarily local government) to plan and implement CRM programs.

The key components of an integrated program of action that the initiatives in Tubigon seem to have converged into are already listed in Table 9. If a SWOC²⁵ analysis was done on the CRM practice of Tubigon ten years ago and compared with the current practice, there would be clear improvements in the areas of policy environment, capacity of the local institution to implement CRM and the capital assets situation of primary resource users.

Future interventions should analyze what is already in place and build on this, rather than reinvent the wheel from scratch again.

4.1.2 Participation and Partnership

“Coastal resource management needs the cooperation of all major stakeholders in the locality,” reads a caption in the LOGODEF book showcasing its experiences. This principle seems to have penetrated the core of the way the Tubigon LGU implements CRM. The formulation of the local CRM policy framework (Tubigon CRM Code) was a result of several consultations with various local stakeholders, the majority of whom are fishers and representatives of *barangay* governments. The selection of sites for marine sanctuaries was done jointly by fishers, NGOs and the LGU. The zonation of the Tubigon municipal waters is also being done in consultation with several groups; this process has not been completed (as of December 2002). The type of aquaculture projects to be tested emerged as a result of discussions with fishers associations. The selection of who should participate in the aquaculture projects was decided in consultation with *barangay* officials and the fishers associations. Fishers are even involved in carrying out participatory resource assessments and are capable of doing transects and quadrats. There is therefore local ownership of the many CRM initiatives in Tubigon.

The conduct of the participatory processes was made possible through the support of development agencies and NGOs such as CRMP, LOGODEF and FTC. The focus of support of these groups should now shift to further enhancing the capacity of persons within the institutions in the municipality to facilitate participatory processes by themselves. We felt that there is still a general lack of confidence in using the results of participatory processes for decision-making and resource management. For instance, results of PCRA in Batasan and Pangapasan are not really used by the *barangay* governments in these villages in their planning. They seem to rely on the results of a more “official” resource assessments done by academics and NGOs rather than the ones they could already do.

An area where lessons have been learned it seems is in the process of selecting beneficiaries for aquaculture projects. The grouper culture projects in Matabao and Pandan have been stopped because of high mortality and therefore the projects were losing money. There was also perceived dishonesty on the part of some beneficiaries. Pepito Flores, a member of the fishers association in Matabao, told us that he thinks the perception of dishonesty is true. Some members borrow money from LOGODEF to buy trash fish, but they use the money for something else. He also thinks that the project should not have chosen beneficiaries who are relatively well-off and therefore did not really need the additional income from the project.

²⁵ Strengths, Weaknesses, Opportunities and Constraints

He thinks that some members' motivations are questionable. This seems to suggest that the "Guidelines for Mariculture Financial Assistance" document of LOGODEF should include in its provision on eligibility a line about fishers who are most in need should be prioritized and not just any "active" member of the fishers association. This member should demonstrate willingness to participate in all the preparatory aspects (e.g., orientation, training) of the project. LOGODEF started its grouper culture projects in Matabao and Pandan and it seems the other succeeding sites benefited from the experience of these two villages.

Another value of partnership and participation for Tubigon is the sharing of responsibility for CRM to a wider group of actors. Noel Mendaña told us that they have long realized that their staff of four fishery technicians and six sea wardens supported by two police officers can not possibly effectively manage 133 sq km of municipal waters and attend to the needs of about 1,400 municipal fishers. This is why he said their CRM plan includes the initiatives of NGOs such as IMA, Haribon, FTC and CRMP. The LGU meets these groups regularly for purposes of coordination of efforts, helps them with their information needs, and even provides local financial counterpart to the projects they implement.

4.1.3 Adequate Social and Technical Support

Mariculture projects require investments that poor fishers in Tubigon can not afford. The investment cost for one module (two 3 x 3 meter cages) including operating costs for one cycle operated by two fishers is about 90,000 pesos (US\$ 1,682), or about 45,000 pesos (US\$ 841) per fisher²⁶. A gill net costs only 5,000 to 6,000 pesos (US\$ 93 to 112)²⁷ which could somehow earn for the fisher on a daily basis. Mariculture projects require more management skills than the extractive forms of fishing, although the time required for management is not really a lot (less than an hour a day). The fishers need to calculate feeding rate and monitor fish growth, water quality and fish diseases. There is also a need to watch and protect the cages from potential intruders and poachers.

The problem with the high cost of investment was addressed by the provision of LOGODEF of soft loans (8% interest per annum) to fishers. The lack of knowledge and skills of fishers in grouper aquaculture was tackled by the provision of practical training courses in grouper culture from SEAFDEC and by hiring local fishery technicians who can provide daily technical support to fishers.

The fish cages were established in a complex of eight modules – either as floating cages or permanent fixtures – in each village for the LOGODEF-assisted projects. The FTC-assisted projects had fewer modules (four only) in one complex. Except for Panaytayon, where FTC and LOGODEF are each assisting one fish cage complex (i.e., there are two complexes in the village), all other villages have only one fish cage complex. Each fisher has a module of his own but they work in pairs for feeding, monitoring growth and looking after the fish. But the entire fish cage complex in each village is managed in a cooperative way, meaning the sourcing of feeds, connecting with buyers and selling of the marketable sized fish is done by the group, not individually, with the help of the fishery technician.

²⁶ Based on LOGODEF calculations in 2001

²⁷ Based on estimates of fishers interviewed

This mode of organization ensured that each fisher gets support from other fishers, facilitated the provision of technical support from the fishery technician, and encouraged shared learning. On the other hand, it required some skills from fishers in managing people that are not needed if fish culture is done individually. For this, LOGODEF relied on the previous work of FTC and CRMP in organizing groups.

The work of the fishery technicians is funded by LOGODEF, and later this will be shouldered by the LGU. This support is crucial and the LGU and local fishers should find ways to ensure that financial support to the work of the fishery technicians is ensured. One way to do this perhaps is to ask fishers to contribute a small part of their additional income to finance the work of the technicians.

4.1.4 Embedding a Culture of Responsible Resource Governance

Resource governance is the way in which resource uses are managed by sets of rules, social norms and shared strategies. It includes enforcement mechanisms such as policing measures and punishments (Bunce et al., 2000). Perhaps of the four key lessons enumerated here, embedding a culture of responsible resource governance is the most important.

When asked what it is that makes Tubigon able to effectively implement CRM that many other municipalities in the Philippines are not able to do, Mayor Paul Lasco jokingly replied, “It is a trade secret.” Noel Mendaña laughed when told about this. But he was quick to add that the “secret formula” is a simple “potion” of enhancing the character of a community’s natural leaders by training them and exposing them to other projects so that they can expand their horizons and broaden their thinking and later they can serve as champions for a program such as CRM. This does not sound like a difficult formula and it seems many municipalities have done the same with less convincing results.

Maybe the fact that Tubigon is, by Philippine standards, an old municipality (it is 150 years old) has something to do with it. It has a long experience of governance and perhaps its political leaders have more experiences to draw lessons from their longer history, although it seems similarly old municipalities in the country are still embroiled in petty politics.

