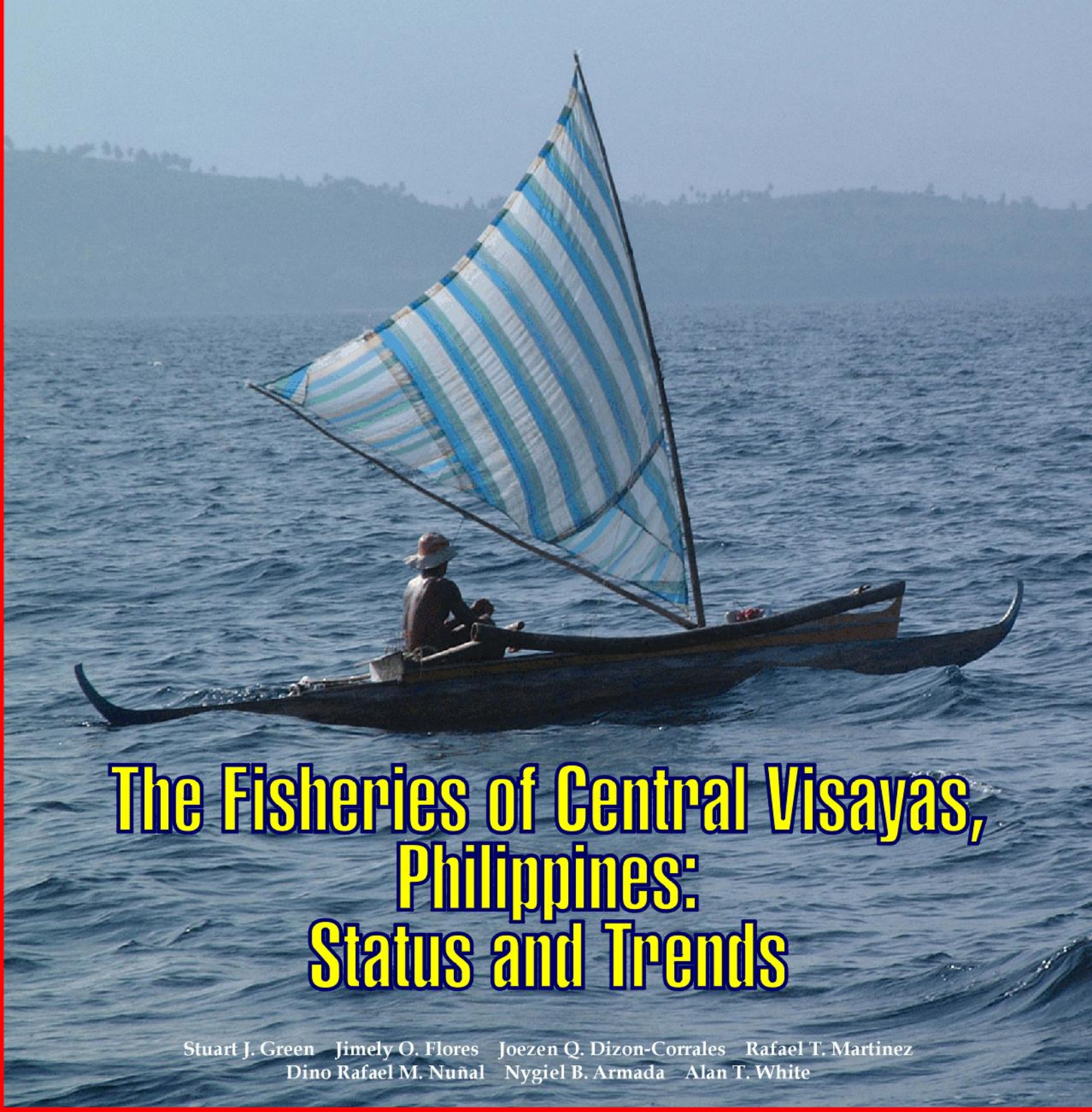
The Fisheries of Central Visayas, Philippines: Status and Trends



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Stuart J. Green Jimely O. Flores Joezen Q. Dizon-Corrales Rafael T. Martinez
Dino Rafael M. Nuñal Nygiel B. Armada Alan T. White

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An Initiative of the Department of Agriculture-Bureau of Fisheries and Aquatic Resources 7
in collaboration with the Coastal Resource Management Project
of the Department of Environment and Natural Resources, Regional Development Council of Region 7,
Provincial and Municipal Local Government Units of Bohol, Cebu, Negros Oriental and Siquijor.

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List of Acronyms and Abbreviations

ADB	Asian Development Bank
AFMA	Agriculture and Fisheries Modernization Act (Republic Act 8435)
AT	Agriculture Technician
B/M FARMC	Barangay/Municipal Fisheries and Aquatic Resources Management Council
BANGON	Bohol Alliance of Nongovernment Organizations
BAS	Bureau of Agricultural Statistics
BEMO	Bohol Environment Management Office
BFAR	Bureau of Fisheries and Aquatic Resources
BMT	Bohol Marine Triangle
CBRMP	Community-based Resource Management Project
CELEBOSOLE	Cebu, Leyte, Bohol and Southern Leyte Management Council
CENRO	Community Environment and Natural Resources Office
CFVG	commercial fishing vessel gear
CLEAR 7	Coastal Law Enforcement Alliance in Region 7
CLEC	Coastal Law Enforcement Councils
CMMO	Coastal and Marine Management Office of the DENR
CPUE	catch per unit effort
CRM	coastal resource management
CRMP	Coastal Resource Management Project
CVRP	Central Visayas Regional Project
CVSCAFT	Central Visayas State College of Agriculture, Forestry and Technology
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DOTC	Department of Transportation and Communication
DREAM	Project Development of Resources, Education, Awareness and Management
DTI	Department of Trade and Industry
EcoGov	Philippine Environmental Governance Project
EEZ	exclusive economic zone
ELAC	Environmental Legal Assistance Center
ENRD	Environment and Natural Resources Division
EO	Executive Order
FAD	fish aggregating device
FAO	Fisheries Administrative Order
FRMD	Fisheries Resource Management Division of the BFAR
GEF	Global Environment Facility
GT	gross tonnage
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
ha	hectare
HDI	human development index
HP	horsepower
ICFM	integrated coastal and fisheries management
ICM	integrated coastal management
IEC	information, education and communication
ITD-USCG	International Training Division of the United States Coast Guard
JICA	Japan International Cooperation Agency
LGC	Local Government Code

LGU	local government unit
LOI	Letter of Instruction
MAC	Marine Aquarium Council
MAO	Municipal Agriculture Officer
MARINA	Maritime Industry Authority
MCDP	Marine Conservation and Development Project
MCS	Monitoring, Control and Surveillance Section of the BFAR
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPA	marine protected area
MSY	maximum sustainable yield
NALECC	National Law Enforcement Coordinating Committee
NGA	national government agency
NGO	nongovernment organization
NIPAS	National Integrated Protected Area System
NRM	natural resource management
NSAP	National Stock Assessment Project (DA-BFAR)
NSO	National Statistics Office
OBST	Olango Birds and Seascape Tour
PAMAS	Panadtaran Mangrove Association
PAMB	Protected Area Management Board
PAO	Provincial Agriculturist Office
PCAMRD	Philippine Council for Aquatic and Marine Research and Development
PCG	Philippine Coast Guard
PCRA	participatory coastal resource assessment
PD	Presidential Decree
PEDO	Police Environment Desk Officer
PFO	Provincial Fishery Office of the BFAR
PNP	Philippine National Police
PNP-MARIG	PNP-Maritime Group
PO	people's organization
PP	Presidential Proclamation
RA	Republic Act
RDC	Regional Development Council
SB	Sangguniang Bayan
SCORE	Siquijor Coastal Resource Enhancement Project
SEED	Socioeconomic Empowerment and Development
SIRMAP	Siquijor Integrated Resource Management Project
SP	Sangguniang Panlalawigan
UP	University of the Philippines
USAID	United States Agency for International Development
VisSea	Visayan Sea Coastal Resources and Fisheries Management

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Foreword

The Central Visayas is strongly dependent on its marine capture fisheries to supply the main source of animal protein in the region as well as to provide livelihood to over 150,000 fishers from commercial and municipal fishing sectors.

The Bureau of Fisheries and Aquatic Resources (BFAR) publishes a yearly regional accomplishments document, alongside the national fisheries profiles of the Central Office. This regional fisheries profile entitled ***The fisheries of Central Visayas, Philippines: Status and trends*** adds tremendously to the information already compiled by the BFAR and consolidates historical fisheries data of the region as a basis for future planning activities.

By looking more closely into the seven distinct fisheries ecosystems of Central Visayas, this profile integrates the commercial and municipal capture fisheries trends to give a snapshot of the current situation. It also proposes a fisheries ecosystem management framework for Central Visayas.

I would like to congratulate the many partners involved in the production of this profile. May it provide a road map for a new era of fisheries management in Central Visayas in which the different resource users of the region's ecosystem can begin to work together to manage the remaining fish stocks and ensure abundant supplies of protein for the region's present and future generations.

CORAZON M. CORRALES, CESO IV
Regional Director
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Region 7

Preface

This profile consolidates the wealth of fisheries and coastal related information in Central Visayas to look at the current state of the region's fisheries ecosystems. The information aims to provide a clear basis for policymakers, managers and agencies involved in coastal and fisheries management to make more informed decisions on what management interventions are required in the region.

This profile highlights the fact that although Central Visayas is split by geopolitical boundaries, the region's waters are divided into seven distinct fisheries ecosystems. Fish move around, spawn and migrate within these ecosystems. Fishers follow the fish around the region, crossing political and administrative boundaries in pursuit of their livelihood. Management interventions must consider this mobility to improve collaboration and agreements and to integrate the 109 individual coastal local government units with areas under national waters.

The management of fisheries is one component of an integrated coastal management framework that has long been tried and tested in Central Visayas. Coastal and fisheries management at an ecosystem level allows us to look beyond the current localized initiatives. It gives us a clearer bird's-eye view of the region and lets us follow marine organisms along their varying geographical journeys and wide-ranging life cycles. Fisheries ecosystem management can be a vital link that bridges all of the localized coastal and fisheries management initiatives into a wider area management system.

Despite many coastal management interventions in Central Visayas, the larger fisheries situation still looks bleak. Many key challenges lay ahead. As identified in the profile, the poor situation of fisheries is mainly the result of a poor national policy framework. This framework does not take into account the fact that fisheries are a biologically renewable natural resource that can be harvested sustainably up to a certain limit. However, once this limit is reached, the capacity of the resource to replenish itself is severely inhibited.

The fisheries of Central Visayas have surpassed their natural limits, and their ability to renew and provide fish catch is now hampered. Although coastal management interventions at local levels are addressing several issues, there are still many regional problems that affect the state of the whole resource. Unless there is a shift towards a larger area management, which considers the regional wide issues, then the ecosystems will degrade further. Further degradation will have impacts on long-term social, economic and ecological development. This will directly affect the poorest sectors of the region.

This book aims to communicate the state of the region's fisheries while suggesting solutions. Specifically, the objectives of this profile are to:

- consolidate key Central Visayas fisheries-related information into a series of maps that document the status of the region's coastal and fisheries resources;
- present reliable data on the state of the region's commercial and municipal fisheries while highlighting the relatively poor status of fisheries;
- highlight that the commercial and municipal fisheries of the region are competing with each other for the same resources in the same fishing grounds of the region and that if only one sector is involved in management, then management on the whole will fail;

- identify the key fisheries ecosystems of Central Visayas and define their boundaries for management; and
- present a fisheries management framework plan for Central Visayas, refined from many fisheries stakeholders' meetings.

This first Philippine regional fisheries profile — **The fisheries of Central Visayas, Philippines: Status and trends** - provides the information and policy directions required for the region to better manage its fisheries for present and future generations. Let us all work together and take action now to achieve sustainable fisheries and food security in the Central Visayas!

Chapter 1
Overview of the Marine Fisheries Management Framework Plan for Central Visayas

Introduction

Central Visayas is endowed with productive and diverse marine capture fisheries resources within a variety of fisheries ecosystems, such as the Visayan Sea, Camotes Sea, Bohol Sea, East Sulu Sea, Cebu and Tañon Straits and Danajon Bank. These resources provide the majority of animal protein to the region's fast-growing population as well as full-time employment (direct and indirect) to hundreds of thousands of people. As presented in this profile, the resource base, habitats and fisheries of the region are degraded and their ability to supply food and livelihood is severely declining. This situation is having major repercussions on the economic, social and ecological welfare of the region.

Since the 1980s, the region has been the recipient of many government and nongovernment-funded projects in coastal management which have been undertaken at the barangay, municipal, provincial and regional levels. These projects sought to conserve the remaining habitats and fisheries resources through management interventions targeted at mostly village and local government unit (LGU) levels. Despite many localized successes, these initiatives have not achieved major impacts at the larger ecosystem level. Generally, the resources of the fisheries ecosystems of the region have continued to degrade considerably.

Why a Fisheries Management Framework Plan?

The Philippine Fisheries Code of 1998 provides for the Bureau of Fisheries and Aquatic Resources (BFAR) to prepare and implement a comprehensive national fisheries industry development plan to ensure the long-term sustainability of the country's fishery and aquatic resources (Chapter III, Article 1, Section 65). The planning process model developed in Region 7 could form a basis for replication, towards developing the national fisheries industry development plan, region by region, and fisheries ecosystem by fisheries ecosystem.

During mid-2002, BFAR 7 and BFAR Central Office, in coordination with the Coastal Resource Management Project (CRMP) of the Department of Environment and Natural Resources (DENR), signed a memorandum of understanding to formulate a participatory fisheries management framework plan for the region.

The main objective of the plan was to set a management framework to sustainably manage the fishery resources in Central Visayas. The planning process adopted a participatory approach. Stakeholders from commercial and municipal fisheries, key managers of the resource, LGUs, national government agencies, nongovernment organizations, academic institutions and other stakeholders were involved at all stages of planning through a series of forums. The planning process provided a venue for the different stakeholders to get a broader understanding of fisheries ecosystems of the region, benchmark management within each ecosystem and identify how local actions could support

a wider fisheries ecosystem management approach. The key outputs of these forums were the delineation of the key ecosystems in the region and the development of a workable framework that could lead towards a more sustainable management of resources.

Fisheries Ecosystem Management

The Central Visayas is composed of islands that have been placed under different political and administrative jurisdictions for ease of governance and manageability. Marine fisheries, however, are totally unaware of these administrative boundaries; they spawn, feed and move around the region, within the different fisheries ecosystems of the region.

Marine fisheries ecosystems are intricate networks of habitats and fisheries that all depend on one another to function properly. If one part of the ecosystem becomes degraded or overfished, other components are affected. This leads to a marked decrease in food, income and other benefits for the human population. Conversely, the same applies to coastal management. If management occurs in only one area, then the marine organisms are protected only for the time in their life cycle in which they inhabit this area. As soon as they leave the management area to spawn or feed in another area that is not well managed, the benefits of the management are reduced considerably; livelihood and food benefits are again lost.

Like fish, fishers are also mobile, especially the commercial fishing fleet of the region. They move among the ecosystems. If the fleet is well managed in one province but poorly managed in another, the impact will be the same on the whole ecosystem. Eventually, food and income for all commercial fishers will be reduced because of what is happening in the unregulated areas of the fisheries ecosystem.

Each fish species has a unique biology and ecology. Hence, management interventions should be attuned to each fish species' individual characteristics. Given, however, that in some of the fisheries ecosystems of the region, there are more than 1,500 identified species of fish, moving around areas of up to 5,000 km^2, individual management per species would be very costly and difficult, if not impossible. Management could be easier through looking at the ecosystem as a whole and managing it as one larger unit.

The ecosystem approach considers the sum of all the organisms' life cycles, the key habitats they utilize and their resource users. Its goal is a more productive fishery for the benefit of all stakeholders, while ensuring protein is in regular supply in the region's markets. The ecosystem approach also recognizes that management is not about managing the fish stocks because they naturally manage themselves. It is about managing impacts on the resources of humans through fishing effort, pollution and others, while making the resources as productive as possible to ensure users will have sustainable benefits.

A common excuse for lack of management and interventions at the regional and country levels has been that there is not enough information to initiate management. The information in this profile represents the best available information and gives more than enough rationale for ecosystem-wide management interventions.

The first in the country, the fisheries management planning framework for Central Visayas was initiated to integrate barangay, municipal, provincial and regional management interventions into ecosystem-wide fisheries approaches (Figure 1). It promotes thinking and planning from an ecosystem perspective, but acting locally!

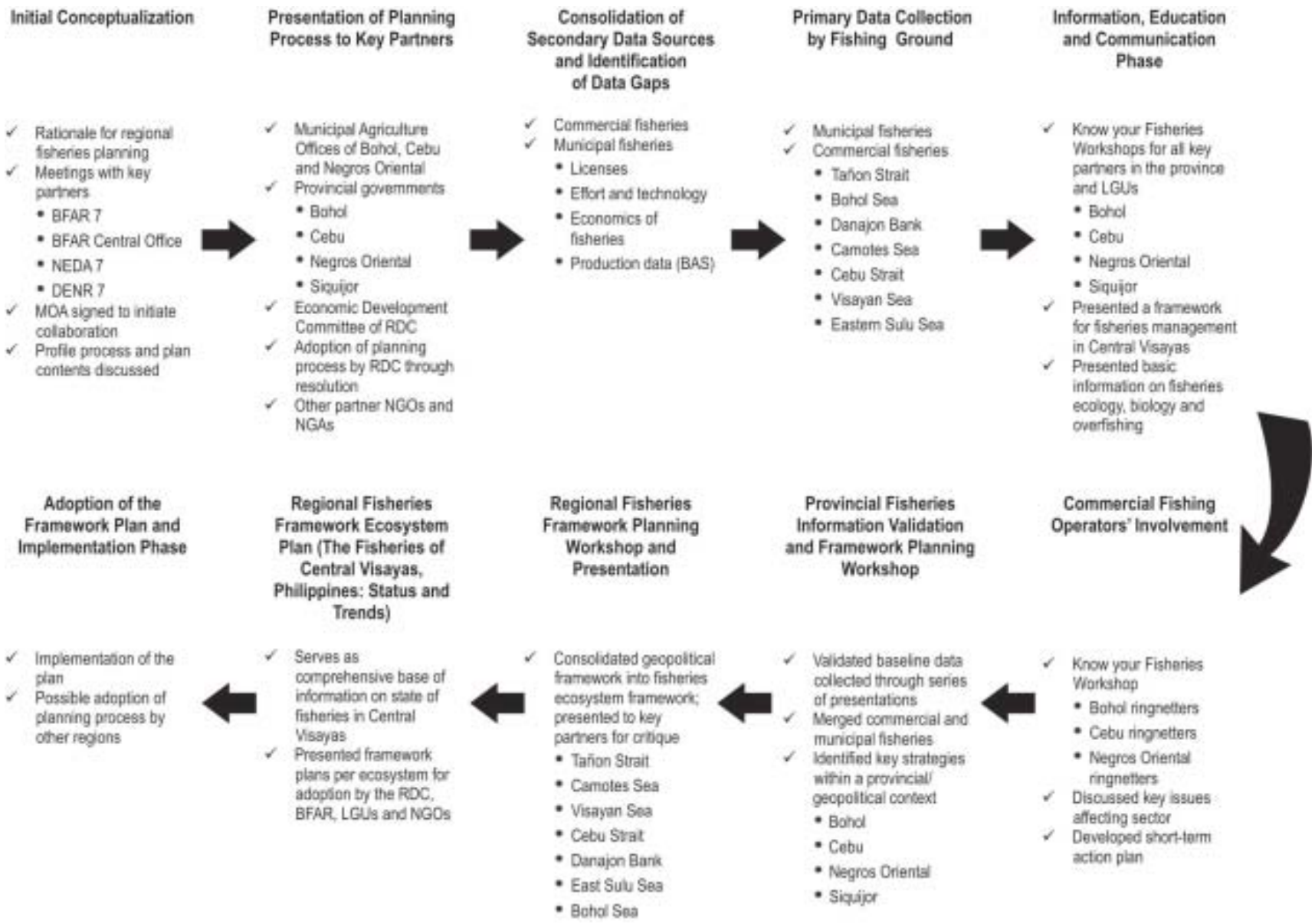


Figure 1. Central Visayas fisheries management framework planning process (September 2002 – March 2004). BAS - Bureau of Agricultural Statistics; LGU - local government unit; MOA - Memorandum of Agreement; NGO - nongovernment organization; RDC - Regional Development Council

Chapter 2
The Geopolitical and Socioeconomic Setting of Central Visayas

Central Visayas is situated in the center of the Philippine archipelago. It is bounded on the north by the Visayan Sea, on the south by Bohol Sea and East Sulu Sea, on the west by Negros Island and on the east by the Camotes Sea and Leyte Island. It is composed of four island provinces, namely, Negros Oriental, Cebu, Bohol and Siquijor (Figure 2). It has a coastline of 2,029 km; 132 municipalities, 109 of which are coastal; and 1,027 coastal barangays and 108 islands (CRMP-GIS 2004).

The region's population is heavily dependent on the marine fisheries ecosystems for livelihood through fishing, with over 125,000 full-time municipal fishers and 5,000 full-time commercial fishers. These figures do not include ancillary industries related to fishing, such as fishing gear supply, boat building, ice factories, fish sellers and fish processors. These ancillary industries provide at least another 50,000-75,000 full-time jobs.

Marine tourism, developed around the natural and artificial beaches of the region, scuba diving and ecotourism activities also provide considerable income to the region. In 2003, over 1 million tourists arrived, the majority of whom came to visit coastal areas (DOT 7 2004).

Fish remains a major component of the diet, accounting for over 50% of the total animal protein consumed in the country (ADB 2001). In Central Visayas, fish protein is the main source of cheap animal protein. However, with marine capture fisheries stagnating, the future does not look good for food security, especially of lower-income families.

The fisheries ecosystems of the region supply cheap protein to the region's fast-growing population as well as livelihood to a variety of people.

Central Visayas has a total land area of about 14,923 km^2. Negros Oriental comprises 5,402 km^2 (36%); Cebu, 5,088 km^2 (34%); Bohol, 4,117 km^2 (28%); and Siquijor, 344 km^2 (2%) (Table 1). Some 83% of municipalities and 34% of barangays are located in coastal areas. Central Visayas has a total of 109 coastal municipalities (Table 2) and 1,027 coastal barangays, with 65% of the population located in Cebu while just about 2% in Siquijor. The rest are in Negros Oriental (18%) and Bohol (15%).

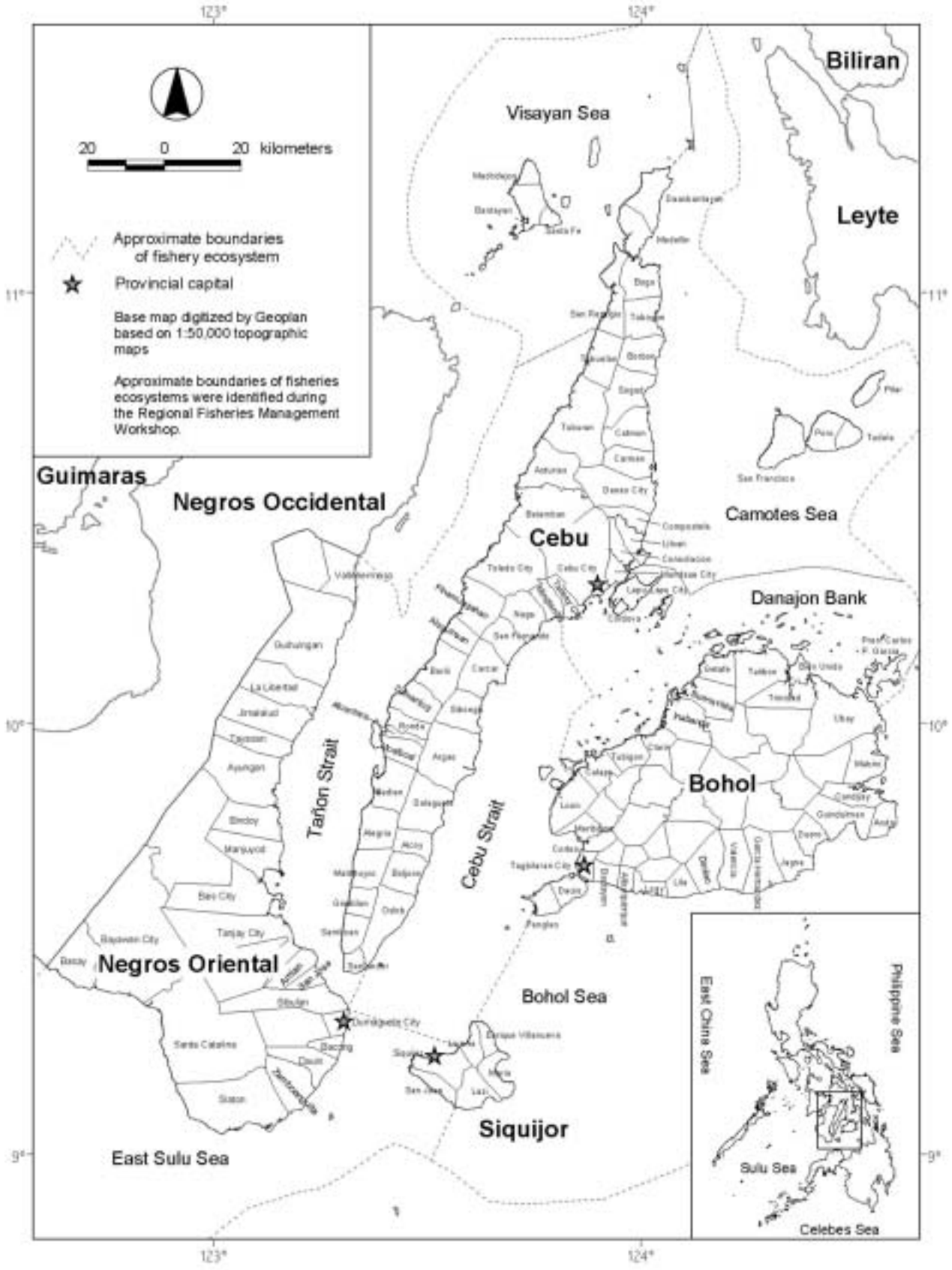


Figure 2. Map of Central Visayas.

Table 1. Key statistics on the four provinces of Central Visayas.

	Province				
	Bohol	Cebu	Negros Oriental	Siquijor	Totals
Capital city	Tagbilaran City	Cebu City	Dumaguete City	Siquijor Town	
Total no. of municipality/city LGUs	48	53	25	6	132
Total no. of coastal municipalities/cities	29	53	21	6	109
Total no. of barangays	1,109	1,203	557	134	3,003
Coastal barangays	365	427	166	69	1,027
Length of coastline (*km*)	682.3	916.5	334.2	96.1	2,029.1
Islands/islets	73	30	4	1	108

Socioeconomics

Central Visayas has a population of 5.7 million, or 7.5% of the Philippine population (Table 2). Since 1990, the coastal population in the region has increased 24.7% (NSO 2001) (Figure 3). Cebu's population has grown 27.2% since 1990 (making it the country's second most populated province, next to Pangasinan). In the last decade, population has increased by 22% in Negros Oriental, 19.5% in Bohol and 9.7% in Siquijor.

Table 2. The total population of the provinces of Central Visayas and percent increases since 1990 (NSO 2001).

Province	Population (2000)	% Increase since 1990
Bohol	1,137,268	19.5
Cebu	3,356,137	27.2*
Negros Oriental	1,126,061	22.0
Siquijor	81,598	9.7
Total	5,701,064	

* Reflects Cebu City immigration.

Human development index

The United Nations human development index (HDI) provides a benchmark of the development of the province compared to the rest of the country. This shows that the provinces of Central Visayas are in the middle and bottom third "developed" in the country (Figure 4).

Table 3. Socioeconomic indices in the provinces of Central Visayas (NSCB 2002 and NSO 1995, 2000).

Province	Poverty income threshold (P)	Poverty food threshold (P)*	No. of household members**
Bohol	9,125	7,082	5.18
Cebu	10,485	7,055	4.98
Negros Oriental	8,940	6,703	4.99
Siquijor	8,966	7,009	4.64

* National Statistics Office (NSO) defined minimum income level per month per family for Central Visayas to be above "poverty level".

** NSO defined minimum income level to supply enough food protein to typical family in Central Visayas.

Annual per capita poverty threshold in Central Visayas varies among provinces (Table 3), based on national government weighting.

The percentage of families under poverty income threshold in the provinces and which represent the percentage of population are as follows, respectively: Cebu, 28.7% and 32.7%; Negros Oriental, 28.9% and 36.4%; Siquijor, 29.2% and 33.6%; and Bohol, which has the poorest constituents in the region, 47.3% and 53.6%. See Figure 5.

The proportion of families (populace) with per capita income less than per capita food threshold (i.e., minimum amount required to provide protein to the family, P6,989 in Central Visayas) to the total number of families (population) is 17.0% (NCSB 2002). Compared with 1997 data, this shows that the percentage of the number of persons below poverty threshold in the region has increased by 3.4% in Cebu and 10.5% in Bohol, while it decreased 3.3% in Negros Oriental and 17.0% in Siquijor compared to 1990 data.

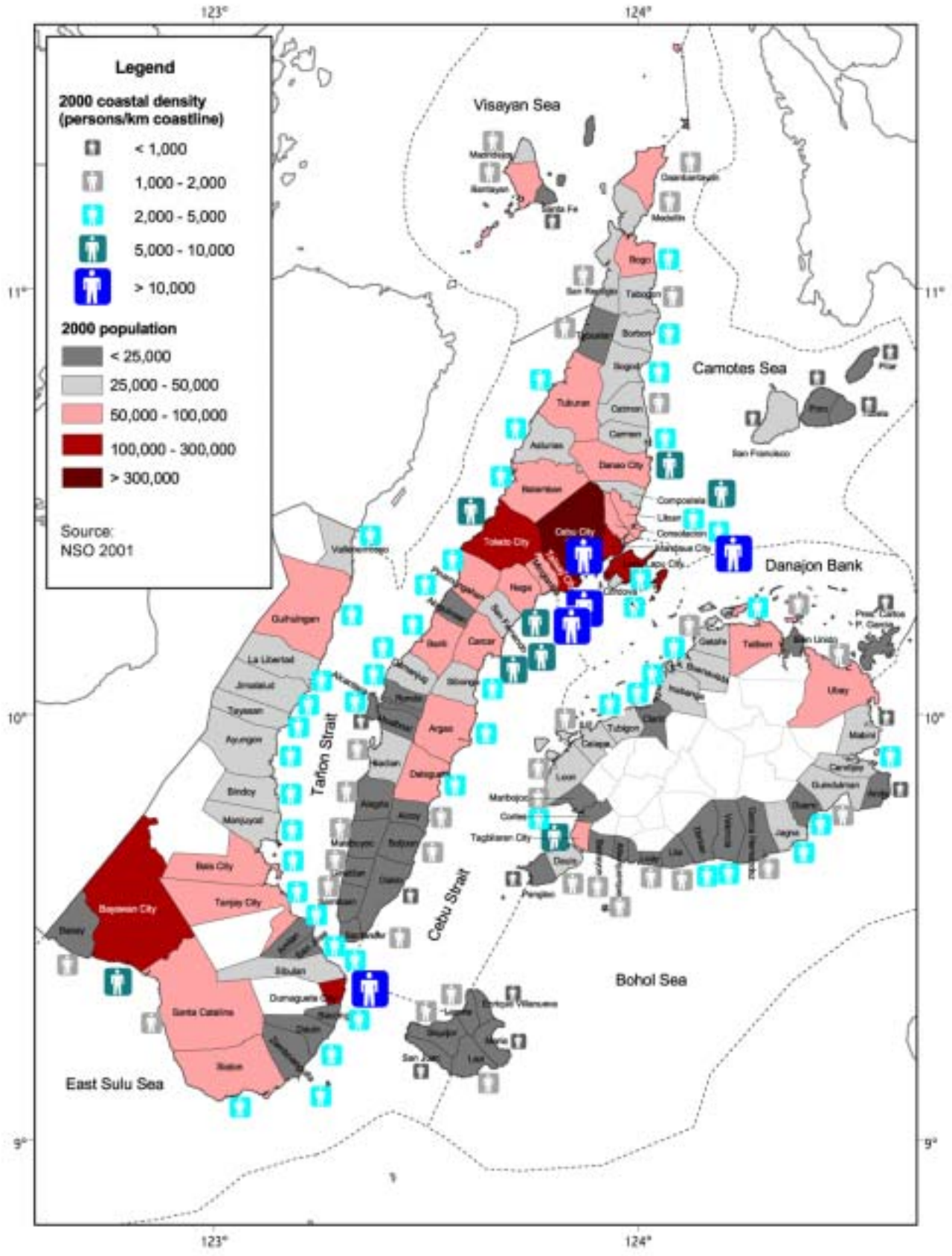


Figure 3. Population and coastal density in Central Visayas, 2000.

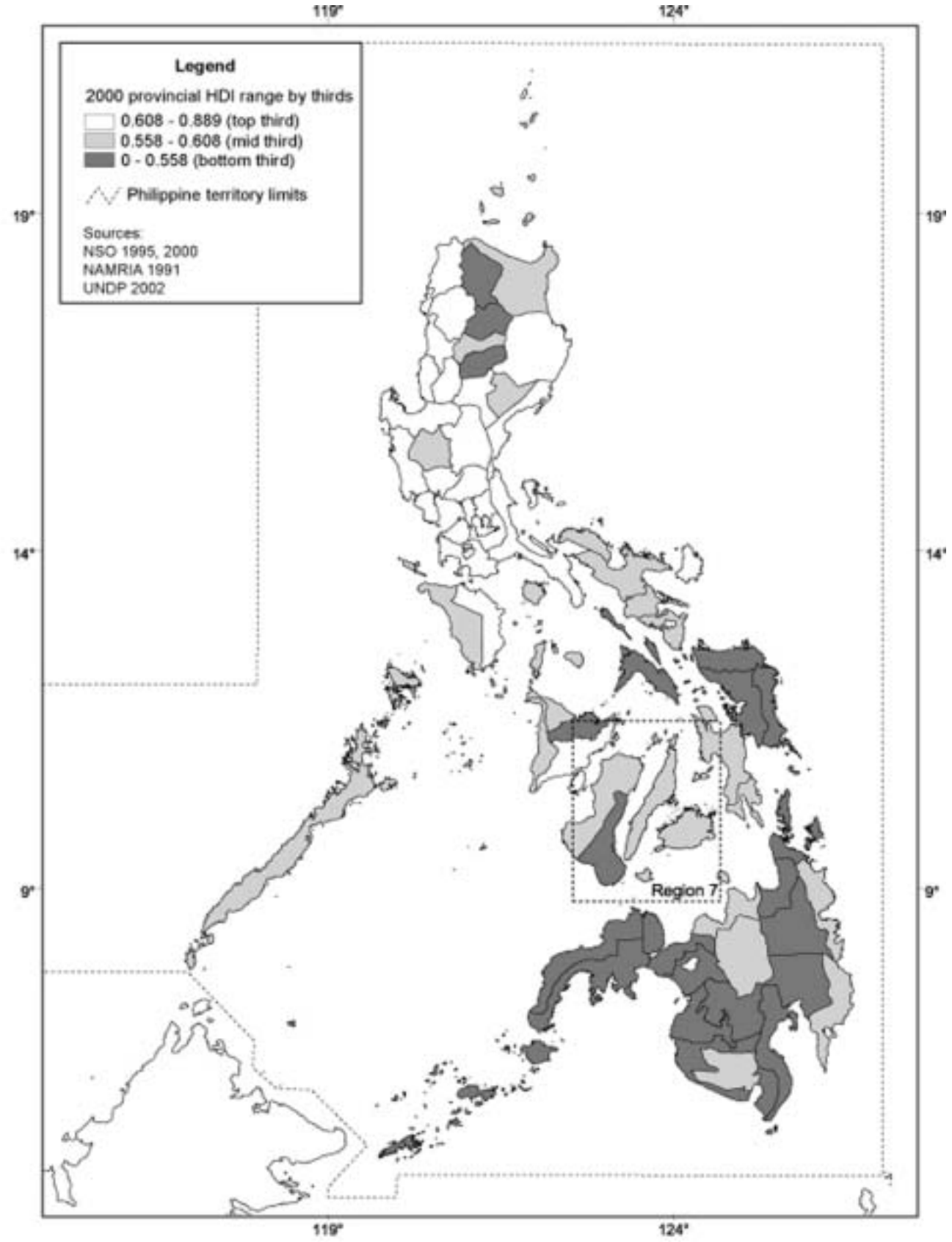


Figure 4. Human development index, by ranges of thirds, in Central Visayas.

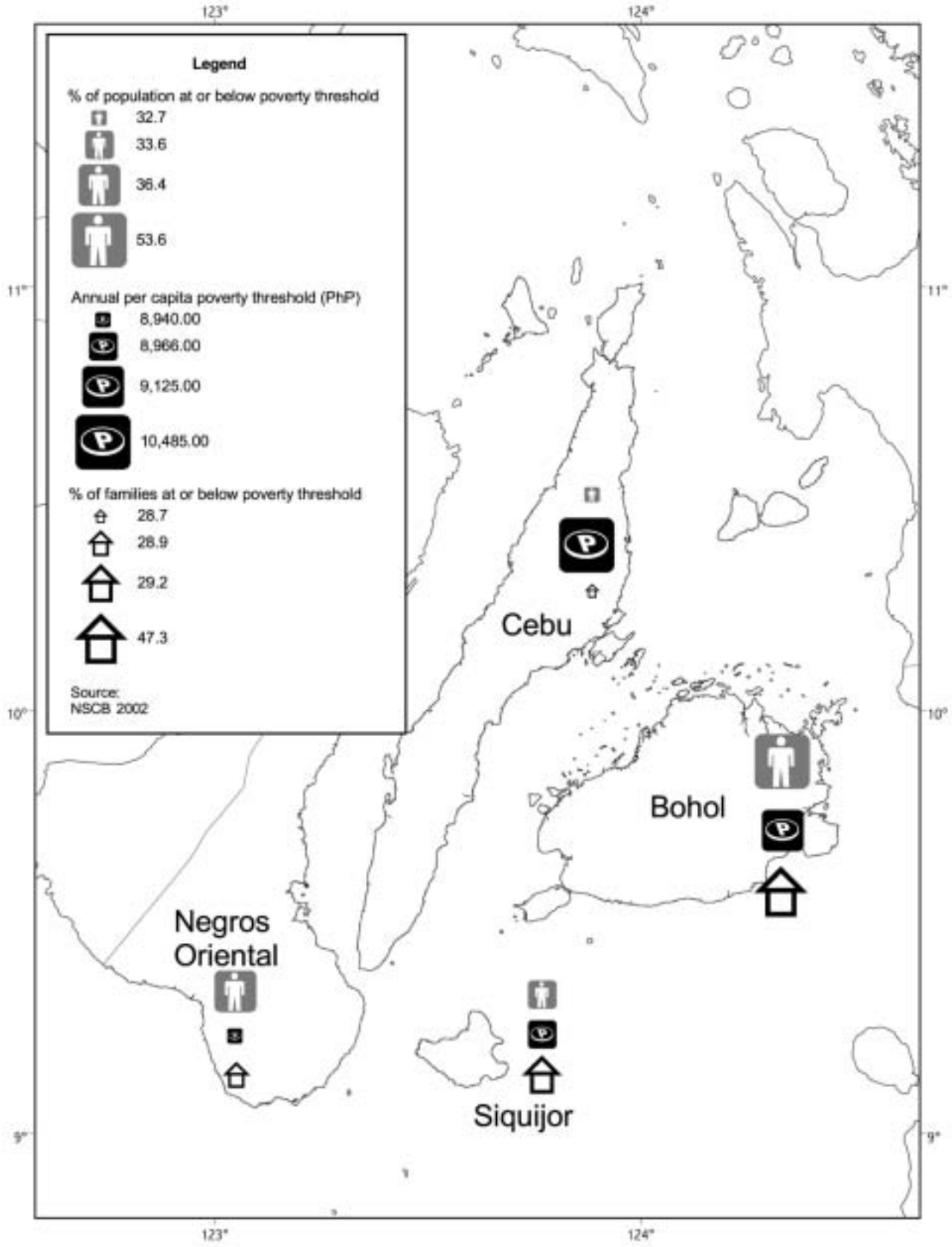


Figure 5. Relative incidence of poverty in Central Visayas.

These figures are very important when considering coastal fisheries management because the majority of the people involved in municipal fisheries live below the poverty level. Families who live below the poverty level depend on fish for their main source of cheap protein. The quality of marine resources also directly affects their income and health.

Gleaning and collection of marine organisms by women and young children supply a large portion of the animal protein to a typical coastal family in Central Visayas. Moalboal, Cebu.

Summary

The socioeconomic context of Region 7 and its implications for fisheries management are summarized as follows:

- Development is tied intricately with the marine fisheries ecosystems, providing income through fishing and other marine-related industries.
- Population is growing very fast, and this is having negative implications for the region's development.
- A majority of the population lives within the coastal zone of the region.
- Region 7, similar to the rest of the country, still has a low rating on HDI. Bohol has the largest percentage of people living below the poverty line, with Negros Oriental close behind. The levels of poverty in both provinces have worsened considerably in the last five years.
- Negros Oriental and Siquijor appear to be taking action towards reducing poverty; however, their figures may be influenced considerably by outmigration.
- Fishing is the number two employer in the region, second only to farming. There are over 200,000 people directly employed in fishing and related industries.
- Municipal fisheries provide livelihood for many families, who live below the poverty threshold, and marine fisheries provide cheap animal protein to those who need it most. Hence, the state of marine fisheries ecosystems directly impacts the quality of life of the region's poorest communities.

Chapter 3
An Introduction to the Marine Fisheries Ecosystems of Central Visayas and Their Habitats

The Marine Fisheries Ecosystems

The Visayan Sea borders the Central Visayas in the north, Camotes Sea in the east, Bohol Sea in the southeast and East Sulu Sea in the southwest. The Tañon Strait separates Negros and Cebu, and Bohol Strait is between Bohol and Cebu (Figure 6). Table 4 gives key statistics for each fisheries ecosystem.

For purposes of this profile, which looks at the Central Visayas fisheries ecosystems, only the area of the different ecosystems within the geopolitical jurisdiction of the region is considered (NAMRIA 1991). This is followed consistently for the rest of the profile, despite the ecosystems reaching into other adjacent regions.

Table 4. The total area of the different fisheries ecosystems, including area outside of Central Visayas.

Ecosystem	Coastline (km)	Total ecosystem area (km^2) (inside and outside of Central Visayas)
Bohol Sea	273.3	20,943.6
Camotes Sea	248.2	7,448.0
Cebu Strait	264.8	3,933.0
Danajon Bank	301.0	2,475.6
Sulu Sea	205.5	285,612.9
Tañon Strait	452.7	3,995.2
Visayan Sea	242.1	11,696.3
Total	1,987.6	336,104.6

The Fisheries Ecosystems within Central Visayas Geopolitical Jurisdiction

Bodies of marine waters in Central Visayas cover an approximate total area of 31,912 km^2 (CRMP-GIS 2004), which is 213% more than the total land area of the region. This total marine aquatic environment is further classified into municipal waters (under the management jurisdiction of local government units), covering 69.4%, and the remaining 30.6% is considered part of the national waters, administered through the national line bureaus such as the Department of Agriculture–Bureau of Fisheries and Aquatic Resources (Table 5).

A seagrass bed, Mactan Island. (A. White)

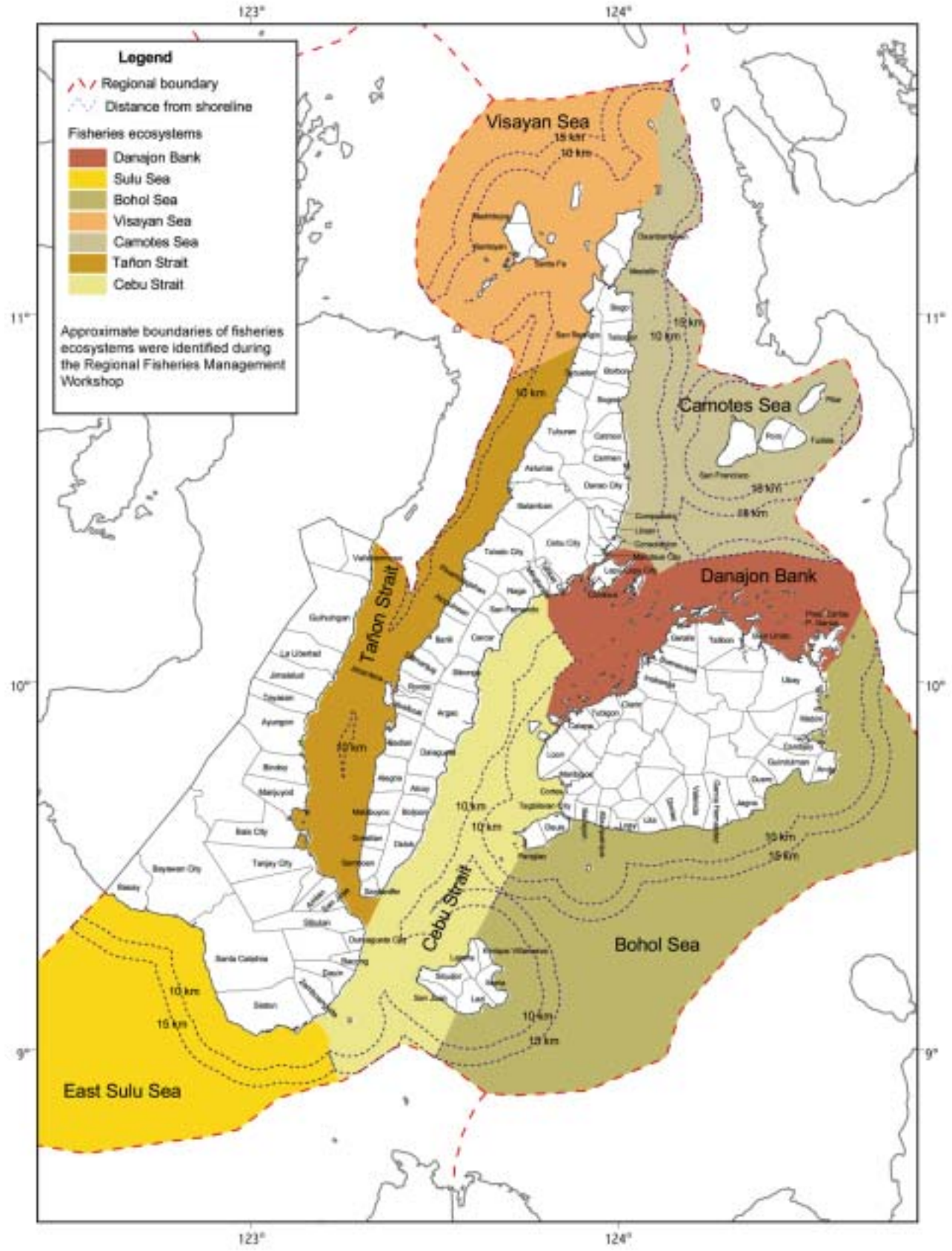


Figure 6. The marine fishery ecosystems of Central Visayas.