An interesting fact that we observed in Tubigon is that persons in power seem to have no vested interests in commercial fishing and other undertakings that are in conflict with the interests of municipal fishers who compose the majority of coastal resource users in the municipality. There are only a few commercial fishers based in the area and those who intrude in their municipal waters come from other areas. This absence of vested interests with the local government may also have something to do with its effectiveness.

Whatever it is that makes the Tubigon LGU click in terms of implementing CRM programs, fishers we interviewed are united in the perception that it is a government that they can depend on and make suggestions to. The programs implemented in the area would have not succeeded if the local government did not support them. The staff of the NGOs (IMA and FTC) we interviewed echoed the sentiments of the fishers.

The lesson that this seems to tell those from external development agencies is that any program of intervention should integrate within its component a strengthening of the local government as an institution that has the responsibility to deliver basic services, along with coastal resource management as a service, to its constituency. NGOs, for instance, should not

compete with government in delivering CRM as a service that many NGOs in the Philippines are wont to do; rather it should work together with government and strengthen it rather than undermine its mandated function.

The LGU of Tubigon admits that it owes its strength in implementing CRM to all the programs of external agencies that helped strengthen not just their capacity as an LGU but those of their constituency as well through organizing them, raising their awareness and teaching them new skills. LOGODEF, FTC, IMA, MAC, CRMP and Haribon in particular deserve most of the credit, Noel and Mayor Lasco told us in separate meetings. BFAR, in collaboration with the regional development council, is also instituting a CRM certification for municipalities that would qualify them for specific assistance in strengthening CRM services. The lesson we are getting from all this is that resource governance is a joint responsibility of government and its constituency, and external development programs should strengthen both.

4.2 Possible Role of the Private Sector

The rationale for the introduction of aquaculture projects is to reduce fishing pressure, so that reef ecosystems can be rehabilitated. Aquaculture projects are just one of many approaches to reduce fishing pressure, and its intensification can even add to fishing pressure. There should therefore be a clear limit to how much aquaculture projects can be introduced.

We noticed in our conversations with fisher families that only a few of their children go to fishing when they grow up, which partly explained the reduction in the fishing population in Tubigon. Many of these children have high school education, with some even finishing college²⁸. They work in export processing zones, or in the service industries in the cities of Cebu or Manila. Some of them work as domestic helpers in Manila or abroad. *Manong* Macario, the *barangay* councillor of Pangapasán, has a son who is abroad, working as a seaman.

Apart from introducing non- or less-extractive livelihood activities such as aquaculture projects, the conflicting goals of reduction in fishing pressure and improving coastal livelihoods it seems can only be done by reducing the number of resource users. The exclusion of commercial fishers from municipal waters has significantly contributed towards reduction of fishing pressure. Alongside this, livelihood opportunities for the children of fishers in service industries within and outside Bohol should be made available. There seems to be a big role for the private sector in at least exploring this idea further. There is also a need to educate fisher families about reproductive health, so that they can make informed choices about how many children they should have. The role of the private sector in this is not so direct, but they can support programs of NGOs and LGUs who are implementing projects along this line, such as the FTC.

²⁸ There are 34 elementary schools in Tubigon, one for each village; there are three high schools (one privately owned) and one college (privately operated).

In relation to the introduction of aquaculture projects, we can see three possible roles for the private sector:

1. Marketing the produce of aquaculture projects
2. Providing financial support to research activities to improve aquaculture production, and
3. Helping programs related to “market denial” of fish caught through unsustainable practices.

Of these three roles, in the current state of play in the Philippines, it seems the only practical role for the private sector at the moment is the first one, i.e., help market the fish.

4.2.1 Marketing the Produce of Aquaculture Projects

The produce from the aquaculture projects (green grouper) of Tubigon are bought by established buyers (there are only three listed in the LOGODEF documents) of live grouper in Bohol and Cebu and sold to restaurants in Cebu. The current arrangement is a common one where these buyers place an order and LOGODEF delivers when the fish have reached marketable size and gets paid upon delivery. The green grouper²⁹ are not exported to Hong Kong, China, Taiwan or Singapore, which are known buyers of live grouper.

Juanito Ang, a businessman based in Cebu who is into buying mature groupers, selling fingerlings and one of the buyers of live grouper from Tubigon, says that businessmen like him have a stake in maintaining the health of the environment in which the fish are grown to ensure a steady supply of quality fish. He seems to suggest that this responsibility should not be borne by the fishers, the LGU and the likes of LOGODEF alone, and they should work in partnership. He laments, however, that they (businessmen) are not getting support from the Philippine national government; he feels that government is working against them rather than for them. He says that the proximity of the Philippines to Hong Kong, Singapore, China and Taiwan makes it an ideal site for grouper culture, but it presently cannot compete with Indonesia and Thailand. The government of Thailand, he pointed out, even helps live grouper exporters in that country to negotiate freight rates with airline companies, which he can not imagine the Philippine government will do for him. The price of green grouper (exported to Hongkong) he says is only 300 to 350 pesos a kilo (US\$ 6 to 7), and freight costs from Manila to Hong Kong are already US\$ 1.25. He was not sure about the tariff rates, but he says export of green grouper from the Philippines to the countries above is not feasible. Growers, he concludes, should look into the more expensive species.

This phone conversation with a businessman shows that one of the roles of the private sector is in promoting sustainable aquaculture (at least grouper culture) in improving coastal livelihoods. Mr Ang also showed readiness to be a partner of growers in ensuring that the environment in which the fish is grown remains healthy. The problem lies in the lack of political will of people in national government agencies to ensure that adequate support in terms of information, technical and market advice is given to businessmen and local

²⁹ Mr Juanito Ang, in a phone conversation, says that the green grouper is not the preferred species in the international market, so it only gets sold in Manila, Cebu and Bacolod (on the island of Negros). It is also cheaper. The grouper species from Guiuan, Samar, he says is the expensive variety. The Guiuan LGU, however, he says has not even reduced the practice of using cyanide in catching grouper fingerlings.

communities. Which unit of BFAR should focus on this is not clear. BFAR has no unit responsible for providing support to aquaculture-related businesspersons. Perhaps this is one thing that BFAR should seriously consider.

4.2.2 Financial Support to Research Activities to Improve Aquaculture Production

As is done in many “fairly traded” products, the price structure of the fish can include a small percentage to establish a development fund. This has been done in the production of raw sugar (called *muscovado*) from the island of Panay and its export to several countries in Europe and Japan³⁰. The development fund can be used to fund projects that will improve aquaculture production.

But at present when the fish traders seem not to be able to penetrate the export market, it seems the logical thing to do is to convince BFAR to first extend support to fish traders.

4.2.3 Helping Programs Related to Denying Markets for Illegally-caught Fish

One of the factors for the success of the dramatic reduction in the practice of illegal forms of fishing in Tubigon is local market denial. In a workshop to discuss the experience of Tubigon held in Tagbilaran City on 24-25 October 2002, CRMP representatives mentioned that they were able to convince vendors not to sell fish caught with explosives. Buyers have also become aware and are not buying fish caught with explosives, even if these were dead cheap. This will only happen if the public’s consciousness of health and environmental issues is high, and heightened public consciousness is realized by a constant dose of public environmental education. The development fund from the price structure of the fish mentioned above could help make this a reality.

³⁰ Ronet Santos, one of the authors of this report, was involved in a project to revive the dying *muscovado* industry in the island of Panay from 1986 to 1992. The women farmers from the small village of Pisang, in the town of Janiuay, until now are exporting *muscovado* to at least 8 countries in Europe.

5. Conclusion

The thesis that a strategy to improve coastal livelihoods would be likely to deal with *asset-building* and *strengthening policies, institutions and processes* is proven correct. All the components in both areas figured as key elements of a strategy to improve coastal livelihoods. Any management intervention in an area with the same problems Tubigon had in the past should first analyze what has been done in each of the components of the above strategy, and build on these. This means that the intervention does not have to be integrated, but the analysis that would shape the design of the intervention should be holistic.

Introduction of aquaculture projects to improve coastal livelihoods therefore should not be done in isolation but should be informed by such a strategy. Specifically, aquaculture projects should not be introduced if there is no adequate social preparation and if the rationale of the project (poverty eradication) is not clear to project beneficiaries.

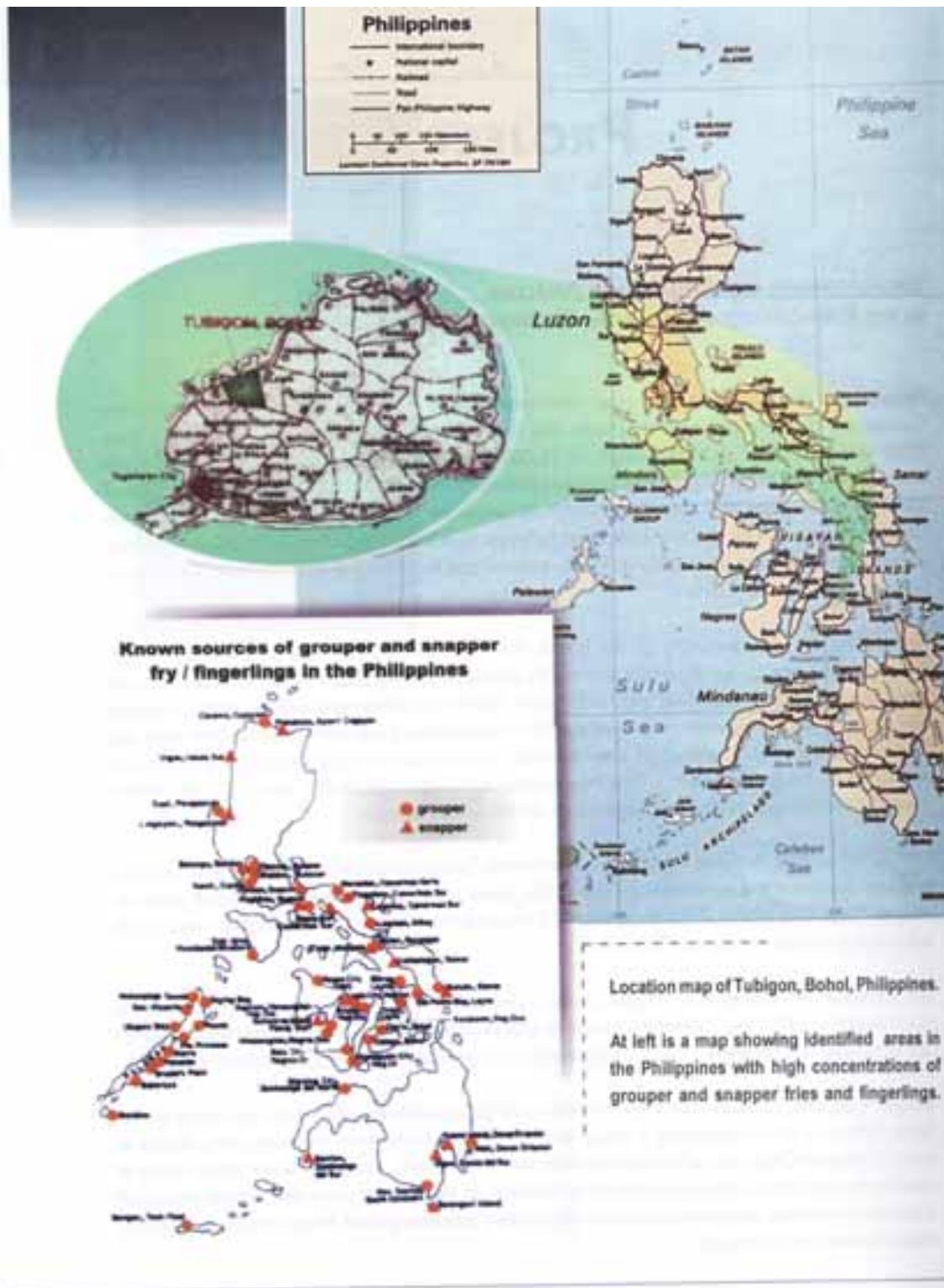
The possible role of the private sector in the above can either be very or focused on supporting aquaculture projects. There is a clear role for the private sector in investing in non-fishery-related industries that can absorb human resources who would otherwise have no choice but to add themselves to the burgeoning number of people dependent on the resource. The obvious role of the private sector in promoting sustainable aquaculture projects is to assist in marketing its produce. Less obvious roles include helping with initiatives to deny a market for fish caught through illegal means and exploring possibilities of integrating within price structures of the fish a development fund that could be used to fund aquaculture-related research initiatives.

Grouper aquaculture is not a big industry in the Philippines yet, and therefore it is not yet attracting a lot of investment. In fact, businesspersons we were able to interview complained about the total absence of support from the fishery-related national agencies of the government. It seems before the private sector can be encouraged to support sustainable aquaculture initiatives, the fishery-related agencies of the national government must first demonstrate that it has the political will to craft a sustainable development framework for fisheries in the country that would provide a good balance between food production and resource protection and conservation.