Table 5. Major marine fisheries ecosystems of Central Visayas based on computer-derived model calculating area of marine waters and municipal boundaries (CRMP-GIS 2004) and showing management jurisdiction (within political boundaries of Central Visayas).

Ecosystem	Coastline length (km)	Total area (km^2)	0-10 km		10.1-15 km		Area beyond municipal waters (>15 km)	
			Area (km^2)	(%)	Area (km^2)	(%)	Area (km^2)	(%)
Bohol Sea	273.3	7,968.0	2,490.0	31.2	1,248.0	15.7	4,230.0	53.1
Camotes Sea	248.2	4,310.0	2,693.0	62.5	1,065.0	24.7	552.0	12.8
Cebu Strait	342.4	3,933.0	2,808.0	71.4	1,030.0	26.2	95.0	2.4
Danajon Bank	301.0	2,476.0	2,476.0	100.0	-	-	-	-
East Sulu Sea	128.0	5,587.0	986.0	17.6	516.0	9.2	4,085.0	73.1
Tañon Strait	452.7	3,108.0	2,829.0	91.0	279.0	9.0		
Visayan Sea	242.1	4,116.0	2,250.0	54.7	804.0	19.5	1,062.0	25.8

Each of these bodies of water can be considered a discrete ecosystem. Within each ecosystem are multitudes of habitats, such as mangrove forests, coral reefs, seagrass, mudflats, sandy beaches and others. These habitats are most commonly encountered in coastal areas near the shoreline and are the main feeding grounds, nursery areas and spawning grounds of coastal-dwelling marine aquatic organisms.

*Healthy coral (*Acropora*) field, Sumilon Island, Cebu Province. (A. White)*

Coral reef habitat

Coral reefs are a diverse and productive habitat in the Philippines. These can provide potential annual revenues of between US$31,900 and 113,000 when all direct and indirect benefits (such as fishery income and tourism benefits) are included for a healthy reef (White and Cruz-Trinidad 1998). The total reef area in Central Visayas is estimated to be 1,560 km^2, 41% of which is located in Danajon Bank (Ong *et al.* 2002; CRMP-GIS 2004). See Table 6 (Figure 7).

Table 6. Area of coral reefs in Central Visayas (based on SPOT satellite imagery) collated by the National Biodiversity Strategy and Action Plan (Ong *et al.* 2002).

Province	Total area of coral reef	
	(ha)	(km^2)
Bohol	69,614.0	696.1
Cebu	62,462.3	624.6
Negros Oriental	13,704.9	137.0
Siquijor	6,935.3	69.4
Total	152,716.5	1,527.1

Note: Various surveys on the state of the region's reefs have been published, and these are summarized in Figure 7.

Mangrove habitat

Mangroves are estimated to cover some 102.1 km^2 (10,208 ha) of the region (Ong *et al.* 2002) (Figure 8). They are widely distributed around the region, with over 50% in Bohol (Table 7). There are 32 true species of mangrove identified within the region. Mangroves are a very productive habitat for fisheries and shrimps, providing an ideal spawning ground for many fish and crustaceans. A healthy and biologically diverse mangrove ecosystem is estimated to provide between US$500 and 1,550 per hectare per year (Dixon 1989).

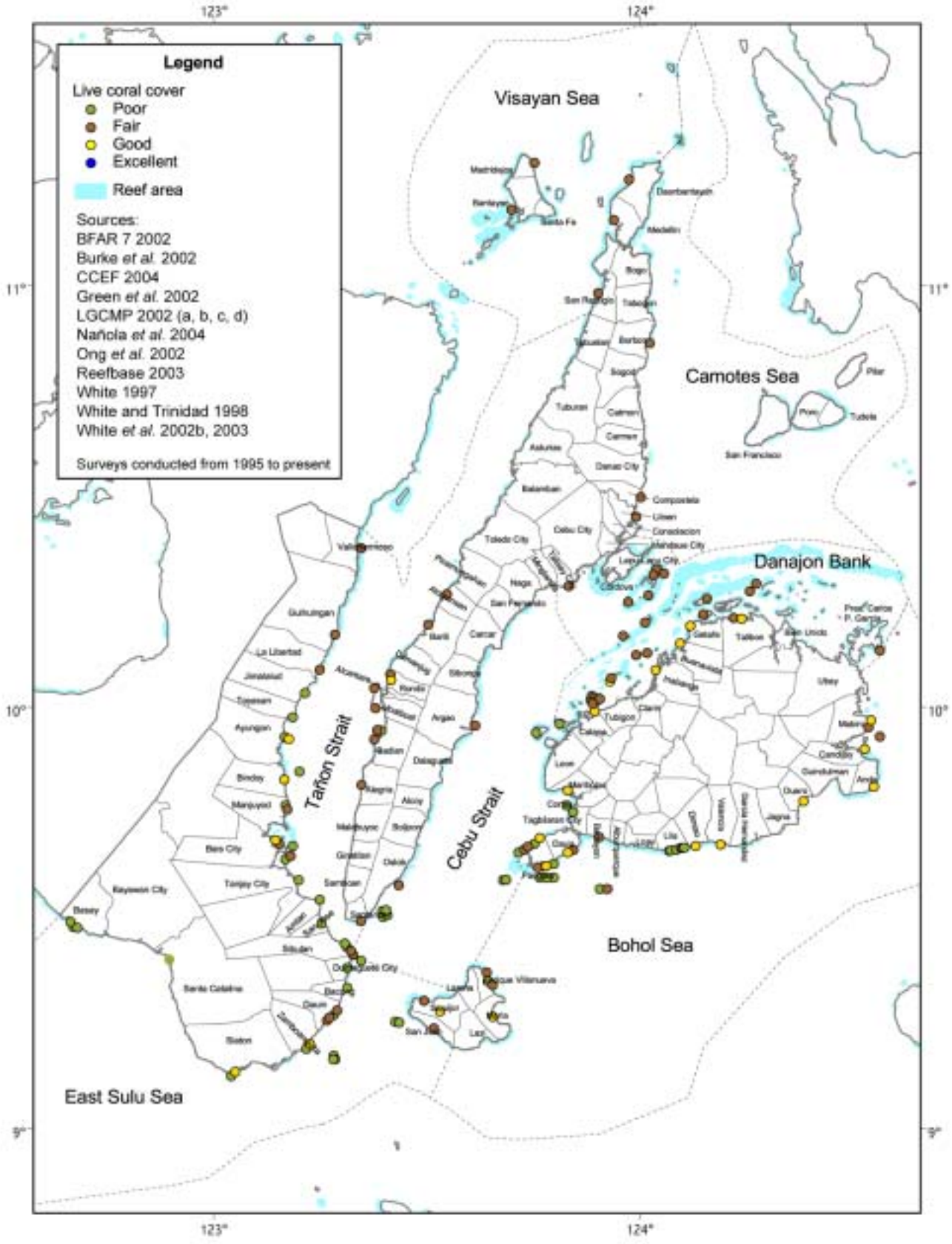


Figure 7. Results of coral reef assessments conducted in Central Visayas since 1995.

Many of the mangrove areas in the region were leased to private individuals for fishpond development during the 1970s-1980s in line with the national government's fisheries development program - "the blue revolution". At that time, only a few valued the real benefits of mangroves. Some of these mangrove areas that were converted into fishpond currently lie abandoned, underutilized and unproductive (Figure 8).

Table 7. Areas (ha and km^2) of mangroves and of fishponds in mangrove areas in Central Visayas (Ong *et al.* 2002).

Province	Area of fishponds in mangrove area		Area of remaining mangrove	
	(ha)	(km^2)	(ha)	(km^2)
Bohol	4,738.2	47.4	9,292.2	92.9
Cebu	2,888.9	28.9	126.6	12.7
Negros Oriental	1,909.2	19.1	789.0	78.9
Total	9,536.2	95.4	10,207.8	102.1

*Siquijor maps show minimal mangrove and fishpond area.

A large portion of the region's mangroves have been converted into fishponds, Talibon, Bohol.

A typical fishpond in the region. Argao, Cebu.

Visayan Sea fisheries ecosystem

The provinces of Cebu (Region 7), Negros Occidental and Iloilo (Region 6), Masbate (Region 5) and a portion of Leyte (Region 7) share the fisheries ecosystem of Visayan Sea. At the north perimeter of the sea is Asid Gulf, which is bordered by Masbate. Visayan Sea is bordered by Bantayan Island, Cebu, to the east; Negros, to the south; and Panay, to the west. The sea is generally shallow (therefore productive), with depths ranging from 6 m to 96 m, the deepest portion being near Leyte Island. The length of Central Visayas coastline fronting Visayan Sea is 242.1 km while 4,116 km^2 of it is within the jurisdiction of Central Visayas.

Visayan Sea is one of the most productive fishing grounds of the country. The fisheries resources are mostly pelagic, which feed near the sea floor such as Indian mackerels and sardines, and coastal pelagics such as anchovies (Figure 9).

The Central Visayas portion of Visayan Sea has only 0.05 km^2 of mangrove and no fishponds in mangrove areas (Ong *et al.* 2002). Most of the coral reef habitat is along the coast of Bantayan Island and the islets surrounding it. The total reef area in the Central Visayas portion is 258.8 km^2 (Ong *et al.* 2002), found along fringing reefs in Bantayan Island and the islets surrounding it. Five surveys have been conducted recently on the status of coral reefs. All the reefs surveyed were categorized as fair (25.1-50%).

Visayan Sea is also one of the priority areas for the conservation of cetaceans, mollusks, reef fishes and elasmobranchs (Ong *et al.* 2002). Malapascua Island in Daanbantayan, Cebu, is known to be one of the regular sighting areas of the thresher pelagic shark (*Alopias pelagicus*), in the world.

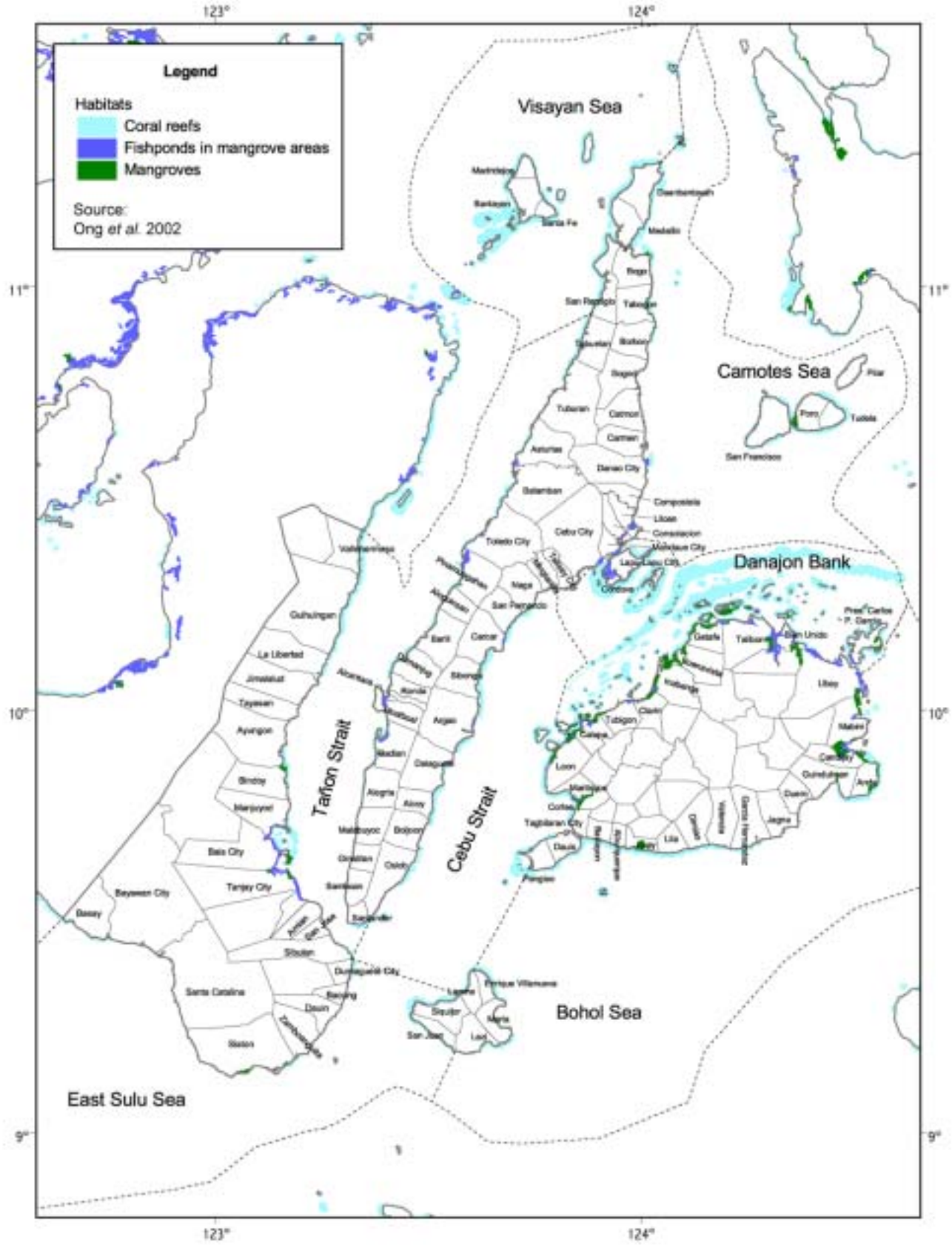


Figure 8. Coastal habitats and their distribution in Central Visayas.

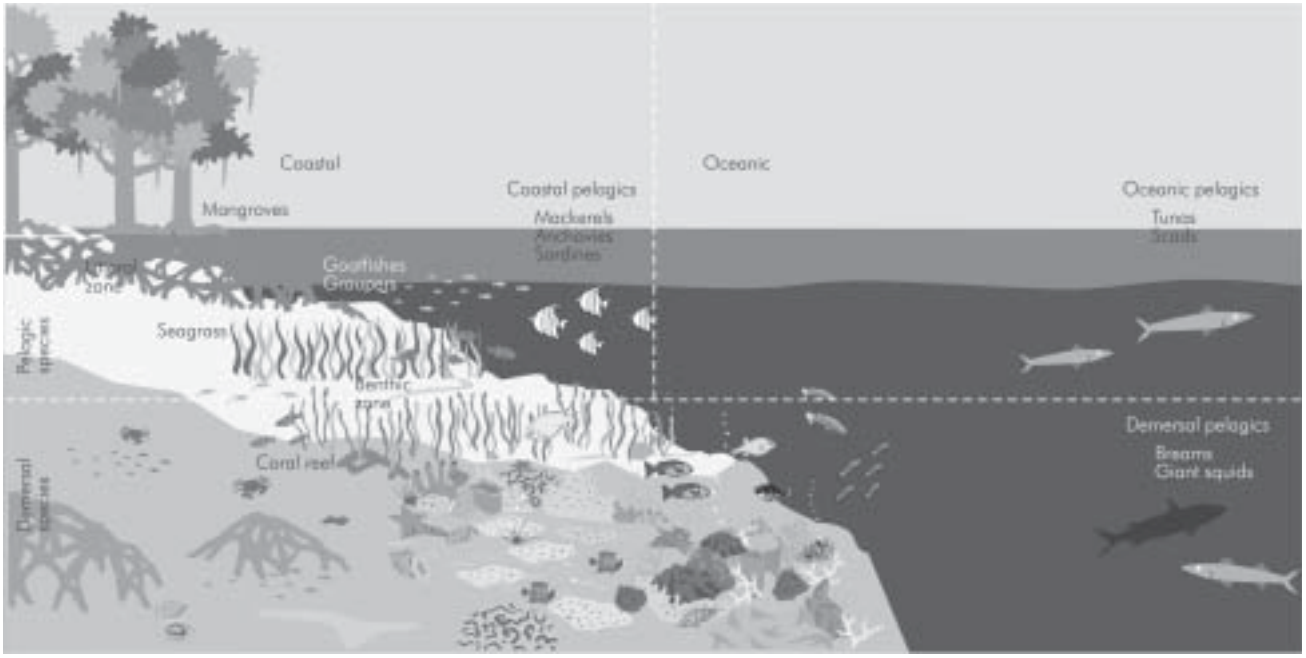


Figure 9. A cross-section of a typical Central Visayas fisheries ecosystem.

Camotes Sea fisheries ecosystem

The Camotes Sea surrounds the Camotes Group of Islands. Leyte borders the eastern periphery of Camotes Sea, Bohol is at its south and Cebu, at its north. The sea is relatively deep, reaching up to 806 m in its deepest portion. Its coasts are sharply sloping and highly irregular due to reef patches. The total length of coastline edging Central Visayas to Camotes Sea is 248.2 km. An area of approximately 4,310 km^2 of the sea is within the Central Visayas jurisdiction.

The region's portion of Camotes has some 380 ha of mangroves and 370 ha of fishponds in mangrove areas (Ong *et al*. 2002). Coral reef habitats fronting the coasts of mainland Cebu are not so extensive and are mostly fringing the coasts of Northeast Cebu and Camotes Group of Islands (Ong *et al*. 2002). There are 114.5 km^2 of coral reef in the Central Visayas portion of Camotes Sea. Within this area, only three coral reef surveys have been conducted recently. The live hard coral was found to be fair (25-50%) in status.

The Camotes Group of Islands is also identified as one of the priority conservation areas for reef fishes while the northern tip of Cebu is for elasmobranch protection (Ong *et al.* 2002).

Danajon Bank fisheries ecosystem

At the southern periphery of Camotes Sea is Danajon Bank, which is about 72 km long on the east-west axis and ranges from 9 to 25 km wide. It has a total coastline of 301 km and a total area of 2,476 km^2. The entire Danajon Bank is within municipal waters, within 10 km of the shoreline. Danajon Bank is a unique double barrier reef composed of numerous but dispersed islets and reef patches joining together into an inner Calituban and outer Caubyan barrier reef.

Historically, the bank is the most habitat-rich fisheries ecosystem of Central Visayas, having the largest areas of both coral reefs and mangrove in the region. It is rich in mangrove habitats found mostly in the coastal areas of Getafe to Calape, with significant patches along the coastlines of Talibon and Bien Unido. Mangroves cover an area of 5,250 ha and fishponds in mangrove area cover 4,750 ha. The area also contains one of Southeast Asia's largest human-made mangrove forest in Banacon Island with over 2,000 ha of *Rhizophora* spp.

The coral reef habitat covers an area of 62,430 ha (Ong *et al.* 2002). Figure 10 shows that the remaining reefs are on the whole fair (25-50%) in status.

A portion of the outer Caubyan reef in the Danajon Bank Double Barrier Reef.

Soft corals, Cabilao Island, Bohol. (T. Parras)

The Danajon Bank is identified as a priority area for the conservation of reef fishes, corals, mangroves and mollusks. It is also part of the Asian southward bird migratory pathway; in 1990, over 1,000 migratory birds belonging to 20 species were identified during their southward migration from northern Asia from late July to November (Perennou *et al.* 1994). Also identified was the Chinese egret (*Egretta eulophotes)*, which is on the protected species list of the World Conservation Union and is categorized as threatened.

Tañon Strait fisheries ecosystem

Tañon Strait separates Cebu and Negros. Its peripheral provinces are Negros Oriental, Negros Occidental and Cebu. The strait has a total coastline of 452.7 km and a total area of 3,108.0 km^2. It is relatively deep, with the deepest at about 509 m. Its coasts are sharply sloping and fringed with reefs.

Patches of mangrove aggregates are found in the southern coasts of the strait at both sides of Negros Oriental and Cebu. Only 650 ha of mangroves remain, while 2,990 ha of fishponds in mangroves are found within the area (Ong *et al*. 2002). There are 188.3 km^2 of coral reef within the strait, composed of mostly fringing reefs along the Negros and Cebu coastlines. Forty-seven coral reef surveys have been conducted since 1995.

The strait is a distinct habitat of the chambered nautilus (*Nautilus pompilius)* and a migration route of Whalesharks *(Rhincodon typus)*. It is home to at least nine species of cetaceans, the most interesting of which are the Dwarf sperm whale *(Kogia simus)* and Melon-headed whale (*Peponocephala electra)*. Thus, the strait is identified as one of the priority areas for the conservation of cetaceans and reef fishes. Initial oceanographic studies of water and larvae flow suggest that the Visayan Sea is the net supplier of fish larvae to the strait, suggesting that management of the strait should be closely linked with that of the Visayan Sea fisheries ecosystem.

Cebu Strait fisheries ecosystem

Cebu Strait, sometimes called Bohol Strait, is the body of water separating the islands of Bohol and Cebu. This strait is relatively deep, with a maximum depth of about 306 m. It has a

coastline length of 342.4 km and a total area of 3,933 km^2.

Mangroves, interdispersed with *Nypa* palms *(Nypa fruticans)*, are found around the rivers leading out from the mainland of Bohol in the towns of Loon, Calape, Maribojoc and Cortes. The strait has over 10.9 km^2 of mangrove cover dispersed along the coastline and offshore islands of Cebu and Bohol, with 3.8 km^2 fishponds in mangrove areas (Ong *et al.* 2002). Its coastline is sharply sloping and fringed with coral reefs, especially near Bohol's offshore islands, with 158.6 km^2 of coral reef for the whole fisheries ecosystem. Twenty-four coral reef surveys have been conducted in the area since 1995.

Bohol Sea fisheries ecosystem

Bohol Sea is also known as Mindanao Sea. It is a large body of water bounded by the islands of Mindanao (south and east), Leyte, Bohol and Cebu (north) and Negros (west). It measures about 270 km on the east-west axis and the length of coastline fronting Central Visayas is about 273.3 km. About 7,968 km^2 of Bohol Sea is within Central Visayas jurisdiction. Mangroves are mostly found in the coasts of Candijay to Guindulman, with small patches in Loay. The total area of mangrove is 2,810 ha, with 1,080 ha of fishponds in mangroves (Ong *et al.* 2002).

The coasts along the islands of Bohol are sharply sloping and fringed with irregular patches of reefs and rocks. Coral reef covers 132.7 km^2 within the fisheries ecosystem (Ong *et al.* 2002). Thirty-six coral reef surveys have been conducted in the area since 1995.

The sea is relatively deep and is famous for its Whaleshark *(Rhincodon typus)* population, which only recently returned in small numbers after many years of hunting, and manta ray (*Manta* spp.) inhabitants, now protected by FAO 193. The Bohol Sea is identified as one of the priority areas in the conservation of mangroves, cetaceans, corals and whalesharks. It has at least eight species of resident and migratory cetaceans.

East Sulu Sea fisheries ecosystem

The East Sulu Sea is a continuum of Sulu Sea. It is located at the southernmost part of Central Visayas, outlining the south peripheries of the provinces of Cebu, Negros Oriental and Siquijor. The East Sulu Sea is shared by a number of provinces, namely, Negros Oriental and Siquijor (Region 7), Palawan (Region 4) and Zamboanga del Norte (Region 9). The portion of East Sulu Sea under Central Visayas jurisdiction is about 5,587 km^2 with a coastline length of 128 km.

The coasts of East Sulu Sea fronting Central Visayas are edged with mangroves, seagrasses and coral reefs. Mangroves cover only 1,300 ha of area within the Central Visayas portion of the ecosystem, and there are no recognized fishponds in mangrove areas (Ong *et al.* 2002).

Fringing coral reefs along the coastline of Negros Oriental cover some 49.9 km^2. Some 29 coral reef surveys have been conducted in the area since 1995.

A large portion of East Sulu Sea is deep. It is one of the major migratory paths of Yellowfin tunas (*Thunnus albacores*) and other economically important large pelagic species in the country. The sea is also identified as one of the priority areas for the conservation of reef fishes, cetaceans, elasmobranches, whalesharks and marine turtles. It is part of one of the most biodiverse marine ecosystems in the world.

Summary

The major coastal habitats and ecosystems and their conditions within Region 7 are summarized as follows:

- Central Visayas is surrounded by seven major marine aquatic ecosystems, namely, Visayan Sea, Camotes Sea, Danajon Bank, Tañon Strait, Cebu Strait, Bohol Sea and East Sulu Sea, which are all unique in terms of resources, habitats and bathymetry.
- The collective area of all these bodies of waters is significantly larger than that of the Central Visayas land area (213% larger).

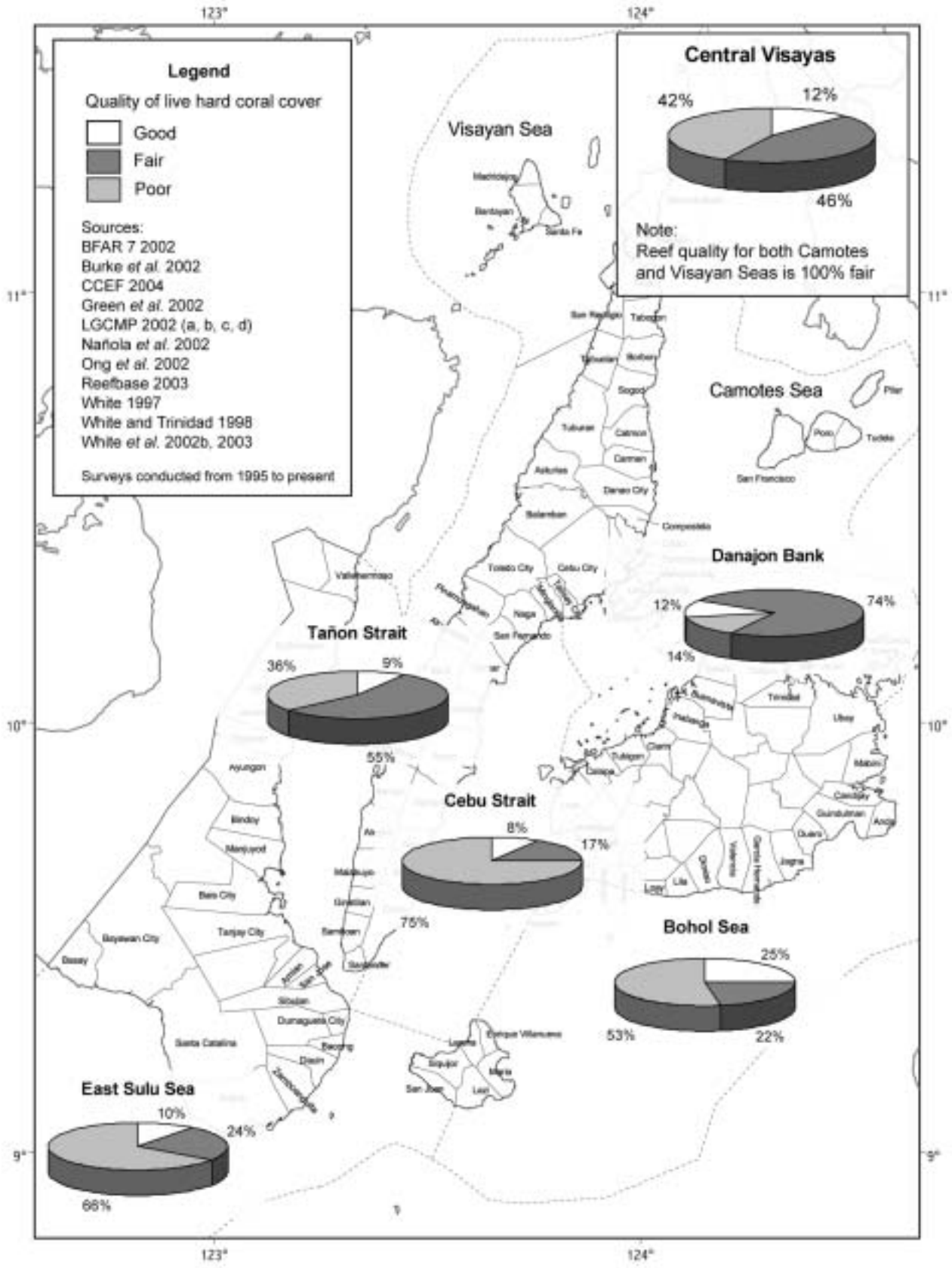


Figure 10. Quality of live hard coral cover per ecosystem showing average for whole Central Visayas.

- Of the seven major ecosystems, only Visayan Sea and Danajon Bank are relatively shallow. The rest are relatively deep fishing grounds.
- The coral reef habitats, one of the most ecologically significant coastal water habitats in the region, are in a degraded state, with 172 documented surveys in the region indicating that 70 sites (42.0%) of the reefs have poor quality coral cover and no sites were found to be in excellent state (Figure 10).
- Mangroves are very diverse, with 32 species identified in the region, out of 35 species found in the Philippines. However, the mangrove area has been reduced considerably from its original state, with over 50% (9,540 ha) of mangroves (19,740 ha) now converted into fishponds in mangrove areas.
- There are still abandoned and underutilized fishponds in the region. These should be rehabilitated by mangrove reforestation to make them productive again.
- The region also contains a variety of endangered and unique species of birds, fish, mollusks and cetaceans that live or migrate in and around the waters.
- Because the ecosystems cross political jurisdictions and cut across regions, NGAs and LGUs should cooperate in management scheme between regions sharing the same ecosystems with Central Visayas. Joint inter-regional initiatives should be made with Regions 4, 6, 8, 10 and 12 in the long term if fisheries management is to be successful.

Chapter 4
The Status and Trends of Commercial Fisheries of Central Visayas

Marine capture fishes are a biologically natural renewable resource composed of hundreds of different species interacting with many different habitats and caught using various fishing gears. This chapter presents historical data and overall trends of the region's fisheries production and commercial fishing industry.

Fisheries Production/Landings

In the late 1970s, the average total annual landings in Central Visayas were about 63,952 t. In the 1980s, the average annual fisheries landings decreased 13.3% to 56,454 t, but in the 1990s, these rose significantly to 101,822 t, an increase of 45.56%. By early 2000, landings were 109,671 t only (Figure 11). Central Visayas has been contributing 3.7-7.7% to Philippine total fisheries production since 1976. In 2002, the region contributed about 6.0% to total marine capture fisheries production of the country (Figure 12). The fisheries landings are subdivided into two sectors, municipal and commercial.

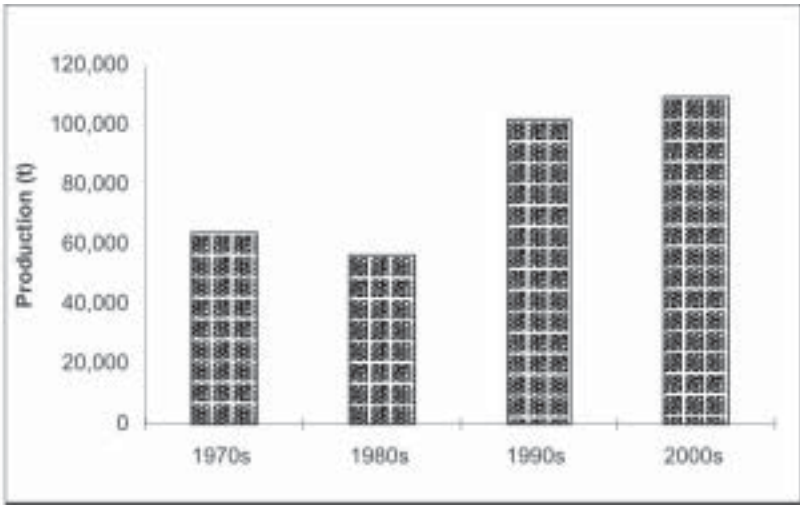


Figure 11. Average total marine capture fisheries landings in Central Visayas (BFAR and BAS 1976-2002).

Figure 12. Percent contribution of marine capture landings in Central Visayas to total Philippine marine capture production (BFAR and BAS 1976-2002).

From 1976 to 1983, municipal fisheries sector landed more than the commercial one. However, the period 1984-1986 marked the onset of a shift towards more commercial fisheries landings, and this trend has continued to the present (Figure 13).

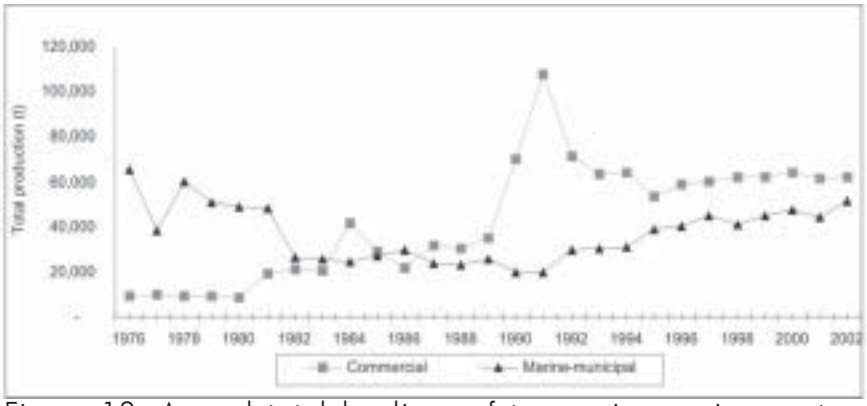


Figure 13. Annual total landings of two major marine capture fisheries sectors, municipal and commercial for Central Visayas (BFAR and BAS 1976-2002).

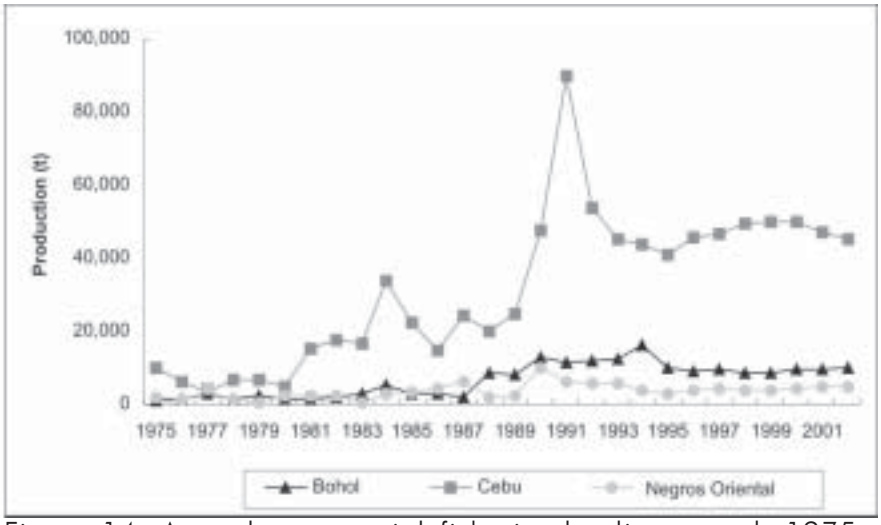


Figure 14. Annual commercial fisheries landings trend, 1975-2002 (BFAR and BAS 1976-2002).

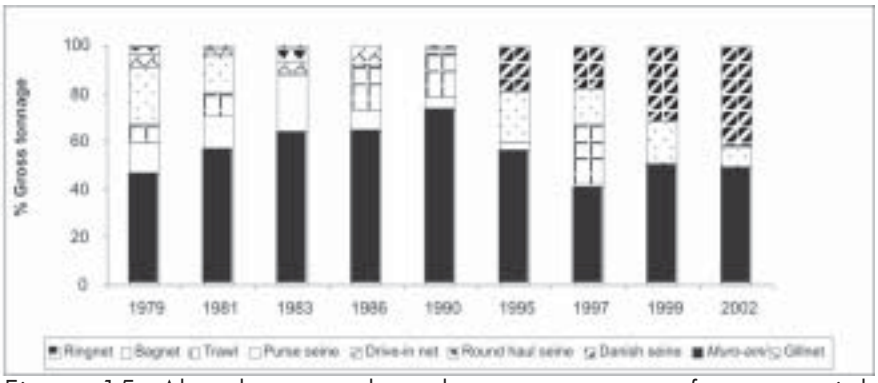


Figure 15. Abundance and total gross tonnage of commercial fishing vessels licensed by BFAR 7 since 1979 (DA-BFAR 7). (*Since the late 1980s, the* muro-ami*, drive-in net and Danish seine were declared illegal due to their being defined as "active" fishing gears [FAO 201].*)

Commercial Fishing Industry Landings by Province

Since 1976, the average contribution of Cebu to the total commercial fisheries production was 73.5%, while those of Bohol and Negros Oriental were 15.6% and 10.9%, respectively (Figure 14).

Over a span of two decades, there had been nine major types of commercial fishing gears used in Central Visayas fishing grounds (Figure 15). These proliferated during the 1970s and 1980s. In the 1990s, however, some of the gears were banned (e.g., *muro-ami*); some became too expensive to operate due to fuel prices (e.g., trawl); and some have simply ceased to be economical. Others, such as round haul seine and bagnet, have modified their boat size to below 3 GT and have gone under the guise of "municipal fishers." The remaining commercial fishing gears are the more efficient ones; these have lower operating and maintenance costs. The ringnet has maintained its position as the primary fishing gear that targets pelagic fishes; Danish seine took the place of trawl as the primary demersal fishing gear in the region (Figure 16).

Ringnet

The apparent success of ringnet fisheries is also partly due to introduction of other fishing accessories to work in partner with this gear, such as *payao*, a fish aggregating device

that makes fishing very effective and is relatively cheap to install and maintain.

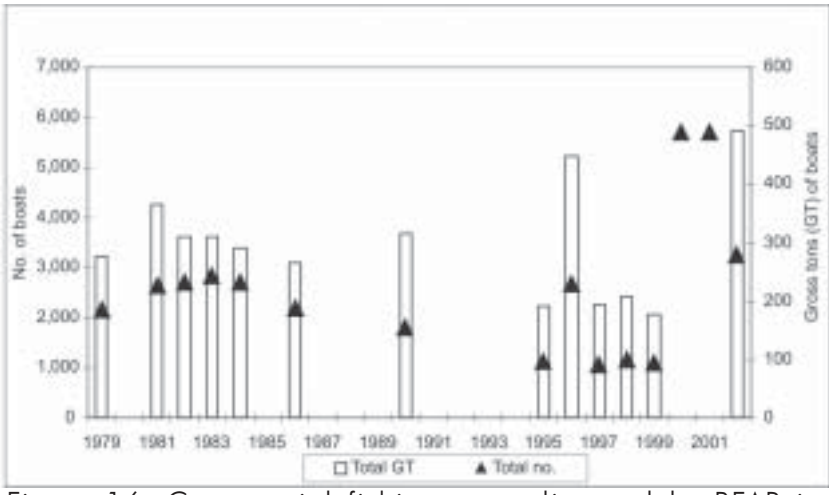


Figure 16. Commercial fishing gears licensed by BFAR in Central Visayas (BFAR 7 2002).

The efficiency of ringnet fisheries was further enhanced with new technologies of the fish finder (a transducer that helps locate fish, identifying their depth and volume of shoals) as well as superlights (composed of halogen lights of up to 5,000 kw which are dropped below boats and powered by a dynamo) to aggregate schooling pelagics. However, the use of superlights eventually became regulated. Their use was banned within municipal waters during the late 1990s. During this time, a new technology, the sonar was introduced and fast became a necessity for profitable fishing. The sonar is much more efficient and costly than a fish finder. It can identify shoaling pelagics from a long distance away and gives much more information about the shoal than a fish finder does. Some 20% of commercial boats in the region now carry sonars.

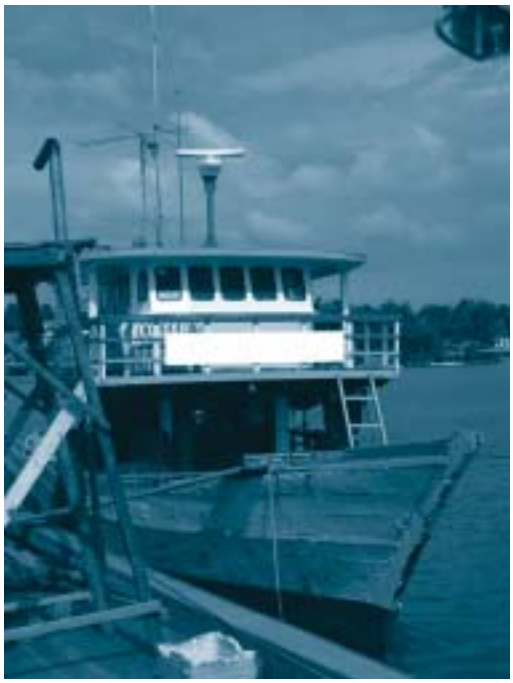
Fish aggregating device (payao)*, near Pamilacan Island, Baclayon, Bohol.*

During this time, there was also a shift on the size capacities of the ringnet fishing boats from mostly small-scale to medium-scale, due in part to the ban on commercial fishing within municipal waters (Fisheries Code, Republic Act [RA] 8550) as well as incentive programs from the Department of Agriculture and the Fisheries Modernization Act of 1997 (RA 8435). More recently, the ringnet boats are being upgraded by owners from small wooden hulled boats to much larger and expensive metal hulled boats (Figure 17).

Lightboat using gas lights to attract fishes before harvesting with a round haul seine, Clarin, Bohol.

Danish seine

The Danish seine fishery was introduced to the region during the 1980s. Its operation started as a large-scale municipal fishing gear. Its full commercial operation developed only after 1986 when BFAR provided the commercial size design of the gear as well as trained fishers how to use it. In 2004, BFAR Central Office issued Fisheries Administrative Order (FAO) 222, which regulates the operation of the Danish seine fishery by banning the use of "tom weights" (a



An array of technologies on top of a commercial fishing boat.

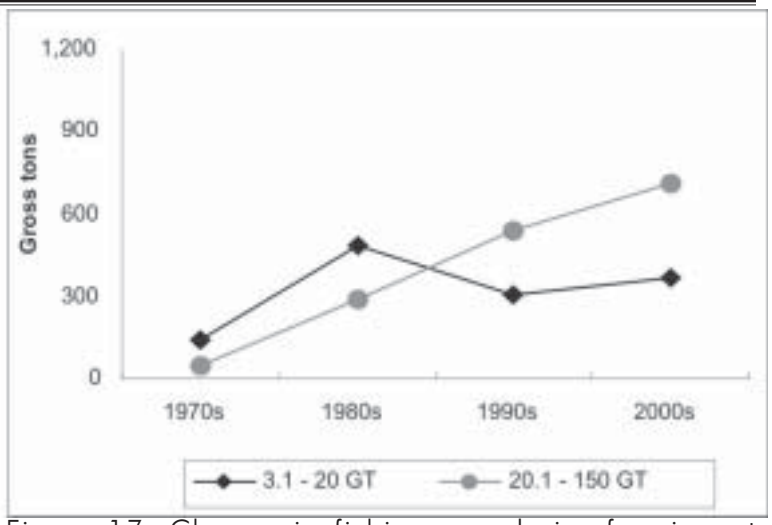


Figure 17. Change in fishing vessel size for ringnet fisheries, Cebu (BFAR 07 2002).

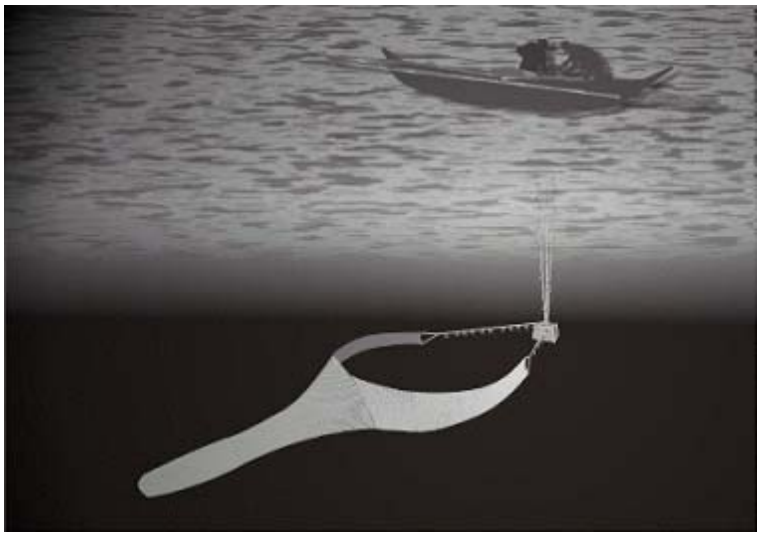


Figure 18. Typical modified Danish seine operation (recently banned in municipal waters through FAO 222).

large weight that helps keep the net low to scrape the bottom of the seabed) during fishing operation. It disallows its use within municipal waters due to its fine-meshed net, use of scaring devices, and tendency to catch juvenile fishes and to damage the seabed (Figure 18).

State of Fisheries Ecosystems with Reference to Commercial Fisheries

Visayan Sea fisheries ecosystem

Landings

The Visayan Sea hosts various fishery activities targeting all major fishing habitats - pelagic (surface and midwater-dwelling fishes), demersal (bottom-dwelling fishes), reefs and seagrass beds. In 1995, the sea was the third top contributor of fish and other marine fisheries products in the country, with landings of approximately 208,883 t (BFAR 1997), making up 12.4% of total fisheries landings. In the commercial fisheries sector, Visayan Sea was the top producer in the country while in marine municipal fisheries sector, it ranked third. The volume of landings over the years from commercial fisheries showed that this sector was indeed one of the most important sources of fish food and fisheries revenue of the country. Figure 19 indicates a steady increase in landings until the early 1980s; since then, there has been a steady decline.

Catch composition

A general trend in the composition of landings from Visayan Sea, since the 1950s, shows a significant change, from slipmouth to sardine-dominated landings (Figure 20 and Table 8). The shift in catch can be largely associated with the demise of the trawl fishery, which mostly caught slipmouths. The trawl has

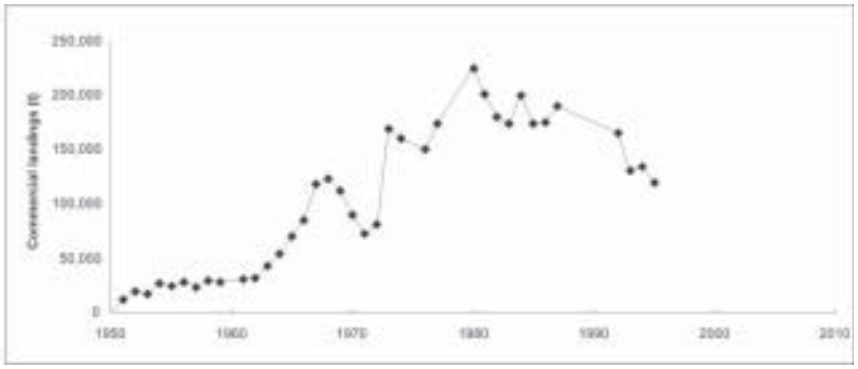


Figure 19. Total commercial fishing sector landings from Visayan Sea (BAS and BFAR 1951-1995).