6. References

- Agbayani R F 2000 *Seafarming and Community Development in the Philippines*. Tigbauan, Iloilo, Philippines: SEAFDEC Aquaculture Department. <http://www.enaca.org>
- Bunce L, Townsley P, Pomeroy R and Pollnac R 2000 *Socio-economic Manual for Coral Reef Management*. Townsville, Australia: Australian Institute of Marine Science.
- Calara D N (ed) 2001 *Instructive Guide in the Replication of the Tubigon - LOGODEF - KAS Mariculture Project*. Manila, Philippines: Local Government Development Foundation (LOGODEF).
- Davies R 1998 *An evolutionary Approach to Organisational Learning: An Experiment by the Christian Commission for Development in Bangladesh*. Swansea, Wales, UK: Centre for Development Studies. <http://www.swan.ac.uk/cds/rd1.htm>
- DENR/DA-BFAR/DILG/CRMP 2001 *Managing Municipal Fisheries: Philippine Coastal Management Guidebook No. 6*. Coastal Resources Management of the Philippines and Department of Environment and Natural Resources.
- Green S, Monreal R, White A and Bayer T 2000 *Coastal Environmental Profile of Northwestern Bohol, Philippines*. Cebu City, Philippines: Coastal Resource Management Project.
- Green S, Alexander R, Gulayan A, Migrino C, Jarantilla-Paller J and Courtney C 2002 *Bohol Island, Its Coastal Environmental Profile*. Cebu City, Philippines: Bohol Environment Management Office, Coastal Resources Management Project.
- MPDO 2000 *Municipal Profile of Tubigon*. Municipal Planning and Development Office.
- Municipality of Tubigon 1999 *Comprehensive Land Use Plan for the Municipality of Tubigon, 1999-2008*. Tubigon, Bohol, Philippines: Municipality of Tubigon and Housing and Land Use Regulatory Board (HLURB).
- Rivera-Guieb R, Santos R, Turcotte D and Pangilinan J 2002 *Poverty in the Aquatic Resource Sector in the Philippines*. Bangkok, Thailand: Support to Regional Aquatic Resources Management (STREAM).

Appendix 1 Location Map of Tubigon

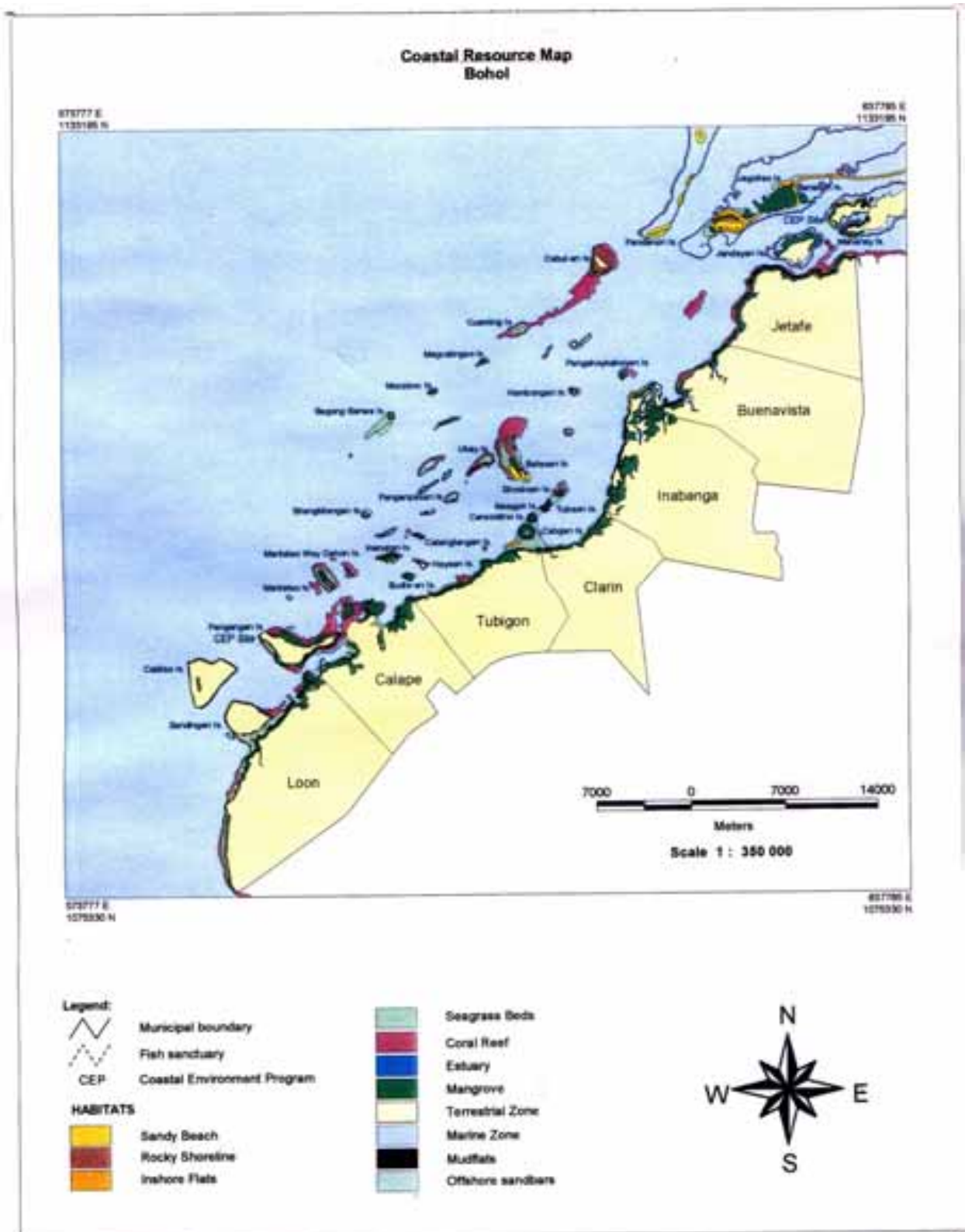


Appendix 2 List of Key Informants

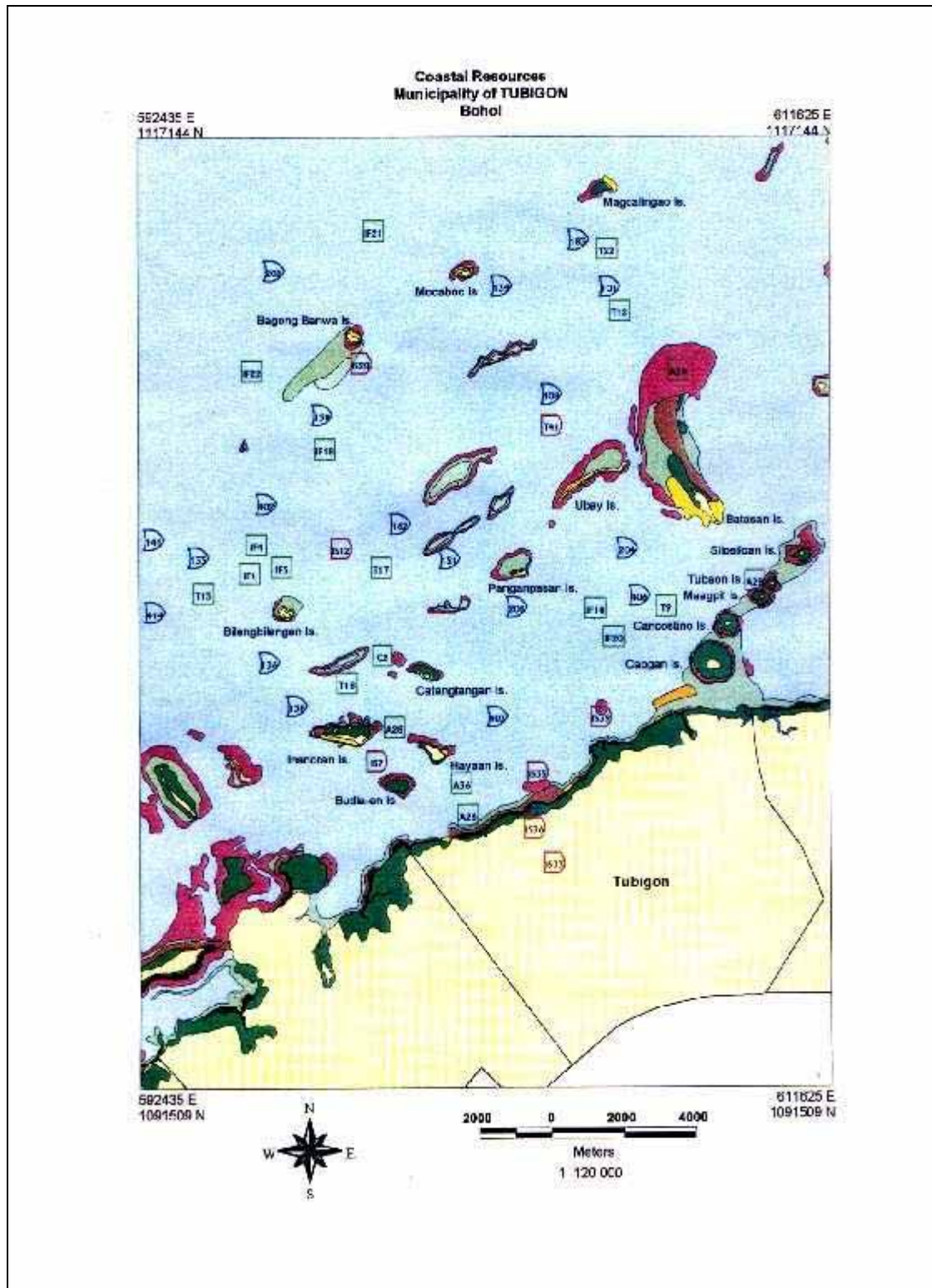
Name	Organization	Date of SSI/FGD
Noel Mendaña	MPDC and LOGODEF Project Director	16-21 October 2002, 18-22 November 2002
Victor Boligao	LOGODEF Fisheries Technician	16-21 October 2002, 18-22 November 2002
Renato Bagsac	LOGODEF Fisheries Technician	16-21 October 2002, 18-22 November 2002
Epitacio Mumar	MAO	16-21 October 2002, 18-22 November 2002
Hon Paulo Lasco	Municipal Mayor	18 November 2002
Cesar Boligao	Member, Pangapasan Fishers Association	21 November 2002
Macario Abapo	Member, Pangapasan Fishers Association	21 November 2002
Manuel Cantones	Member, Pangapasan Fishers Association	21 November 2002
Wilfredo Millomeda	Member, Pangapasan Fishers Association	16-21 October 2002 21 November 2002
Renato Gutierrez	Barangay Councillor, Chair Agriculture and Fisheries Committee	21 November 2002
Gerardo Bayon	Member, Pangapasan Fishers Association	21 November 2002
Rogelio Cantones	Member, Pangapasan Fishers Association	21 November 2002
Florante Cantones	Member, Pangapasan Fishers Association	21 November 2002
Antonio Espra	Member, Pangapasan Fishers Association	21 November 2002
Federico Augis	Member, Pangapasan Fishers Association	21 November 2002
Carlos Cantones	Member, Pangapasan Fishers Association	21 November 2002
Bernardo Cantones	Member, Pangapasan Fishers Association	21 November 2002
Jacinto Cabiso	Member, Pangapasan Fishers Association	21 November 2002
Alex Rallos	Barangay Councillor, Pangapasan	21 November 2002
Ethel Torijano	Feed the Children, IPOPCORM	20 November 2002
Giselle Bacyar	Feed the Children, Community Banking Micro-Finance Project	20 November 2002
Boy Caba	Seaborne Patrol member, Macaas	16-21 October 2002 18-22 November 2002
Claro	Member, Macaas Mudcrab Project	18 November 2002
Rodel	Member, Macaas Mudcrab Project	18 November 2002
Teodoro	Member, Macaas Mudcrab Project	18 November 2002
Rodrigo Cosicol	Barangay Captain, Batasan	16-21 October 2002
Rufina Gutierrez	Barangay Secretary	16-21 October 2002
Fortunato Salomon	Grouper Culture Project Coordinator in Batasan	16-21 October 2002 19 November 2002
Edward	Member, Batasan Fishers Association	19 November 2002
Paning	Member, Batasan Fishers Association	19 November 2002
Felipe	Member, Batasan Fishers Association	19 November 2002
Mesiah	Member, Batasan Fishers Association	19 November 2002
Dodong	Member, Batasan Fishers Association	19 November 2002
Victor	Member, Batasan Fishers Association	19 November 2002
Estanislao Cervantes	President, Panaytayon Fishers Association	16-21 October 2002 20 November 2002
George Honteras	Member, Panaytayon Fishers Association	20 November 2002
Felix Cervantes	Member, Panaytayon Fishers Association	20 November 2002
Junior	Member, Panaytayon Fishers Association	20 November 2002
Eduardo	Member, Panaytayon Fishers Association	20 November 2002
Pepito Flores	Member, Matabao Fishers Association	21 November 2002
Chris Mante	President, Matabao Fishers Association	21 November 2002

Name	Organization	Date of SSI/FGD
Rolando Obquia	President, Bilangbilangan Fishers Association	16-21 October 2002
Juanito Ang	Businessman	2 December 2002
Monique Piquero	Project Staff, MAC in Tubigon	20 November 2002
Dionisio de la Peña	Assistant Regional Director, BFAR 7	4 November 2002
Jocel Corrales	Planning Staff, BFAR 7	25 October 2002
Esdel Ensomo	Technical Staff, BFAR 7	4 November 2002
Elsa Bulasa	Fish feed supplier	18 November 2002
Jovito Josol	Fish feed supplier	18 November 2002
Manang Elpidia	Fish gleaner from Batasan	19 November 2002
Liza Cuyno	Barangay Treasurer, Pandan	22 November 2002
Felipe Reserva	Barangay Captain, Pandan	22 November 2002
Octavio Cuyno	Member of grouper culture group, Pandan	22 November 2002


Appendix 3 Map of Northwestern Bohol






Appendix 4 Tubigon Coastal Resources, Uses and Issues




















Legend:

 Municipal boundary

HABITATS


















-  Sandy Beach
-  Rocky Shoreline
-  Inshore Flats
-  Seagrass Beds
-  Coral Reef
-  Estuary
-  Mangrove
-  Terrestrial Zone
-  Marine Zone
-  Mudflats
-  Offshore sandbars