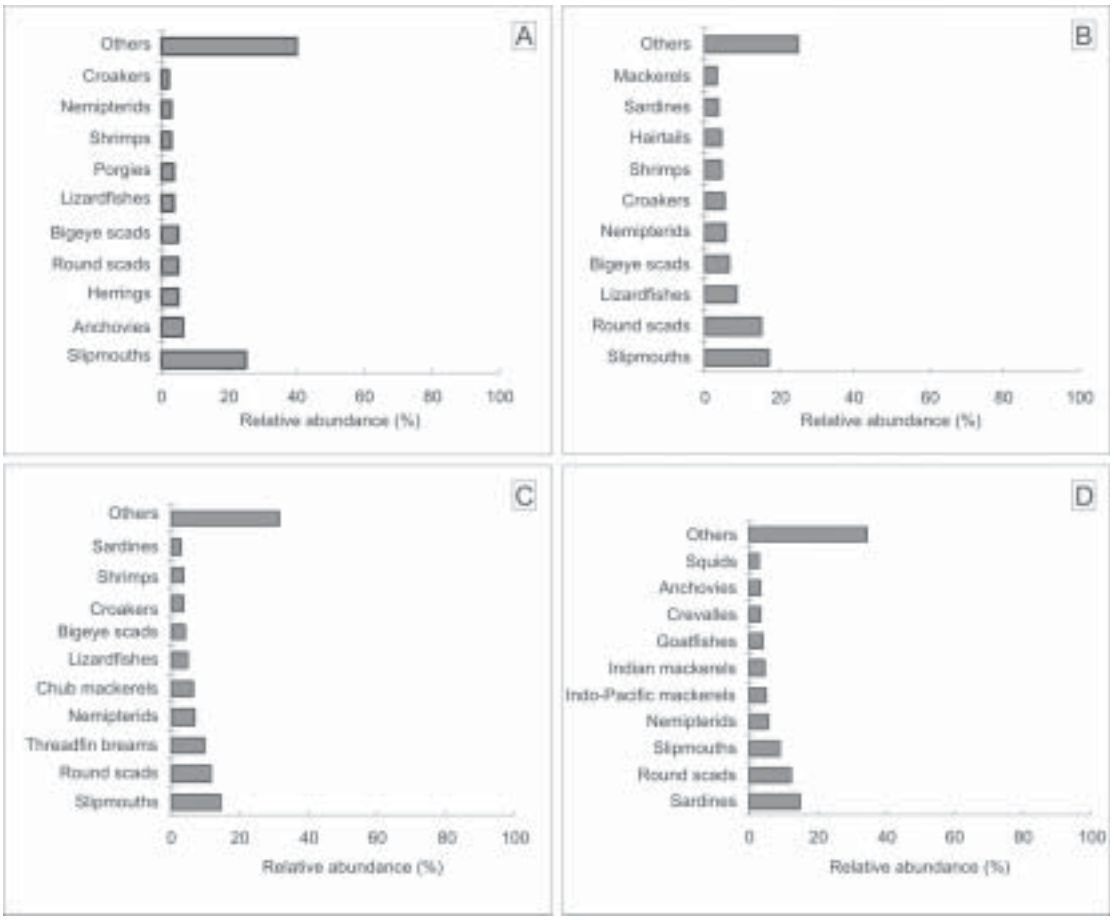


Figure 20. Major species landed by the commercial fisheries sector from Visayan Sea: (A) 1950s, (B) 1960s, (C) 1970s and (D) 1980s (BFAR and BAS 1951-1987).

Table 8. Percent breakdown by type of the top 10 species of fish caught from 1950 to 1980s for which data were available (BFAR and BAS 1950-1980).

Decade	Top 10 species caught as % of total catch	Demersal	Coastal pelagic fishes	Oceanic, small pelagic fishes	Invertebrates
1950	60.6	36.6	11.6	9.6	2.8
1960	75.0	41.8	21.8	6.7	4.7
1970	68.4	39.8	9.4	15.6	3.6
1980	65.4	19.0	27.6	15.7	3.0

been replaced by Danish seine as the most productive fisheries gear in the sea.

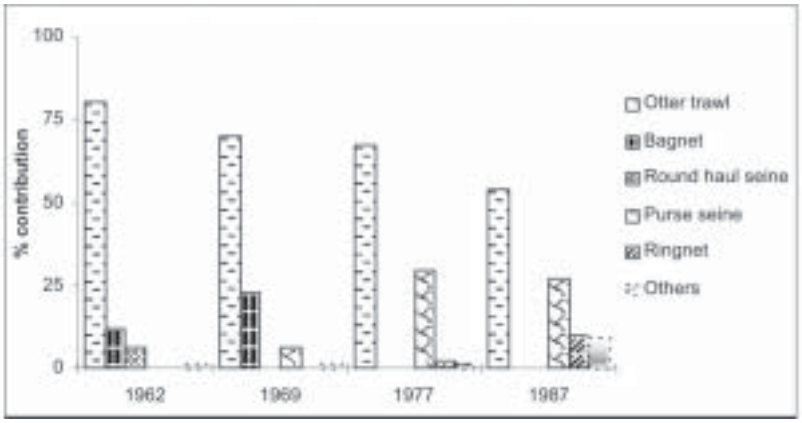


Figure 21. Major commercial fishing gears with respective percent of contribution to total volume of landings from Visayan Sea (BFAR 1962, 1969, 1977, 1987).

Major fishing gears

A wide range of fishing gears are used to harvest fisheries products in Visayan Sea. During early 1960s, the high volumes of landings were from trawl (80.3%), bagnet (12.0%) and round haul seine (6.3%). In late 1960s, trawl remained as a major contributor of fish landings (70%). The bagnet contribution almost doubled (22.6%), and purse seine replaced round haul seine as the third contributor (6.0%) (Figure 21).

In the 1970s, trawl fisheries contributed 67.5% to total landings from Visayan Sea while purse seine, 29.7%. In the late 1980s, trawl fisheries contributed 54.0%; purse seine, 26.8%; bagnet, 6.7%; and all other gear types, 12.2%. The trawl fisheries were consistently the most important until the onset of the oil crisis in the 1970s, which made the method less profitable. The void left by trawl operations was immediately occupied by Danish seine fisheries, the major demersal fisheries in Visayan Sea at present.

Catch composition of major fishing gears

Catch composition of gear may be used as indicator on the characteristics of fishing grounds as well as of fishing operation. Data from 1985 to 1987 showed that most demersal fishes (i.e., slipmouths) were caught by trawl; coastal pelagic fishes, such as anchovies, by bagnet; and oceanic, small pelagic fishes, by purse seine and ringnet.

Trawl catch was mostly composed of demersal fishes (33.6%), pelagic fishes (33.5%), invertebrates (3.7%) and others (29.2%). The most abundant catch were round scads (24%) (Figure 22).

The bagnet fisheries operated in different depths within Visayan Sea as indicated by diverse catch composition (Figure 23). The common characteristic among key organisms caught by bagnet was their attraction to light. Hence, the bagnet's dependence on light as an aggregating device. However, the predominance of pelagic fishes (56.1%) showed that most fishing was done in relatively deep waters (Figure 24).

The purse seine fisheries operated in deep waters through the aid of *payaos* (Figure 25) and in most cases adjacent to reef areas, as illustrated by the abundance of aggregating reef-associated, pelagic fishes such as mackerels and crevalles (Figure 26). These fishes are known to be prone to aggregate easily if exposed to lights near a *payao*.

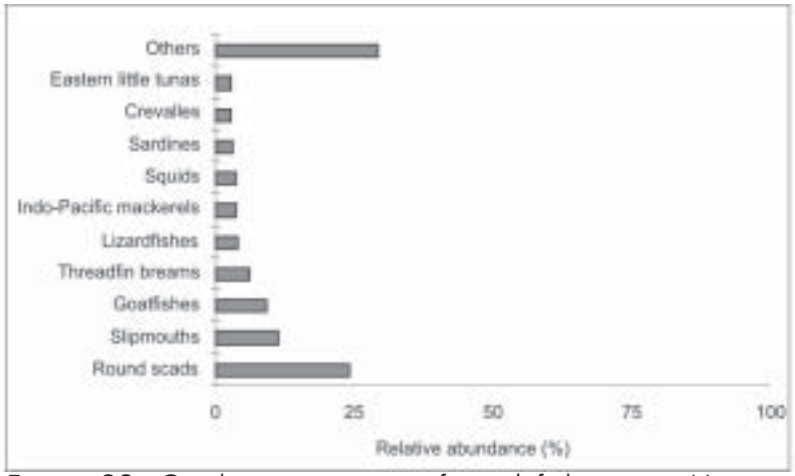


Figure 22. Catch composition of trawl fisheries in Visayan Sea (BFAR 1985-1987).

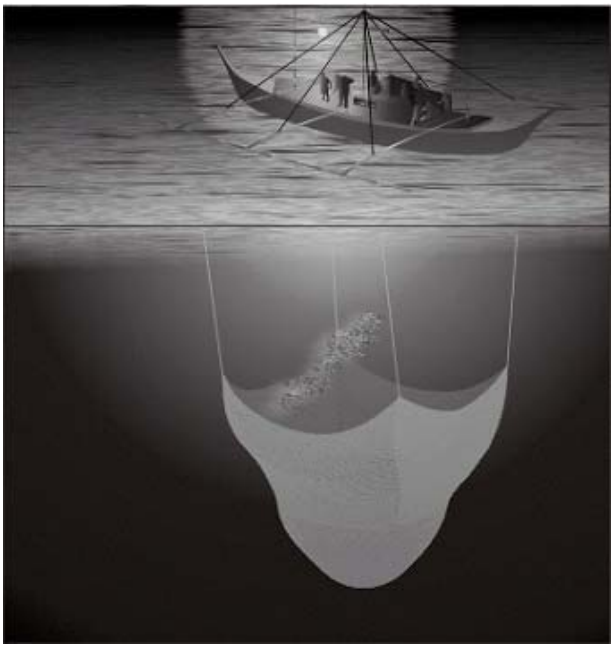


Figure 23. Typical bagnet operation.

The ringnet operated similarly to purse seine, as shown by their similar catch composition (Figure 27).

Camotes Sea fisheries ecosystem

Landings

The Camotes Sea provides a relatively minor source of fish and fish-related revenues to the country as a whole. However, it is one of the major sources of fish in Central Visayas. Ringnets and other pelagic-based fisheries ply the waters of Camotes Sea. This sea is a sharply sloping insular shelf and has deep bathymetric features. The history of landings shows an abrupt increase from less than 500 t in 1950s to the early 1970s to a peak in 1984 of about 22,800 t. BFAR did not collect data from 1987 to 1996 (Figure 28).

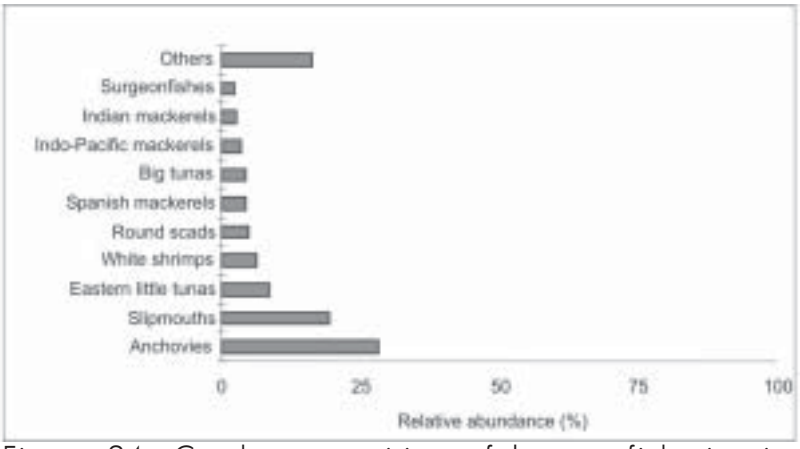


Figure 24. Catch composition of bagnet fisheries in Visayan Sea, 1985-1987 (BFAR 1985-1987).

Catch composition

Coastal pelagic fishes, such as anchovies, sardines and mackerels, were the most abundant landings during the 1950s and 1960s, comprising 37.6% and 24.6%, respectively. There was an increase in landings of demersal fishes from 12.5% in the 1950s to 24.5% in the 1960s. During the 1970s, the most abundant catch shifted to small, oceanic pelagic fishes, such as small tunas, round scads, bigeye mackerels, moonfishes and flyingfishes, comprising 53.2% of total catch. The coastal pelagic species comprise 24.1% and the demersal species decreased to only 9.7% of the total catch. In the 1980s, small, oceanic pelagic fishes were still the most abundant, comprising 45.2% of total catch (Figure 29).

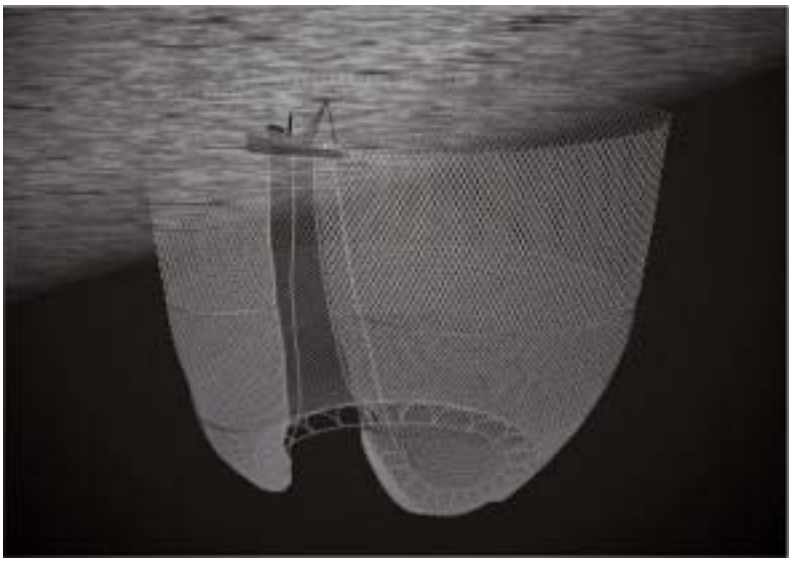


Figure 25. Typical purse seine operation.

Major fishing gears

During the early 1960s, trawl, bagnet and purse seine were the major fisheries in Camotes Sea. By the 1970s, ringnet became the main commercial fishery (Figure 30).

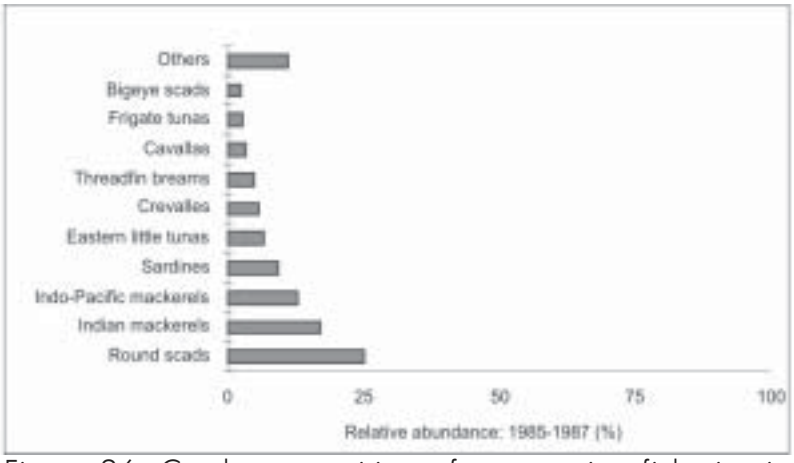


Figure 26. Catch composition of purse seine fisheries in Visayan Sea, 1985-1987 (BFAR 1985-1987).

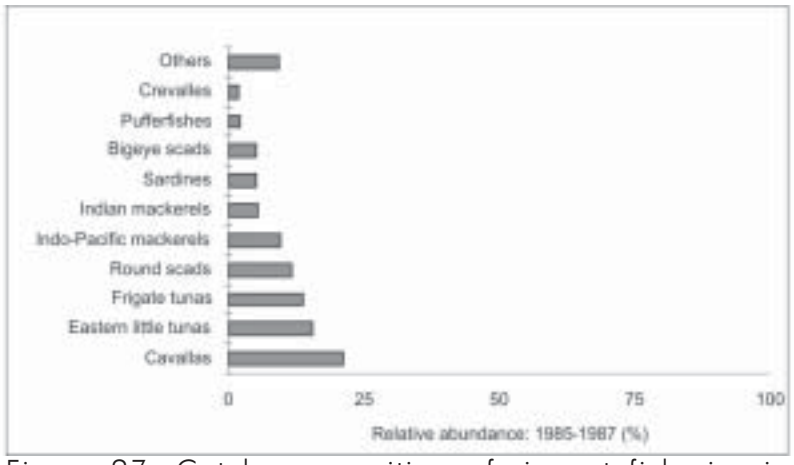


Figure 27. Catch composition of ringnet fisheries in Visayan Sea, 1985-1987 (BFAR 1985-1987).

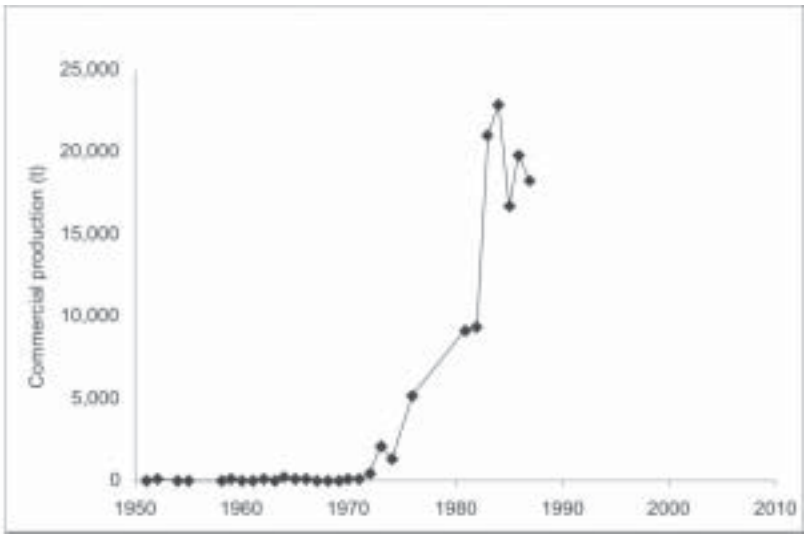


Figure 28. Landings from commercial fisheries in Camotes Sea (BFAR 1951-1987).

Catch composition and major fishing gears

Most demersal fishes (i.e., slipmouths, spadefishes, groupers, crevalles, catfishes, etc.) from Camotes Sea were landed by trawl. The coastal pelagic fishes (i.e., anchovies, mackerels, sardines, etc.) were mostly landed by bagnet. Ringnet and purse seine mostly caught small, oceanic pelagic fishes, such as round scads, small tunas, bigeye scads and others (Figure 31).

Catch rates of ringnet fisheries from 1983 to 1987 had an average of 198.3 kg/hour while from 1998 to 2002, the average was 178.7 kg/hour of fishing. This decrease since the 1980s, despite advancement in fishing technology, suggests that catch per unit effort (CPUE) has fallen considerably (Figure 32).

Tañon Strait fisheries ecosystem

Landings

Statistics show that the Tañon Strait commercial sector produces only an average of 405 t/year (Figure 33). The area within the whole Tañon Strait is, however, all municipal waters and even with a municipal ordinance they can only fish from 10.1 to 15 km. Without a municipal ordinance allowing entry to commercial fishers, fishing operations within this area can be considered illegal. It is also a protected area under the National Integrated Protected Area System Act, declared through Presidential Proclamation 1234, due to its rich diversity of cetaceans. The area is heavily fished due to its proximity to a large number of fishing communities, particularly in Eastern Cebu and Negros Oriental.

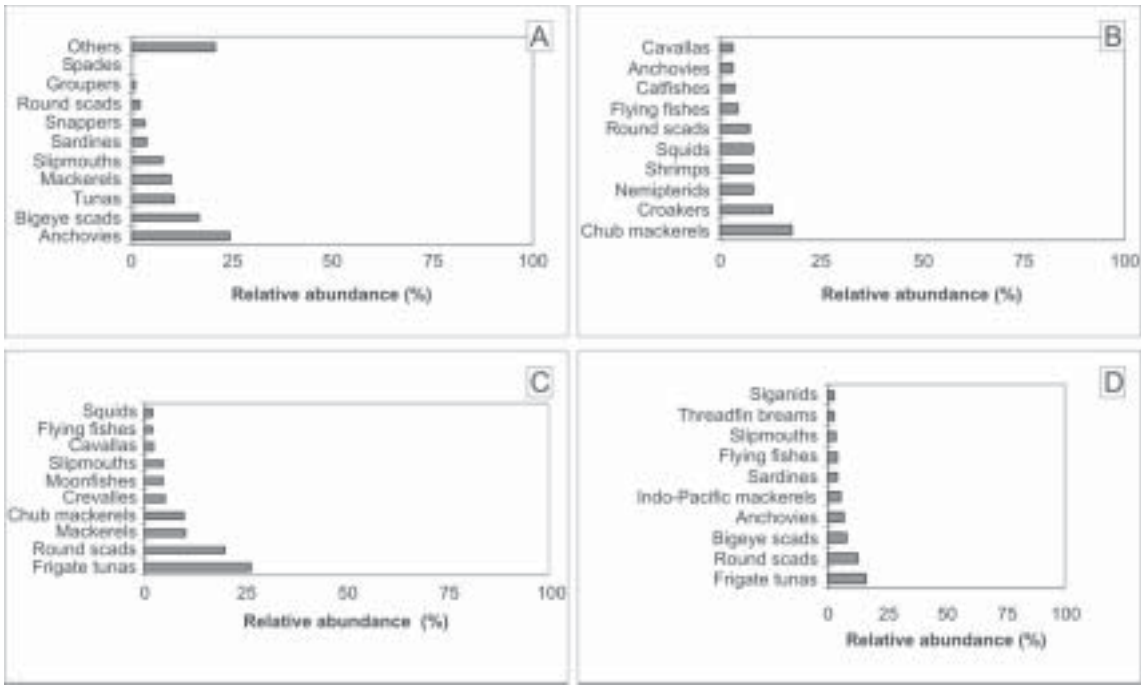


Figure 29. Composition of landings and respective average relative abundance in Camotes Sea: (A) 1950s, (B) 1960s, (C) 1970s and (D) 1980s (BFAR and BAS 1951-1987).

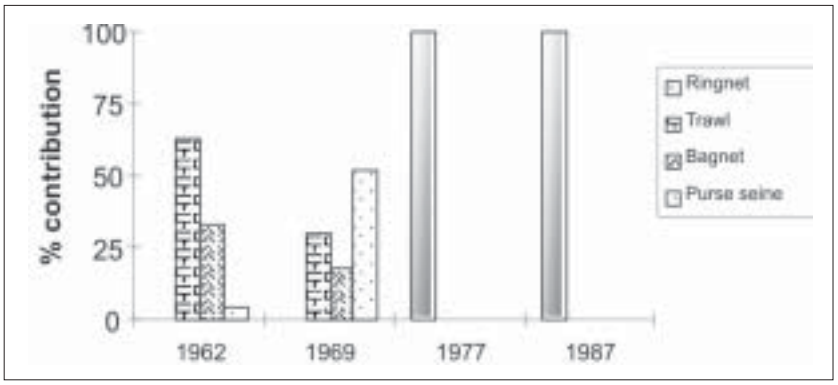


Figure 30. Major commercial fishing gears and respective contribution to total landings of Camotes Sea (BFAR 1962, 1969, 1977, 1987).

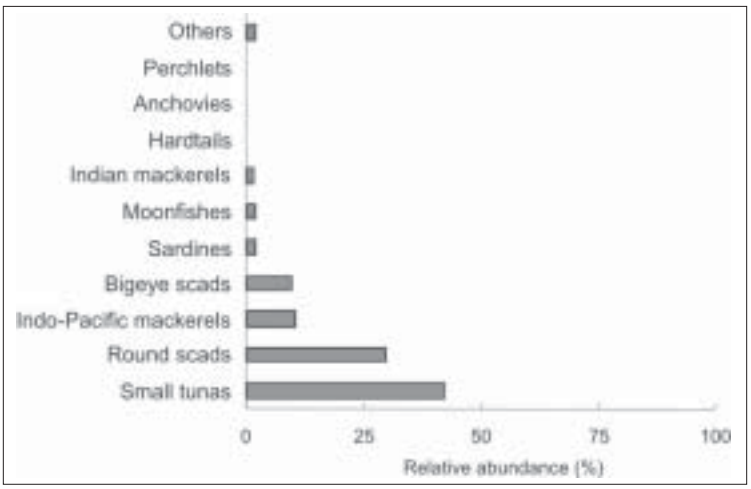


Figure 31. Catch composition of ringnet fisheries in Camotes Sea, 1985-1987 (BFAR 1985-1987).

Figure 32. CPUE trend of ringnet fisheries in Camotes Sea (Jabat and Dalzell 1988; Belga *et al*. 2003).

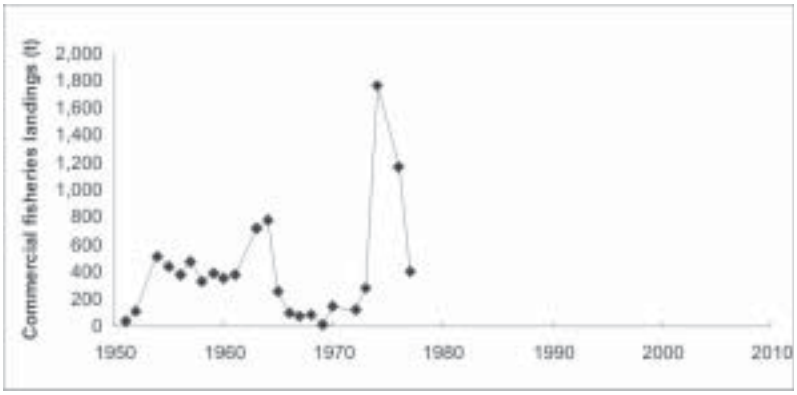


Figure 33. Total landings of commercial fisheries in Tañon Strait (BFAR 1951-1977).

During the 1960s and 1970s, purse seine was the predominant fishing gear. Recently, this was replaced by ringnet.

Catch composition

Pooled catch composition of commercial fisheries in Tañon Strait shows that since the 1950s, species harvested were predominantly small oceanic, pelagic fishes, comprising 40.5% of total catch, with rainbow runners being most abundant. In the 1960s, the proportion of small oceanic, pelagic fishes (32.5%) decreased and the major fish became the coastal, pelagic ones (36.1%). Round scads, lower-value fish, became dominant. The abundance of rainbow runners decreased significantly by the 1970s and even ceased to be among the top 10 species caught from the strait. Shifts in landing compositions may be a function of changes in types of fishing implements used as well as reaction of fisheries resources to fishing pressures (Figure 34).

Major fishing gears

During the 1960s and 1970s, there were four major commercial fishing activities plying the waters of Tañon Strait. Bagnet fishery (66.5%) contributed the most landings in the 1960s; in the 1970s, it was the purse seine fishery (62.1%) (Figure 35). Correlating the type of predominant gear to the composition of landings, the predominance of bagnet in the 1960s largely coincided with the prevalence of coastal pelagic fishes. Likewise, the predominance of purse seine in the 1970s aptly corresponded to a higher prevalence of small, oceanic pelagic fishes caught from the strait.

Bohol Strait and Bohol Sea fisheries ecosystems

Landings

Before the 1980s, there was no catch record from Bohol Sea, only from Bohol Strait. However, from the 1980s to present, only Bohol Sea is found in fisheries statistics. A closer look at the area shows that the reported fish and fisheries landings statistics may have been both coming from these two adjoining bodies of water. They do not belong to the top-producer fishing grounds in the country, yet their role as major fish supplier in Central Visayas should not be discounted, as most of the pelagic-based fisheries in Bohol fish these waters.

During the 1950s-1970s, commercial fisheries production from Bohol Strait ranges from about 50 t in 1968 to about 12,000 t in 1974, while the erratically high production from 1985 to 1987 was from Bohol Sea (Figure 36).

Composition of landings

In the 1950s, landings from Bohol Strait were mostly coastal pelagic fishes (26.7%), such as anchovies, and demersal and reef fishes (18.1%), represented by slipmouths, fusiliers, crevalles and surgeonfishes. In the 1960s, small,

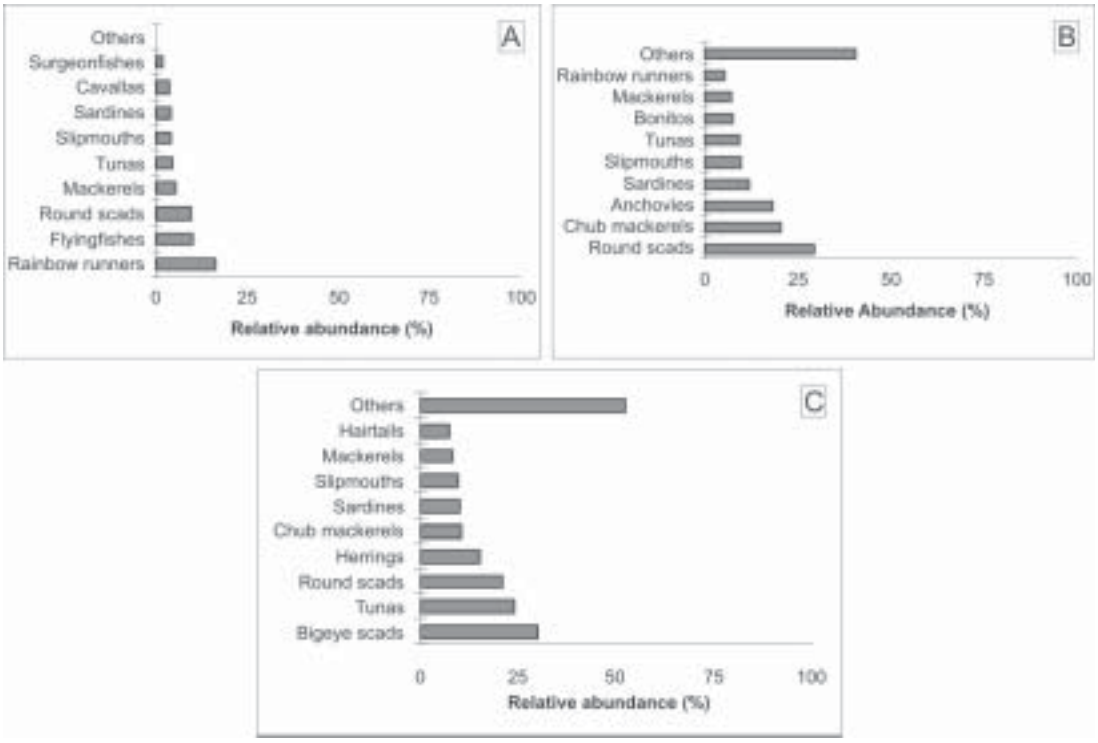


Figure 34. Major species landed by commercial fisheries in Tañon Strait: (A) 1950s, (B) 1960s and (C) 1970s (BFAR and BAS 1951-1977).

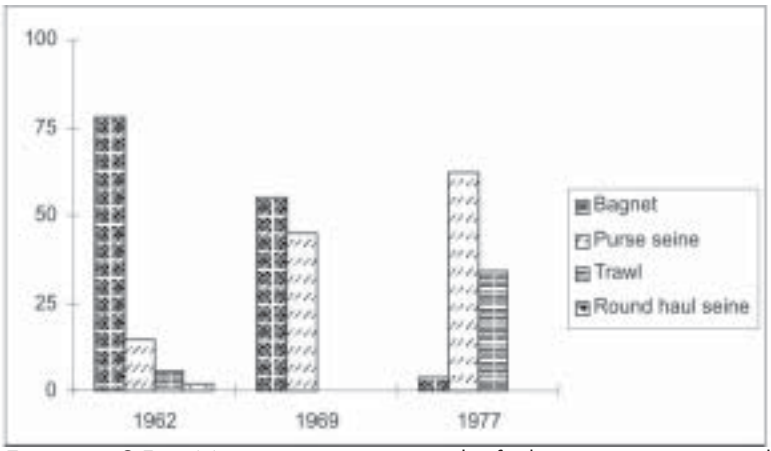


Figure 35. Major commercial fishing gears and respective contribution to total landings of Tañon Strait (BFAR 1962, 1969, 1977).

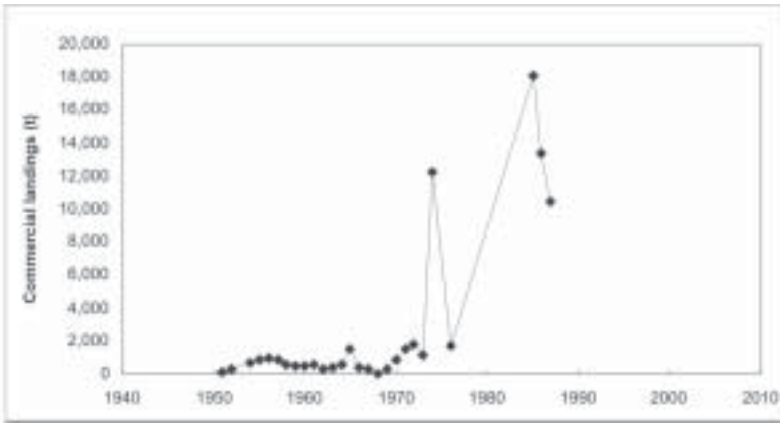


Figure 36. Total landings of commercial fisheries in Bohol Strait and Bohol Sea (BFAR 1951-1987).

oceanic pelagic fishes were most abundant (26.8%) (i.e., round scads, bonitos and rainbow runners), despite the predominance of anchovies (12.5%), a coastal pelagic fish. There was also an apparent shift in abundance, from predominantly coastal pelagic landings in the 1950s to small, oceanic pelagics in the 1960s. During the 1970s, demersal fishes (41.1%) were the most common catch, with slipmouths (29.4%) as most abundant. During the 1980s, in Bohol Sea, the most abundant landed fishes were small, oceanic pelagic fishes composed of bullet/frigate tunas (17.2%) and flyingfishes, round scads, eastern little tuna and skipjacks, which collectively total 35.2%. See Figure 37.

Major fishing gears

During the early 1960s, the catching gears were bagnet (79.6%), purse seine (12.2%) and trawl (3.6%). In the late 1960s, it was still the bagnet landing the most (42.8%), with the

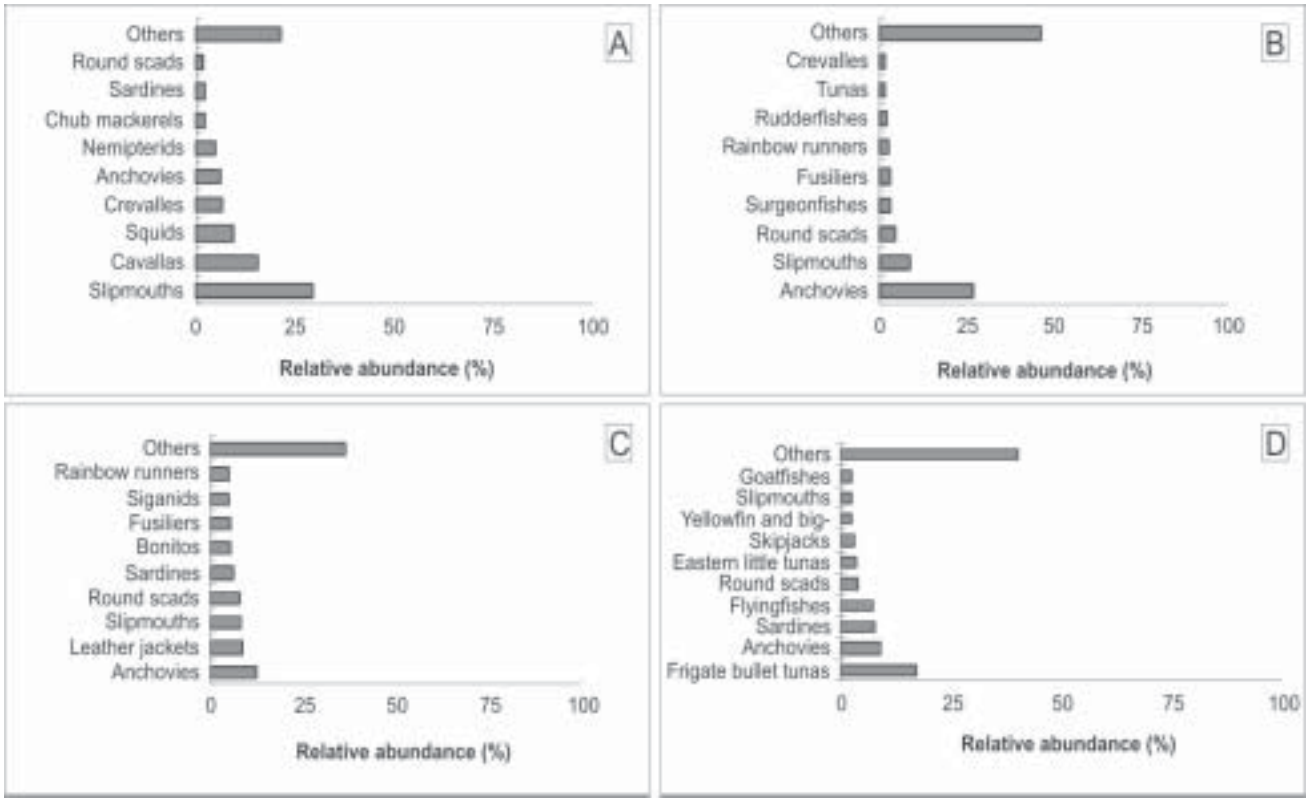


Figure 37. Major species landed by commercial fleet in Bohol Strait: (A) 1950s, (B) 1960s, (C) 1970s and (D) 1980s (BFAR 1951-1987).

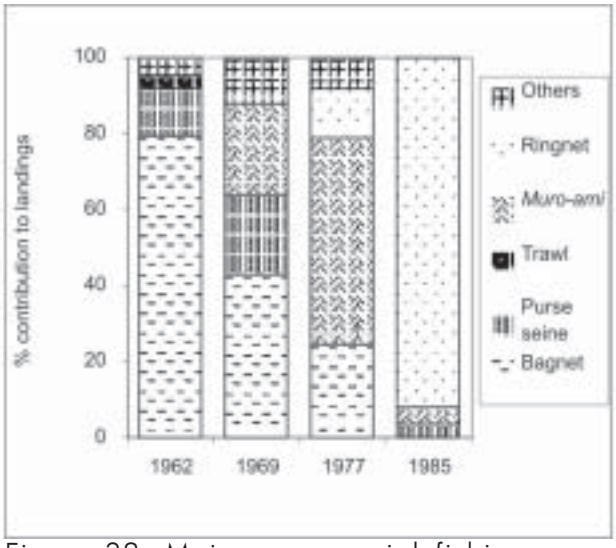


Figure 38. Major commercial fishing gears and respective percentage contribution to total landings of Bohol Strait/Bohol Sea (BFAR 1962, 1969, 1977, 1985).

catches (Figure 38). By the 1970s, *muro-ami* was the most prolific among fisheries in Bohol Strait and Bohol Sea, accounting for 54.6% of total landings. Bagnet fishery (24.5%) became the second top-producer, while ringnet fishery was still in its infancy. In the mid-1980s, ringnet moved in to get 91.9% of total catch and has persisted as the major catcher ever since.

Catch composition

A snapshot on the catch composition of major gears indicates that bagnets were mostly operating in coastal waters as evidenced by the abundance of anchovies and round herrings (Figure 39), the most common coastal pelagic species. While ringnet and purse seine caught mostly skipjacks and small tunas (Figures 40 and 41), both are representative of oceanic pelagic species, indicating that these fisheries mostly operate in deep offshore waters.

East Sulu Sea fisheries ecosystem

Landings

The East Sulu Sea is a continuum of one of the world's most biodiverse seas, part of the migration path and feeding grounds of tunas and other large pelagic fishes. Consequently, the five municipalities of Negros Oriental adjacent to the sea target mainly large and small pelagic fishes.

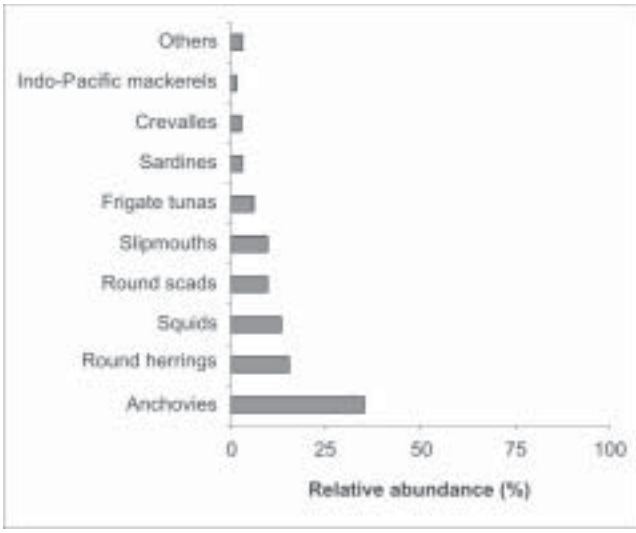


Figure 39. Landing composition of bagnet fishery from Bohol Sea, 1985-1987 (BFAR 1985-1987).

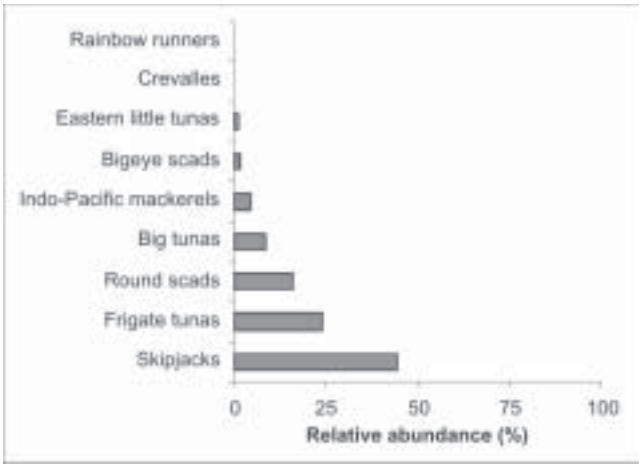


Figure 40. Landing composition of purse seine fishery from Bohol Sea, 1985-1987 (BFAR 1985-1987).

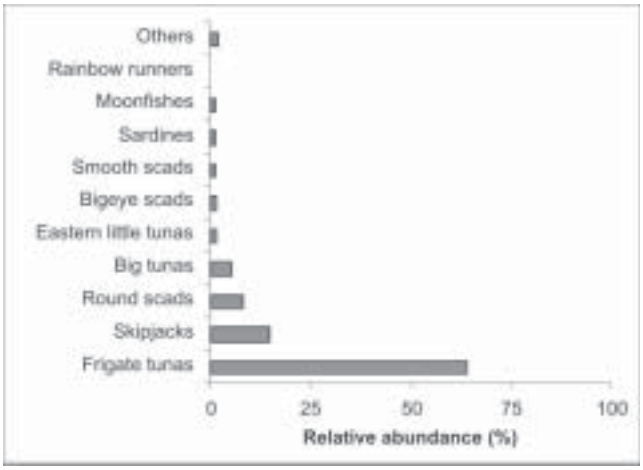


Figure 41. Landing composition of ringnet fishery from Bohol Sea, 1985-1987 (BFAR 1985-1987).

Drying anchovies to make lansang. *(A. White)*

In 1995, the total landing from East Sulu Sea was about 90,480 t, and this ranked seventh among the 16 major fishing grounds of the country. In 2001, it was the third most productive municipal fishery, catching 71,486 t, while it ranked as the 12th most productive commercial fishery in the country, with 18,994 t (BFAR 7 2002).

Fishing gears and catch composition

Statistical records (1985-1987) of East Sulu Sea show that the major commercial fisheries were purse seine (67.1%), ringnet (22.0%), trawl (8.1%) and bagnet (2.2%) (Figure 42). Catch composition from 1985 to 1987 were pooled to further characterize each major fishing gear. The major fisheries were round scads, the main food source of tuna and tuna-like species (Figures 43-47).

The small, oceanic pelagic fishes were mostly landed by purse seine and ringnet, comprising 59.2% and 77.8% of total catch, respectively. Most of demersal fishes were landed by trawl (28.4%). The coastal pelagics were mostly from bagnet fishery (56.0%), with 29.4% of total catch from purse seine fishery. Pooling the catch data of all major commercial gears show that the dominant type of fish produced by East Sulu Sea were mostly small, oceanic pelagic fishes, at 60.0% of total landings while the coastal pelagics were 24.4%.

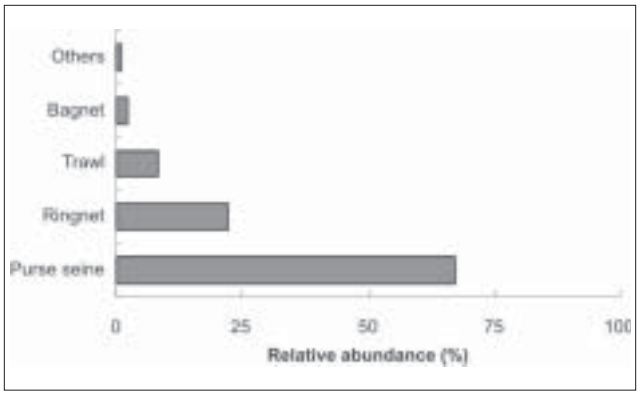


Figure 42. Major commercial fishing gears and respective percentage contribution to total landings/production of East Sulu Sea (BFAR 1985-1987).

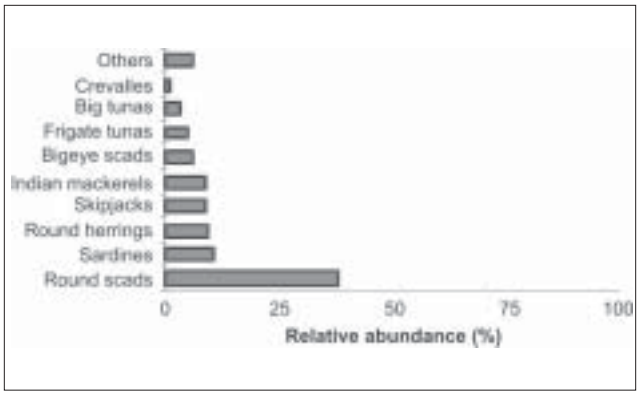


Figure 43. Landing composition of purse seine fishery from East Sulu Sea, 1985-1987 (BFAR 1985-1987).

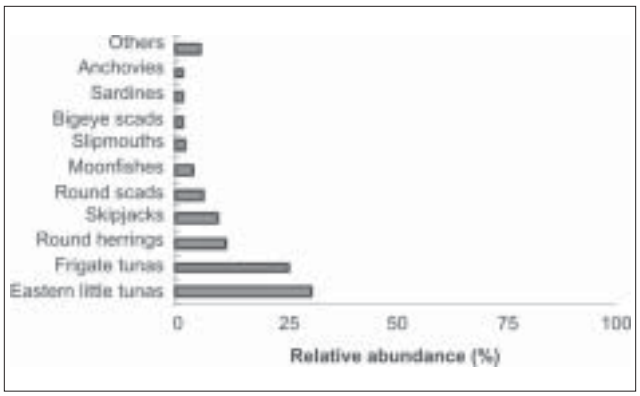


Figure 44. Landing composition of ringnet fishery from East Sulu Sea, 1985-1987 (BFAR 1985-1987).

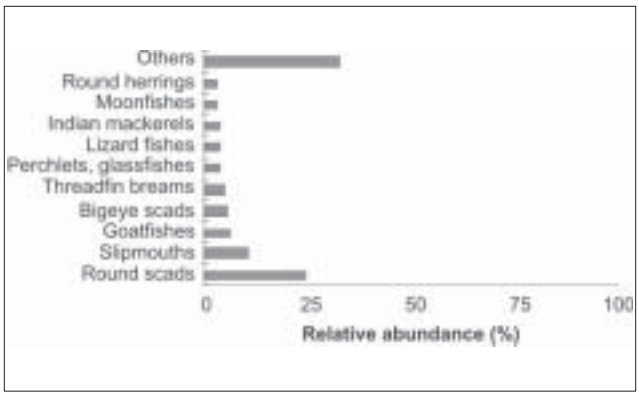


Figure 45. Landing composition of trawl fishery from East Sulu Sea, 1985-1987 (BFAR 1985-1987).

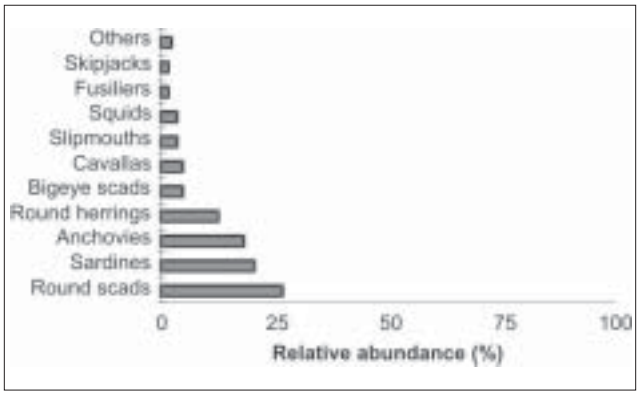


Figure 46. Landing composition of bagnet fishery from East Sulu Sea, 1985-1987 (BFAR 1985-1987).

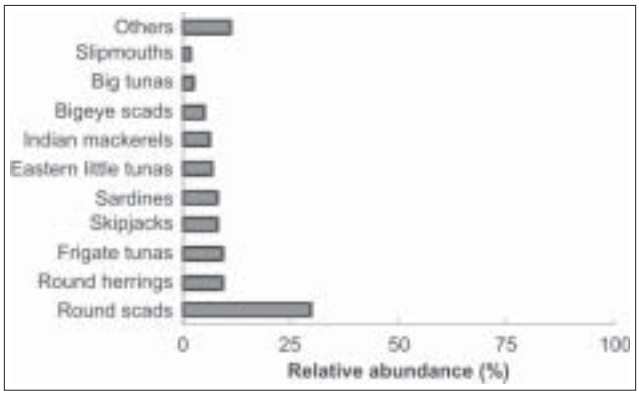


Figure 47. Landing composition of all commercial fishing gears in Bohol Sea, 1985-1987 (BFAR 1985-1987).

Summary

Central Visayas is an important fisheries area in the country, with six major fisheries ecosystems: Visayan Sea, Camotes Sea, Tañon Strait, Bohol Strait, Bohol Sea and East Sulu Sea. Visayan Sea is the most productive, followed by East Sulu Sea.

In Camotes Sea, Bohol Sea, Bohol Strait and Tañon Strait, the dominant fishery is ringnet. Offshore of East Sulu Sea, the most common

fisheries are longline and purse seine, while nearshore, ringnet and longline are common. Fishes landed in Central Visayas are mostly small pelagics; ringnet is the most important commercial fishery. The demersal fishes are mostly landed by Danish seines, trawls and municipal fisheries.

The maximum production in Central Visayas was reached during the early 1990s and has since declined 7.5%. Cebu is the major catcher and landing site of fish from both its municipal and commercial fisheries. The waters of Cebu are much smaller than those of other provinces, therefore suggesting that the Cebu fleets are highly mobile, fishing around and outside the region.

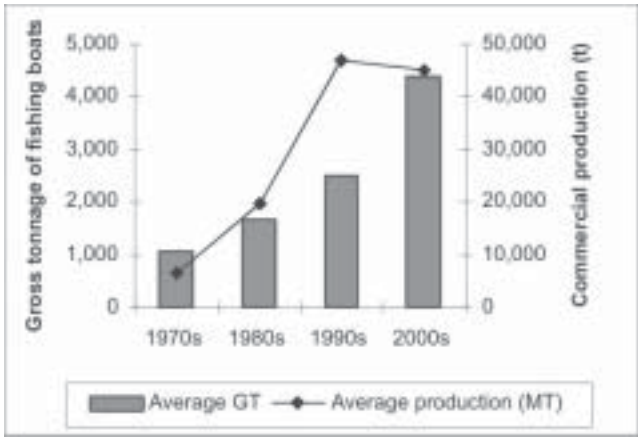


Figure 48. Trend of commercial fishing fleet's capacity (GT) with commercial fisheries production (t), from the 1970s to early 2000.

From municipal fisheries to commercial fisheries

Commercial fisheries since 1986 have replaced municipal fishers as the main catcher of fishery products with approximately 60% of all landed fish in the region. With an increase of about 250% in size and number of commercial fishing boats since 1991 (when the production peak for the region was already met), the commercial fishers are catching less fish than they did in the 1990s; these fishers are merely taking a greater proportion of the fish from the region's waters to the detriment of municipal fishers and other commercial fishers alike.

Since 1998 and the Fisheries Code, commercial fishing production has not been reduced, suggesting that coastal law enforcement in the region for municipal waters is very poor and the majority of commercial fishing still operates within these (which comprise over 60% of the region's waters).

The average gross tonnage of commercial fishing boat, however, continues to increase, as does the use of new fishing technologies. Superimposing production over gross tonnage of licensed commercial fishing boats shows an upsurge of commercial fishing efficiency (fleet size and technologies) contrary to decreasing fisheries landings. This trend indicates that generally there is economic overfishing in the whole fisheries sector in Central Visayas. See Figure 48.

Shift in quality of catch – overfishing

Not only has volume of catch in the region been reduced, but also quality. On the whole in Central Visayas, there has been an overall shift of catch away from coastal pelagic to oceanic pelagic species and away from demersal to pelagic species.

The Tañon Strait provides a good example of overfishing. The main fish caught in the 1960s, the high-value rainbow runner, is now almost totally replaced by the lower-trophic and lower-value scad. The changes in catch composition, especially increase in volume of invertebrates (i.e., squids), indicate that ecosystem overfishing is occurring.

The dominant kind of fishes landed in the late 1980s, small tunas (frigate / bullet tunas), are giving way to round scads, which were not the top-fish caught then. The assigned trophic levels* for the most common small tunas, frigate and bullet tunas, found in Camotes Sea were 4.3 and 4.1, respectively. The assigned trophic level for most species of round scads was 3.4, a level that is far below that of small tunas. This is termed as "fishing through the food web," and the reduction of tunas due to excess harvesting has

* *The higher the trophic level, the better the fisheries – a species of fish becoming dominant from a lower trophic level is an indicator of overfishing.*

allowed the lower-quality round scads to proliferate, as do the squids (due to a lack of their predators such as tunas).

Results are similar to those of Visayan Sea. From the 1950s to the 1960s, there has been an apparent shift in the second most abundant group of fishes landed from coastal (nearshore) pelagic fishes to small, oceanic (offshore) pelagic fishes in the 1960s.

The 1980s heralded a major change in composition of catch from Visayan Sea. The coastal pelagics have replaced the demersals as the most abundant catch and the invertebrate species have shifted from shrimp-dominant to squid-dominant, illustrating a shift in the ecosystem due to fishing pressure and a shift away from trawling to purse seine and ringnet. The abundance of squid is considered a key indicator of excess fishing pressure. These changes illustrate that as far back as the 1980s, Visayan Sea was exhibiting signs of overexploitation.

Unhealthy industry?

The commercial fishing industry has faced considerable challenges in recent decades. What was once a multispecies, multigear fishery with over nine different fishing gears, now has only two remaining, the ringnet and Danish seine. These gears survive because of various new technologies that have assisted their fishing activities, such as the *payao*, superlight and sonar.

The industry is still changing technologically at the moment. For those who can afford it, the commercial fishers are upgrading their smaller wooden hull boats to much larger metal ones. Other operators are also upgrading from fish finders to sonar technology, and others are even moving part of their fleets away from the region to fish in other waters, such as General Santos City and other areas in Mindanao where fish stocks are still in a relatively better state. This suggests that again there will be further infighting within the industry, and larger ringnetters with metal hulls and sonars will soon become the norm in the region, leaving the other smaller and less technologically advanced (or well-financed) owners unprofitable.

Superlights at night within municipal waters, Panglao Island, Bohol.

The commercial fishing industry is not evenly distributed among various individual owners, but is fast moving towards just a select few who own numerous boats, ice plants, distribution networks, and who control the supply and ultimately the price of the fish they land (Figure 49). This does not set the path for a healthy, economically viable and sustainable industry, but is more similar to a series of monopolies dominated by a few key players.

Further problems ahead?

The ever-changing fisheries industry has to adapt to the present situation. One of the adaptations is the use of commercial-size fishing gears using boats of less than 3 GT (although in most cases these boats are dubiously registered as less than 3 GT and are in fact larger). This is the most effective way to overcome the general restrictions to commercial fishing within the 15-km radius from the shoreline (municipal waters). This adaptation is alarming as this will further aggravate the condition of the overfished shallow coastal waters through the introduction of more efficient fishing gears. One example of this is the proliferation of the *licom* or *hapa-hapa*, which are found in all four provinces of the region. These small-scale ringnets have shorter depth coverage than commercial ringnets but with almost the same circumference of net and ability to catch large volumes of fish.

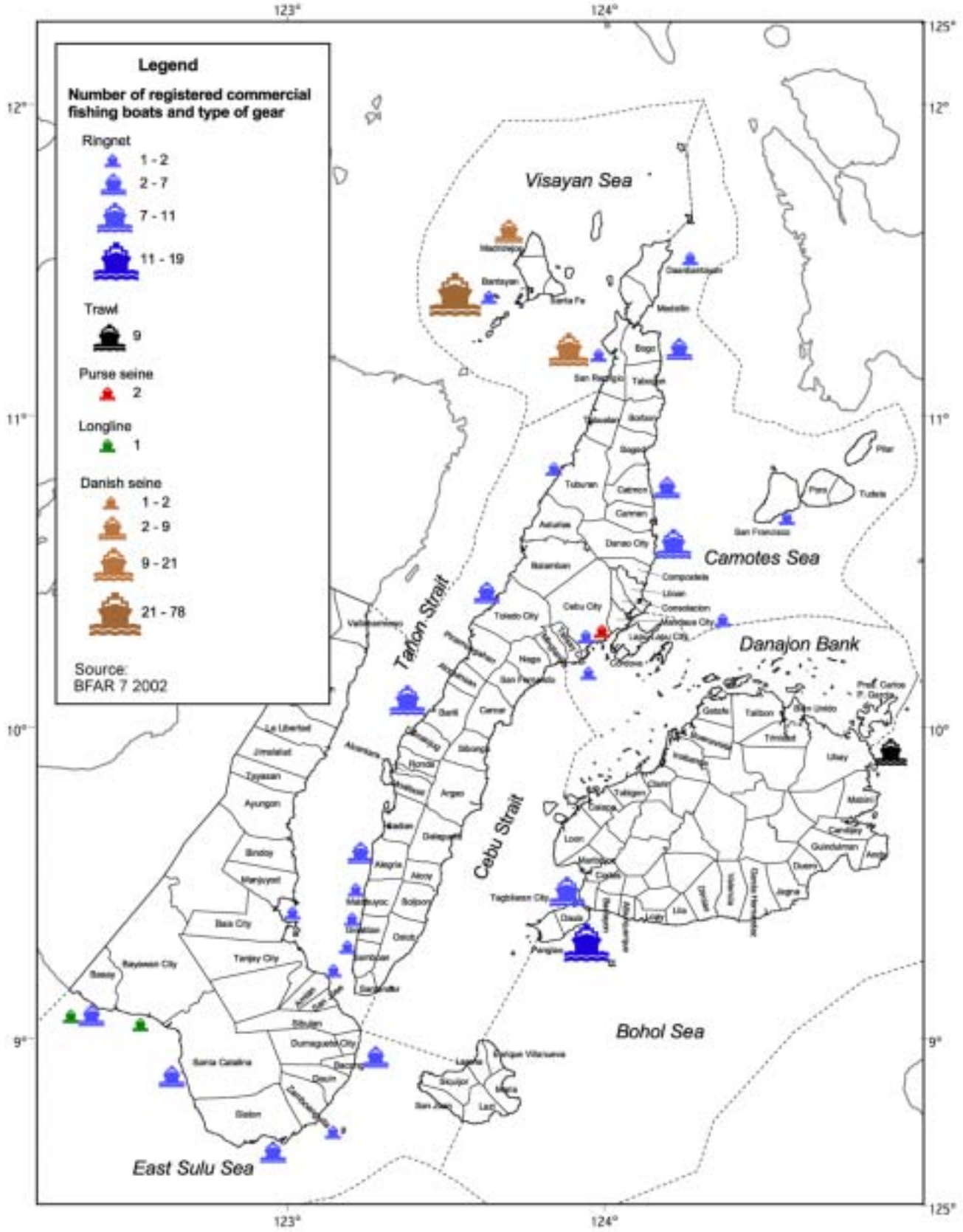


Figure 49. Number and type of registered commercial fishing boats in Central Visayas.

Another example is the *lawag*, or the small-scale round haul seine, present in Bohol, Cebu and Negros Oriental. These are very big seines operated by two municipal fishing boats which use an active fishing gear that is active as defined in FAO 203. Other gears that are proliferating in the region are very long gillnets (both surface / drift and bottom-set types of over 2-3 km in length). These fishing gears are in theory illegal and all the more problematic as they fish in nearshore coastal waters at the detriment of municipal fishers and they also target small, immature fishes that spend their early lives in these waters before migrating offshore.

Who ultimately pays?

With the technological improvements and reduction in fish catch in the region, it is interesting to note who is actually paying for these developments and improvements of fishing fleet to catch even less fish than they used to catch (but of course a larger portion). These extra costs are all being passed on to the consumers. This explains the fast-rising price of fish in the region. Ultimately, the consumer pays the cost of new sonars, fishing boats and technological advances. The same amount of fish could be caught with a lot less fishing effort and technology, and at less expense!

The price of fresh fish has increased over 1,400% in the last 20 years (Figure 50). Fish is no longer a source of cheap and nutritious food for the growing population, but is becoming a luxury item. This is worrisome and will have major implications in the coming years on economically marginalized sectors of the region that need large volumes of cheap animal protein to feed their growing families. The development of an unsustainably large and technologically advanced fleet will also be at the expense of municipal fishers, most of whom live below the region's "poverty threshold limit" and have few other alternative livelihoods.

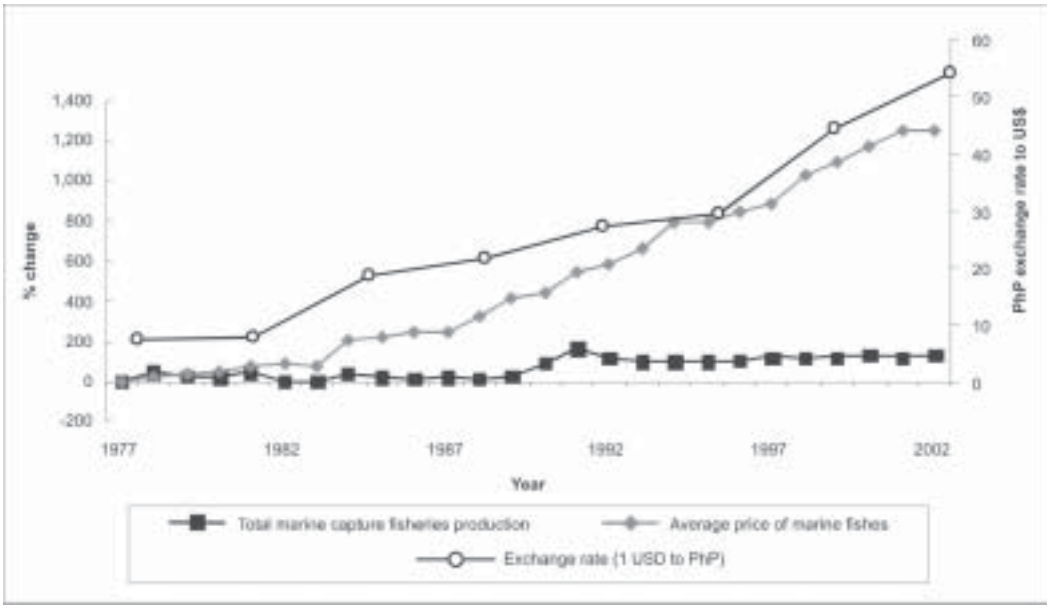


Figure 50. Fisheries production in Central Visayas showing change in average price of common marine fish since the 1970s, with US$ to PhP exchange rate as benchmark for inflation (BFAR 7 1951-1987, BAS 1992-2002, Antweiler 2003).

Chapter 5
The Status and Trends of Municipal Fisheries of Central Visayas

Introduction

Municipal fisheries provide food and direct and indirect employment to at least 200,000 people in Central Visayas. In recent years, the municipal fisheries and fishers have changed considerably. This chapter looks at the current status of municipal fisheries – fishers, crafts, gears, and stocks.

Municipal Landings and Fishers

As shown in Chapter 3, municipal fishers now catch approximately 42% of the region's total fish catch, a far cry from the 70-75% they used to catch in the 1960s. As of 2002, Cebu provided the largest average contribution of landings, at 40%; Bohol, 34%; Negros Oriental, 22%; and Siquijor, 4% (Figure 51). There is an estimated total of 126,371 small-scale fishers in Central Visayas (Table 9) and about 52% of them are based in Cebu, 26% in Bohol, 18% in Negros Oriental and 4% in Siquijor. The distribution of fishers is summarized in Figure 52 and Table 10.

Fishing Boats

There are 78,395 motorized and nonmotorized fishing craft in Central Visayas (Table 11 and Figures 53-54). On average, there are three nonmotorized fishing craft for every two motorized ones, except in Siquijor, where the ratio is 4:1. There is an average of 1.6 fishers for every fishing craft in the region. The actual number of fishers on board each fishing unit depends on the size of the fishing craft, means of propulsion, engine and type of fishing gear (Table 12).

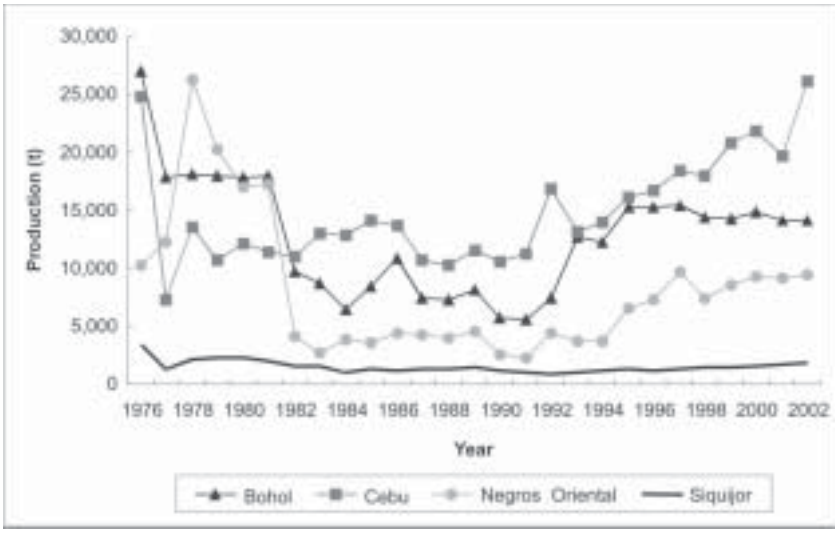


Figure 51. Landings from marine-municipal fisheries sector (BFAR and BAS 1976-2002).

Table 9. Total number of municipal fishers in the four provinces of Central Visayas in 2003.

Province	Bohol	Cebu	Negros Oriental	Siquijor
Number of fishers	32,953	65,748	22,285	5,385

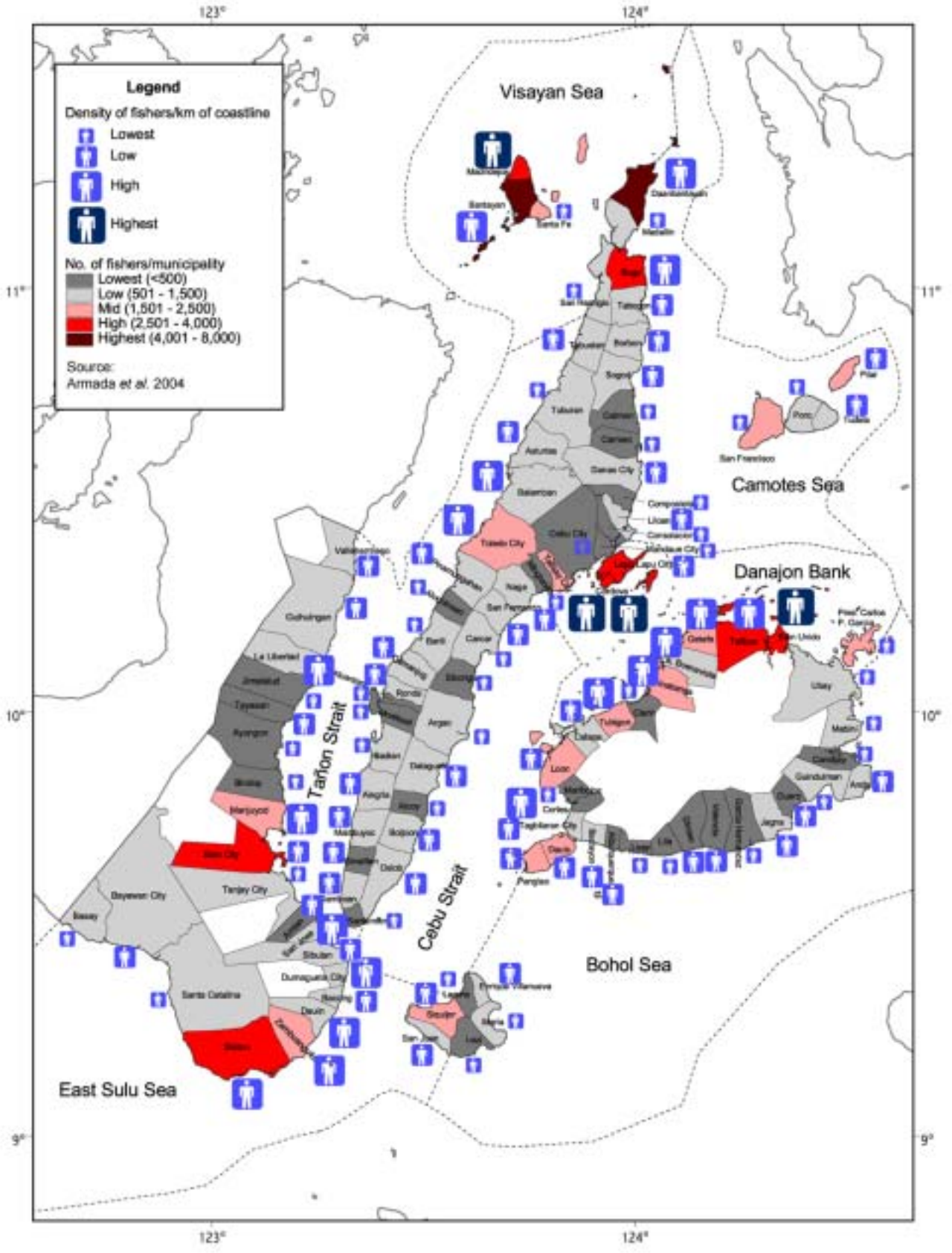


Figure 52. Distribution of fishers in Central Visayas.

Table 10. Concentrations of fishers/km of coastline in the region.

Province	Concentration			
	Highest (more than 200 fishers/km)	High (more than 100 fishers/km)	Medium (50-100 fishers/km)	Lowest (less than 50 fishers/km)
Bohol	Bien Unido	Inabanga, Getafe, Talibon, Pres. Carlos P. Garcia	Cortes, Tubigon, Buenavista	Maribojoc, Clarin, Ubay, Mabini, Candijay, Guindulman, Garcia Hernandez, Lila, Loay
Cebu	Madridejos, Talisay City, Cordova	Bantayan, Daanbantayan, Bogo, Toledo City	Balamban, Lapu-Lapu City	Santa Fe, Medellin, Poro, San Francisco, Catmon, Carmen, Compostela, Consolacion, Mandaue City, Minglanilla, Carcar, Sibonga, Argao, Alcoy, Santander, Badian, Moalboal, Alcantara, Barili, Aloguinsan, Tuburan, San Remigio
Negros Oriental		Siaton, Manjuyod	La Libertad, San Jose, Dumaguete, Dauin, Zamboanguita	Jimalalud, Ayungon, Bindoy, Tanjay City, Sta. Catalina, Basay
Siquijor		Siquijor	Larena	Maria, Lazi

Table 11. Total number of motorized and nonmotorized boats in Central Visayas.

Boat category	Bohol	Cebu	Negros Oriental	Siquijor	Total
Motorized	8,952	16,791	5,843	659	32,245
Nonmotorized	11,686	23,680	7,926	2,858	46,150

This ranges from one for simple hook and line to as many as five for some gillnet types.

Nonmotorized fishing craft comprise approximately 60% of the entire municipal fishing fleet of Bohol, Negros Oriental and Cebu. In Siquijor, more than 80% are nonmotorized. Municipalities with many nonmotorized fishing boats (over 600) include the coastal town of Siquijor in Siquijor; La Libertad, Dauin and Zamboanguita in Negros Oriental; Loon, Inabanga, Getafe, Talibon, Bien Unido, Pres. Carlos P. Garcia, Mabini and Panglao in Bohol; and Bantayan, Madridejos, Pilar, Lapu-lapu City, Cordova, Oslob and Asturias in Cebu.

Fishing Gears

There are about 50 generic types of fishing gears in Central Visayas and about 200 specific variations of these. Several fishing gears have various local names. Some fishing gears have undergone modifications to specifically adapt to target species; hence, their very specific local names (refer to Appendices 1 and 4). On the whole, however, frequent modification of fishing gears in an area is not a good indicator, suggesting that changes have had to be made to ensure catch of fish.

Figure 55 shows the distribution of combined fishing gears, providing a broad picture of the various levels of fishing activities in the region. There is a high concentration of gears around Bantayan Island, in various parts of Tañon Strait especially along the southern tip of Cebu, Danajon Bank and in the southern part of Bohol. The major fishing gears are gillnets, hook and lines, and squid jigs (Figures 56-58).

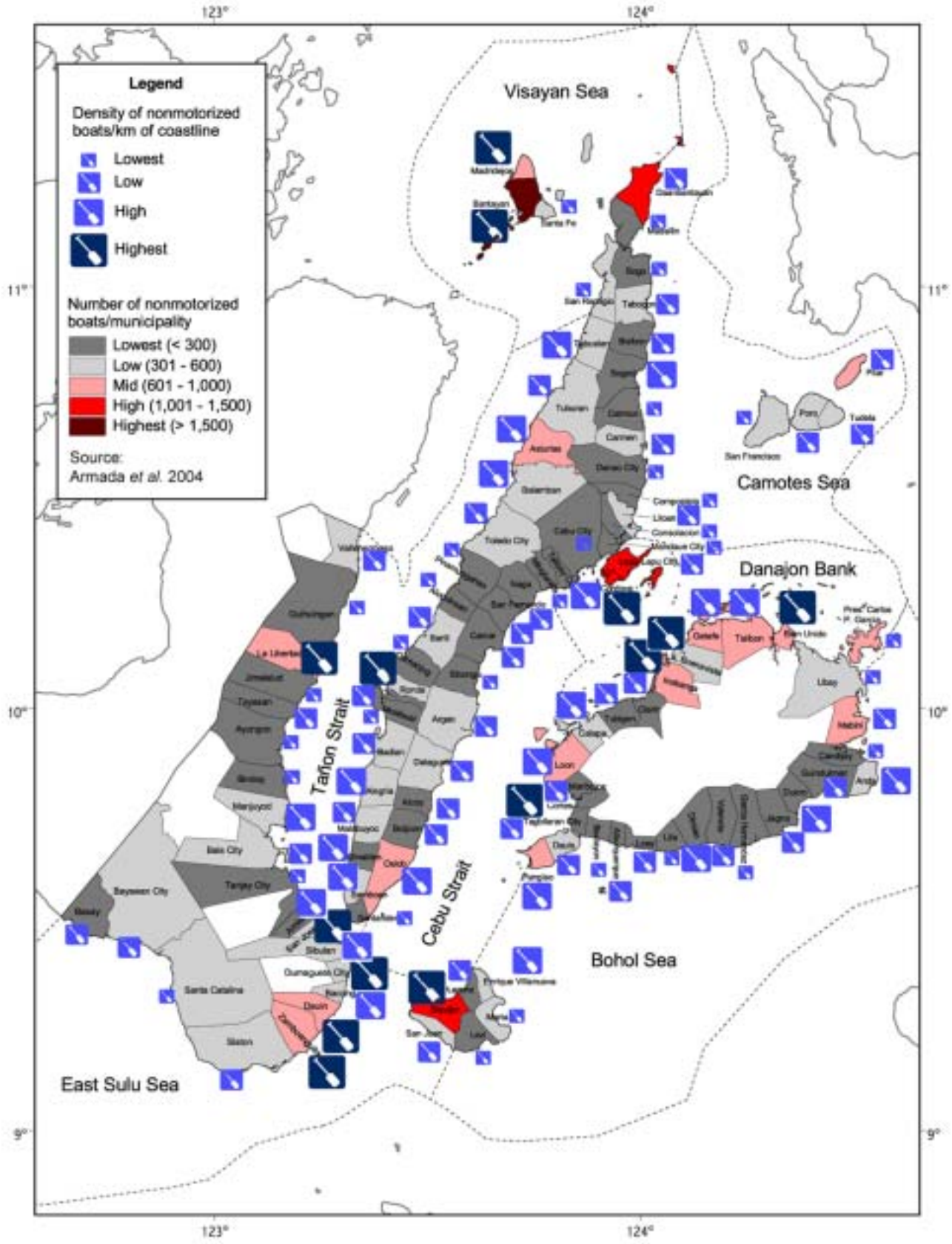


Figure 53. Distribution of nonmotorized boats in Central Visayas.

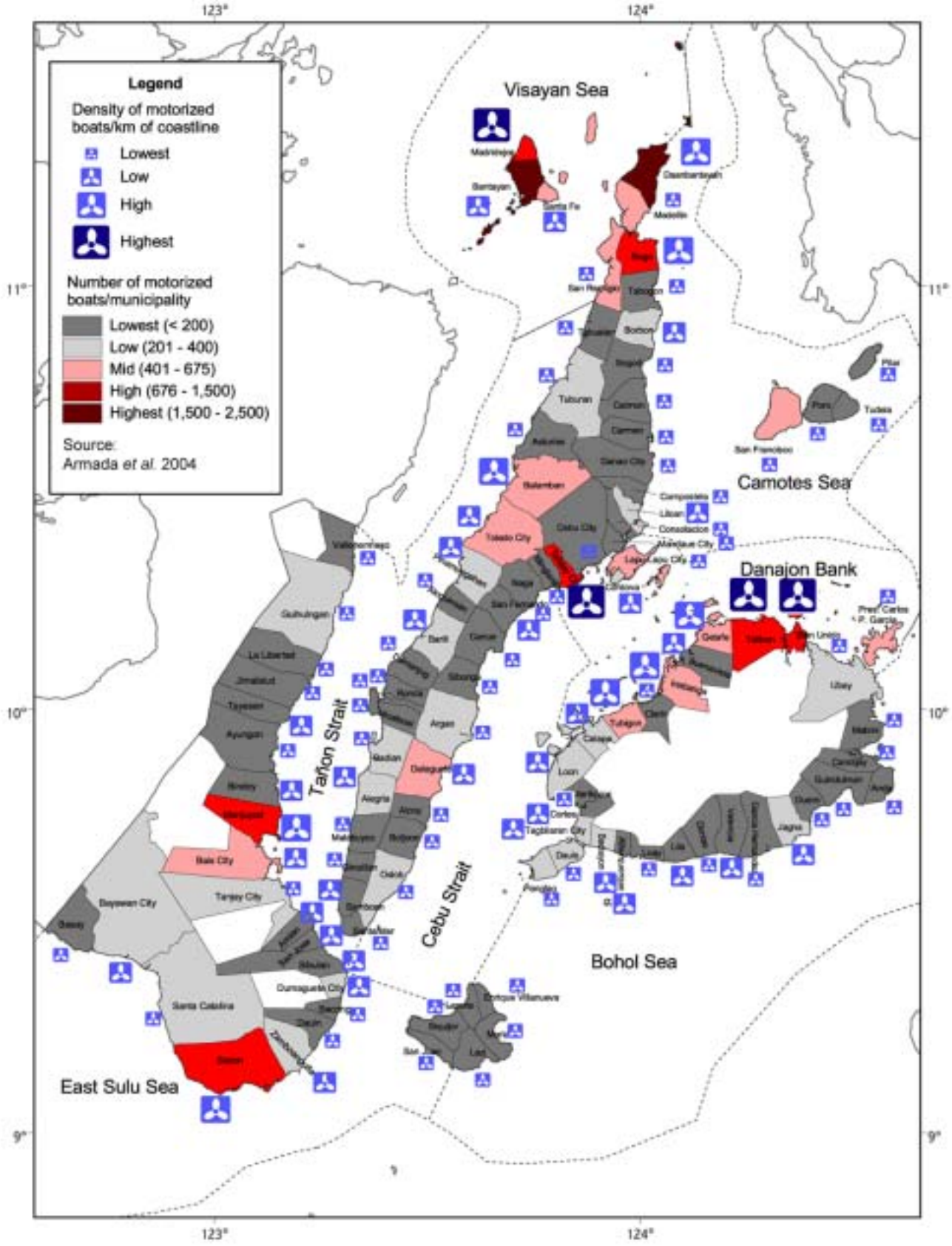


Figure 54. Distribution of motorized boats in Central Visayas.

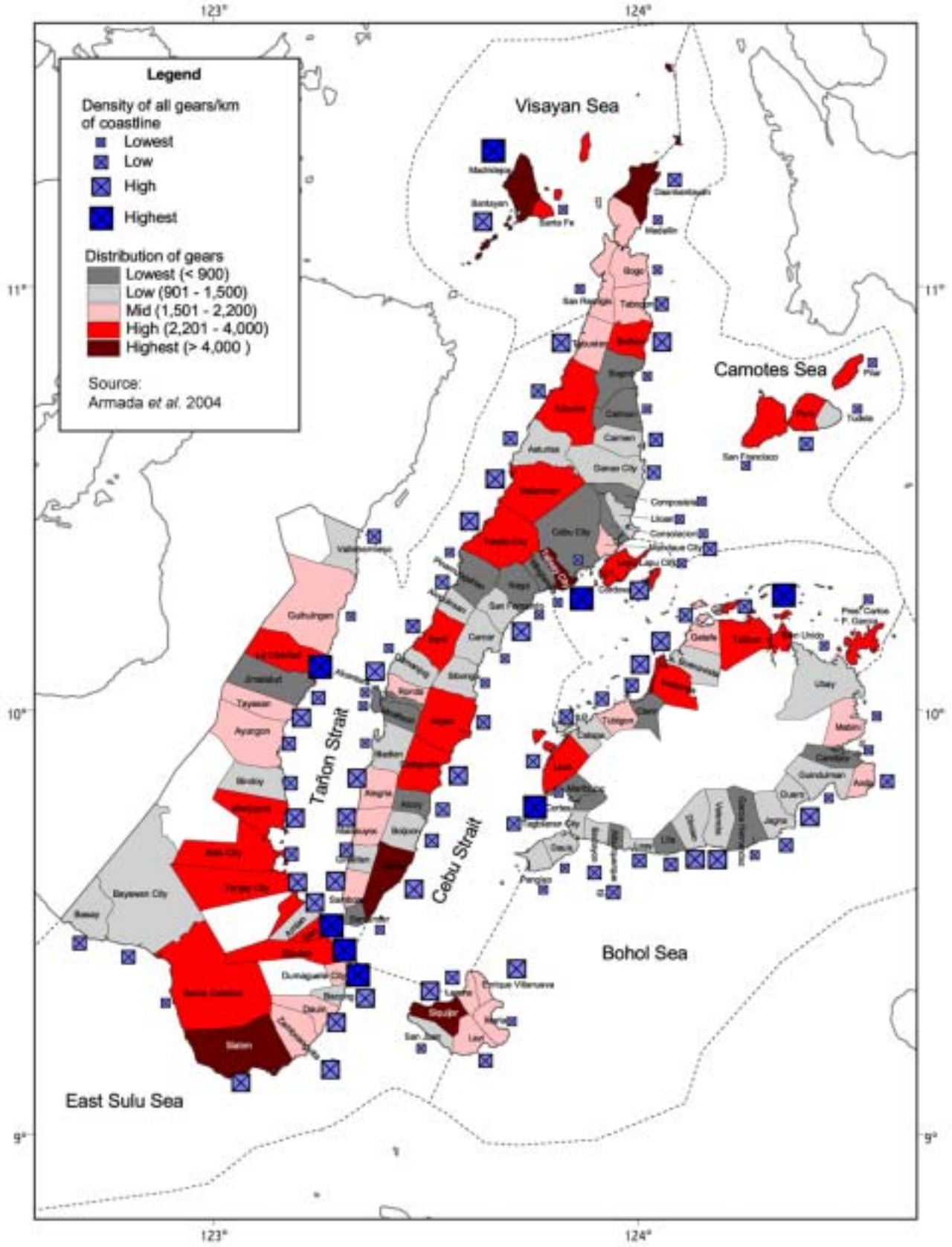


Figure 55. Distribution and coastal density of all gears in Central Visayas.

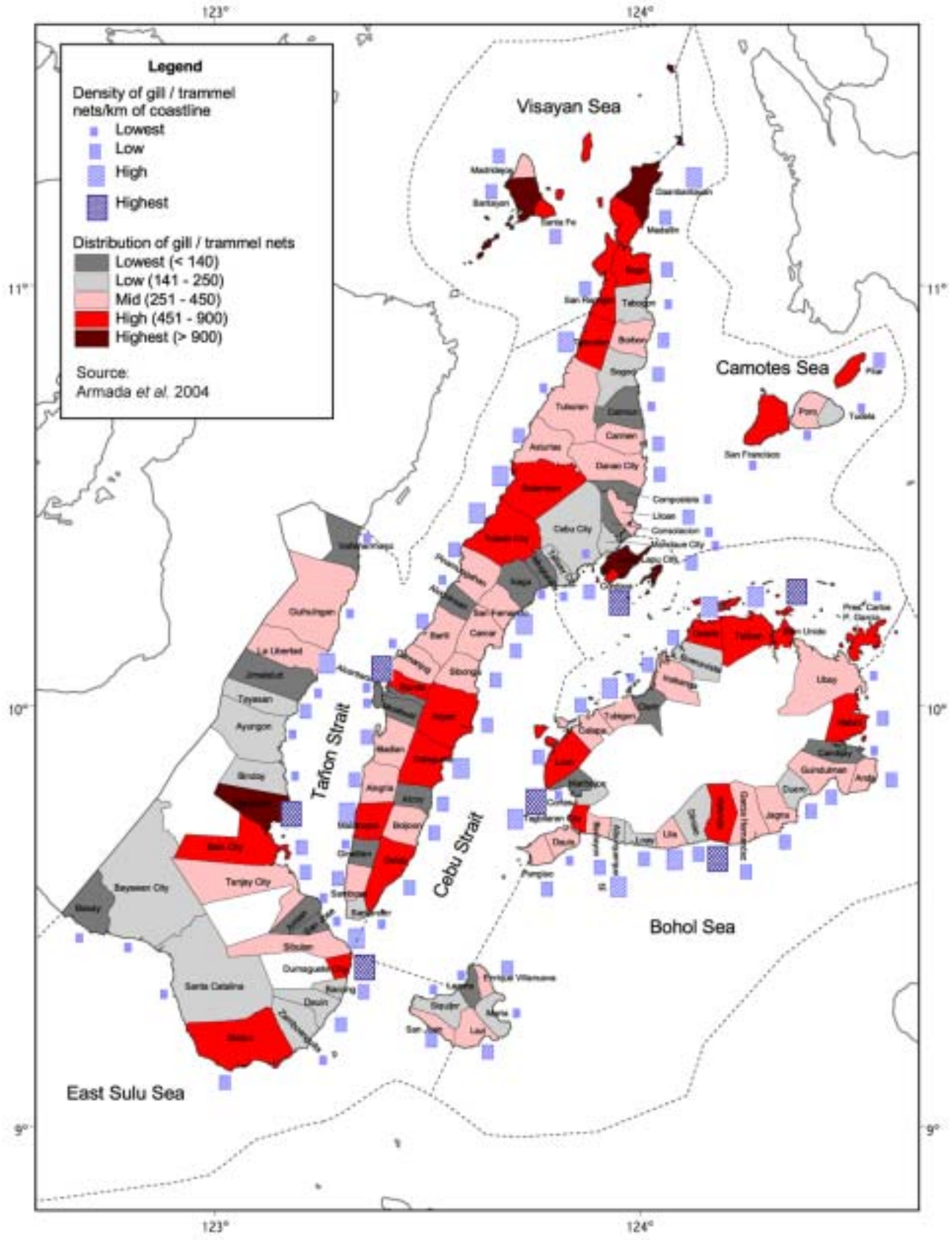


Figure 56. Distribution and coastal density of gill/trammel nets in Central Visayas.

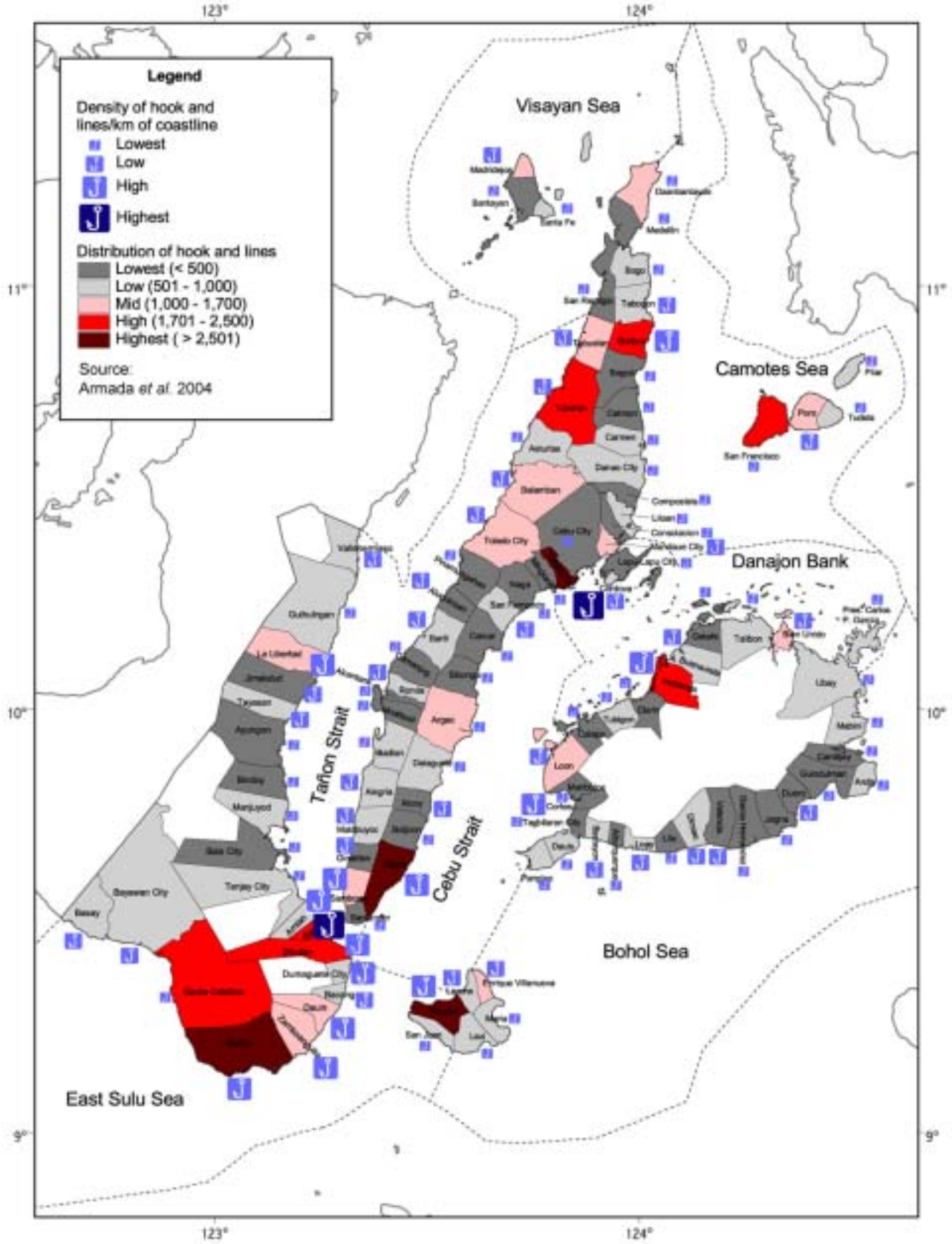


Figure 57. Distribution and coastal density of hook and lines in Central Visayas.