RESOURCES

-  101 Anchovies
-  134 Fusiliers
-  135 Garfish, needlefish
-  136 Goatfish
-  138 Groupers, seabasses, perchlets
-  141 Halfbeaks
-  145 Jacks and cavalas
-  151 Mojarras
-  158 Parrotfish
-  162 Rabbitfish, spinefeet
-  182 Snappers
-  202 Tunas and mackerels
-  204 Whittings
-  206 Wrasses
-  402 Cuttlefish
-  407 Large shrimps and prawns
-  408 Blue crabs
-  408 Octopuses

 Squids

USES

-  A25 Port/pier/wharf/marina
-  A28 Protected areas
-  A36 Sand and gravel extraction
-  C2 Compressors
-  IF1 Drive-in net with bamboo/free trunk scare devices
-  IF4 Explosives
-  IF5 Fine mesh nets (<3cm) for unexempted species
-  IF18 Gears banned by local legislation (e.g. beach seines, baby trawls, modified danish seines)
-  IF20 Poisons/toxic substances
-  IF21 Superlights within municipal waters
-  IF22 Commercial fishing
-  T9 Crab lift nets
-  T12 Drift gill nets
-  T15 Encircling gill nets
-  T17 Fish corrals
-  T18 Fish pots and crab pots
-  T22 Hook and lines/handlines/drop-lines
-  T41 Spears

ISSUES

-  I07 Coral extraction
-  I09 Declining fish catch
-  I12 Destructive fishing
-  I20 Fishing gear conflicts
-  I36 Low environmental awareness
-  I39 Mangrove overharvesting
-  I55 Waste dumping

Appendix 5a Status of Coral Resources of Northwestern Bohol (Jetafe to Calape)³¹

The reefs are characterized as steep and gently sloping, with reef widths ranging from 100-200 m. Substrate composition was mostly rubble, sand and rock. High silt cover was observed in Banacon and Inanoran where seagrasses were found in the shallower portions of the reef. During the survey, Crown-of-Thorns starfishes (*Acanthanster planci*) were encountered in Cabul-an (four individuals), Ambongan (14 individuals) and Pangangan (three individuals).

One hundred eleven (111) taxa (genera/species) of scleractinian corals in 14 families were documented. Ambongan (65) and Inanoran (63) recorded the highest number of genera and species. Pangangan had 53 species, Banacon 45, Coamen 41 and Cabul-an 31. The non-scleractinian *Millepora* (fire coral) and certain soft coral genera were also noted in some areas.

All deep stations showed higher hard coral cover than the shallow stations except in Banacon and Inanoran. Good coral growths were concentrated on the reef slope, particularly in Amboangan, Coamen and Inanoran.

Results of random quadrat sampling revealed highest total coral cover in Ambongan (58.75%) and Inanoran (40%). Dominant hard coral growths on Ambongan were represented by the branching *non-Acropora* represented by *Porites nigrescens* and massive corals, while the branching *stylophora pistillata* and massive *Porites* and *coeloseris mayeri* were the common forms in Banacon. Inanoran had 40% total coral cover, dominated mostly by the branching *Montipora stellata* and *Porites nigrescens*, encrusting *Montipora*, massive *Porites* and faviids and *Millepora*. Total coral cover for Coamen was 31% with the branching *echinopora mammiformis* and *Porites negrescens* and massive *Porites* as dominant hard corals. The lowest total coral cover was observed in Cabul-an and Pangangan, both of which has 15%. They also had the highest cover of abiotic components (rubble, sand and rock, 53.13% and 59.07% respectively). Furthermore, Pangangan showed the highest dead coral (11.88%). Common hard corals in these areas were massive *Porites* and faviids.

Overall, Bohol exhibited a mean total coral cover of 35.04% (31.35% hard corals and 3.69% soft coral), dead corals 5.99%, seagrasses 4.05%, other fauna 10.21% and abiotic components 44.71%.

³¹ (SUML, 1997)

Appendix 5b Coral Reef Areas, Reef Flat Extent and Other Descriptions of the Stations in Northwestern Bohol³²

Stations	Coral Reef Area	Reef Flat Extent (width)	Slope (degrees)	Substrate	Remarks
Banacon Island Jetafe	Reef is part of Calituban Reef = 7,202.80 ha (Pichon, 1977)	100 m from shoreline, coral reef width is 30 m at 3-5 m deep	20	Mostly sand/silt, little rubble and rock	Seagrasses abound in the shallow area; high cover of soft corals, sea whips and sponges; beyond 5 m deep, substrate composed primarily of sand and patches of corals
Cabul-an Island Buenavista	Reefs of both islands are part of single unit = 1,040 ha	200 m from shoreline	20	Sand,rubble, rock	Seagrasses abound in the shallow area; starfishes and sea urchins were numerous; four Crown-of-Thorns starfishes <i>Acanthaster plancii</i> were found
Coamen Island Inabanga		200 m from shoreline	45-50 at 13 m deep	Sand, rubble rock, a little silt	Seagrasses abound in the shallow area; sea urchins were numerous; beyond 20 m deep, substrate is primarily sandy; four Crown-of-Thorns starfishes <i>Acanthaster plancii</i> were found
Ambongan Island Inabanga	76.18 ha	150 m	60-70 at 10 m deep	Sand, rubble, rock	Seagrasses abound in the shallow area; high cover of <i>Anacropora puertogalerae</i> in deep station; 14 Crown-of-Thorns starfishes <i>Acanthaster plancii</i> were found
Inanoran Island Tubigon	115.65 ha	150 m from shoreline	20 at 3 m deep, 60 at 10 m deep	Sand, rubble, silt, rock	Seagrasses abound in the shallow area
Panganan Island Calape	240 ha	100 m from shoreline, coral reef extent is 20 m from the sargassum bed at 10 m deep	45 at 7 m deep	Sand, rubble, rock, little silt	Sargassum bed in the shallow area; three Crown-of-Thorns starfishes <i>Acanthaster plancii</i> were found

³² (SUML, 1997)

Appendix 6 Relevant Organizations in Tubigon (other than primary and secondary stakeholders)

Organization	Description of Activities	Contact Persons and Addresses
Municipal government (through the Municipal Agriculturist's Office)	<p>The municipal government has these responsibilities related to CRM³³:</p> <ol style="list-style-type: none"> a. Legislation b. Impose penalties for acts which endanger the environment c. Grant permits for fish corrals, fish pens, aquatic beds, taking of fish and prawn fry d. Adopt measures for conservation e. Enforce fishery laws in municipal waters f. Provide research services and facilities related to fishery activities g. Initiate activities for the conservation of mangroves h. Give exclusive authority to grant fishery privileges in municipal waters i. Issue permits to construct fish cages in municipal waters j. Issue licenses to fishing vessels weighing three tons or less k. Issue permits to gather aquarium fishes within municipal waters l. Establish fishing seasons in municipal waters m. Issue permits to collect mollusks n. Issue licenses for seaweed farms within municipal boundaries, and o. Issue auxiliary invoices for transport of fishery products 	<p>Noel Mendana, MPDC Tubigon Cultural Centre Building, Tubigon, Bohol Philippines Tel: 063 38 2372456 E-mail: ncmmpdc@yahoo.com</p>
Haribon Foundation	<p>Haribon is a Manila-based NGO involved mainly in conservation work. It conducted research on seahorses in Bohol. It also worked with the social component of CRMPs in five municipalities, including Tubigon.</p>	<p>9 Malingap Corner Malumanay Streets Teachers Village, Diliman Quezon City, Philippines Tel: 063 2 9253332, 0632 4362756 E-mail: director@haribon.org</p>

³³ These are responsibilities spelled out in the law, but this does not mean that the municipalities have the capacity to carry them out.