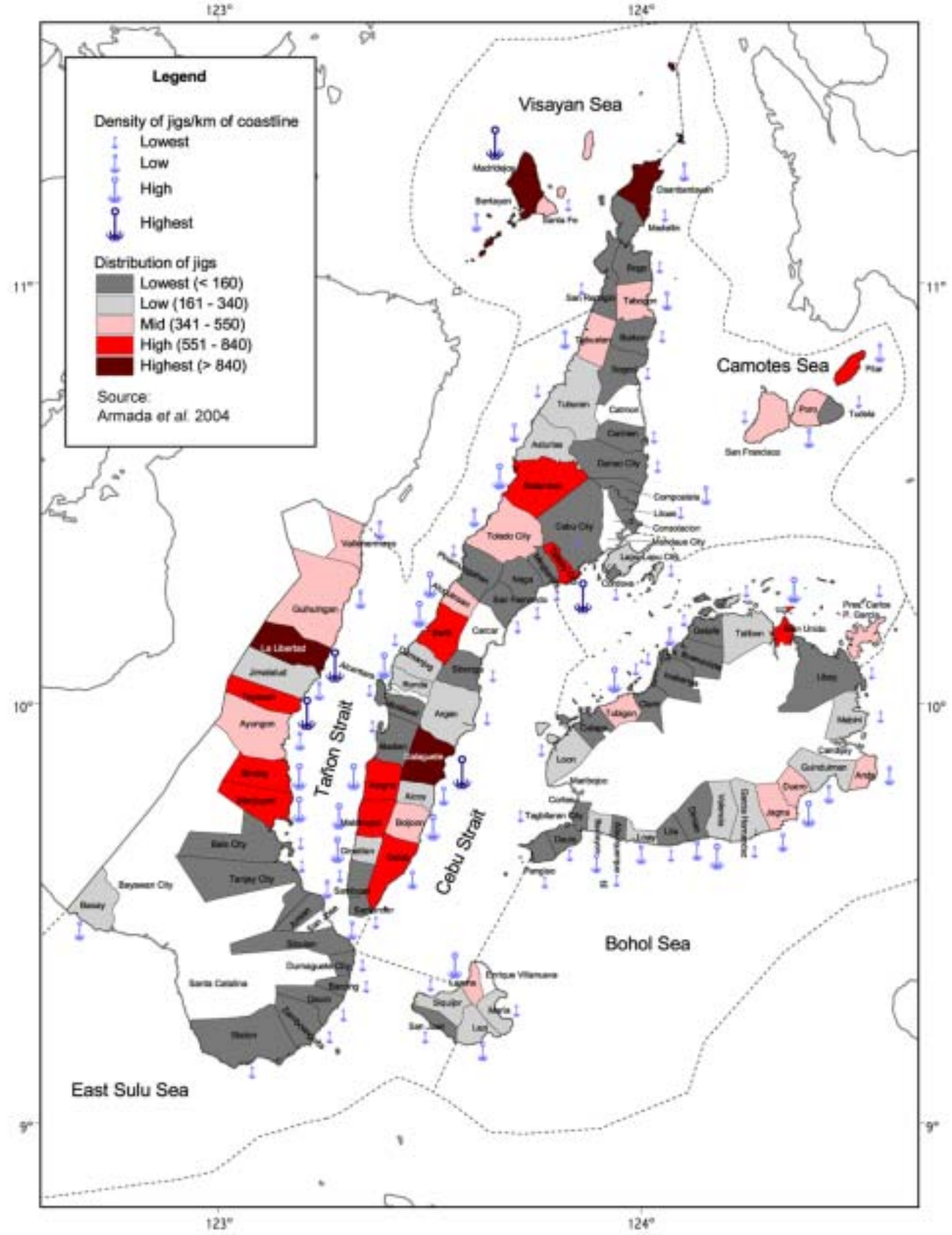


Figure 58. Distribution and coastal density of jigs in Central Visayas.

Table 12. Estimated total number of fishers and boats by fishing ground of Central Visayas in 2003.

	Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea	Total
Fishers	13,112	13,792	18,222	27,188	6,240	26,850	20,967	126,371
Nonmotorized boats	5,402	4,464	9,356	8,343	1,590	9,884	7,111	46,150
Motorized boats	2,578	3,165	3,856	7,553	2,074	6,347	6,672	32,245

Major Fishing Grounds

The marine waters of Central Visayas have seven distinct fishing grounds (fisheries ecosystems), as discussed in Chapter 3. Unlike commercial fishers, municipal ones generally exploit fishing grounds near their villages, as follows:

- Bohol Sea – by fishers from southern municipalities of Bohol and eastern and southern municipalities of Siquijor;
- Camotes Sea – by fishers from northeastern Cebu and Camotes Island;
- Cebu Strait – by fishers from Northwestern Bohol, southeastern Cebu, northern Siquijor and southeastern Negros Oriental;
- Danajon Bank – by fishers from northern Bohol and central part of eastern coast of Cebu;
- East Sulu Sea – by fishers from southern Negros Oriental and few motorized boats from west coast of Siquijor;
- Tañon Strait – by fishers from eastern Negros and western Cebu; and
- Visayan Sea (southeastern portion) – by fishers from northern tip of Cebu and Bantayan Island.

Fishing Craft and Fishers

Fishers and fishing boat distribution are given in Table 12. Danajon Bank and Tañon Strait have the highest number of fishers and fishing craft while East Sulu Sea has the lowest. Tañon Strait has the highest number of gillnets, hook and lines and squid jigs. This is followed by Cebu Strait and Danajon Bank, with East Sulu Sea as the lowest.

Typical municipal fishers preparing to go to sea, Siquijor.

Nonmotorized bancas, Balicasag Island, Bohol. (A. White)

Fishing gears

Relative to the length of their coastline, Tañon Strait, Cebu Strait and East Sulu Sea have the highest densities (units/km of coastline) of hook and lines; Visayan Sea and Danajon Bank, of gillnets; Tañon Strait and Visayan Sea, of squid jigs (where catching of giant squids are also quite prevalent); Visayan Sea, Danajon Bank and Cebu Strait, of pots and traps; and Visayan Sea and Danajon Bank, of spear fishing gears.

Among the minor fishing gear types, Tañon Strait and East Sulu Sea have high concentrations of pushnets mainly due to their very seasonal use in the capture of milkfish fry; East Sulu Sea, of scoopnets, which are primarily used as accessory gear in the capture of tuna and tuna-like species as well as other small pelagics; Visayan Sea and Danajon Bank areas, of fish corrals, which are also quite popular in Tañon Strait. Gleaning is relatively widespread in almost the entire Bohol coastline. Beach seine is relatively concentrated in Tañon Strait and Danajon Bank.

Beach seine in operation, Liloan, Cebu.

Spear fishing is common in the region, Pamilacan Island, Bohol.

Hand instruments, hook and lines, and jigs

This group of gears (Table 13) consists mainly of traditional ones, many of which have evolved and are currently operated for specific use or to catch specific marine organisms. With some exceptions, many of these are relatively passive gears, requiring low investment and have low catch rates. Though scoopnets are designed as accessory gear for hauling the catch, they are used in Central Visayas as a main gear to scoop fishes aggregated by light. They are heavily used in Tañon Strait and East Sulu Sea and less used in Visayan Sea. Except in Bohol Sea and East Sulu Sea, spear fishing is very common in most fishing grounds. Though generally banned, spear fishing with the aid of compressor is still commonly used in specific areas of Danajon Bank and Visayan Sea.

Hook and lines are the main fishing gears in the region. Simple hook and line (*pasol*) and multiple handline (*undak*) are common and operated as main as well as alternative gear in all fishing grounds. Bottom-set longline (*palangre*) is commonly used in Tañon Strait, Danajon Bank and Visayan Sea while surface-set longline (*tapsay*) in Tañon Strait and Cebu Strait. Troll lines (*subid*) are widely operated in Tañon Strait, Cebu Strait and Camotes Sea.

Fish jigs are highly modified gears that are becoming common in the area, especially in Tañon Strait. Squid jigs are widely used in all of Central Visayas, especially in Tañon Strait and Visayan Sea but less used in East Sulu Sea. Also common are the highly modified jigs used to catch giant squid. These jigs are deployed at about 200 m deep and aided with light.

Traps, pots and gillnets

Traps and pots (Table 14) are some of the traditional gears still used in the area. These are generally made of bamboo. Recently, however,

Table 13. Inventory of fishing gears by fishing ground of Central Visayas: hand instruments, hook and lines, and jigs (Armada *et al*. 2004).

Fishing gear	Common local names	Major fishing grounds							Total
		Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea	
Hand instruments									
Scoopnet	*Sapyaw, sibot, sikpaw*	172	38	37			63		310
Scoopnet with light	*Panulo, paapong, salakab*	843	571	618	939	1,091	1,402	135	5,599
Spear fishing	*Pamana, panungkit, gantaaw*	209	714	1,017	918	36	894	3,026	6,814
Spear fishing with compressor	*Pana-compressor, buso*	40	14	59	265		39	105	522
Spear fishing with light	*Pana-panuga, panamal*	490	4	56	225	10	147		932
Hook and lines									
Bottom set-surface set longline	*Panalabay, pakatay, salabay*	432		527	2	356	869		2,186
Bottom-set longline	*Kitang, palangre, palabay*	630	695	981	1,962	262	3,570	1,605	9,705
Hook and line	*Pasol, habyog, tonton*	4,167	3,656	7,741	5,913	1,709	6,525	1,648	31,359
Hook and line with float	*Pataw, palagdas, pahawin*	78	383	1,148	1,228	2,349	1,385	68	6,639
Multiple handline	*Barangay, lasdak, undak*	4,246	4,876	6,532	4,808	2,646	8,966	1,494	33,568
Surface-set longline	*Bahan, tapsay, pakaras*	578	392	1,264	30		1,299		3,563
Troll line	*Subid, limbag, adis-adis*	31	1,584	1,476			2,113	193	5,397
Jigs									
Fish jig	*Kab-it, saranggat, helicopter*	40	605	648	545		929		2,767
Octopus jig	*Pangati*						5		5
Squid jig	*Angkla, subid, saranggat*	3,673	1,991	3,807	2,801	396	9,957	5,217	27,842

these were modified; parts are now made of various materials like plastic nets, steel screens, polyvinyl chloride pipes and steel pipes. Most common are crab pots, which are widely used in Visayan Sea and Danajon Bank, and fish pots, in Visayan Sea, Cebu Strait and Danajon Bank. Squid pots are quite widely used in Visayan Sea but rarely used in other fishing grounds. There are also traps for specific organisms like eel, nautilus and shrimp. The use of synthetic materials like plastic nets and polyvinyl chloride pipes instead of just bamboo poses some problems. Because they do not degrade easily, pots or traps may still continue to catch fish when lost in the sea (ghost fishing). Also, lost synthetic gears become marine debris.

The second most important major group of fishing gears used in Central Visayas are the gillnets (Table 14) — drift gillnets (*kurantay*), which are heavily used in Cebu Strait and Tañon Strait, and bottom-set gillnets (*palugdang*), in Danajon Bank. To a lesser extent, also common in all fishing grounds are surface-set gillnets (*patuloy*), trammel nets (double/triple nets), encircling gillnets (*likos*) and drive-in gillnets (*bahan*).

Table 14. Inventory of fishing gears by fishing ground of Central Visayas: traps, pots and gillnets (Armada *et al*. 2004).

Fishing gear	Common local names	Major fishing grounds							Total
		Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea	
Traps and pots									
Bamboo fish trap	*Dupa-dupa*			18					18
Crab liftnet	*Sapyaw, bintol, skylab*				316	34	5	4	359
Crab pot	*Panggal, gulo-gulo, ligid*	53		38	672	19	188	845	1,815
Eel pot	*Bantak, pangbakasi*	42	21	183	81		5		332
Fish pot	*Bubo, panggal, timing*	461	377	1,229	934	32	518	1,420	4,971
Nautilus pot	*Bubo panglagang*				2		28		30
Shrimp pot	*Bubo pangsapayan/ pasayan*				62	3			65
Squid pot	*Bubo/panggal pangnokos*	8	12		23	2		1,109	1,154
Gillnets									
Bottom-set gillnet	*Palugdang, pamahala, palubog*	1,181	1,145	1,227	4,050	420	2,333	2,943	13,299
Drift gillnet	*Kurantay, paanod, palaran*	2,595	1,767	3,476	1,280	232	3,824	1,575	14,749
Drive-in gillnet	*Bahan, sagiwsiw, tapsay*	62	185	212	117	12	167	207	962
Encircling gillnet	*Likos, panglihos, kayagkag*	181	61	131	352	52	677	334	1,788
Gillnet (unspecified)	*Pukot*			12			5		17
Set gillnet	*Kayagkag, patulay*	4	273	76	71	19	225	224	892
Surface set-encircling gillnet	*Pangnokos, pangsulid*	8	225	57		4	477	56	827
Surface-set gillnet	*Palutaw, patuloy, kurantay*	424	195	789	504	318	1,212		3,442
Trammel net	Triple net, double net, *padlas*	695	176	1,042	337	20	630	219	3,119

Impounding gears, dragnets and seines

Impounding gears (Table 15) are also among the traditional fishing gears used in Central Visayas. The more common ones are fish corrals (*bungsod*) and miracle holes (*amatong*). Fish corrals are found everywhere in the region but are more often used in Danajon Bank, Tañon Strait and Visayan Sea; and miracle holes, in all fishing grounds, except in Bohol Sea and East Sulu Sea. Less frequently used are bagnets *(basnig)*, filternets *(tangab)* and liftnets. Bagnets are common only in Tañon Strait; filternets in Visayan Sea; and liftnets in Tañon Strait. Rarely used these days are barrier nets (*pahubas*).

Net fishing in shallow waters. (A. White)

Table 15. Inventory of fishing gears by fishing ground of Central Visayas: impounding gears, dragnets and seines (Armada *et al*. 2004).

Fishing gear	Common local names	Major fishing grounds							Total
		Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea	
Impounding gears									
Miracle hole (artificial reef)	*Gango, amatong, balirong*		137	232	696		240	108	1,413
Bagnet	*Basnig, tapay, iwag, sabinit*		10	35			104		149
Barrier net	*Pahubas, pang-ali*	13					8		21
Filternet	*Tangab, lukob, sanggab*			4	18		64	305	391
Fish corral	*Bungsod, dumpil, punot*	275	111	361	802	9	785	573	2,916
Liftnet	*Sapyaw, sabinit, surambao*					34	125		159
Stationary liftnet	*"New look", bintol*	12	3	9	55		92		171
Dragnets and seines									
Baby trawl	*Parakaya, palakaya*				176				176
Beach seine	*Baling, sahid, sarap, aghid*	26	131	293	398	20	518	178	1,564
Danish seine	*Hulbot-hulbot, liba-liba*	14	16		204		12		246
Fry dozer	*Trol, saplad*	240	174	650		800	3,047		4,911
Mechanized pushnet	*Baling, baby trawl, sudsud*				149		6		155
Midwater trawl	*Palupad, sapyaw*				10			22	32
Other seines, seine net	*Sabinit, pukot binulsahan*		6		18		18	13	55
Pushnet, scissor nets	*Sahid, sudsud, salibot*	364	278	536	664		962	306	3,110
Ringnet/purse seine	*Likum, hapa hapa, kubkub*	24	7	20		42	8		101
Round haul seine	*Lawag, sabinit, sapyaw*				24		126	14	164

Fry dozers (*saplad*) are commonly used, especially in areas where milkfish fry is gathered, such as in Tañon Strait, East Sulu Sea and Bohol Sea. Pushnets (*sudsud*) are still regularly used in all fishing grounds, except in East Sulu Sea. These fine-mesh nets catch shrimps and small fishes. Also with fine-mesh nets, beach seines (*baling*) are commonly used along sandy beaches, particularly in Tañon Strait and Danajon Bank.

Many very efficient, active fishing gears are still being used by municipal fishers but are confined to specific areas, such as baby trawl (*palakaya*) and Danish seine (*liba-liba*) in Danajon Bank; midwater trawl in Danajon Bank and Visayan Sea; and round haul seine (*lawag*) in Danajon Bank and Tañon Strait. These gears, however, are subjects of controversy, especially in implementation of recently enacted laws and municipal ordinances that prohibit their use in municipal waters.

Other fishing activities

There are many other fishing activities that cannot be categorized under the above groupings. These include gleaning and diving for shells and other invertebrates as well as illegal fishing activities like blast fishing and fish capture or collection with the aid of poison (Table 16). Almost all of these activities are known to be carried out in Danajon Bank. There are miscellaneous fishing activities quite popular in other fishing grounds like abalone fishing

Table 16. Inventory of fishing gears by fishing ground of Central Visayas: other fishing activities (Armada *et al*. 2004).

Fishing gear	Common local names	Major fishing grounds							Total
		Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea	
Abalone fishing	*Pangkapinan*			92					92
Blast fishing	*Paniro*			6	145				151
Castnet	*Laya*	12		17	345		5		379
Crab fishing, picking	*Pangkasag, panikop*		137		10				147
Diving for ornamentals	*Sawm pangsimilya*				75				75
Gleaning	*Panginhas*	600		570	213		583	6	1,972
Lobster fishing	*Pangmantaba*				8				8
Octopus lure	*Pangtamaa, pangugita*			9	24		15		48
Poison, rotenone fishing	*Panuble, panghilo, panguskus*				7				7
Sea cucumber collecting	*Pangbat, panulo ug bat*			1	309				310
Sea urchin picking	*Panuyom, pangswaki*				38				38
Shell dredging (rake)	*Imbaw panginhas*		40						40
Shell/pearl diving	*Panawm ug kinhason, sarap*				108				108
Sponge diving	*Panawm*				4				4
Starfish diving	*Panawm*				40				40

(*pangkapinan*) in Cebu Strait, gleaning (*panginhas*) in Bohol Sea, Cebu Strait and Tañon Strait, and shell dredging (*panginhas ug imbaw*) in Camotes Sea.

Catch Per Unit Effort

Indicative of catching efficiencies of fishing gears are their catch per unit effort (CPUE), in this case, expressed in and standardized to catch in kg/day (Table 17). Fishing gears with generally high catch rates are Danish seine, spear fishing with the aid of compressor and encircling gillnet. Gillnets and various hook and line types have generally higher catch rates in East Sulu Sea compared to others. This is primarily due to the presence of tuna and tuna-like species in this area. Lowest catch rates among various gillnet types are in Tañon Strait and Camotes Sea while those among different hook and line types are in Danajon Bank. Though changes in CPUE cannot be measured during a short data collection period, interview with fishers indicated large decreases in catch rates during the last four decades (Figure 59). Decreasing trends were likewise observed in different fishing grounds of Central Visayas (Figure 60).

Catch composition

In general, the catch by municipal fishers in Central Visayas consists of bigeye scads, round scads, Indian mackerels, anchovies and various squids. Other major catches are siganids, blue crabs, flying fishes and halfbeaks. The contribution of various fish groups to total fish landing in different fishing grounds of Central Visayas is shown in Table 18 and Figure 61. The major catches by all gears operated by municipal fishers in the following fishing grounds are:

- Bohol Sea - anchovies (*bolinao*), followed by squids (*nokus*) and round scads (*tulingan*);
- Camotes Sea - bigeye scads (*tamarong*), followed by round scads (*tulingan* and *mangko*);
- Cebu Strait - bullet tunas, followed by anchovies and bigeye scads;
- Danajon Bank - blue crabs (*lambay*), bigeye scads and siganids (*danggit*);

Table 17. CPUE (kg/day) of common fishing gears used in Central Visayas (Armada *et al*. 2004).

Fishing gear	Major fishing grounds						
	Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea
Baby trawl	-	-	-	15.3	-	-	-
Beach seine	19.3	6.9	25.7	6.6	17.8	12.6	11.4
Bottom-set gillnet	5.5	9.1	7.1	7.7	12.8	7.2	14.3
Bottom-set longline	6.1	5.4	6.2	7.2	6.0	7.3	13.8
Crab pot	2.3	1.0	2.8	4.2	6.2	3.3	3.4
Danish seine	20.0	-	-	65.1	-	-	-
Dragged handline	5.0	-	12.3	10.0	6.7	4.5	-
Drift gillnet	12.6	12.5	10.4	13.2	40.3	10.7	17.7
Drift longline	-	5.0	8.5	-	16.9	7.1	-
Drive-in gillnet	18.1	16.0	15.0	27.0	12.0	15.0	19.7
Encircling gillnet	13.7	12.3	16.9	12.9	60.0	17.0	42.0
Fish corral	16.0	6.6	3.9	6.3	5.0	4.6	7.6
Fish jig	-	5.6	7.0	4.3	-	6.3	-
Fish pot	6.3	10.6	7.1	10.5	6.3	7.1	20.3
Hook and line	3.6	8.0	5.2	3.9	8.8	4.8	8.5
Hook and line with float	20.0	7.6	9.6	10.2	42.5	12.7	30.0
Multiple handline	4.6	4.8	3.7	4.2	7.5	4.7	3.9
Push net	0.5	1.4	9.3	2.0	-	2.3	1.8
Scissors net	1.0	1.7	30.0	9.3	-	7.6	1.3
Scoop net	16.2	7.0	2.3	4.5	-	4.0	-
Scoop net with lights	16.1	3.5	8.7	5.4	11.6	11.1	4.8
Set gillnet	17.8	7.1	9.3	6.3	3.5	6.0	6.0
Spear fishing	4.1	3.0	3.6	4.9	4.0	3.6	4.4
Spear fishing with compressor	7.5	65.0	30.0	21.3	-	23.1	13.3
Spear fishing with light	-	10.0	2.8	7.3	5.0	2.6	-
Squid jig	3.5	6.2	4.0	4.1	8.8	5.6	5.6
Stationary liftnet	7.5	35.0	8.7	12.1	-	30.0	-
Surface-set longline	13.8	11.6	7.8	3.0	-	11.3	-
Trammel net	5.5	5.0	4.6	6.6	12.0	6.1	3.3
Troll line	8.5	7.7	7.3	14.0	3.5	8.9	8.7

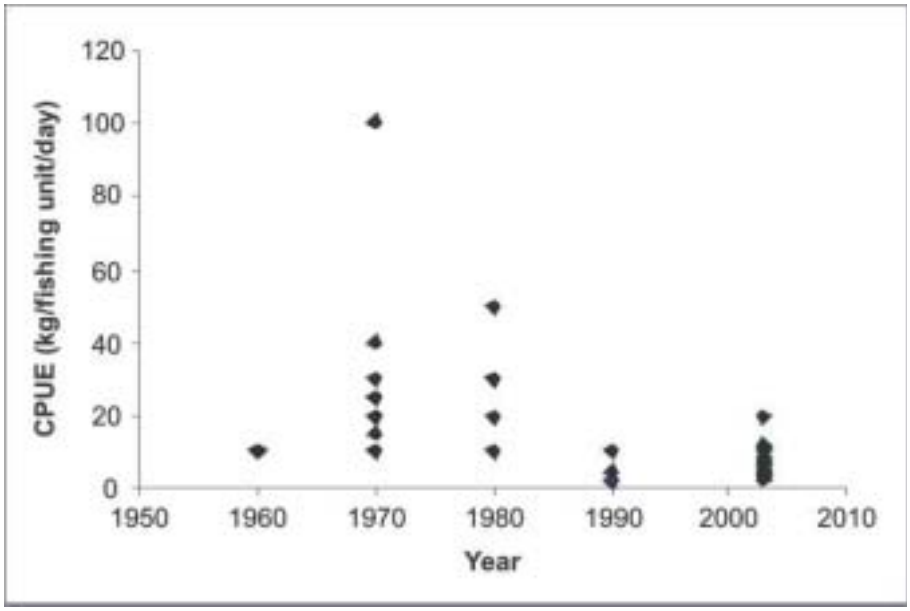


Figure 59. Trend in CPUE over the last four decades as perceived by municipal fishers in Central Visayas.

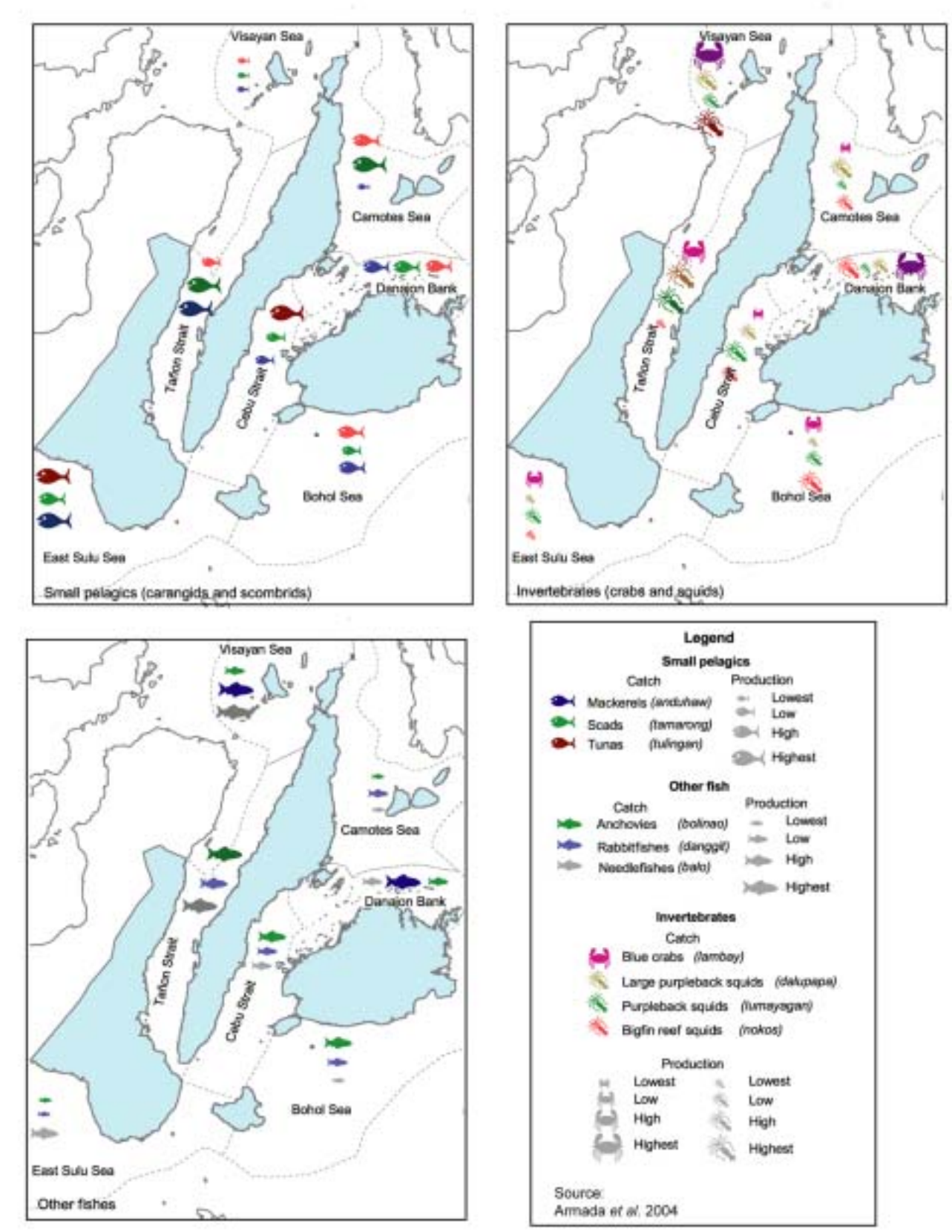


Figure 60. Top ten municipal fishes as reported per fisheries ecosystem.

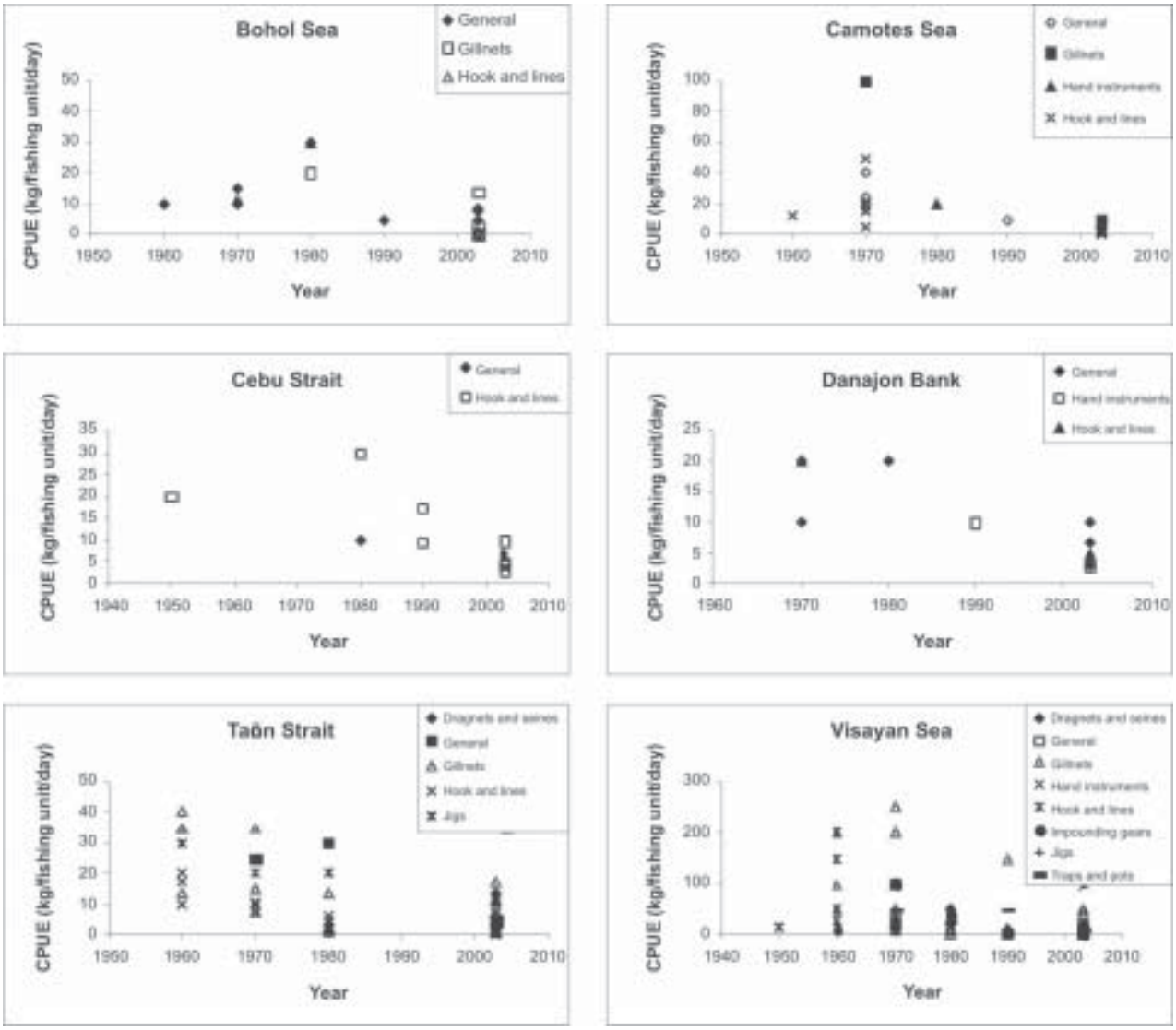


Figure 61. CPUE trend during the last four decades as perceived by municipal fishers in the fishing grounds of Central Visayas.

- East Sulu Sea - bigeye scads, followed by various species of small tunas and Indian mackerels (*anduhaw*);
- Tañon Strait (generally deep waters) - squids (*lumayagan* and *dalupapa*), bigeye scads and Indian mackerels; and
- Visayan Sea - squids *(nokus)*, followed by Indian mackerels (*burao*) and siganids.

Issues

Overwhelmingly, the most important issue raised by municipal fishers is the intrusion of commercial fishing boats in municipal waters (Table 19). This is followed by problems with illegal fishing activities, such as spearfishing with the use of compressor, use of noxious substances in catching or collecting fishes, and blast fishing (Figure 62). The other issues raised include reduction of catch due to increase in boats and fishers and due to excessive fishing in general; problems with existing law enforcement activities; and use of destructive gears, such as drive-in and fine-meshed nets. See Tables 20-22.

Summary of observations and implications to management

The various aspects of the municipal fisheries profiling process of Central Visayas have each contributed to a common realization of various degrees of fisheries resource depletion. Depletion of fish stocks were manifested in many ways. Some insights on possible approach in

Table 18. Aggregate catch composition of all fishing gears in the fishing grounds of Central Visayas.

Bohol Sea			Camotes Sea			Cebu Strait			Danajon Bank		
Rank	catch	%	Rank	catch	%	Rank	catch	%	Rank	catch	%
1	*bolinao*	8.67	1	*tamarong*	14.99	1	*tulingan*	13.51	1	*lambay*	7.27
2	*nokos*	7.22	2	*tulingan*	6.24	2	*bolinao*	8.61	2	*tamarong*	6.31
3	*tulingan*	6.66	3	*mangko*	5.05	3	*tamarong*	5.88	3	*danggit*	4.82
4	*anduhaw*	4.50	4	*hasa hasa*	3.88	4	*malapati*	5.20	4	*bodboron*	3.77
5	*tamarong*	4.00	5	*barongoy*	3.63	5	*lumayagan*	4.12	5	*tulingan*	3.73
6	*bangsi*	3.25	6	*danggit*	3.16	6	*burot-burot*	3.41	6	*nokos*	3.36
7	*danggit*	2.72	7	*dalupapa*	2.96	7	*nokos*	3.13	7	*pasayan*	3.00
8	*katambak*	2.68	8	*nokos*	2.90	8	*danggit*	2.86	8	*molmol*	2.63
9	*lumayagan*	2.46	9	*bawo*	2.87	9	*tulirok*	2.23	9	*potpot*	2.28
10	*mangsi*	2.27	10	*borot*	2.73	10	*anduhaw*	2.04	10	*nokus sa lusay*	2.13

East Sulu Sea			Tañon Strait			Visayan Sea		
Rank	catch	%	Rank	catch	%	Rank	catch	%
1	*tamarong*	7.31	1	*lumayagan*	8.54	1	*nokos*	17.59
2	*ihalason*	5.99	2	*tamarong*	7.52	2	*burao*	5.56
3	*tulingan*	5.50	3	*dalupapa*	5.68	3	*danggit*	4.94
4	*anduhaw*	5.50	4	*anduhaw*	4.75	4	*lingiro*	4.62
5	*tulakhang*	4.24	5	*bolinao*	3.93	5	*lambay*	4.52
6	*tugnos*	4.17	6	*malangsi*	3.69	6	*talho*	3.56
7	*tabas*	3.03	7	*balo*	2.36	7	*libod*	3.25
8	*balo*	2.65	8	*baga*	2.35	8	*balo*	3.23
9	*belong belong*	2.51	9	*bansikol*	2.07	9	*banghutin*	2.90
10	*mamsa*	2.43	10	*danggit*	1.98	10	*tamban tuloy*	2.86

Table 19. Ten most important issues raised by municipal fishers in the fishing grounds of Central Visayas.

Rank	Issue	Fishing ground							Total
		Bohol Sea	Camotes Sea	Cebu Strait	Danajon Bank	East Sulu Sea	Tañon Strait	Visayan Sea	
1	Commercial boats (*likum*, *palakaya*, *hulbot-hulbot*) operating inside municipal waters	35	31	46	157	6	95	23	393
2	Spear fishing with compressor	28	10	22	13	1	13	5	92
3	Fishing with noxious substances, e.g. cyanide, *tubli (Derris elliptica)**, insecticide	9	11	12	23	3	15	1	74
4	Blast fishing	1	11	10	37		2	11	72
5	Increase in the number of boats and fishers leading to reduction in fish catch	13	5	14	12	2	18	5	69
6	Decrease in fish catch attributed to overfishing	19		5	4	4	2	1	35
7	Problems with Bantay-Dagat (inactive, lack of support from local government, no patrol boats)	4	8	11	3		5	1	32
8	Operation of drive-in nets (*bahan*, *sagiwsiw*, *kurantay* and *lamba*)	2	2	11	9		2	4	30
9	Fine-mesh net operation, such as *baling*, *basnig* and *lawag*, catching juveniles		3	6	13		2		24
10	Weak enforcement (inconsistent, lack of local government support and low penalty)	1		8	2	1	11	1	24

* A mangrove associate, the roots of which are crushed and thrown into shallow waters to stun fish.

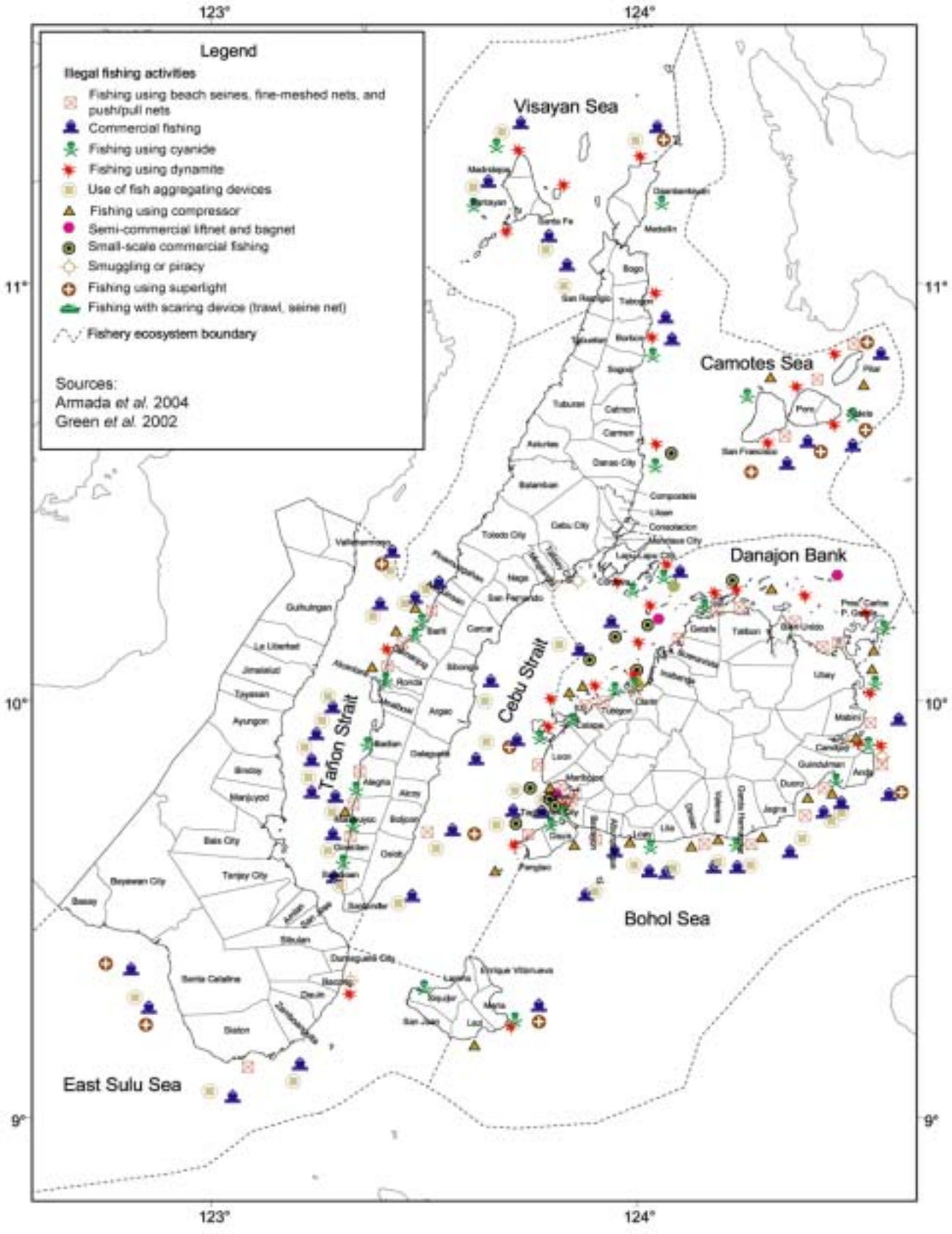


Figure 62. Incidence of illegal fishing activities in Central Visayas.

Table 20. Apprehensions by type of violations in Central Visayas (September 2002-September 2003) (UPV 2003).

Violation	No. of Apprehensions	No. of Suspects
Compressor	18	55
Dynamite fishing	8	15
Employing unlicensed fishers	7	14
Unauthorized fishing/fishing without license	31	67
Use of superlight	3	4
Use of active gear	52	163
Use of fine-meshed net	5	12
Unauthorized taking of rare species	1	1
Possession/sale of dynamited fish	23	17
Total	148	348

Table 21. Observed fishing violations in Central Visayas (UPV 2003).

Bohol	Cebu	Negros Oriental	Siquijor
Child labor in fishing	Compressor fishing	Child labor in fishing	Baby *muro-ami*
Compressor fishing	Cyanide fishing	Compressor fishing	Compressor fishing
Cyanide fishing	Dynamite fishing	Cyanide fishing	Cyanide fishing
Dynamite fishing	Intrusion of commercial fishers in municipal waters	Dynamite fishing	Dynamite fishing
Intrusion of commercial fishers in municipal waters	Unauthorized gathering of aquarium fishes	Intrusion of commercial fishers in municipal waters	Intrusion of commercial fishing in municipal waters
Unauthorized gathering of aquarium fishes	Use of fine-meshed nets	Unauthorized gathering of aquarium fishes	Use of fine-meshed nets
Use of fine-meshed nets	Use of noxious substances (e.g., *tubli*)	Use of fine-meshed nets	

Table 22. Origin of suspected violators apprehended in Central Visayas (September 2002-2003)(UPV 2003).

	Bohol	Cebu	Negros Oriental	Total
Same municipality	58	42	18	118
Same province	109	22	45	176
Other provinces	12	16	54	82

managing the fisheries in general and in reversing the trend in particular may be gained by examining them.

Decreasing CPUE trend

A decreasing trend in catch per unit of effort has been observed by a majority of the fishers interviewed. Without referring to any type of fishing gear, fishers indicated a reducing trend of catch rates especially during the last three decades. Only a few pelagic fishers claim that their catch has not changed during the past decades. The majority believe that catch rates in recent years are much lower than before even for pelagic fishes. Almost all believe that catch rates of demersal fishes are markedly lower now than before. The majority of the fishers are aware that the main reason for decline in catch is because there are just too many of them. Even the few who still claim that fish stocks remain the same all through these years are also convinced that there are just too many fishers operating in all fishing grounds of the region.

Effort reduction as a major management option may still not be acceptable to a majority of fishers or among resource managers in the

local government units. The collected information, however, suggests that management interventions leading to effort reduction have to be done now before the decline becomes irreversible. Registration and ultimately licensing of fishers, fishing crafts and fishing gears can lead the way to rational allocation of fish resources for various fish stock exploitation activities in every particular fishing grounds or water territories. This can be complemented by other management interventions like prioritization of resource exploitation activities, agreeing to standardization of gear dimensions, allocation of areas for protected or "no take" zones, mesh regulations, and declaration of closed seasons during spawning of the commercially important species of fish.

Change in catch composition

Catch composition by municipal fishing outfits recorded during the profiling process can not be compared with the past because of absence of previous documentation. Collected information, however, provide some evidence of changes in the population of harvestable fish stocks in various fishing grounds of the region. These changes were observed as follows:

- The fishing gear is no longer used because it no longer catches fish that it once caught.
- Operating a particular gear has been reduced to minimum because of low catch rate for species it was designed to catch.
- Gears designed to catch a particular species are still regularly used but they are catching other species instead.

Many fishers in Siquijor have stopped using surface longline (*pamirit*) because they are no longer able to catch skipjack tuna (*pirit*) in their fishing ground. In the same manner that bottom-set gillnets are no longer used in Tayasan and Ayungon in Negros Oriental because of the decline in the population of *balanak*, *kilawan*, *tabogok* and *banagan*. Fish pots are no longer used in Boljoon, Cebu.

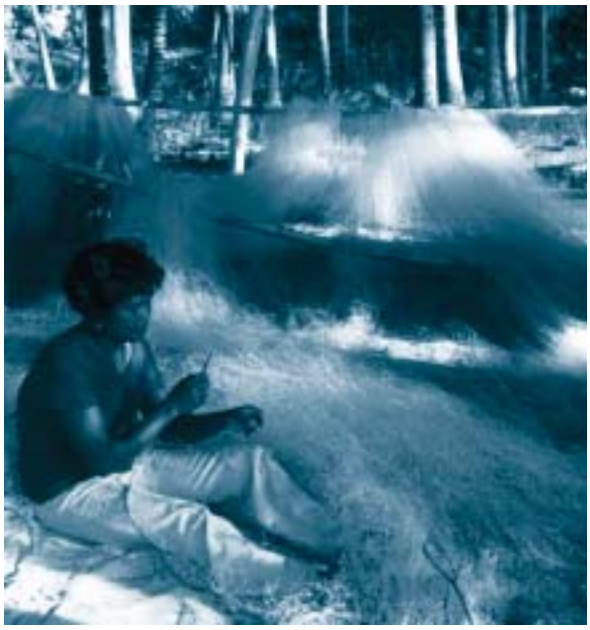
The multiple handlines (*bira-bira* and *latak*) and bottom-set longline (palangre) in southern Bohol have reduced their operation because of the sharp decline in the population of *mamsa*, *katambak*, *maya-maya* and *sagisihon*.

Other surface longline (*pamirit*) fishers in Siquijor continue to fish but they are now catching *tabas* instead of *pirit*. In Tabogon, Cebu, trammel nets (*ukay-ukay*) are catching mainly *danggit* instead of *molmol* and *katambak* and the bottom-set longline (*palangre*) are catching mainly *ubod* instead of *ahaan* or *pogapo*. Drift gillnets (*panulingan*) are catching primarily *kutob* and *anduhaw* instead of *tulingan*.

Fine-meshed nets

The use of fine-meshed nets by beach seine (*baling*), round haul seine (*lawag*), fish corral (*bungsod*), Danish seine (*liba-liba*) and baby trawl are, to various degrees, still tolerated in many fishing grounds of Central Visayas. A number of municipalities are, however, very serious in their management initiatives that they no longer allow the use of these gears especially those categorized as active gears like beach *baling*, *liba-liba* and baby trawl in their territorial waters. These actions are supported by appropriate national laws and local ordinances and the problem ultimately boils down to merely enforcing these laws consistently.

The predicament of fishing gears designed to catch relatively small species of fish such as anchovies (*bolinao*) is a bit more complicated. This is particularly true in the case of the round haul seine, locally known as *lawag*. The size composition of *bolinao* caught by *lawag* is comparable to other fishing gears (Figure 63). However, the problem arises when *lawag* starts to catch other fish species that grow bigger (Figure 64). The information gathered through the profiling process of municipal fisheries in Central Visayas also recognizes the fact that some species of pelagic fish do not grow big and can only be exploited using gears with relatively fine-meshed nets. These species of fish are likewise seasonal. However, the gears designed to catch them become destructive when they start catching the juveniles and early stages of other species of fish outside of the normal seasons of these fish. This includes other fishing gears like the stationary liftnet (*tower*), pushnet



Repairing nets is a part of daily life. (A. White)

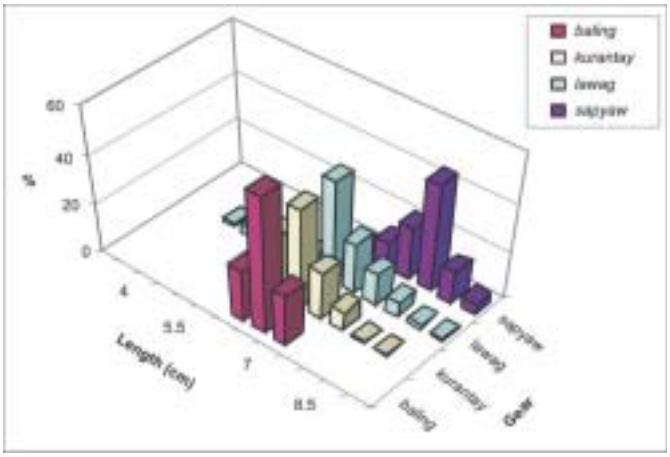


Figure 63. Comparison of size composition of *Stolephorus indicus* (*bolinao*) caught by various fishing gears in Danajon Bank.