Organization	Description of Activities	Contact Persons and Addresses
Feed the Children	FTC has been in Bohol for more than ten years. Its work has four components: a) community-based coastal resource management, b) integrated population and coastal resource management, c) integrated child family development, and d) community banking and micro-financing.	Field Office: Barangay Matabao Tubigon, Bohol, Philippines Tel: 063 38 5080015
LOGODEF	LOGODEF collaborates with the Konrad-Adenauer Stiftung in the implementation of a livelihood program for coastal communities in Tubigon. LOGODEF introduced grouper, mudcrab, oyster and mussel culture in Tubigon.	Dr Gaudisio Sosmena Suite 333 & 334, Secretariat Building, PICC Complex Roxas Boulevard, Manila, Philippines Tel: 0632 8313866 E-mail: logodef@info.com.ph
International Marinelife Alliance	The focus of IMA's work is to reform cyanide users by introducing them to non-destructive fishing methods and alternative livelihood programs. It is working in at least four municipalities in Northwestern Bohol.	Jean Caleda Tel: 063 2 6353530; 063 2 638 1119 E-mail: mjac@marine.org
Marine Aquarium Council	MAC is an international, not-for-profit organization that brings marine aquarium animal collectors, exporters, importers and retailers together with aquarium keepers, public aquariums, conservation organizations and government agencies. MAC's mission is to conserve coral reefs and other marine ecosystems by creating standards and certification for those engaged in the collection and care of ornamental marine life from reef to aquarium.	In Tubigon: Monique Piquero, project staff Clarín, Tubigon, Bohol, Philippines In Hawaii: 923 Nu'uanu Avenue Honolulu, Hawaii 96817 USA Phone: +1 808 550 8217 Fax: +1 808 550 8317 E-mail: info@aquariumcouncil.org
CRMP	CRMP is a seven-year (1996-2001) project – extended up to 2004 – that provides technical assistance and training to local governments and communities in coastal resource management. It is funded by the US Agency for International Development (USAID).	5F Cebu International Finance Towers J Luna and JL Briones Streets, North Reclamation Area, Cebu City Tel: 06 32 232 1821-22 E-mail: crmp@oneocean.org www.oneocean.org

Appendix 7 General Background of Seafarming in the Philippines

Seafarming activities have been identified as an appropriate fish culture technology in the vast coastal waters of the Philippines (Agbayani, 2000). Seafarming, or mariculture, contributed 681,397 mt to fishery production in 1998, accounting for 25% of total fishery production in that year (Agbayani, 2000; Rivera-Guieb et al., 2002, citing BAS figures). Seaweed production, however, comprised 97.8% of this production.

Grouper production in fish cages in the same year totaled only 33 mt. The main reason for the low production was lack of fry and fingerlings (Agbayani, 2000).

The known sources of grouper fry and fingerling and culture sites in the Philippines are shown in Figure 5 (below), which is a bigger version of the inset in Appendix 1.

Appendix 8 Fishing Gears Used in Northwestern Bohol³⁴

Classification	Gear Type	Local Name
Lift nets	Cast nets Fish nets Scoop nets	<i>yabyab</i> <i>bilaw</i> <i>sikpaw, papyaw</i>
Pull nets	Baby trawl Push nets Seine net with scaring devices Ring nets	<i>palakaya</i> <i>sudsud, dosdos</i> <i>liba-liba, ring-ring, kubkob, de-ring</i> <i>lawag</i>
Entangling nets	Bottom set gill nets Drift gill nets Gill nets Set gill nets Squid nets Two-ply Fish corral	<i>pukot</i> <i>pangasa, pamo</i> <i>pukot</i> <i>pukot</i> <i>pang-nokos</i> double net <i>bunsod</i>
Barriers and traps	Fish pot Fish trap Bamboo structure with lift net	<i>panggal</i> <i>bobo</i> new look
Line	Jigger Single hook and line Multiple hook and line Line with no hook Troll lines	<i>sarangat, panglabyog</i> <i>pasol, latak, subid</i> <i>palangre, kitang</i> <i>rentex</i> <i>subid, subid-subid</i>
Hand instrument	Spear gun Spear gun with compressor Gleaning Bare hands Torch and kerosene fueled lamp Torch with scoop nets	<i>pana</i> <i>buso</i> <i>panginhas</i> <i>panalum</i> <i>panulo</i> <i>panulo</i>
Others	Dynamite Sodium cyanide Poison seeds Poison vine Pesticide Electricity fishing Tobacco and tobacco-chili mix for small octopus Purse seine Drag seine Baby ring net Bag net for schooling fish Drive-in net with scaring device Small drag seine, beach seine Fine-mesh gill net Small barrier nets	<i>tiro, dinamita</i> <i>cyanide, kuskos</i> <i>lagtang</i> <i>tubli</i> <i>indrin, malathion, muriatic acid</i> <i>kuryente</i> <i>likom-likom</i> <i>basnig</i> <i>sinsoro</i> <i>baling</i>

³⁴ (SUMML, 1997, as cited in Green, 2000)

Appendix 9 History of Reef Fishery and Coastal Resources Management in Bohol³⁵

Unsustainable fishing practices in Tubigon can be traced back to the late 1940s after the Second World War. Gunpowder left during the war was used in making dynamite for blast fishing. It was not really clear who introduced the practice, but it instantly became popular as it can bring in a lot of catch. The practice persisted, as there was no regulation then against its use. When the leftover gunpowder was used up, fishers resorted to using fertilizer, which is still being used up to the present.

In 1975, President Ferdinand Marcos enacted Presidential Decree (PD) 704 or the “Fisheries Decree of 1975”. This degree encouraged the full exploitation of the Philippines coastal resources to increase fishery production. The effect of this decree in Tubigon was the proliferation of baby trawl operations, which required less capital than fish pond operation. Many marginal fishers became workers in baby trawl operations. The use of dynamite and poisonous substances continued to proliferate, because, although there is law penalizing these illegal-fishing practices, law enforcement was poor.

In the 1980s, the use of sodium cyanide to catch tropical aquarium fishes and *lapu-lapu* (grouper) fingerlings emerged in Tubigon. International market demand for tropical fish was high, and *lapu-lapu* fingerlings were also highly in demand. The adverse effects of the different forms of illegal fishing, lower fish catch and destroyed reefs, were already being felt in the late 1980s.