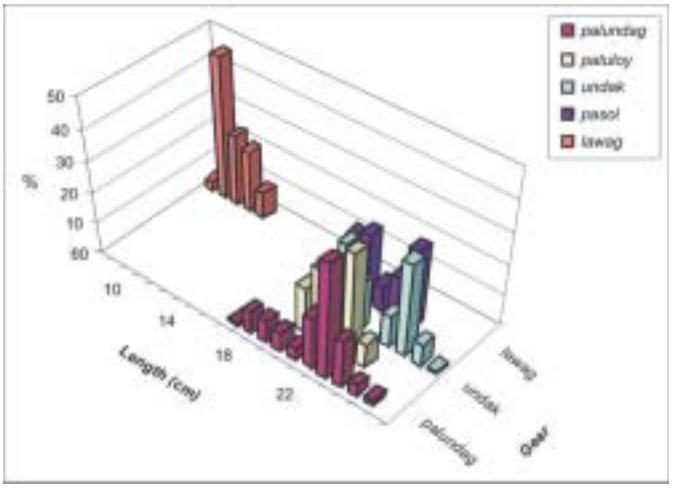


Figure 64. Comparison of size composition of *Rastrelliger brachysoma* (*hasa-hasa*) caught by various fishing gears in Danajon Bank.

(*sudsud*), and fish corral (*bungsod*), that all use fine-meshed nets, but catch a variety of species.

There is an option to totally ban the use of fine-meshed nets. This may prove drastic and may not totally be feasible. It is often argued that a number of species of fish can only be caught using fine-meshed nets. These species of fish appear only during a particular season of the year. The other option is to allow the use of these fishing gears but be very precise with its implementation like strict adherence to close and open seasons. This may have to be accompanied by a study to determine exactly the start and end of the fishing season for particular species.

The profile study shows that for *hasa-hasa* for instance, the *lawag* gear is catching the fish very young and small, so it is in effect contributing to overfishing. It is economically and ecologically better to disallow *lawag* to catch *hasa-hasa* and this will ensure more catch for the other gears and allow stocks to mature and breed consistently.

Use of synthetic materials

The development of stronger twines made of synthetic materials has improved the fishing efficiency of many fishing gears. However, it also brought with it a number of problems. Because they are stronger, they can easily be configured to fit into innovations of fishing gears and therefore increase catch rates. Nylon gillnets are relatively invisible in the water column thereby catching more fishes than before. Because of synthetic materials, dragged gears became sturdier and fishers can operate in relatively rough sea bottoms thereby destroying important fish habitats.

Lost synthetic gears also pose some problems to fisheries in general. Aside from their contribution to environmental degradation, these gears lost in the bottom of the sea continue to catch fish (ghost fishing) while intact. Some agreements may be forged among fishery resource users of Central Visayas in terms of rationalization of the use of synthetic materials. There are traditional

fishing gears made of organic materials that perform at par with similar gears constructed of synthetic materials. In the case of fish pots, fishers are making innovations such as the use of plastic screen and polyvinyl chloride pipes instead of bamboo. These synthetic materials, when lost at the bottom of the sea, continue to catch fish for a much longer period of time compared to those made of bamboos, which quickly degrade.

Summary

- There are a large number of fishers in the region dependent on fisheries for their livelihood. Municipal fishers' catch has decreased considerably in the last two decades.
- In general, the highest fishing concentration is in Visayan Sea, Danajon Bank and Tañon Strait. The region's fisheries have changed significantly in the last decades and the changes are on the whole negative for the fishers, with declining CPUE shown for all fishing grounds.
- There have been many changes in fishing gears in the last two decades. Many new target specific fishing gears have evolved, indicating a loss in diversity of the fish stocks.
- There is a need to limit some fishing gears in the region. If certain gears continue to get larger and more advanced, catch of other gears will decrease proportionaly.
- There is a dire need to enforce fishery laws and regulations more consistently.
- The introduction of new fishing gears and new synthetic materials is not good for fishing as a whole. Because these gears are not biologically degradable, when dumped at sea or lost they continue to catch fish for years.

Chapter 6
Coastal Management in Central Visayas

In coastal and fisheries management, the two key influencing factors in Central Visayas have been change in policy at the national level as well as a large number of internationally and nationally funded development projects (White and Chua 2004). Both of these key influences will be briefly described in this chapter.

The Change in Policy Environment and Its Implications for Central Visayas

With the passage of Presidential Decree 704 in the early 1970s, the national government through its line agencies aimed to assist fishers and the private sector to develop more intensive fishing gears at both municipal and commercial levels to increase "production" of fisheries through a more "globally efficient and technologically advanced" fleet. Large areas of mangroves considered unproductive were zoned as "available for fishpond development," and various new "efficient" fishing gears were introduced, such as trawl, Danish seine and purse seine.

The fishing industry was encouraged through a series of loans and incentive schemes to increase the number and size of vessels and technologies in use. This encouraged a change from low-cost and more sustainable fishing gears (such as hook and line) to more efficient and even in some cases habitat and fisheries-destructive gears.

With the passing of the Local Government Code of 1991 (Republic Act [RA] 7160), the management of "municipal waters" was devolved away from national government to local government units (LGUs). The Fisheries Code of 1998 then realigned the priorities of the Bureau of Fisheries and Aquatic Resources away from production towards fisheries and coastal management. In 1998, the Agriculture and Fisheries Modernization Act (AFMA) (RA 8435) was also introduced, modernizing agriculture and fishing vessels, in an unsuccessful attempt to assist small and medium commercial fishers to move beyond municipal waters and fish more in the huge Philippine exclusive economic zone (EEZ). The AFMA allocated funds for the commercial fleet to upgrade their boats and to move beyond municipal waters. The money, however, was never released!

These laws enabled a more localized management (through devolution of waters within 15 km) to LGU, but overlooked some legacies from previous decades of fisheries development. Central Visayas, like other regions, was left with a well-financed and excessive commercial fleet as well as a variety of gears which were destructive and too efficient, such as trawl and Danish seine. These legacies stall the full implementation of the Fisheries Code. These gears and the excessive fleet must be restricted so the Fisheries Code can be fully implemented.

The other key factor that has influenced Central Visayas fisheries and coastal management has been the various foreign and nationally funded special projects. Each of these projects is presented briefly below.

Key Coastal and Fisheries Projects

Marine Conservation and Development Program

The Marine Conservation and Development Program (MCDP) was funded through the Asia Foundation by the United States Agency for International Development (USAID) and implemented by Silliman University in 1984-1986. This was one of the first coastal management projects in Central Visayas. It focused on the establishment of community-based marine protected areas (MPAs) in 3 sites. MPAs in Balicasag and Pamilacan Islands, Bohol and Apo Island, Dauin, Negros Oriental were established. These proved to be some of the founding MPAs in the region, providing important examples of potential sustainable use of coral reef habitat and of fisheries (MCDP 1986).

Central Visayas Regional Project

The Central Visayas Regional Project (CVRP) was a pilot project for decentralization focusing on integrated rural development using community-based approaches. The program ran from 1984 to 1992. Of the US$35 million loan from the World Bank, approximately 10% was allocated for the nearshore fisheries component. Operating in nine critical watersheds in the region, a total of 182 barangays became involved in nearshore (coastal) activities covering selected municipalities of all provinces in Central Visayas. The project piloted various integrated coastal management (ICM) tools, such as marine sanctuaries, mangrove reforestation, mariculture, fish aggregating devices, artificial reefs and coral reef management having considerable successes in certain areas.

One of the key strategies of the project was that it worked hand in hand with the Department of Environment and Natural Resources (DENR) and the Department of Agriculture–Bureau of Fisheries and Aquatic Resources (DA-BFAR) regional offices as well as provincial governments through Provincial Resource Management Committees. These later became the Resource Management Division in Negros Oriental and the Cebu Resource Management Office (project) of the provincial government.

The World Bank Project Report of 1993 revealed that the design of the project established an approach to natural resource management (NRM) in the Philippines that was successful in achieving community participation, extending project technologies, improving NRM and increasing participants' income.

Coastal Resource Management Project

The nine-year (1996-2004) Coastal Resource Management Project (CRMP) was funded by USAID and implemented by DENR in partnership with NGAs. It provided technical assistance and training to coastal communities, LGUs, NGOs and national government agencies (NGAs) to promote improved management of coastal resources in the Philippines. Within Central Visayas, the project focused on the provinces of Bohol, Cebu and Negros Oriental, with small interventions in Siquijor in coordination with an NGO, the Coastal Conservation and Education Foundation, Inc.

Technical assistance was provided initially to "learning areas" composed of municipal and city clusters within each of the provinces. The assistance offered various ICM tools under a predefined planning process, with adequate room for innovation and focusing on key issues and needs of LGUs concerned. The key objective of the project was to expand and sustain ICM from pilot-scale, community-based and LGU projects to a strategic spread that cuts across a broad range of coastal stakeholders and geographical areas. The latter period of the project concentrated more at the provincial government level. Here, the project helped institutionalize the tools implemented and the lessons learned during implementation in learning areas. Eventually, the goals were achieved in some 52 coastal LGUs in Region 7 and in 61 LGUs in other regions.

Community-based Resource Management Project

The Community-based Resource Management Project (CBRMP) was a

continuation in part to lessons learned from CVRP, with a new funding window opened in 1997, supported by the World Bank and implemented through the Department of Finance. The CBRMP aims to reduce rural poverty and environmental degradation through support for locally generated and implemented NRM projects.

Funding consists of a grant and loan facility for LGU-initiated community-based resource management projects, with LGUs implementing activities along with DENR, BFAR and other appropriate development partners. The LGU, however, is the one to apply, document and manage the whole project as well as provide counterparts to a loan, grant and equity mix of funding for priority areas in the municipality. Seventeen coastal LGUs in Region 7 have availed of funding. Central Visayas was one of the first pilot regions in the country for this funding window.

Cebu Socioeconomic Empowerment and Development Project

The Cebu Socioeconomic Empowerment and Development (SEED) Project is a project of the Provincial Government of Cebu working with the Provincial Planning and Development Office. It is funded by the Japanese International Cooperation Agency. The project assists five core LGUs in Cebu, in various development activities. It plans to assist in promoting CRM to over 20 target municipalities within the province. The project also works with other nationally and internationally funded projects to further amplify its results in Cebu Province.

Philippine Environmental Governance Project

The Philippine Environmental Governance (EcoGov) Project is a technical assistance grant from USAID to the Government of the Philippines from December 2001 to November 2004. Its aim was to foster improved management of the environment and natural resources that provide key inputs to long-term economic development.

Project-sponsored activities addressed critical threats to coastal resources and forests, primarily overfishing, use of destructive fishing practices and illegal cutting and conversion of natural forests. EcoGov assisted decisionmakers and implementers in adapting and practicing transparent, accountable and participatory decisionmaking at national and local levels to improve the management of coastal resources, forests and forestlands, and solid wastes.

The project worked with DENR, self-selected LGUs, communities and coalitions in Central Visayas. It assisted LGUs to improve local legislation to support coastal resource management (CRM). It has encouraged LGUs to take proactive actions in municipal water delineation, MPA establishment and CRM zoning and planning. The legitimization process, which secures the LGU's executive and legislative support, commits it to implement CRM plans that will ultimately protect municipal waters from illegal fishing and overfishing.

Bohol Marine Triangle

The Bohol Marine Triangle (BMT) is a project of the United Nations Development Program–Global Environment Facility (GEF) initiated in late 2000 in southern Bohol. The Project Management Office is managed by the Foundation for Philippine Environment. It implements ICM with a focus on tourism in the three towns of Dauis, Baclayon and Panglao, a highway and residence area for globally significant coral reefs, marine mammals and related resources.

The project is working with the Bohol Alliance of Nongovernment Organizations (BANGON), Bohol Environment Management Office and Silliman University to coordinate planning and management in this globally rich marine area.

Visayan Sea Coastal Resources and Fisheries Management Project

The Visayan Sea Coastal Resources and Fisheries Management (VisSea) Project is an initiative supported by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). The project involves all coastal LGUs fringing Visayan Sea, one of the country's most

productive fishing grounds. Based on a participatory framework and involving the cooperation of DA-BFAR Regions 5, 6 and 7 as well as DENR, Department of Science and Technology–Philippine Council for Aquatic and Marine Research and Development, and the academe, the project aims to promote a more integrated resource management system for the entire Visayan Sea.

Siquijor Integrated Resource Management Project

The Siquijor Integrated Resource Management Project (SIRMAP) is a GTZ-funded project of the Siquijor Provincial Government. The project aims at economic reform and strengthening of the market economy. It focuses on building the capacity of the provincial government to map and collect information as basis for planning and implementing a series of coastal management (e.g., aquaculture, tourism) and waste management initiatives at various pilot sites around the province.

Fisheries Improved for Sustainable Harvest Project

The FISH Project is a seven-year (2003-2010) technical assistance project funded by the USAID, and implemented in partnership with the DA-BFAR. The FISH Project activities will focus on four target implementation areas: Calamianes Islands (Palawan), Danajon Bank (Bohol), Surigao del Sur and Tawi-Tawi. The Project is currently collecting baseline data for the four sites.

National Government Agencies and Their Programs in Coastal and Fisheries Management

Aside from special projects in the region, it is the government line agencies that provide most development assistance to LGUs and stakeholders in coastal and fisheries management. The main agencies and their key roles are described below. In recent years, there have been many changes in the mandates of various NGAs. This section summarizes their current mandates and thrusts in coastal and fisheries management.

Department of Agriculture–Bureau of Fisheries and Aquatic Resources

The DA-BFAR, in cooperation with concerned NGAs, has jurisdiction over the management, conservation, development, protection, utilization and disposition of all fisheries and aquatic resources of the country, except those within municipal waters. In municipal waters, however, it may coordinate with and assist LGUs, Fisheries and Aquatic Resource Management Councils and other concerned agencies in the development, conservation, protection, utilization and management of fisheries and aquatic resources as specified in RA 8550, the Fisheries Code of 1998. BFAR's vision is "a modernized fisheries that is technologically advanced and globally competitive." The transformation of fisheries is guided by sound practices of resource sustainability, principles of social justice and a strong private sector. It has three overriding mandates: on global competitiveness, on food security and on support services.

Department of Environment and Natural Resources

The DENR, through Executive Order 192, is the primary government agency responsible for the sustainable use of the country's environment and natural resources. It aims to be a dynamic force behind people's initiative in the conservation, management, development and proper use of the environment and natural resources through strategic alliances and partnerships, participatory process, relevant policies and programs, and appropriate technology towards sustainable development.

Coastal and Marine Management Office/ Division

The DENR through the Department Administrative Order 2002-08 established the Coastal and Marine Management Office. The office offers technical assistance in coastal management to LGUs through the Coastal and Marine Management Division / Section at the Regional / Community Environment and Natural Resources Office levels. In Central Visayas, the sites assisted by the office include Carcar,

Carmen and Pinamungajan in Cebu; Calape, Getafe and Talibon in Bohol; and Bayawan, Dauin, Basay, Ayungon, Guihulgnan and Valle Hermoso in Negros Oriental.

National Integrated Protected Area System

The Central Visayas has a unique and diverse ecosystem, which has led to the declaration of many national protected areas under Presidential Proclamations (PP) 2151 and 2152. PP 2151 establishes areas as initial components of the National Integrated Protected Area System. PP 2152 establishes areas under the category of protected landscapes and seascapes, such as mangrove swamp forest reserves. Over 40 coastal areas have been declared in the region. DENR does not currently have the funding to help establish and enable the various Protected Area Management Boards to manage these, so many of the protected areas still need considerable assistance.

Department of the Interior and Local Government

The Department of the Interior and Local Government (DILG) was reorganized by virtue of RA 6975, which created two basic sectors within the department: the Local Government Sector and the Interior or Public Safety Sector.

The Local Government Sector is responsible for planning, implementing, monitoring and evaluating plans, programs and policies pertaining to local autonomy, decentralization and local governance. The Public Safety Sector, which includes the Philippine National Police (PNP), plans and implements the department's programs on peace and order and public safety. It has the lead role in all types of law enforcement, including coastal law.

Patrol 117

One of the more recent programs of DILG is Patrol 117 or Dial 117. Patrol 117 was primarily established to encourage public reporting of common crimes. It was expanded to include emergency response and report of violations of special laws. Distinctively, in Region 7, patrol 117 further broadened its coverage to include acceptance and referral of reports concerning violations of coastal and fishery laws. Any person may call the number and get an immediate response to any criminal or environmental crime.

Police Environment Desk Officer

Letter of Instruction (LOI) 10/01, also known as LOI Perfect Environment, established the position of the Police Environment Desk Officer (PEDO) in response to the clamor of coastal mayors for them to assign at least one police officer in every station to be directly responsible for coastal and environmental law violations. The PNP in Central Visayas, however, expanded the scope of PEDO to include all environmental law violations. The National Law Enforcement Coordinating Committee (NALECC) in 2002 endorsed the LOI to be implemented nationwide leading to LOI 08/03, called National Perfect Environment, establishing the position of PEDO across the country.

The main function of PEDO is to be the key person who is trained and capable of responding to all reports of environmental law violations. Such a scope is possible because, unlike other enforcement agencies such as DENR and BFAR, PNP is present in all communities. Under the law, PNP enforces all laws of the state including special laws and ordinances. PEDO will assume jurisdiction if necessary or refer violations and crimes to appropriate agencies.

Philippine National Police – Maritime Group

RA 6975, as amended by RA 8551, created the PNP-Maritime Group (PNP-MARIG), which can perform all police functions "over Philippine territorial waters and rivers, coastal areas from the shore line to one mile inland to include ports and harbors and small islands of two miles in length or diameter with less than 1,000 population." Section 24 of RA 6975 also clarified that after an 18-month transition period, PNP-MARIG would absorb all police functions of the Philippine Coast Guard (PCG). This transition period ended in June 1992.

Department of Transportation and Communication

The Department of Transportation and Communication's involvement in coastal and fisheries management is through the Maritime Industry Authority (MARINA) and PCG. The MARINA is responsible for the promotion and development of the maritime industry, regulation of shipping and maritime safety regulations in collaboration with PCG. The MARINA used to be involved in the registration and inspection of commercial fishing boats, and issuance of certificate of Philippine registry to commercial fishing boats operating in the country.

Philippine Coast Guard

The PCG's mandates are to: promote safety at sea and maritime security as an armed force; assist in implementing laws in the high seas and waters under Philippine jurisdiction; and safeguard marine resources and environment. In Central Visayas, the Eastern Visayas District Command is responsible for the region.

Regional Alliances/Special Bodies

Apart from special projects and NGAs, various regional alliances and special bodies were created to initiate interagency collaboration on priority projects and issues. Some of these have a large role to play in Central Visayas.

Regional Development Council

Composed of provincial governors, city mayors and heads of NGAs as well as academic institutions and with one-fourth of the composition coming from the private sector, the Regional Development Council (RDC) is the highest policymaking and planning body in the region. It is also the primary institution that sets the region's direction of social and economic development efforts.

The RDC was created to implement the policy of the state so that socioeconomic development programs and activities of government should be undertaken with the extensive and active participation and support from and coordination of various government agencies as well as the private sector at the national, regional and local levels.

The RDC integrates and monitors all regional plans and activities of NGAs in the country and reviews policy activities. It can assure that programs and activities do not overlap and that the civil society, academe and national government programs are done in coordination with one another through short and long-term regional development, physical framework and special development plans. The council also reviews and endorses national plans, programs and projects proposed for implementation in the region as well as special projects it has identified.

Coastal Law Enforcement Alliance in Region 7

The Coastal Law Enforcement Alliance in Region 7 (CLEAR 7) is a voluntary initiative of NGAs and NGOs with the objective of integrating coastal law enforcement activities in Central Visayas. The alliance was established through a Memorandum of Understanding (MOU) in 2001 among DENR, DILG, BFAR, PNP-MARIG, National Bureau of Investigation, Office of the Regional State Prosecutor, League of Municipalities–Bohol Chapter, International Marinelife Alliance, Environmental Legal Assistance Center, Philippine National Association of Fish Wardens and CRMP.

CLEAR 7 benefited from a short-term technical assistance from the International Training Division of the United States Coast Guard (ITD-USCG) through USAID. In 2001, the ITD-USCG dispatched a team to conduct a series of classroom and on-site training on interdiction planning and boarding protocols.

The regular training and interaction of law enforcement agencies provided many opportunities for information exchange and improvement of inter-operability strategies among its members. The result was an enhanced individual agency or group enforcement response. Central Visayas has now established a protocol on vessel impoundment and a joint operations plan. A series of task forces, such as Task Force Kinhason (Convention on

International Trade in Endangered Species of Wild Fauna and Flora enforcement), Task Force Mailap (wildlife enforcement), Task Force Sundown (anti-intrusion of commercial fishing vessels in municipal waters) and Task Force Tiklong (anti-dynamite blasting cap), have been established to focus on key law enforcement issues in the region.

The key lesson learned by CLEAR 7 is that due to the complexity of coastal and fisheries law violations, it is almost impossible for one agency to address them all. Thus, to be effective, coastal law enforcement must be integrated, multi-agency and multisectoral.

Mactan Channel Multisectoral Council

Because of degrading water quality and habitats due to heavy land and water pollution of the Mactan Channel, various stakeholders formed the Mactan Channel Multisectoral Management Council. This council is composed of stakeholders from LGUs, NGOs, POs, NGAs, religious sector, academe and industry / business sector.

With assistance from the Ramon Aboitiz Foundation through a USAID grant, the council has begun to look at some of the problems confronting the channel. With a wide array of stakeholders and active assistance from different agencies, the council is currently running a community-based advocacy campaign. It is also profiling the state of the channel as basis for various proposed management interventions.

Danajon Bank Double Barrier Reef Management Council

Currently being established through MOU, the Cebu, Leyte, Bohol and Southern Leyte Management Council (CELEBOSOLE Council) has been formed to provide an overseeing and policy function for assisting to manage the only double barrier reef off the northern coast of Bohol and south of Southern Leyte province. Originally formed to assist in collaborative management, the council and a technical working group are composed of key persons from provincial and municipal governments of Bohol, Leyte, Cebu and Southern Leyte, alongside key NGAs and NGOs.

Bohol District Coastal Law Enforcement Councils

The three Bohol District Coastal Law Enforcement Councils won in the Top Ten National Galing Pook Awards in 2003. The councils are multisectoral, composed of key agencies and groups involved in law enforcement in Bohol. They were a spin-off of the Bohol Coastal Law Enforcement Summit in 2000, which pulled together all agencies and persons involved in law enforcement to identify why coastal law enforcement in the province was so weak. The councils, divided by congressional districts, assist in implementing coastal law enforcement across the province through a multi-agency team and fully equipped patrol boats funded by the province. The efforts of the multi-agency teams have led to the conviction of over 350 illegal fishing infringements since 2001 (Table 23).

Table 23. Results of enforcement activities of Coastal Law Enforcement Councils (BEMO), 2000-2003 (UPV 2003).

Year/District	No. of Apprehensions	No. of Persons Arrested	No. of Cases Filed
2000	214	462	131
2001	312	1,073	202
2002	346	887	200
2002			
CLEC I	84	247	51
CLEC II	213	491	102
CLEC III	49	149	47
2003 (Jan-Aug)	143	348	93

Mabata Bay Initiative, Negros Oriental

Manjuyod, Bais City and Tanjay Bay management system evolved in early 2000 due to a need for a more integrated management of Bais Bay. Although initial activities were unsustained, there have been recent moves to re-establish the alliance and look at a more integrated management for Negros Oriental's productive bay.

Other Organizations Assisting in Coastal and Fisheries Management

The Local Government Code encourages LGUs to involve NGOs (Sections 34-36). NGOs, POs and civic groups have significant roles in Central Visayas' coastal and fisheries management. The government recognizes the roles of NGOs and POs in catalyzing development in rural areas, particularly in securing people participation in the decisionmaking process and in amplifying the community's role in environment protection. Table 24 shows some of the NGOs working in coastal and fisheries management in the region and includes a variety of projects such as the Siquijor Coastal Resource Enhancement Project in Siquijor and the Local Governance for Coastal Resource Management Project (LGCRMP) in Southern Cebu as well as others. Many are working on their own activities, but there is great room for collaboration among them and with LGUs and to go beyond the typical community-based coastal management.

Academic institutions that help in implementing research on coastal and fisheries management abound in Central Visayas. These include Central Visayas State College of Agriculture, Forestry and Technology (CVSCAFT), Silliman University Center of Excellence in Coastal Resource Management, Negros Oriental State University, Siquijor State College and Research Foundation, University of San Carlos, University of the Philippines (UP) in Visayas, UP Foundation, UP Coastal Environment Information System as well as special projects being handled by UP-Marine Science Institute.

Table 24. NGOs working in coastal and fisheries management in the region.

Regionwide	Bohol	Cebu	Negros Oriental	Siquijor
Philippine Partnership for the Development of Human Resources in the Rural Area	Bohol Alliance of NGOs	Tambuyog Development Center	St. Catherine's Foundation	Rtn. Martin "Ting" Matiao Foundation, Inc.
United Nations Development Project-Small Grants Fund	Bohol Integrated Development Foundation	Reef Check	Rtn. Martin "Ting" Matiao Foundation, Inc.	St. Catherine's Foundation
Ramon Aboitiz Foundation Inc.	Project Seahorse Philippines		World Wildlife Fund Tañon Strait Initiative	
Coastal Conservation and Education Foundation, Inc.	Haribon Foundation			
Visayas Central Fund	Participatory Research, Organization of Communities and Education Towards Struggle for Self-Reliance – Bohol			
Marine Aquarium Council				
Environmental Legal Assistance Center, Inc.	Feed the Children Philippines			

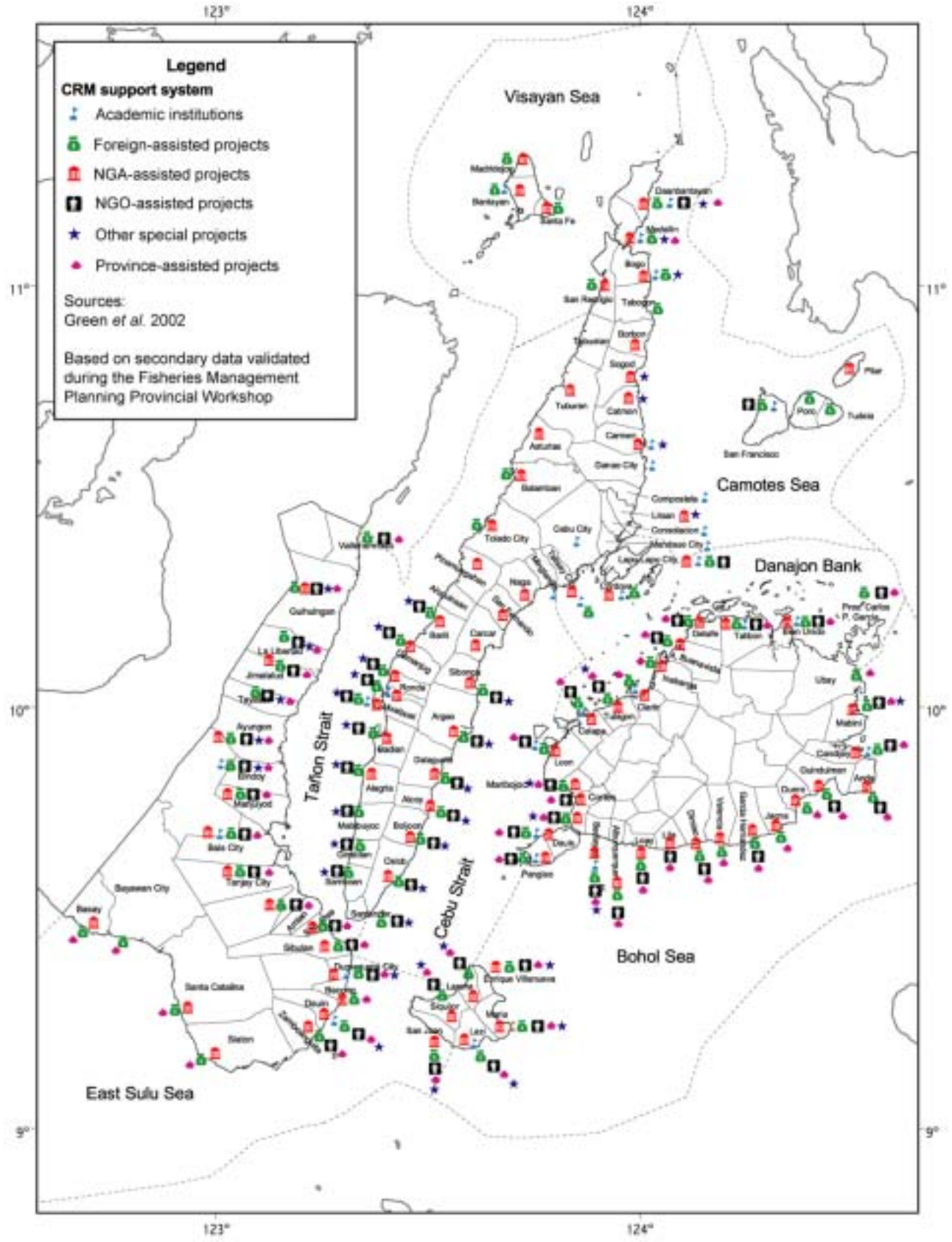


Figure 65. CRM support structure in Central Visayas.

Summary

The results discussed in this chapter as well as the various institutions and agencies working in the region are summarized in Figure 65.

- The policy framework and national government thrusts on coastal and fisheries development have changed considerably over the last two decades, moving away from "increasing production" to management and protection. However, there are still considerable overlaps in policy environment between AFMA and the Fisheries Code as well as legacies from previous thrusts that must be dealt with while moving forward.
- There are many agencies and organizations involved in coastal management in the region. The chapter identifies 7 special projects, 9 NGAs, 7 alliances, 22 NGOs and 9 academic institutions currently involved in coastal and fisheries management in the region. Each of these has a key focus and a perspective to share, which can be greatly enhanced through more formal alliances of these different organizations. These groups need to clarify one another's role and to ensure that those groups working in the area will not overlap their activities. They need to work together by providing different perspectives and sharing resources on common coastal agenda and activities.
- In Central Visayas, assistance providers in coastal and fisheries management are not evenly distributed around the region. Northern Cebu and until recently Siquijor and certain parts of Negros Oriental have on the whole been overlooked by assistance providers. In contrast, Bohol has many assisting organizations, whose functions overlap.
- The role of academic institutions in coastal and fisheries management should be strengthened. More research on integration of results into management will be helpful. More tie-ups among academe, NGOs and NGAs are also vital.
- Based on initial calculations, special projects and national government and nongovernment funding in the region on coastal and fisheries management are in excess of PhP300 million (US$6 million) per year. If evenly distributed around the region, this would amount to around PhP3 million per coastal LGU.
- There are more than enough innovative management and collaboration mechanisms in the region. However, the key to success is to institutionalize them into the government systems to ensure their sustainability.
- There is poor collaboration among NGOs, special projects, academe and alliances with the private sector of the region. This should be improved to assist the region's development.

Chapter 7
Mainstreaming and Institutionalizing Coastal and Fisheries Management within the Local Government

Introduction

This section focuses on the local government units (LGUs), at the municipal and provincial levels, and analyzes how far coastal and fisheries management has been adopted at these levels within the region.

The Local Government Code (LGC) of 1991 recognizes the municipality/city as the key manager of coastal waters from the shoreline to 15 km and mandates it to be the key provider of services, extension and technical assistance, protection, regulation, revenue generation, enforcement, local legislation and knowledge of conduct of relations (between government units and among people's organizations and nongovernment organizations). In line with this, there is already a prescribed set of benchmarks which can be used to assess the LGU's status in providing coastal management as a basic service. The following section maps out the current state of LGUs offering these services in Central Visayas.

Coastal and fisheries management should follow a basic planning cycle, integrating lessons from each phase of the cycle into the next (Figure 66). Within each planning cycle, there are also a series of tools/benchmarks which can be achieved. These benchmarks are considered the minimum that an LGU should implement if it adopts coastal and fisheries management as a basic service.

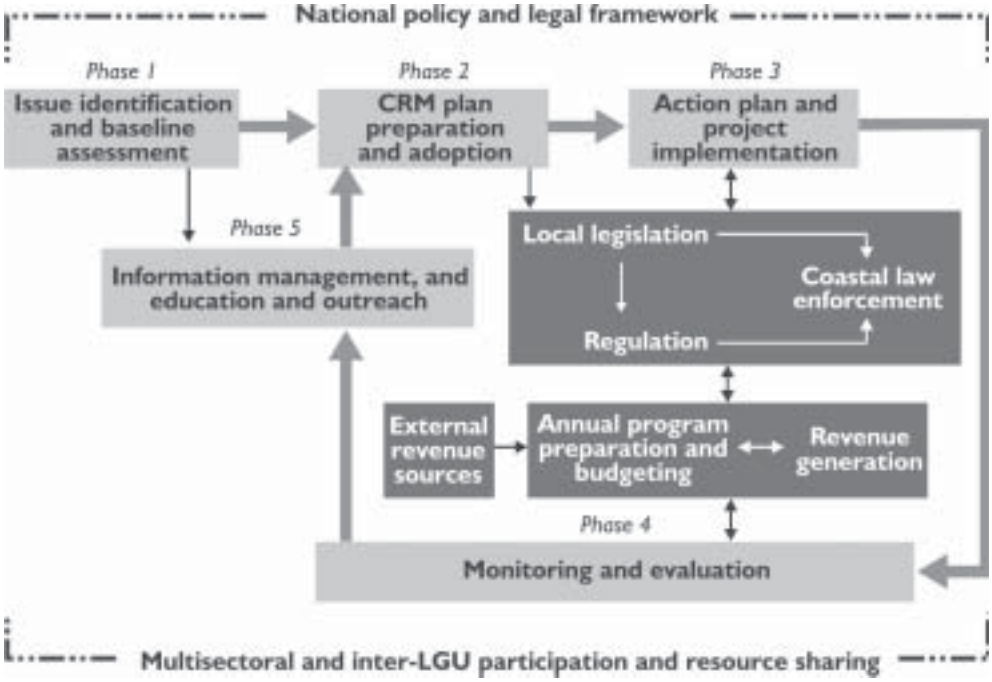


Figure 66. Philippine CRM planning process (adapted from DENR 2001).

To institutionalize the benchmarks for making CRM as a basic service at the LGU level, Regions 7 and 11 tested a CRM certification process at the provincial and regional levels (Figure 67).

Benchmarking of LGUs in Central Visayas

The section below shows how far the 109 coastal LGUs have gone in implementing 11 key benchmarks, as of 2003. The information came

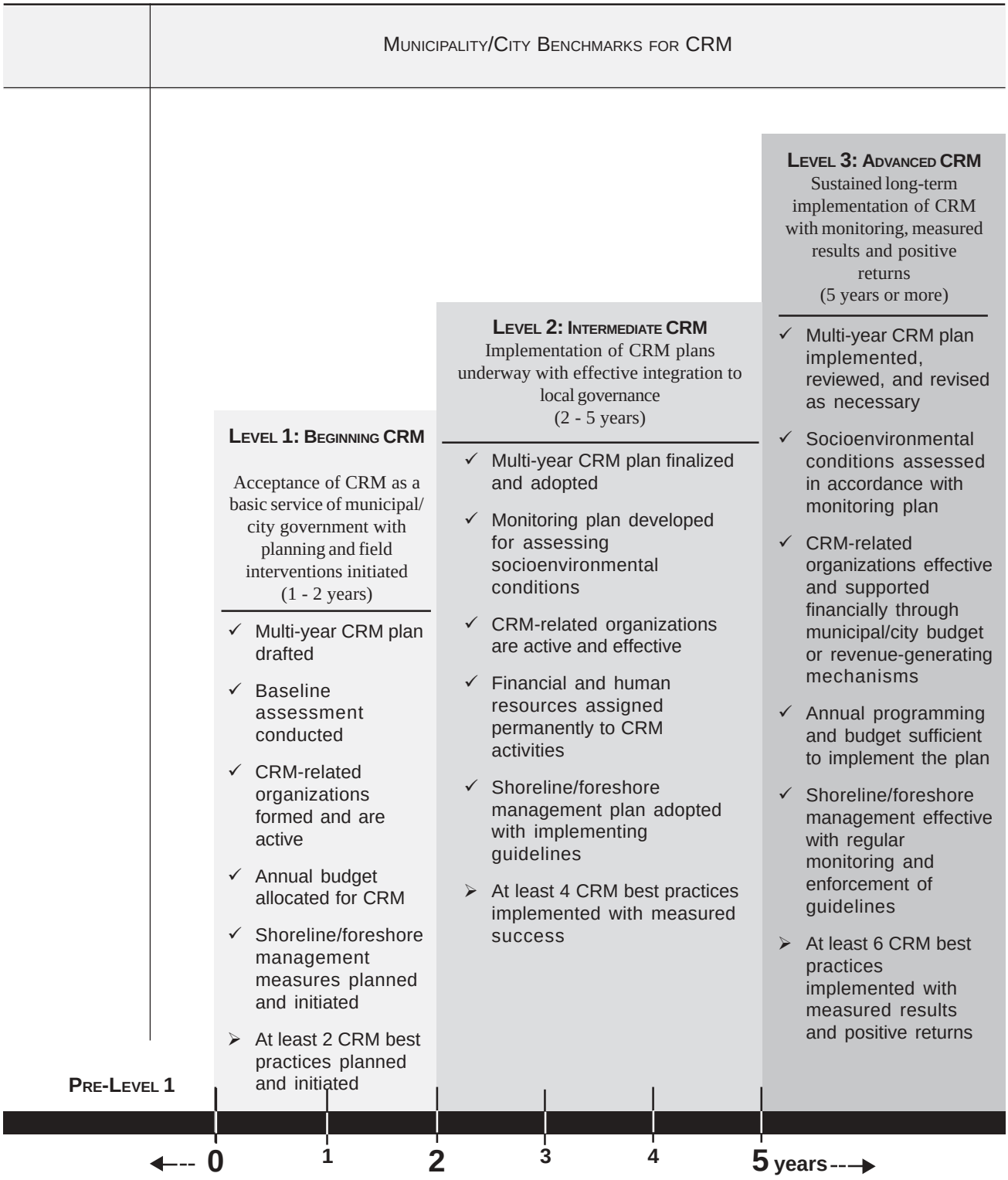


Figure 67. Municipality/city benchmarks for the three levels of CRM.

from various sources and was validated during the Fisheries Management Planning Provincial Workshops.

1. Completion of the participatory coastal resource assessment of the municipalities' resources – This assessment profiles the different habitats and fisheries resources in an area and identifies the key issues, leading directly into the coastal management planning process (Figure 68).

2. Allocation of an annual municipal budget for coastal management - A coastal LGU requires a minimum budget to implement the coastal management initiatives as planned (Figure 69).

3. Adoption by the LGU of the five-year, approved coastal management plan - An essential component of any coastal and fisheries management program is a clear plan and direction; the functions and responsibilities of all agencies and offices should also be clearly defined, preferably prepared in a participatory manner (Figure 70).

4. Approval of the comprehensive coastal and fisheries legislation – The LGU should lay down its comprehensive coastal and fisheries management laws in its own legislation / code but should be consistent with national laws and policies (Figure 71).

5. Delineation of the municipal waters – The LGU should have clear boundaries of where its jurisdiction exists. This is finalized through the delineation process, as laid out in the Department of Agriculture Administrative Order 1, Series of 2004 (Figure 72).

6. Putting the multistakeholder management council in place – This council might be the Fisheries and Aquatic Resources Management Council (FARMC) or another multistakeholder management structure which is essential in helping plan and implement coastal initiatives in the LGU (Figure 73).

7. Allocation of human and financial resources for coastal law enforcement activities - A coastal law enforcement unit will enable the laws and policies declared by the municipality to be implemented. This is vital to successful coastal and fisheries management (Figure 74).

8. Establishment of well-managed MPAs – MPAs established in Central Visayas (including sites under the NIPAS law) are a simple, easily replicable and manageable tool wherein communities and LGUs can see fast fish biomass buildup, rehabilitation of coral reefs and achievement of various coastal management objectives (Figure 75).

9. Initiation of mangrove management interventions, such as reforestation / rehabilitation activities and / or putting in place a community-based forestry management agreement within the municipality – Mangroves are an important habitat which, if better managed and protected, can help ensure increased fisheries production and fishers' livelihoods (Figure 76).

10. Auditing of the LGU and granting it a CRM certification – A CRM certification is an optional system whereby LGUs can submit full documentation and assessment of their coastal management projects to regional and provincial Technical Working Groups for assessment and possible endorsement and "certification" that they have indeed reached a series of benchmarks and levels (1, 2 and 3) in institutionalizing coastal and fisheries management (Figure 77).

11. Packaging of the best and wise practices in coastal management and showcasing them for educational and mainstream tourism - Visits to well-packaged and high-quality coastal management interventions provide a strong impetus for replication and sharing of experience in other parts of the country and outside. The interventions need considerable assistance initially to establish the area as a showcase (Figure 78).

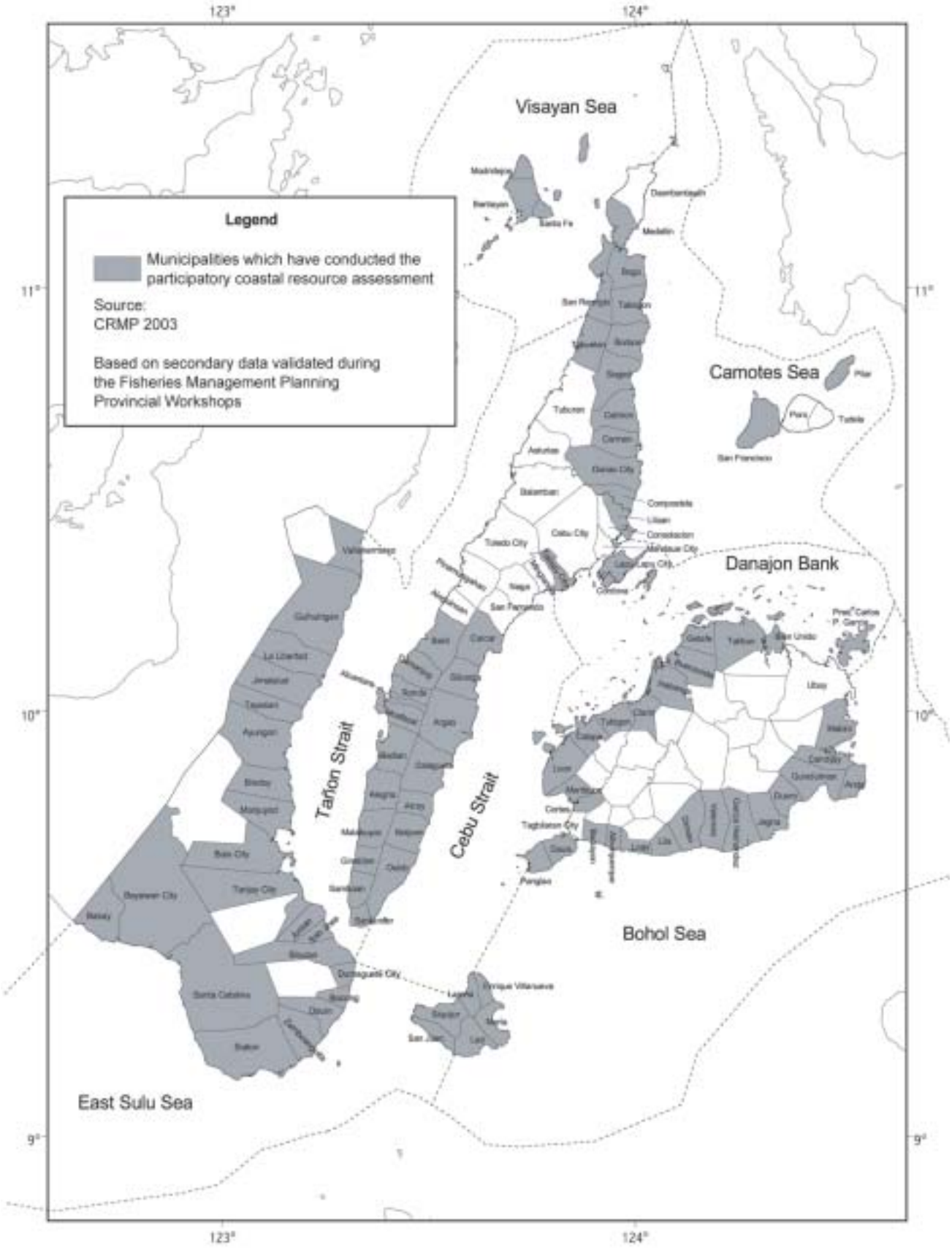


Figure 68. LGUs that have completed their PCRA.

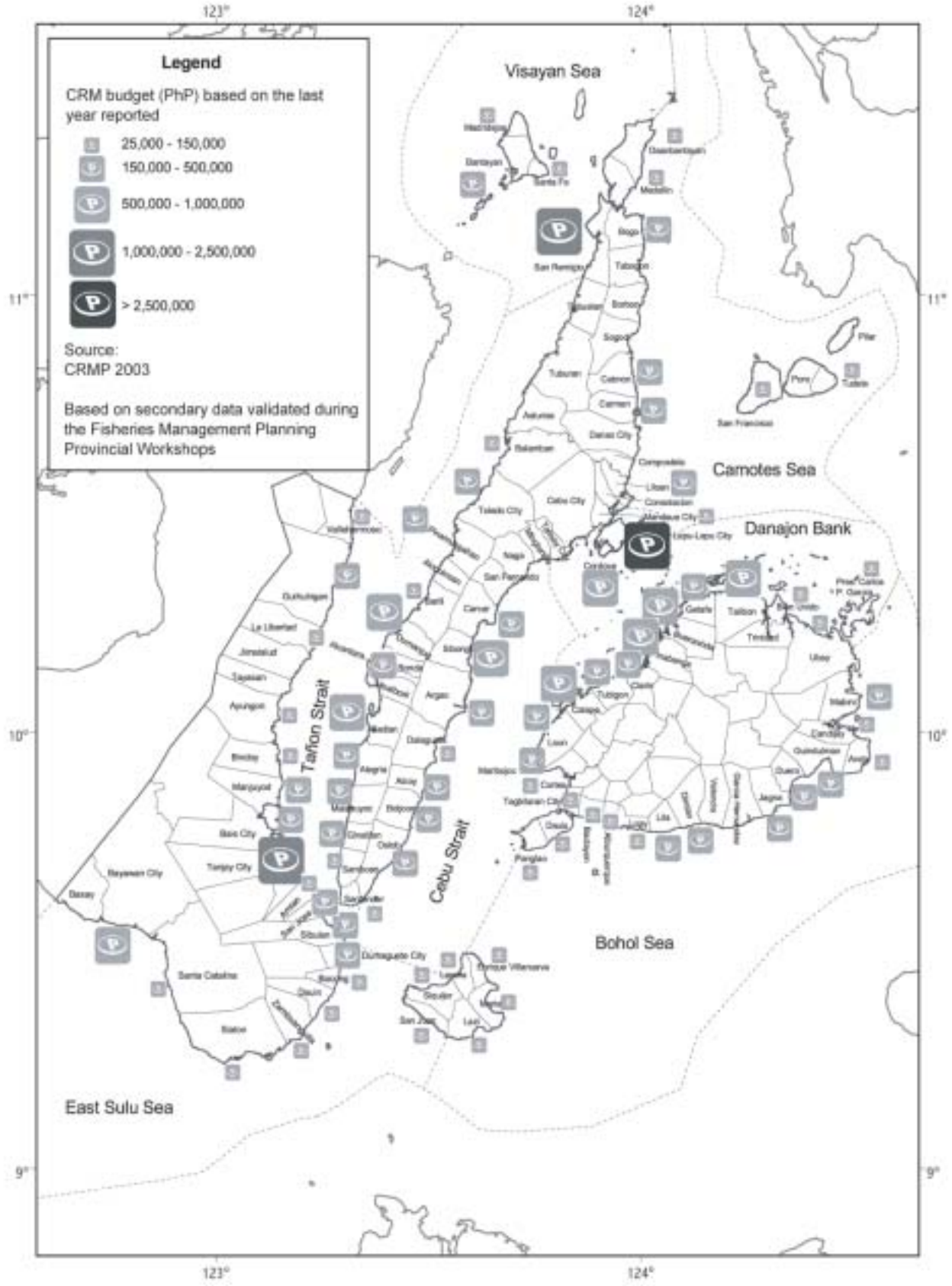


Figure 69. Relative allocation of LGU budget for coastal management.

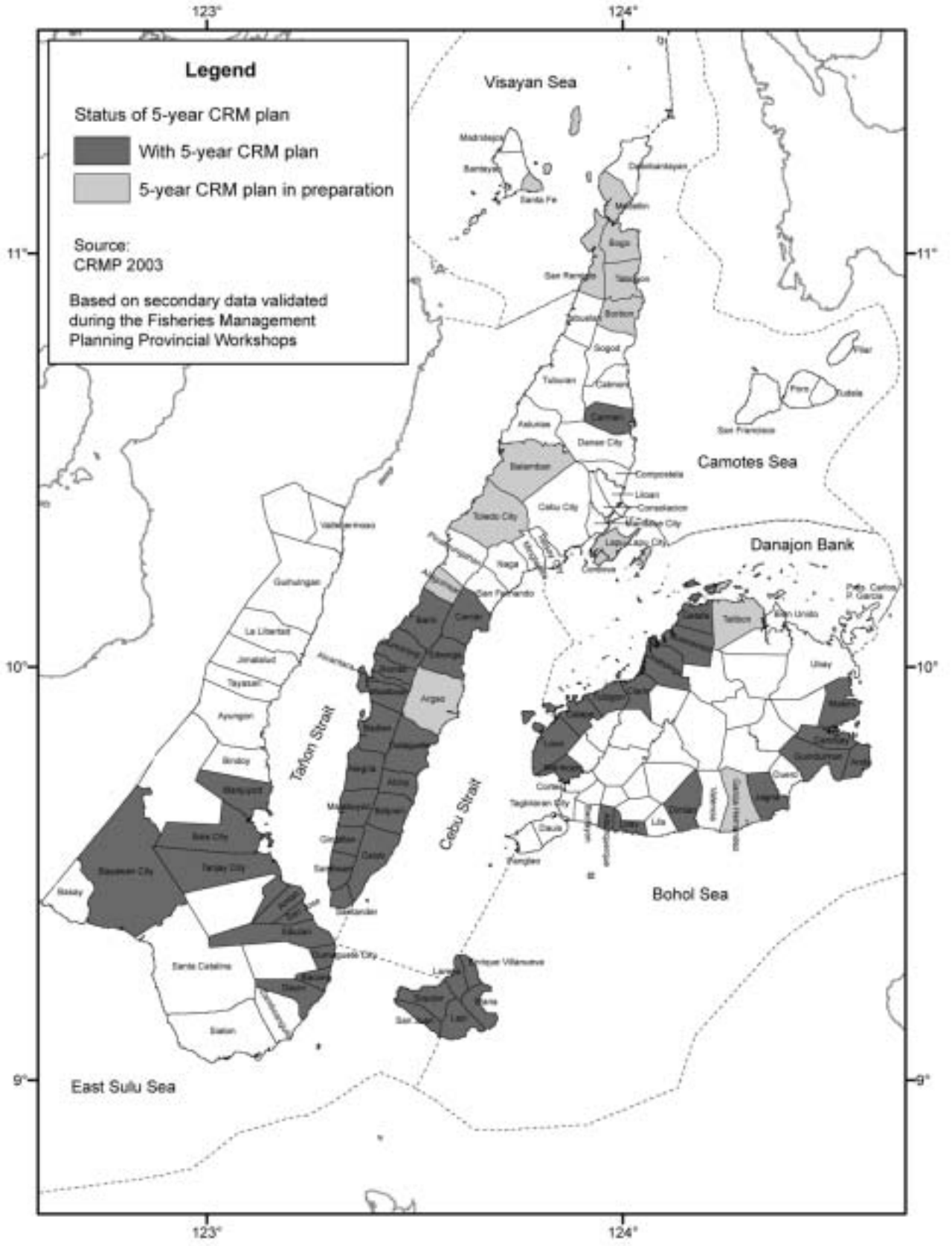


Figure 70. LGUs that have adopted a five-year coastal management plan.

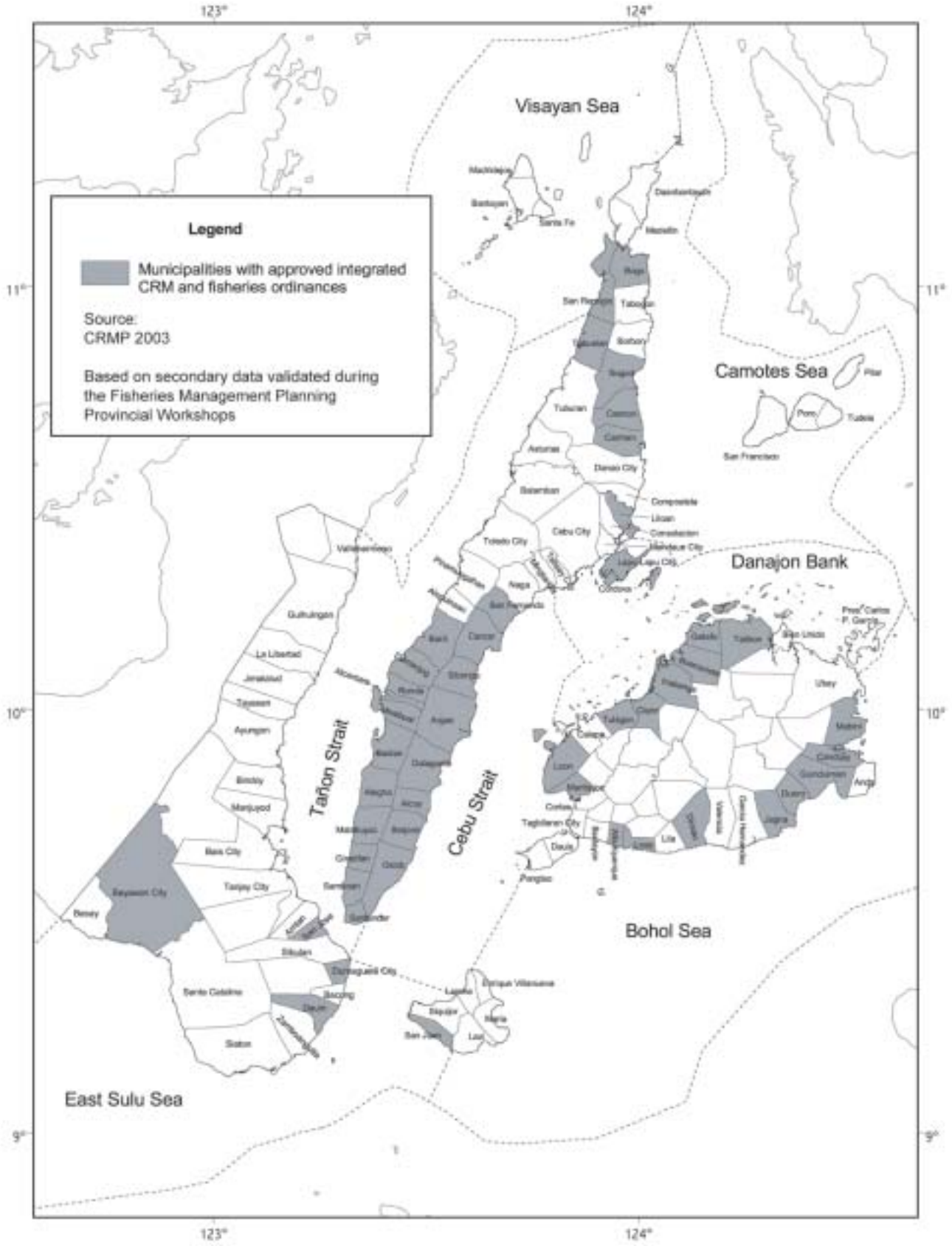


Figure 71. LGUs that have approved comprehensive coastal and fisheries legislation.

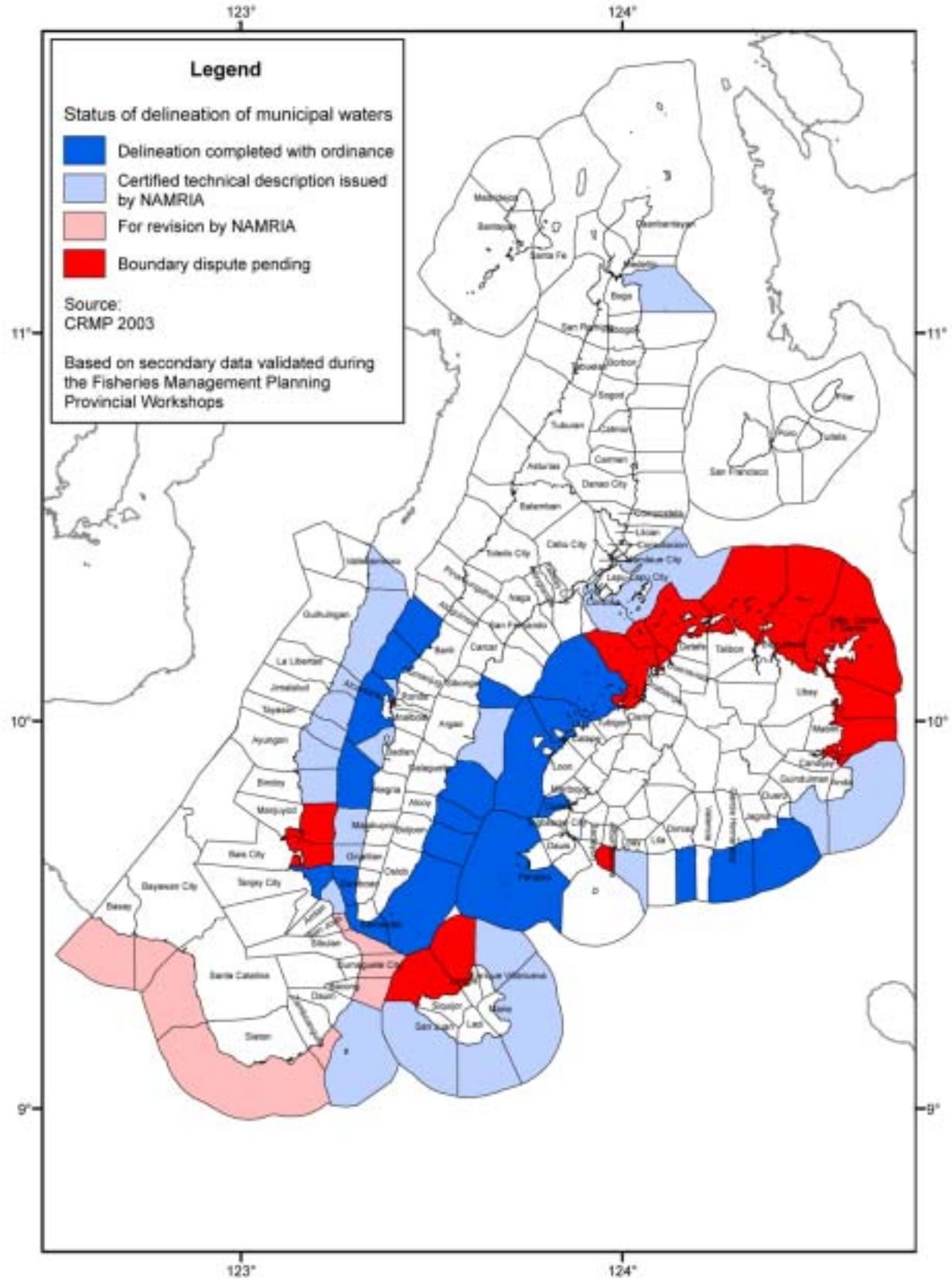


Figure 72. LGUs which have finalized the delineation of their municipal waters.

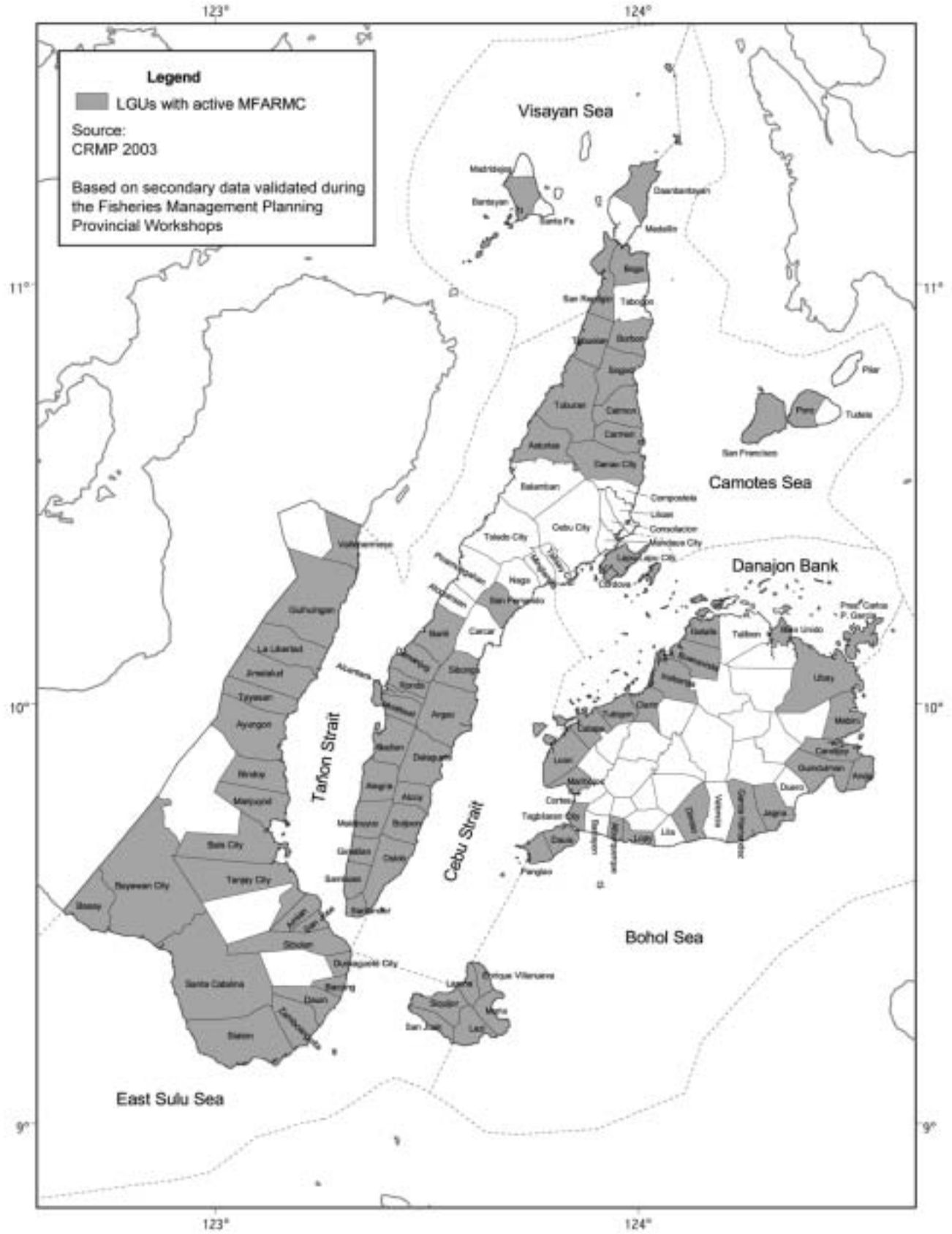


Figure 73. LGUs with an active multistakeholder management council in place (i.e., FARMC, PAMB, etc.).

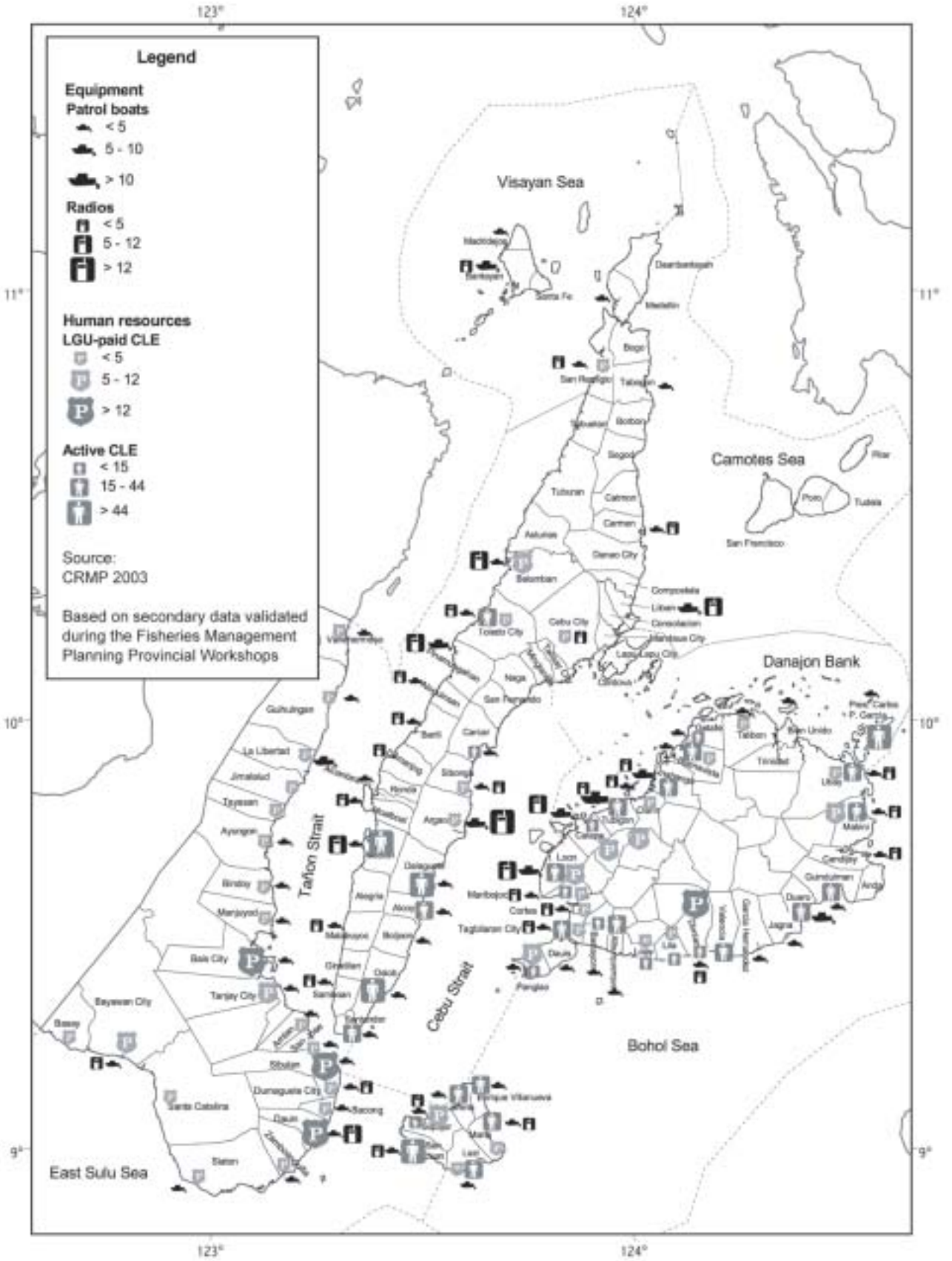


Figure 74. LGUs with human and financial resources allocated for coastal law enforcement (CLE).

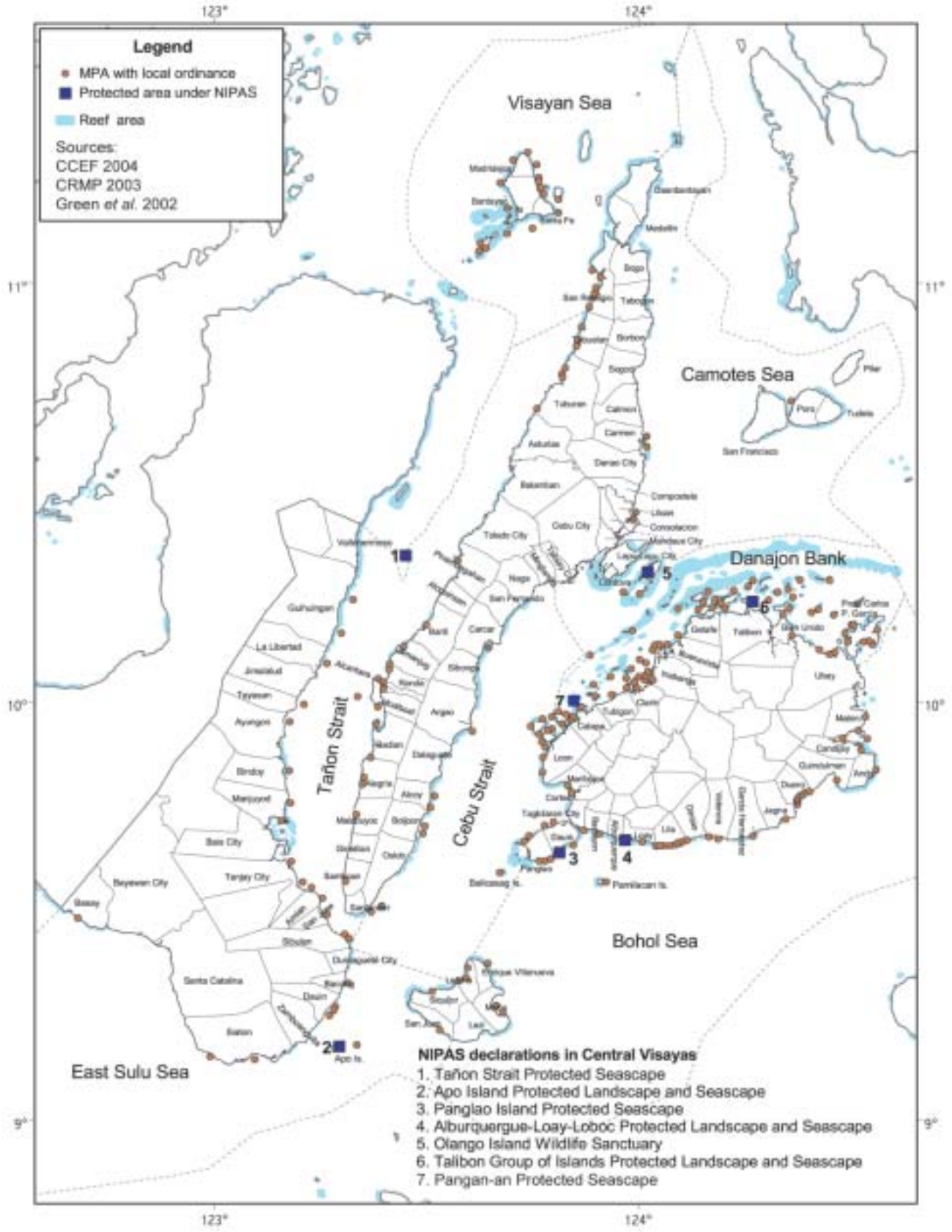


Figure 75. Legally declared municipal MPAs and NIPAS areas in Central Visayas.

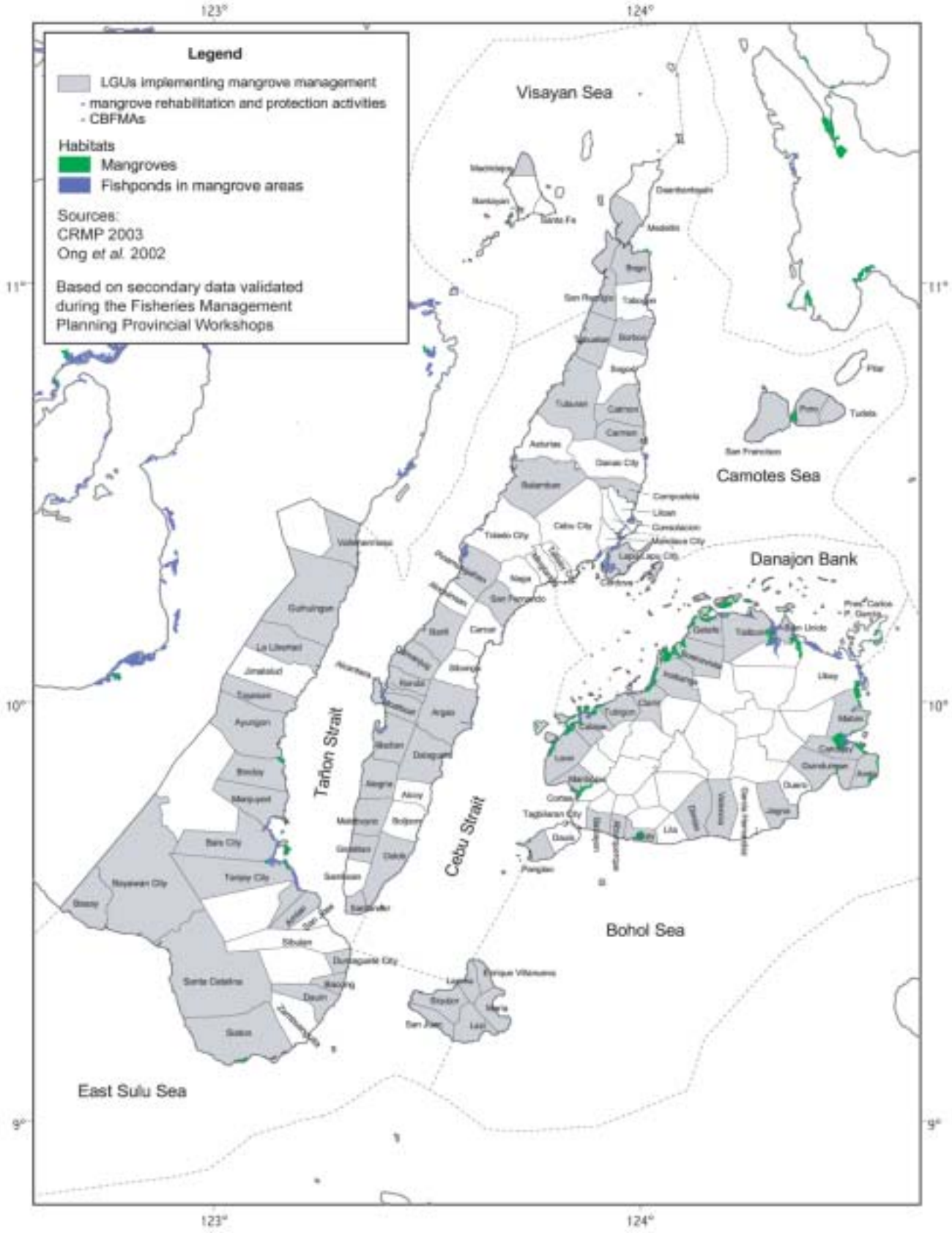


Figure 76. LGUs implementing some form of mangrove management in Central Visayas.

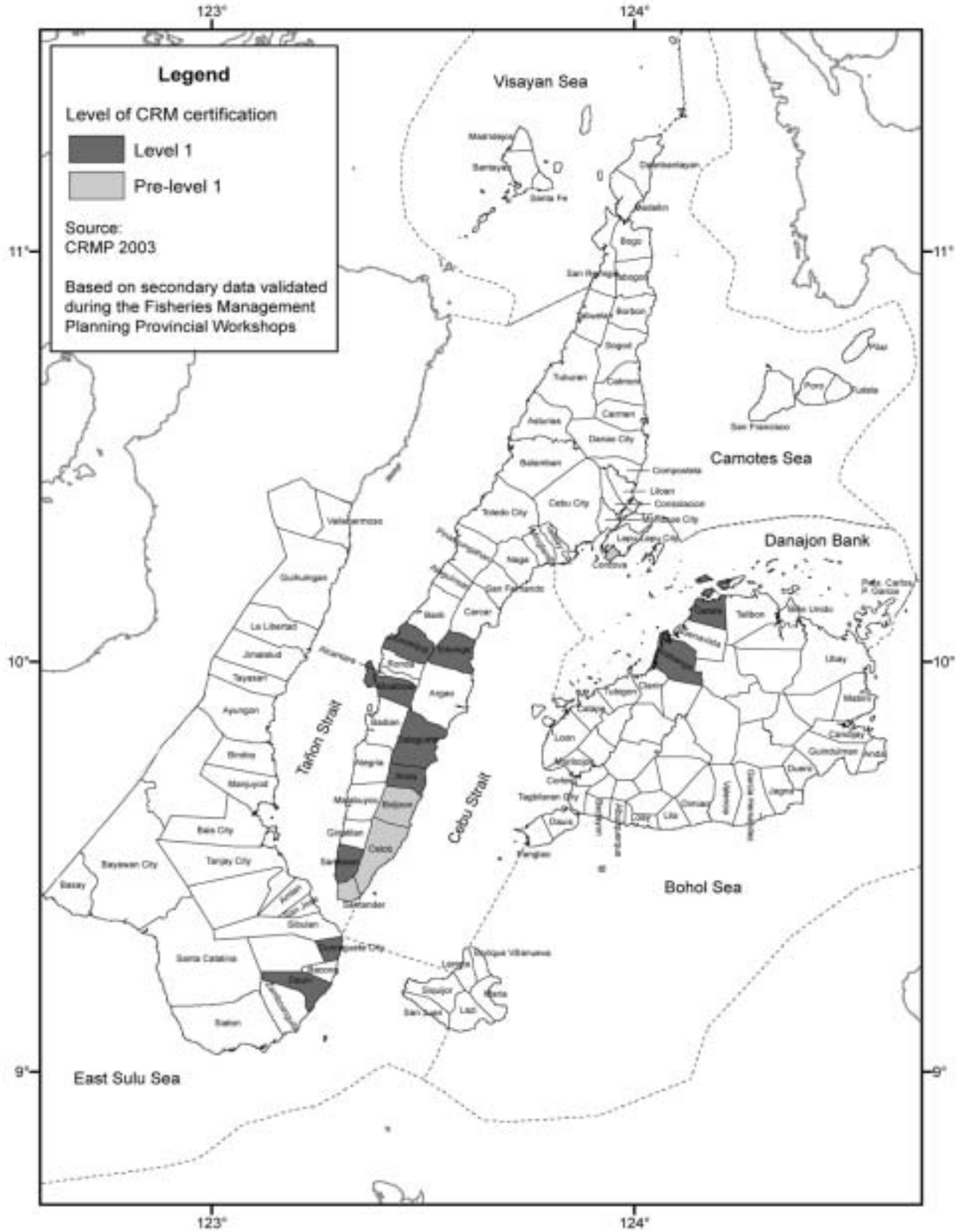


Figure 77. LGUs with CRM certification at various stages.

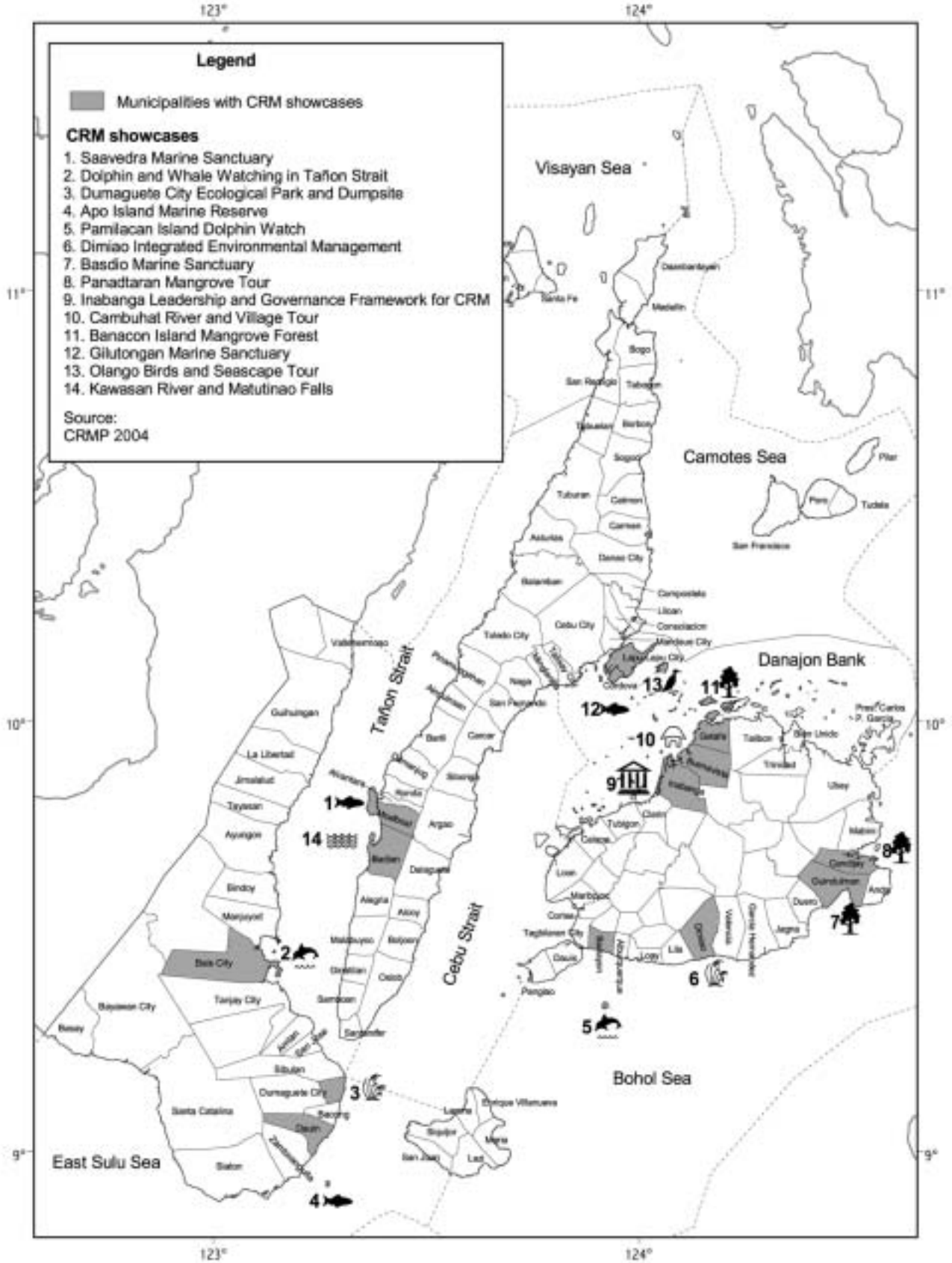


Figure 78. LGUs with packaged CRM best practices for showcasing and educational tourism (see Appendix 2).

Figures 68 to 78 (maps) indicate that there is indeed a strong momentum in coastal management in the region. Since 1991, through the LGC of 1991 and reiterated in Republic Act 8550, LGUs have been given the responsibility to manage their municipal waters. This policy shift supports localized management. It made integrated coastal management a lot easier to implement. With little technical assistance or budget, the LGUs of Central Visayas have, on the whole, done an excellent job of taking on mandates and protecting their nearshore habitats and implementing coastal management (Figure 79).

The problem, however, is that approximately 85% of the fish caught in the region are pelagic-dwelling species (i.e., living and moving around on a larger geographic scale than municipal waters), as discussed in chapter 4. The fish are unaware of geopolitical boundaries overlaid on top of their juvenile, feeding and spawning grounds. This means that in the current situation, the "regional waters" are divided into 109 smaller management units (LGUs), with different levels of management interventions. This is now the key problem for the region's fisheries, an uncoordinated and a non-uniform implementation of coastal and fisheries management in the region. This leads us to the role of the provincial governments in coastal and fisheries management.

The following section reviews provincial mandates and analyzes the situation of the four provinces in Central Visayas. Their function as a technical assistance provider to coordinate coastal and fisheries management across the LGUs is higlighted.

A marine sanctuary signboard in Basdio, Guindulman, Bohol. The sanctuary is part of the CRM showcase in Central Visayas.

Logistics and patrol boats, such as above, are essential for coastal law enforcement.

The Evolving Role of Provincial Governments in Coastal and Fisheries Management

In terms of coastal and fisheries management, the provincial government has a much better "bird's eye view" of the province than municipalities have. Based on the LGC of 1991, the provincial government has the following roles and responsibilities (Table 25). Despite being an optional provision in the LGC of 1991, a key first step towards institutionalizing coastal management within a province is the establishment of a Provincial Environment Management Office which can assist in offering technical assistance to LGUs and other stakeholders in coastal and fisheries management, as well as other environmental management sectors.

Table 25. Roles and responsibilities of the provincial government.

Legislation (Sangguniang Panlalawigan)
- Approve ordinances that shall ensure efficient and effective delivery of basic services and facilities, as provided for under Section 17 of the Local Government Code
- Adopt measures and safeguards against pollution and for the preservation of the natural ecosystem in the province
- Review ordinances enacted by the municipal/city government
Regulation
- Issue permits to extract sand, gravel and other quarry resources
Enforcement/Technical Assistance
- Provide agricultural extension and onsite research services and facilities which include transfer of appropriate technology
- Organize farmers' and fishers' cooperatives and other collective organizations
Protection/Conservation
- Adopt measures to preserve the natural ecosystem in the province and to safeguard against pollution
Enforcement
- Protect the environment and impose appropriate penalties for the following acts which endanger the environment: dynamite fishing and activities which result in pollution, acceleration of eutrophication of rivers and lakes and ecological imbalance
- Prescribe a criminal penalty in accordance with the provisions of the Fisheries Code Implement laws against smuggling of natural resource products and of endangered species of fauna and flora

In Central Visayas, the Environment and Natural Resources Division was created as early as 1993 under the Office of the Governor of Negros Oriental and the Bohol Environment Management Office (BEMO), in 1997. More recently, Executive Order 2003-OF-018 of the Siquijor Provincial Government created the Siquijor Integrated Coastal Management Council, as well as different task forces in implementing the Siquijor Coastal Resource Enhancement (SCORE) Project and providing funds thereof.

Cebu, with the most number of coastal municipalities, largest provincial budget and most fishers in the region, still needs to define its role in coastal management. Cebu has no separate office offering coastal and fisheries management.

The provincial offices offer technical assistance, training and capacity-building to LGUs and key stakeholders in coastal and fisheries management. Table 26 summarizes some of the key indicators that can be used to assess the level of institutionalization of a provincial government in coastal management. These only serve as guide and others may still be added to the list, depending on the priorities of the provincial government and its stakeholders.

Well-trained law enforcers, such as these members of the Fish Wardens' Association of Samboan, Cebu, are essential for coastal management.

Placing permanent buoys around MPAs in the region is an important part of the MPA establishment process. Saavedra, Moalboal, Cebu.

Table 26. Mandates and progress of the four provincial governments in coastal and fisheries management.

Phase 1: Institutionalizing the mandates at the provincial level (1-3 years)

Key Best Practices	Bohol	Cebu	Negros Oriental	Siquijor
Provincial environment code lays out role in integrated coastal and fisheries management (ICFM).	√	x	x	x
Provincial committee under the SP focuses on coastal management issues and problems.	√	x	x	x
Provincial office (provincial agriculturist or provincial planning), has full-time ICFM staff.	√	√	√	√
Provincial ICFM framework is established for implementing CRM with clear benchmarks.	√	√	√	x
Provincial budget for ICFM.	√	√	√	√
Provincial technical working group for ICFM implementers is established.	√	√	√	√

Phase 2: Provincial government program development (3-5 years)

Key Best Practices	Bohol	Cebu	Negros Oriental	Siquijor
Provincial information management system for ICFM.	√	x	√	x
Active provincial coastal law enforcement team.	√	x	x*	x
Provincial resource assessment team trained and active.	x	x	√	x
Five-year masterplan for ICFM finalized.	x	x	x	x
Environmental management office focused on ICFM, equipped with human and financial resources.	√	x	√	x
Provincial fisheries profile, consolidating key provincial data published.	√	x	√	√
Provincial training team that offers standardized training packages to LGUs requesting technical assistance in ICFM.	√	√	√	x

* Not deemed as necessary by the Negros Oriental provincial government staff during consultations.

Phase 3. Integrated program development (5 years and beyond)

Key Best Practices	Bohol	Cebu	Negros Oriental	Siquijor
Inter-LGU management is encouraged through coastal law enforcement and fisheries management councils.	√	x	x	x
Fisheries ecosystem boundaries are delineated.	x	x	x	x
Province-wide color coding system for fisheries licensing is established and integrated into a regional system which identifies boats from all four provinces of Region 7.	x	x	x	x
Model showcases of good ICFM practices established in the province.	√	√	√	x
Interprovincial ICFM is encouraged.	x	x	x	x
Other environmental management sectors are included in provincial environmental management office – i.e., waste management, watershed management, water resources.	√	x	√	x
LGUs incorporate user-fee systems into already established ICFM projects, i.e., MPAs.	x	√	√	x

For a broader fisheries ecosystem management within the region, it is essential for the provincial governments to adopt responsibilities and to oversee the wider resource management under their jurisdictions. This will ensure that all coastal LGUs implement coastal and fisheries management in a consistent manner. Most municipal and provincial governments in Central Visayas are ahead of other regions of the country. However, this may be because, compared with those in other regions, the fisheries here are more degraded and the impetus for management is stronger.

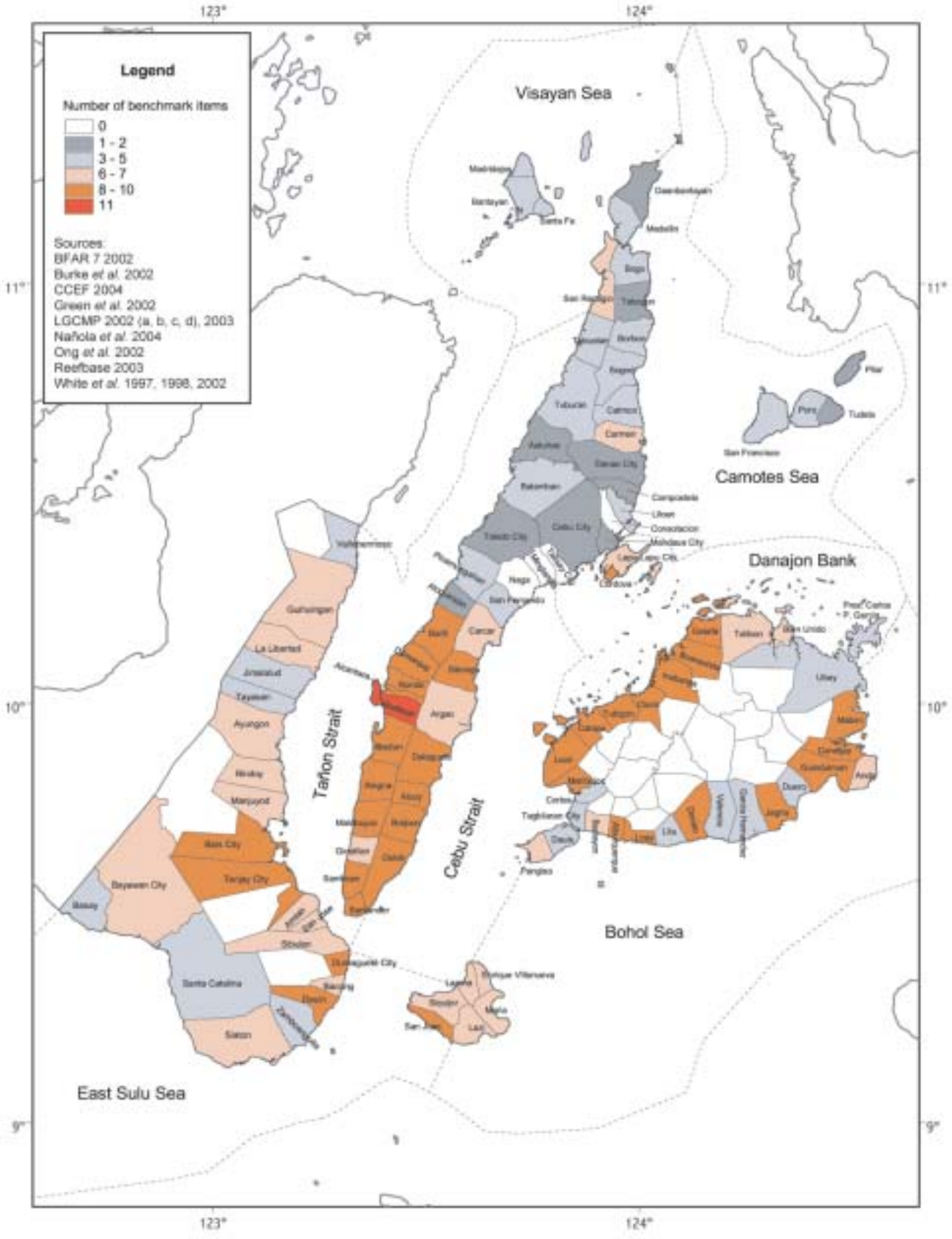


Figure 79. LGU and its corresponding number of CRM benchmarks achieved in the region.