In 1991, Republic Act (RA) 7160, or the Local Government Code, was passed. The central tenet of the code is decentralization of governance. Most of the municipal³⁶ fisheries management responsibilities were devolved from the Bureau of Fisheries to LGUs. In 1992, the LGU of Tubigon passed an ordinance prohibiting the use of *hulbot-hulbot* (trawls) and *liba-liba* (a kind of pull net), dynamite and cyanide, that were then rampant in their municipal waters. The responsibility to enforce the ordinance was given to the local Philippine National Police (PNP) and deputized sea wardens (*bantay dagats*). Enforcement was weak because of lack of equipment and, according to some, the inability of police to stand up to influential personalities who were financing these illegal activities. The strategy to eliminate illegal fishing practices was then anchored on regulation.

In 1993, the Department of Agriculture (DA) and the Department of Environment and Natural Resources (DENR) launched a campaign for sustainable fishing practices and marine conservation. Through the Central Visayas Regional Project (CVRP), funded by the World Bank, these departments launched Information and Education Campaigns (IECs) and promoted the installation of artificial reefs³⁷. The strategy this time was now moving towards information and education and conservation.

³⁵ This section was based on different timelines produced during the SSIs and FGDs.

³⁶ Municipal waters refer to those within 15 kilometers of the shore.

³⁷ Sometime in the middle to late 1990s the DA banned the installation of artificial reefs because these are found to be ineffective in restoring reef habitats as they only act as fish aggregating devices that facilitate the capture of more fish.

As early as June 1996, the Municipality of Tubigon had already taken initial steps in the formulation of the Tubigon Environment Code. The process began with a series of consultations between and among the Municipal Government, LOGODEF and the Federation of Canadian Municipalities (FCM) that provided technical and financial support. These agencies agreed that all environment-related ordinances and pertinent regulations of Tubigon should be compiled into a code. The consultations resulted in the creation of a Technical Working Group with multi-sectoral representation from the *Sangguniang Bayan* (municipal council), NGOs, fisherfolk associations and the Fisheries and Aquatic Resources Management Council (FARMC).

In 1997, the Coastal Resource Management Project (1996-2003), funded by USAID, started their project activities in Tubigon, which is one of their “learning sites”. The main difference of the CRMP strategy with previous strategies is that it focused on improving policy, capacity-building for those enforcing the policy (the LGUs) and institutionalizing CRM systems and processes.

On 25 March 1998, the Tubigon Environment Code was approved and formed the basis for the formulation of the Tubigon CRM Code that was discussed with various stakeholders as early as 1999 and eventually approved by the municipal council on 11 July 2000. With the code in place, Noel Mendaña says that it was easy for the municipality to coordinate the efforts of the different external organizations who are providing assistance to their CRM efforts; most of these groups were involved in the formulation of the code.

In 1999, the municipal government realized that, apart from having a good policy in place and making fishers realize the importance of conserving and protecting the coastal resources through information and education, alternatives to unsustainable fishing practices are needed. Without these alternatives, fishers do not have anything to maintain their livelihoods. Consultations with the *liba-liba* operators resulted in putting down their unsustainable fishing practice and embraced the fishing alternative that was sponsored by the local government. Funds from the congressman and municipality for the purchase of pump boats and fish net were extended as soft loans. Cyanide fishers were given training on proper ways of catching and handling tropical aquarium fishes and were also assisted to market their catch. Another breakthrough in coastal resource management was the integration of the CRM Plan in the Municipal and Barangay Development Plan, and the introduction of the Mariculture Project.

Many of the fishers who had been involved in unsustainable fishing practices are the very people protecting, patrolling and guarding their reserves and sanctuaries, and the resources therein. However, they occasionally complain about commercial fishing boats using purse seine and super lights, apparently coming from Cebu, and some baby trawls that they suspect come from neighboring villages that sometimes are seen operating in Tubigon waters.

Appendix 10 Members of the FARMC in Tubigon (2001)

Name	Position in the MFARMC	Sector or Group Represented
Engineer Noel Mendaña		Municipal Planning and Development Council (MPDC)
Dennis Arcamo (R)		<i>Sangguniang Bayan</i> ³⁸ , Committee on Fisheries and Agriculture
Martino Floinga		Municipal Development Council (MDC)
		NGO representative, Feed the Children (FTC)
		NGO representative, Haribon Foundation
Armando Reserva	Secretary	Private sector representative
Epitacio Mumar	Chair	Municipal Agriculture Office
Rodrigo Calunia	Sergeant at arms	Fisher representative
Mansueto Guitierrez (R)	PRO	Fisher representative
Rogelio Ybañez		Fisher representative
Victor Lagurin		Fisher representative
Christopher Alampayan		Commercial fisher representative
Rolando Obguia		Commercial fisher representative
Flaviano Adtoon	Treasurer	Fisher representative
Batana		Fisher representative
Cesario Cabangbang (R)		Fisher representative
Rodrigo Cosicol		Fisher representative
Maximo Heluano		Fisher representative
Angel Sevilla	Auditor	Fisher representative
Eugenio Abella		Fisher representative
Tito Obquia (R)	Sergeant at arms	Fisher representative
Roy Ladra (R)	Vice-chair	Fisher representative
Romulo Bautista	Sergeant at arms	Fisher representative
Perfecto Notarte		Fisher representative
Rosauro Yosoya		Fisher representative
Cornilio Albura		Commercial fisher representative

Source: MAO records

R = replaced

³⁸ Municipal Council

Photos



Photo 1 The Fish Cages (floating method) in Batasan



Photo 2 Women Gleaning in Batasan



Photo 3 Fishers Using Gill Net



Photo 4 Boats of Municipal Fishers in Panaytayon



Photo 5 Fishpot in Panaytayon



Photo 6 A Smaller Fish Pot in Panaytayon



Photo 7 The Fish Cage (stalking method) in Panaytayon



Photo 8 Another Form of Fish Pot in Macaas



Photo 11 Raising Pigs for the Annual Feast



Photo 9 Trash Fish (mostly slipmouths)



Photo 12 Typical House of a Fisher with a Non-motorised Boat



Photo 10 Victor Boligao, Fisheries Technician, Buying Fish at the Tubigon Market



Photo 13 Getting Ready to Set the Fish Pots (Batasan)



Photo 14 Fixing the Net in Panaytayon



Photo 15 Bamboo Bridge inside Mudcrab Culture Project (Macaas)



Photo 18 PCRA Results in Pangapasan



Photo 16 Fredo Tells Us His Story (Pangapasan)



Photo 19 Tidal Flat in Pangapasan (take note of mangrove reforestation)



Photo 17 Manong Tanny Draws on a Resource Map (Panaytayon)



*Photo 20 Women Cleaning Sea Cucumber
(Pangapasan)*



*Photo 21 Barangay Captain Felipe Reserva and
Treasurer Liza Cuyno Share with Us Their
Experience in Barangay Governance (Pandan)*

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