Summary

- Coastal and fisheries management is basically a planning process with a series of benchmarks which can be used to guide the initial activities.
- Since the implementation of the LGC of 1991, LGUs have done a remarkable job of moving towards coastal and fisheries management, with only limited technical and financial resources to implement their mandate. Although there is still considerable work to be done, most LGUs are achieving important benchmarks.
- The municipal waters and the current legal framework break up the waters of Central Visayas into a series of individual units. Initially, this will help with the management as each LGU takes responsibility for its municipal waters. It, however, misses some of the larger fisheries ecosystem issues. There is a need for more integrated management among the units, and the provincial governments are in the best position to assist with this.
- All LGUs must practice good coastal management in the region before wider management can be implemented. In this regard, the provincial government and the northern municipalities of Cebu are still lagging behind the rest of the region.
- To institutionalize coastal and fisheries management, the provincial government must establish a provincial coastal environment office. This has already been done in three provinces.
- Fish managed in the municipal waters then move into "national waters," i.e., beyond municipal waters. These can be totally harvested if no restrictions or management is in place. This is the case of Central Visayas, where there is little or no coordination of management between the municipal waters and the national waters. This explains why despite many interventions and investment in the region for coastal management, the larger fisheries issues remain unresolved.
- A key first step in moving towards a wider area management is through the provincial government's assistance and coordination of more inter-LGU agreements. Provincial efforts must also interface with national agency mandates, particularly those of DENR and DA-BFAR.

Chapter 8
The Private Sector - The Missing Link?

The State of the Commercial Fishing Industry in Central Visayas

This chapter views the role of the private sector in coastal and fisheries management – initially the commercial fishers and then the fast-growing tourism industry in the region. A unique private sector–driven initiative of the Marine Aquarium Council, that could set the trend for future coastal and fisheries management interventions, is discussed.

A typical municipal water scene with three commercial fishing boats harvesting illegally within 3 km of the coastline in Baclayon, Bohol.

The commercial fishers catch approximately 58% by volume (BFAR 7 2002) of fish within Central Visayas fishing grounds although some of this may be caught from outside the region's waters. Given that they only have access to around 33% of the region's waters (i.e., those outside municipal waters), the large volume of catch from this sector can only be explained by the fact that their catch is being caught from the municipal waters. Although two LGUs in the region have allowed limited commercial entry from 10.1 to 15 km in their waters, this does not explain the large portion of catch going to the commercial sector. Commercial fishers also maintain that municipal waters are also their historic fishing grounds, and since the 1940s, they have been traditionally fishing within municipal waters.

As stocks have declined significantly over the last decade, the response from both commercial and municipal fishing sectors has been to upgrade their fishing gears and technology to catch a larger proportion of the diminishing catch. The national government further encouraged and assisted the commercial fishers to upgrade their capacity and even offered incentives through laws such as the Agriculture and Fisheries Modernization Act although only limited budgets were released and used. The upgrading was meant to assist the industry to operate within the Philippines' exclusive economic zone, but for many reasons, the commercial fleet continued fishing in the region, increasing pressure on already overfished stocks.

Historically, there has been little conflict between commercial and municipal fishers as fisheries resources were still abundant. In the last two decades, however, there have been significant changes in number of fishers, fishing boat size and the technologies used to catch fish (sonars, *payao,* etc.). There are no restrictions on new technologies for the commercial sector and these can be added to the vessel at any time under current policies. New technologies have not added

"production or catch" in the region as the fisheries are already in decline. The new technologies, however, increase the proportion of catch of the individual boat while minimizing the catch for the rest of the fishers in the fishing ground.

Table 27. Comparison of commercial and municipal fisheries in the region.

	Commercial fisheries	Municipal fisheries
Number directly employed	5,000	126,000
% of catch (volume)	58	42
Number of boats	500	65,000

The commercial fishers maintain that the law (Republic Acts 7160 and 8550) should not deny entry to commercial fishing within municipal waters. However, while the sectors argue over who should get access to the remaining resources, the stocks continue to decrease and technologies and fishing effort increase. In fact, the ringnetters are currently in their own "technology war" with the industry now being split into boats with sonars and those without. This is not healthy for the industry and will just lead to further price increases for consumers with no further rise in catch. As one boat buys a new technology, others will follow, until all the commercial fishers have upgraded at considerable cost. After all the expenses, the boats will still only be catching the same amount of fish!

The commercial industry is very "efficient" in comparison to municipal fishers. It employs only 5,000 people, compared to 125,000 full-time municipal fishers (Table 27), in a region with over 10% unemployment. The Philippine commercial industry development is intended for the Philippine EEZ and not municipal waters. Unfortunately, the commercial boats find it difficult to fish beyond the municipal waters of the region. With minimal municipal waters enforcement, this will continue. Given the current situation, the commercial industry will develop further, leaving less room for municipal fishers. With fewer people employed in the commercial industry, this will impact on employment opportunities in the region. Such fishing increases unemployment among municipal fishers.

Despite appearing to be a healthy and economically viable industry, the commercial industry is not without its problems. It is fragmented and has had its own financial problems. It has moved from a healthy industry with over nine types of different commercial fishing gears spread among many different individuals in the 1960s-1970s to the present situation where only three fishing gears dominate the industry (and these are, on the whole, owned and managed by only a few individuals in the region). The remaining boats now look beyond the region for places to fish, as far as General Santos and Zamboanga, due to the poor state of resources in the region. BFAR oceanic studies have also found the Pacific Seaboard to have potential for effort expansion. The problem however, is that most commercial boats in the region are not designed or capable of long offshore fishing trips.

The Policy Environment – a Disincentive to Management

Given that the commercial sector is catching 58% of the catch, it is now the most important sector to work with to gain more sustainable fisheries in the region. The sector must be involved in fisheries management for this to be successful. However, the national and local policy environment does not offer any benefit or incentive for the commercial fishers to initiate management of their fisheries. There is no mechanism for "preferential access or use" of the local commercial fishing boats to waters within the region, unlike municipal waters which give preferential access to municipal fishers with active local government units (LGUs) that are mandated to manage and protect their waters.

Commercial fishers – in a de facto open access system

The commercial fisheries and national waters, unlike municipal waters, are in a de facto

"open access" unmanaged system. The industry will not be sustainable if management interventions are not made, but in the present policy environment, any management interventions are a disincentive to those who initiate the management.

Commercial fishing vessel license fees are alarmingly low, ranging from PhP1,000 to 3,000 per year, a miniscule amount of 0.0012% of the total value of fish caught by commercial fishers (Green *et al*. 2003), although FAO 198 has modestly increased the fees. This is much lower than the amount paid in other countries and is not reflective of the "resource rent" of the fishery (i.e., a percentage of how much profit is made for the resource). The resource is, after all, a national resource open to all Filipinos. Even some municipal fishery outfits pay more for small fishing boats and their access to municipal waters (e.g., Tubigon, Bohol). This must be rectified, with the revenues from the license fee being fed back into the commercial industry for its management activities.

There are also no restrictions followed on the building and purchase of new fishing boats in the region. In theory, a commercial operator should first apply for a permit to build with the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR), but this is not followed or enforced. Anyone wishing to purchase a boat and to become a commercial fisher may do so with very few limits to access. This unlimited system is the reason why the region's fisheries are in the state that they are. There are restrictions on where commercial fishing boats may fish but enforcement is left up to the LGUs, although they do have to inform DA-BFAR if they move home port for any period under the commercial fishing vessel license. This means that at certain times of the year, vessels coming from other regions of the country move in to fish the waters within Central Visayas, when stocks are plentiful and there is no limit to the number of vessels which may do this. Vessels from the region likewise may also move to other regions.

Within the current lacking management regime, any fish – whether young, old, cheap or expensive – is harvested as long as it is in volume. Once a large quantity of fish is found, all the commercial fishers from around the region move in and extract them. This is successively depleting the region's fish stocks and explains why species composition in the region has changed from high-class to lower-class fishes (see Chapter 4). To add to the problems, commercial boats from as far away as Navotas in the north and Cagayan de Oro in the south come to fish in the calm Central Visayan waters from March to June to the detriment of the catch of the locally based commercial fishers.

Under the present situation, any boat can move anywhere. As soon as one fish stock is depleted, the fishers move onto another fishing ground. The problem is that the country as a whole is running out of fishing grounds and the fisheries of Central Visayas mirror the poor fisheries situation in the rest of the country.

While LGUs are initiating limited access regimes and licensing systems to restrict access to their waters, the commercial fishers continue building and purchasing new boats and technologies. Thus, they make their fishing activities more efficient, affecting pelagic resources in the region (which move in and out of municipal waters). Overlapping policies among LGUs, Maritime Industry Authority, DA-BFAR and Philippine Coast Guard make the registration of commercial vessels unclear. Initial dialogues have begun to look into this registration issue.

Furthermore, 85% of the region's fish catch are pelagic species, which have both offshore and coastal parts of their life cycles. This means that even though LGUs are managing their municipal waters, the fish within them are moving in and out of the area. So even if management is strong within municipal waters, the fishes eventually move out to deeper sea where they enter other LGU waters or areas outside of LGU jurisdiction. For effective management of the fisheries ecosystems in the region, both municipal and commercial fishers need close coordination through DA-BFAR and LGUs.

Research conducted by the WorldFish Center in 1998-2001 and reinforced by the information in this profile found that, overall,

"the level of fishing in the already grossly modified stock in the Philippines is 30% higher than it should be" (i.e., fish are being harvested at a level 30% more than they are capable of producing). This excess fishing is resulting in economic losses conservatively estimated at about PhP6.25 billion (US$125 million) per year in lost catch for the whole country (ICLARM 2001). Given that Central Visayas catches 7.5% of the country's marine fishes, the losses in the region will amount to somewhere in the order of US$10 million (PhP550 million) every year – a lot of money to be wasted.

Overfishing was recognized by the national government in the early 1990s – "subsidized acquisition by the industrialized sector of a fleet capacity about three times in excess of what was required to harvest the present marine catches of 1.9 million t per year (BFAR 1994)". Initial steps have been taken to resolve this, such as Republic Act 8550, but there is still considerable room for improvement of its implementation.

In simple economic terms, if restrictions and management were put in place, fewer fishing boats and less financial investment could catch more fish as well as ensure the sustainability of the stocks at the same time! The region's commercial fleet is fast becoming an expensive and overcapitalized fleet.

A recent move by the government in solving the problems of overfishing was the issuance of Fisheries Administrative Order (FAO) 223 in December 2003 that provides guidelines on temporarily suspending the issuance of new commercial fishing vessel and gear license (CFVGL) as part of precautionary approach to fisheries management.

Registration of all commercial fishing vessels, whether licensed or unlicensed, was conducted in 2004 by BFAR Regional Offices. This created an inventory of these fishing fleets and generated a computerized CFVG licensing system to help maintain the present level of fishing effort in Philippine waters.

Another relevant fisheries law issued was Fisheries Administrative Order 222 which bans operation of Danish seine (*hulbot-hulbot*) and modified Danish seine in municipal waters, bays and fisheries management areas. Operation of Danish seine and modified Danish seine, however, is allowed in waters beyond 15 km from the shoreline of any municipality provided that it does not use tom weights and any method / accessories that destroy fisheries habitats. With not much fish left to catch, it is becoming an unsustainable and unprofitable industry to be in.

There is, however, considerable potential for the industry to better maximize and sustain fish stocks through management interventions. The Visayas Alliance of Fisherfolks and Operators for Reform is now working with DA-BFAR to research the country's first private sector-led closed season in Camotes Sea. The alliance will voluntarily enforce a ban on the catching of certain species during their spawning season. This should be lauded as a first for BFAR 7 and the commercial sector. Despite various coastal management initiatives in the region, there are no projects, programs or institutions (except for DA-BFAR and the Philippine Fisheries Development Authority) assisting the commercial fishers with fisheries management. This is a huge gap in the region as well as an opportunity. More inclusion of commercial fishers is essential for the region's fisheries management.

A possible win-win?

The Fisheries Code offers several options on how the industry can improve management. For instance, municipal governments may pass ordinances to allow for commercial fishing within 10.1 - 15 km area, as long as the area is delineated and the Municipal Fisheries and Aquatic Resources Management Council, through consultation, allows this. With the passing of such ordinances, LGUs could allow a regulated level of effort (a limited number of boats based only on sound data) to fish within this area, by giving preferential access to locally based commercial fishing boats and allowing some of the income generated from license fees to be used for enforcing the licensed operators. This could then be a win-win situation for all concerned. It also recognizes that in reality the commercial fishers are fishing there anyway and perhaps it

The Gilutongan Marine Sanctuary project director collecting diver fees (tickets)in the marine sanctuary.

Signboard educating divers on the key rules of the marine sanctuary. Nalusuan Island, Cordova, Cebu.

is time to legalize this common intrusion into municipal waters.

In this way, the commercial fishers would have a stake and an incentive to better manage parts of the region's fisheries ecosystem. That could perhaps springboard them into other management interventions, such as closed seasons and limitations on the technologies used in the region. Such an improvement could lead to a more economically viable and sustainable commercial fishing industry in the region. It will also ensure the fish security in and supply of protein to Central Visayas for future generations.

As municipal governments have a "municipal first" policy, perhaps it is time to explore a "provincial first" and "regional first" policy for commercial fishers, allowing access for them to the 10.1-15 km waters within the province where they are based first and then possibly for the whole regional waters later on. But this means a total overhaul of the current system. The industry should be the one to initiate communication with the national government, and for fisheries management to thrive, this step will be essential.

Other Private Sector Initiatives in Central Visayas

The role of the tourism sector

Another fast-growing economic sector dependent on the state of coastal resources in the region is tourism. Many resorts and hotels in Central Visayas depend on the income of visitors who come to snorkel and dive on the coral reefs of the region. With Central Visayas having the second highest arrivals in the country, the region's dive operations and resorts are beginning to assist in enhancing the resources within their resorts ultimately achieving customer satisfaction.

Municipal and city governments in coordination with fishers, barangay officials, resorts and divers are now beginning to co-finance and co-manage coastal management initiatives such as marine protected areas. Good models of these in the region are the Nalusuan and Gilutongan marine sanctuaries in Cordova, Cebu.

After only three years of operation, Gilutongan's income from their 12-ha marine protected area, through snorkeling and diver fees, was in excess of almost PhP2 million (US$35,000) in 2003. This sets a good model for replication in the region and ensures that the costs of management can easily be offset by the revenues and that marine protected areas can attain economic sustainability if located near tourism centers. In other provinces of the region, the diving industry is getting involved in coastal management activities, and there is still considerable room for more partnerships between and among the private sector, LGUs and communities.

Marine aquarium trade

The Central Visayas was one of the world's first exporters of marine aquarium fishes. Although identified as an unsustainable industry and associated with cyanide and destructive collection techniques, there have been recent moves to clean up the industry initially by the International Marinelife Alliance. More recently, the Marine Aquarium Council (MAC) is working on a system to establish certified marine aquarium collection organisms through certified groups of collectors. The clear incentive for the collection of the organisms is paid through a premium offered by suppliers of these organisms for a cyanide-free and nondestructive collection system which the group of fishers guarantee and enforce. The fishers in the meantime establish a collection area management plan that guides the management of key spots around the area. The first certified collection area in the world was established in Batasan Island, Tubigon, Bohol. This was quickly followed by sites in Tangaran, Clarin, Bohol and in several sites in Camotes, Cebu.

Fishers collecting aquarium fishes. Olango Island, Cebu.

MAC's third-party, independent certification system satisfies the need for a mechanism that helps identify best practices, verify collectors and companies that comply with these practices, and label the resulting products so that consumers can choose and reward responsible operators and sustainable products. Hence, this creates a private sector incentive that encourages and requires collectors to shift to nondestructive practices. All sides get a favorable deal with better collected organisms and happier collectors, suppliers (less overheads for mortalities in transit) and end-consumers.

The marine ornamental collection areas now certified were verified to have sufficiently complied with all the requirements of MAC's ecosystem and fishery management standards. These include the:

- development and implementation of a Collection Area Management Plan;
- definition of collection area boundaries and jurisdiction;
- delineation and management of a marine sanctuary or protected zone;
- strong commitment and demonstrated political will to stop all forms of destructive fishing;
- application of adaptive management and mitigation approaches, such as those related to no-take zones, unsuitable species and catch limits; and
- periodic assessment and monitoring of coral reef health and fish stocks.

There are 27 certified collectors in Batasan Island, Tubigon, and 31 in Tangaran, Clarin, who are committed to a new business model that prefers low-volume, high-value and healthy live animals over high-volume, low-quality and low-priced commodity. These certified collectors were verified to be using best practices such as:

- using only nondestructive methods;
- showing proficiency and utilizing safe diving techniques for collection;
- keeping catch logbook and collecting only what has been ordered;

- maintaining equipment in good condition; and
- employing post-harvest handling techniques that maintain the optimal health of the organisms.

MAC's pioneering work in Bohol has proved that when done responsibly, harvesting marine ornamentals can be sustainable and can support livelihoods in rural coastal villages that otherwise have very few options for generating income. This valuable lesson has inspired international funding institutions to commit funds for the replication of the MAC program in several dozen sites all over the country. In Camotes Island, communities have shown interest in certification. Four other municipalities in Negros Oriental are also on the list of collection areas with strong certification potential.

Summary

- Commercial fisheries are now the last key stakeholder which needs to adopt coastal and fisheries management in the region. The proposed closed season in Camotes Sea is a huge step forward and DA-BFAR and the sector should be encouraged to implement it and expand further.
- There is a need to rethink the commercial fishing licensing system and with FAO 223, it is hoped that further reduction in effort programs can be initiated.
- There is a need for further initiatives to work with the private sector in the region and future programs and projects should consider them as an essential stakeholder.
- Management of the region's fish stocks is not so much about conservation, but more about producing a level playing field for both municipal and commercial fishers, while ensuring that both remain profitable and sustainable industries. Management interventions will have short-term political and economic implications for some sectors, but in the long-term the economic and social benefits will far outweigh the short-term costs.
- The chapter concludes with other private sector initiatives – one in marine tourism and another, the MAC system, which is tying in an economic incentive for sustainable marine aquarium collection techniques within the market. This may set a new trend for the industry as a whole, with the customer paying a premium for higher-quality organisms which may encourage other collectors to move towards sustainable techniques, offering great potential for quick replication within the industry.

Chapter 9
Fisheries Trends and Management Framework in Central Visayas

Introduction

Each fisheries ecosystem of the region has different features, stakeholders and characteristics. These nuances should be understood before the best management system could be put in place. There are, however, general trends common to all of the region's fisheries ecosystems, and these are presented in this chapter. The chapter ends with a proposed framework for how the management of coastal and fisheries resources can be improved in Central Visayas.

Key Trends Common to the Region's Fisheries Ecosystems

Overfishing

The total catch of marine fish in the region's waters peaked in 1991 and has steadily declined since then, clearly illustrating that the fish stocks have reached and gone beyond their sustainable fishing limits. Despite peaking in 1991, the municipal and commercial fishers have continued to intensify their "fishing effort" in the form of new and larger gears, boats and technologies. This has led to the current situation wherein the region's fisheries ecosystems all show signs of overfishing.

The contributors to overfishing are both municipal and commercial fishers, and gears ranging from passive (i.e., *bunsod* using fine-meshed nets and closely spaced together) to active (ringnets) are equally to blame. In recent years, there has been a trend in the region towards the construction of larger, municipal-based fishing vessels (most registered as being below 3 GT, but are commonly over 3 GT) using semi-commercial fishing gears. This fleet has adapted in response to the continued operation of commercial fishers in municipal waters and declining fish catch. Most of these gears use fine-meshed nets and have been claimed to target only the smaller growing fish, such as anchovies, but these fish are present only seasonally during the year. During the rest of the year, the fine-meshed nets are used to catch juveniles of all common commercial fish.

Some ways to make the fisheries more productive include reduction of fishing effort, enhancement of resources with the use of marine protected areas (MPAs), effective coastal law enforcement and application of step-by-step management towards a larger fisheries ecosystem management. Despite many coastal management interventions, they are on the whole only localized and scattered around the region. Various types of overfishing have been occurring in the region.

Economic overfishing

There has been a significant increase in fishing effort (i.e., the amount and type of fishing vessels) in the region in both municipal and commercial fishing sectors which has increased the number and size of boats by over 250% since 1991 (BFAR 2003). Despite this significant investment,

their total fish catch has in fact decreased. This means that more money is being spent and invested to catch even less fish than historically. This is termed as economic overfishing.

The key question is who is paying for the extra investment and the overcapitalization of the industry? These costs are ultimately being passed onto the consumers explaining in part why the average price of fish in the region has increased by 1,400% since 1977 (BFAR 2003).

Ecological overfishing

There has been a clear change in composition of the species caught in the region's fisheries ecosystems. Higher level predatory fish have been replaced by lower trophic fish (usually cheaper and of less quality). For example, the main species caught in the Visayan Sea were frigate/bullet tunas (trophic level 4.4) and mackerels until the 1980s. By the late 1980s, tunas had been replaced as the main species caught by the round scads (*budboron)* (trophic level 3.4) which are much lower in the food chain and of less value and quality, but due to their biology and ecology are more resilient to overfishing. This is caused by overexploitation of the tunas, leaving the round scads as the major fish in the ecosystem. This is a common indicator of overfishing and has been documented around the world (Pauly *et al.* 1998).

The higher than historical levels of squid caught around the region are also a telling sign – that there is a lack of natural predators of squid. Therefore, this reinforces the fact that top predator fish have been removed, thus overfishing.

The high incidence of squid in the waters of Central Visayas is a clear sign of overfishing, Pasil fish market, Cebu.

Growth overfishing

In the Visayan Sea, it was found that the average size of Indian mackerel caught has been reduced in size by over 10 cm in only five years. In 1998, its average size was over 30 cm; in 2003, this was just over 20 cm (BFAR 2004).

These examples of overfishing have only been recently documented. Looking back over the last 40 years, it seems that different types of overfishing have been occurring for a long time, and the fisheries ecosystems of the regions have already changed considerably. Fish stocks fluctuate and change from year to year, but the long-term trends noted in this profile show clearly that the majority of the region's demersal and pelagic fisheries have changed for the worst over the last few decades in both quantity and quality of catch.

Likewise in the municipal sector, the double-net and even mosquito nets for fishing have become the norm. These are the only nets that catch anything anymore, suggesting that fish sizes are much smaller. Twenty years ago, there was no need to use fine-meshed nets.

Recruitment overfishing

As can be seen in any market in the region, the sizes and diversity of fish are getting smaller. Thus, the chances that these will breed and spawn are small because fish need to mature before they can breed. In fisheries biology, breeding is often associated with a certain length and weight of the fish. This situation is leaving the region with fish of age and sizes that are immature. Fish are a biologically renewable resource that needs to leave eggs and young for the future. As more juveniles are caught, less fish will be able to reach adulthood and in turn, the next year's generations are getting smaller and smaller.

Typical round haul seine fish catch of juvenile fishes. Clarin, Bohol.

Typical small-scale, municipal fishers fishing off Pescador Island, Moalboal, Cebu.

"No political boundaries"

About 85% of the fish catch of the region are pelagic species, and these move around the region unaware of political and administrative boundaries of the waters that they pass through. This means that the fish are moving in and out of municipal and national waters on a regular basis during their life cycles. Even if fish are well managed in the municipal waters, they will eventually move to other municipal or national waters; if management is weak there, the benefits of any previous management will be lost.

This means that any changes in the municipal or commercial fishing sectors will ultimately affect the majority of the region's stocks. Despite many statements to the opposite, these sectors both impact on each other's catch. Any increase in fishing effort by the commercial fishers directly affects the municipal fishers and vice-versa. Hence, there is an urgent need for both groups of fishers to work together for the management of the region's waters.

Illegal fishing in municipal waters

Commercial fishers have been banned from operating within municipal waters since 1991, despite municipal fishers being given preferential access in the Constitution for as early as 1987. There have also been many national government programs to encourage commercial fishers to move beyond the municipal waters. In spite of these, commercial fishers of the region still fish the majority of their time within municipal waters. The BFAR is currently distributing monitoring, control and surveillance patrol boats to assist in enforcement.

Degraded habitats

Although some habitats are beginning to recover, they are still in a very poor state compared with their historical condition. Mangroves, coral reefs and seagrasses are a glimmer of their former quality in the region. This means that the economic and fisheries-related benefits are severely reduced. There are large tracts of fishponds in the region that lie underutilized and unproductive. These could be reverted to mangrove areas and could then help increase nearshore fisheries production considerably.

Management Implications for the Region

Enforcement of coastal laws

A major problem facing the marine waters of the region is the lack of a good coastal law enforcement system. There are many coastal laws in the country, but their enforcement is poor. While municipal governments are trying to initiate coastal law enforcement, the waters beyond their areas have limited enforcement.

There is a need for management to be initiated in the region's national and municipal waters. Alternative systems for coastal law

Wall mural in Moalboal depicting the gravity of the problem of illegal fishing in Central Visayas.

A marine sanctuary signboard from Siquijor Province.

enforcement need to be examined. The involvement of commercial fishers is a huge opportunity that also needs to be explored. Their boats often have highly advanced equipment to which law enforcers do not have access. Their involvement through a "self-compliance" strategy or other mechanisms will only materialize, however, when they have a desire for and a clearer say in management of the region's fisheries.

Marine protected areas

There are over 220 documented MPAs in the region. Although many of these are small and focus mostly on the coral reef habitats, they contribute significantly to coastal and fisheries management. Coral reefs are an important ecosystem that contribute about 10-15% of the region's fish production but in addition, they make a larger economic contribution through tourism. The deeper waters are less productive per unit of area, but cover over 90% of the region's waters. These waters are the spawning, feeding and juvenile grounds of the pelagic fish which comprise 85% of the catch and thus require protection through MPAs as well.

At present, the well-managed and protected MPAs in the region cover less than 0.001% of the total area of each fisheries ecosystem. The Fisheries Code suggests that a minimum of 15% of a typical ecosystem be declared into an MPA, up to a maximum of 40%. The area covered by MPAs is therefore miniscule compared with the total suggested area of the Fisheries Code. There is a need to declare a much larger area of locally managed and protected MPAs. MPAs that build up pelagic fish biomass need to be considered. These will have to be large though, covering many square kilometers. This strategy may be one of the most equitable and easiest ways to begin fisheries ecosystem management. One large MPA per ecosystem would have positive benefits for all stakeholders.

These larger MPAs will need to cross municipal boundaries and extend out into the national waters of the region to cover the life cycles of key species. The MPAs will facilitate fish biomass buildup and offer insurance for the pelagic stocks as well as indirectly reduce fishing effort. Initially, management systems and law enforcement for these areas will be difficult, but this strategy could be a very effective stepping stone towards fisheries ecosystem management. It will also encourage agreements between local governments and national government agencies to work together on a large scale, which is an essential first step towards management.

Overefficient and destructive fishing gears

The expansion of gears, such as *lawag, basnig, baby licom,* trawl, nets with scaring devices and Danish seine (targeting demersal species) should be phased out quickly from the region's waters. They are too efficient, and destroy the fisheries habitat.

Large purse seine fishing boats commonly ply the waters of Central Visayas but come from other regions.

Even passive municipal fishing gears can cause overfishing, Baclayon, Bohol.

Incentives

The national policy environment provides no incentive or mechanism for commercial fishers to initiate management of their resources. The current policy is a disincentive to management. Commercial fishing operators who voluntarily stop building new boats or who initiate management do so to their own detriment. In the current open access situation, other commercial fishers or boats from other regions will just expand and catch the fish or build new boats if the local fishers do not build them or do not fish first, in the race to catch all the fish.

If the commercial fleet continues increasing in size and number, eventually it will replace the majority of municipal fishers. Commercial fishers must move out of the nearshore fisheries and into the Philippine EEZ. But for this to happen, a combination of disincentives and law enforcement is needed.

This should create an environment more conducive for management and ensure the success of the industry in the region. Such disincentives include an increase in the license fee payment (proportional to the amount of fish caught), much stiffer penalties for illegal activities, a ban on the building of new boats and purchase of new technologies, and the cancellation of commercial fishing vessel license for fishing within municipal waters (as stipulated in the Fisheries Code).

Fisheries licensing and gear standardization

Fishers are very innovative. Adjusting and modifying fishing gears is an art for most of them. Fishing gears are often evolving. If one gear has 100 hooks or is 500 m in length, other fishers will design fishing gears with 150 hooks and 600 m in length. As fish stocks continue to decline, these adaptations will continue as fishers look for ways to catch more fish. Likewise, commercial fishers with fish finders upgrade to sonars, and those with sonars upgrade from wooden-hulled to metal-hulled boats. This practice is called "technology creep." As long as this persists, fishing effort increases and fish catch decreases when stocks are already overexploited.

One possible remedy for technology creep is to standardize and systematize the fishing gears. A good tool for this could be the use of a clear municipal and commercial licensing system for the region, which keeps a gear at its current length, size and investment. Ideally, fishing gears should all be consistent, thereby giving an equal share of fish catch to all fishers within a municipality and/or region. During the process of standardization, inefficient gears which contribute to habitat degradation, overfishing, and unfair or inequitable catch can be identified. Action plans for their gradual phaseout can be initiated.

"Municipal/provincial/regional first" access policy

Given that the supplies of fish are already limited in the region, the key question is who should now have access to the remaining stocks? There is a need to move towards a preferential access system for fisheries entry. Although some groups and agencies are completely opposed to this system, it is a way for local fishers to get ownership over the remaining stocks.

Municipal waters are already declared as preferential access areas for municipal fishers through the Fisheries Code, but there may also be a need to enhance this system to include provincial fishers (i.e., commercial fishers based in the province in question) in the 10.1-15 km waters and regional fishers gaining preferential access to the national waters of the region for both municipal and commercial fishers.

This would secure a limited tenure system and give all the regular resource users a clearer ownership/incentive for management, but would require legislation. The Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) has the legal mandate to make new laws and policies and can have these suggestions laid out in a Fisheries Administrative Order for Central Visayas. A boat color coding system could be used to facilitate this policy. All boats in the region could be color-coded and have their barangay, municipality and province mark them, which is similar to registration of cars.

Ideally, only local fishers should have access to the local resources for the sake of the region's industries. This would work by banning the entry of commercial fishing boats from other regions. This would have to be initiated at the national policy level, and would ensure more incentives for commercial fishers from the region to get involved in management activities. In this type of situation, the commercial fishers should take the initiative to dialogue with the DA-BFAR on the feasibility of such schemes. The negative side would be that in the long term the commercial fishers may be banned from entering other regions.

Regional Trends

A luxury item

Marine capture fisheries have long supplied cheap protein to the region's fast-growing population. However, due to scarcity of resources and high demand, fish is no longer able to meet this purpose. Regional and provincial plans and planning bodies will have to identify better ways to supply protein. Fish is becoming a luxury item and as price increases, it will be more so.

Population

The population is growing at very fast rates, 2.3-2.7% per annum (NSCB 2002). This adds pressure on the remaining resources in the region. A clear and guided reproductive health program is needed for the region since current levels are not sustainable and will totally undermine what fisheries resources remain.

Government assistance

There is no group or organization that is assisting the municipal and commercial fishing sectors towards integration of their management on the ecosystems approach. The national government agencies can adopt the ecosystems approach to management and initiate it in a common management framework. The DA-BFAR in coordination with local groups and the provincial governments, are all in a perfect position to integrate municipal and commercial fishers into a common ecosystem-based framework for management.

Long-term management planning and technical assistance should be a priority of the national government. What is needed are additional funds for technical assistance to municipal and commercial fishers in the management of remaining stocks and in policing interventions.

Alternative livelihood

In the Regional Agenda 21, the agriculture and fisheries sector is analyzed as being "plagued by a myriad of problems, as reflected in the

continued low quality of life of the typical farmer/fisher, access to technical and credit support programs are still wanting." This reflects field experiences that the vast majority of investments are unsuccessful. It may be a lot more cost-effective to spend these quite substantial resources (hundreds of millions of pesos per year in Central Visayas alone) on coastal and fisheries management and law enforcement. The improvement in livelihood of fishers through fisheries management will far outweigh the "benefits" of unsustainable and wasteful "livelihood" projects.

Ecosystems approach to management

As shown above, the management of fisheries under the current system of municipal and national waters is not working well. The ecosystem approach to management that goes beyond administrative boundaries and looks at the larger level of management will be more effective.

Through a series of consultations during the planning process, key stakeholders helped to delineate the region's "natural bodies of water." The delineation was based on several key criteria and forms a compromise of ecosystem boundaries with the geopolitical and administrative boundaries of the region. One of the key outputs of the planning process was to indicatively delineate the key ecosystem boundaries of the marine waters. This delineation led to adoption of seven key fisheries ecosystems for the region (Figure 80).

Although all marine ecosystems link together and are fluid, in an archipelago like the Philippines, these can serve as a good basis for fisheries ecosystem management. Seven key criteria were used for the delineation:

1. geopolitical aspects of the region (municipal boundaries, indicative jurisdiction of the region's waters, etc.);
2. common municipal and commercial fishing gears in use;
3. common fish stocks and other marine organisms;
4. dominant habitats;
5. physical land-water interface;
6. dominant human activities; and
7. "manageability" of the area, i.e., pragmatic features which will make management easier in the long run.

Although fisheries ecosystem management is a long-term goal, it can serve as a guide to the different managers who are implementing local management interventions. The key to implementation of the framework will be to work locally, targeting ecosystem issues, while progressively moving up the management hierarchy – from the local government unit (LGU), to cluster of LGUs, to the province, to the region and to the inter-region.

The Fisheries Management Framework Plan for Central Visayas

Based on consultations during the planning process, a series of key steps were identified that managers could use with corresponding benchmarks for achieving fisheries ecosystem management. The five steps and their objectives follow:

Step 1: Strategic objective: Institutionalize coastal and fisheries management in each municipality and city. Examples of management interventions include: (see Chapter 7)

- adopt multi-year CRM plan;
- conduct a participatory coastal resource assessment;
- form active CRM-related organizations;
- initiate shoreline/foreshore management;
- implement fisheries and coastal management ordinances;
- establish environment-friendly enterprises;
- operate local enforcement units;
- develop functioning marine sanctuaries;
- implement mangrove management; and
- delineate and enforce municipal water boundaries.

Step 2: Strategic objective: Initiate fisheries management within the commercial fishing sector of the region. Examples of management interventions include:

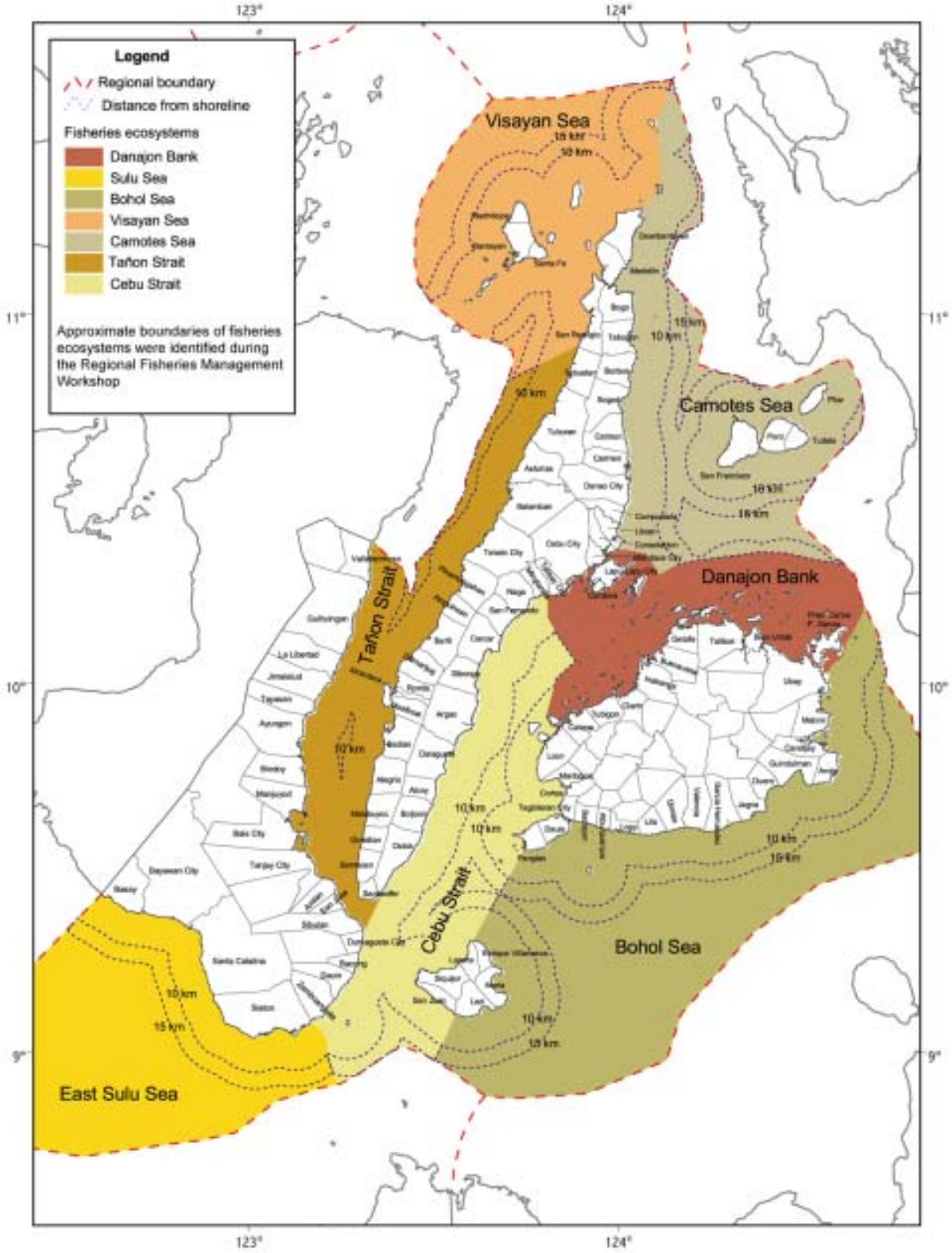


Figure 80. The delineated fishery ecosystems of Central Visayas for management as identified by participants in the regional planning.

- organize and strengthen associations of commercial fishers (i.e., ringnetters, Danish seine operators, etc.);
- collect and consolidate key industry fisheries data;
- identify total catch and total fishing effort per fishing gear per fisheries ecosystem;
- initiate basic research exchange with BFAR Stock Assessment Project and with academic institutions on key biological and ecological characteristics of fisheries, building on the wealth of commercial fishers' indigenous knowledge;
- identify basic fisheries issues by fish aggregation and migration routes for key species in each fisheries ecosystem;
- initiate fishing gear management policies/plans as basis for fisheries management;
- identify areas for possible large MPAs and/or spawning closed seasons; and
- other interventions as may be identified by the commercial sector.

Step 3: Strategic objective: Integrate commercial and municipal sectors in joint fisheries management activities. Examples of management interventions include:

- initiate, by the facilitating agency (provincial government/BFAR), joint consultations and dialogues between commercial and municipal fishing sectors to identify and address common issues and possible solutions;
- conduct coordinated fisheries research on key migration routes of small and large pelagic fish to identify key management areas that cross municipal and commercial fishing waters;
- identify preferential fishing grounds for the region and province-based commercial fishing units;
- municipal governments may decide to allow limited and well-managed commercial fishing within their waters in return for a license fee that can be utilized for coastal management and law enforcement activities; and
- identify effort limits among the different sectors and arrive at agreements on fishing technologies and gears which should be phased out unilaterally.

Step 4: Strategic objective: Initiate, by adjacent LGUs with common fishing grounds, fisheries and issues of intermunicipality fisheries management and agreements through clustering in coordination with local commercial fishers. Examples of management interventions include:

- facilitate meetings/planning activities by the assisting organization/broker;
- coordinate fisheries research on fish spawning areas, migration routes and closed seasons within each cluster of LGUs;
- draft unified ordinances that standardize policy within each of the fisheries ecosystems;
- conduct joint/inter-LGU coastal law enforcement patrolling activities;
- standardize allowed and disallowed fishing gears within each area (not only based on legality, but also on social, economic and equitable access principles) and of the maximum and minimum mesh size, length and width of gears;
- sign inter-LGU agreements on larger-size MPAs which may cut across geopolitical boundaries;
- share preferential access rights between municipalities at the cluster level, with preferential access shared between clusters of LGUs through licensing system; and
- initiate a ban on entry of new commercial and municipal fishing gears within each of the ecosystems.

Step 5: Strategic objective: Begin ecosystem fisheries management in each of the region's fisheries ecosystems. Examples of management interventions include:

- hold fisheries ecosystems summits to identify key priority issues and to draw up a management structure for each fisheries ecosystem;
- identify a regional body/agency that will initiate interprovince, inter-regional and inter-LGU meetings;
- delineate boundaries of fisheries ecosystems;
- agree among commercial and municipal fishers on resource access and levels of fishing effort;

- establish information management system per ecosystem;
- prepare a draft ecosystem masterplan;
- BFAR assists in effort reduction activities within the commercial sector;
- identify fisheries deemed as overfished, for closure or to initiate an MPA;
- identify areas that can be designated as preferential access to regional, provincial and municipal fishers; and
- cooperate among clusters of LGUs and commercial fishers in peer sharing, joint coastal law enforcement and leveraging of resources with national and international counterparts.

Summary and Recommendations

- The development of Central Visayas is intricately tied to marine capture fisheries, which provide protein to and employ a large portion of the population. Regional planning bodies, national government agencies and other organizations should integrate the results of this profiling into their planning activities and focus on better management as their strategy for increasing production in the sector.
- The fisheries of the region are quite degraded and production will continue to decrease unless a more integrated management approach, which includes both the municipal and commercial fisheries sectors, is applied. The region's fisheries situation mirrors that of the rest of the country, if not that of the world.
- Central Visayas can be divided into seven key fisheries management ecosystems wherein management can be better administered.
- A broker or lead facilitator must be identified in Central Visayas to take the lead in the fisheries management activities. The DA-BFAR is in a unique position to be this facilitator to coordinate with the DENR and provincial governments.
- Based on the results of the regional planning process, BFAR 7 could produce a first for the country by developing a medium to long-term fisheries development plan which could set the direction for the region over the next decade.
- There is still hope for fisheries in the region, but there is a need for immediate management interventions, the costs of which will be small in comparison to the social, economic and ecological costs in the future, if no management is adopted.
- A framework for management is presented that can guide the region's fisheries towards a more ecosystem-based management. The framework is merely a guide and can be adjusted to the nuances of the different ecosystems as deemed necessary.
- The fisheries ecosystems identified in this profile spread out well beyond the geopolitical boundaries of Central Visayas. In the long term, management will ideally need to cross the region's boundaries to work with other regions of the country.

Appendix 1
Glossary

Bagnet: A mobile impounding dragnet, locally called *basnig*. This is a conical or cubical net operated with the aid of light on dark nights. A lifting motion effects the capture.

Bottom set gillnet: An entangling net which is locally called *pamante-triple* or *pamante-abay* or by the generic name for gillnet, *pukot*. This net is anchored, weighed down, or attached to the bottom so that it is not free to move with the water current.

Coastline: Outline of the mainland shore touching the sea at mean low tide.

Commercial fishing: Taking or catching of fishery species for trade, business or profit using fishing vessels of 3 GT or above.

Danish seine: This type of seine is basically operated with a tom weight that is used to draw and haul the net, which is a typical extended panel with a cod-end at the center.

Drift gillnet: An entangling net commonly called *pamo*. It is also locally referred to as *pamante*, *patuloy*, *pangtamban* or by the generic gillnet name *pukot*.

Ecosystem overfishing: This occurs when the decline of a once abundant fish stock due to fishing results in an ecological imbalance and leads to eventual changes in the whole fishery ecosystem due to the loss of the abundant fish stock.

Exclusive economic zone (EEZ): An area beyond and adjacent to the territorial sea which shall not extend beyond 200 nautical miles from the baselines as defined under existing laws.

Fine-meshed net: Net with mesh size of less than 3 cm measured between two opposite knots of a full mesh when stretched or as otherwise determined by the appropriate government agency.

Fish aggregating device (*payao/payaw*): A device consisting of a floating structure anchored by a weighted line with suspended materials, such as palm fronds, to attract pelagic and schooling species of fish.

Fish corral: Locally known as *bunsod*, this is a guiding barrier constructed of bamboo and/or nets which are set by means of regularly spaced stakes or posts in tidal waters or along the natural paths of fish into a desired area.

Fish finder: A fishing accessory which detects the presence and aggregation of fish in close vicinity and below the fishing boat, as opposed to a sonar which can detect fish from larger distances.

Fish pen: An artificial enclosure constructed within a body of water for the culture of fish and aquatic resources; made up of bamboo and other poles arranged in an enclosure with fine bamboo materials, screen, or nylon netting to prevent escape of fish.

Fish trap: Locally called *panggal*, this is a set trap or enticing device made of bamboo or rattan which is a regular, usually rectangular, receptacle preventing escape of fish by means of trap doors or tricky passageways. Trapped fish may be collected at regular intervals, in terms of days or weeks.

Fisher: People directly or personally and physically engaged in taking and / or culturing and processing fishery and / or aquatic resources.

Fishery: Targeted effort to catch a species of fish, and the infrastructure that supports it; any activity relating to the act or business of fishing, culturing, preserving, processing, marketing, developing, conserving and managing aquatic resources and fishery areas, including the privilege to fish or take aquatic resources.

Fishing boat/gear license: A permit to operate specific types of fishing boat gear for specific duration in areas beyond municipal waters for demersal or pelagic fishery species.

Gillnet: Variously sized net in which capture of fish is effected by the fish gills becoming entangled by the actual meshes of the net. This is commonly referred to as *pukot, palaran, pamalo, panglambay, panglampornas, pangtamban, pukot-doble, pukot-triple* and *pukot-paapong* (with light).

Gleaning: Collection of organisms, usually during low tide, through the use of hand or simple collection devices; organisms include mollusks, juvenile fish and invertebrates.

Gross tonnage: Includes under deck tonnage, permanently enclosed spaces above the tonnage deck, except for certain exemptions. In broad terms, all the vessel's "closed-in" spaces expressed in volume terms on the basis of 100 ft^3 (= 1 GT).

Growth overfishing: Occurs when fish are caught before they are given the chance to grow to optimum size for harvest.

Jig: This gear is basically made of a molded lead artificial lure, which also serves as a weight and is moved up and down by hand movements or dragged behind moving boats.

Liftnet: Locally called *basnig*, this is a mobile impounding net in which capture is effected by a vertical lifting motion of the gear. It is often used in tandem with lights at night.

Limited access: A fishery policy by which a system of equitable resource use and allocation is established by law through fishery rights granting and licensing procedures.

Longline: An extremely long line with a series of baited hooks, either set or drifting, and requiring only periodic attention at more or less fixed time intervals. Generic local name is *pasol;* other local names are *palangre*, *katay*, *pasol-pambariles, panubid* and *undak.*

Marine protected area: A marine area(s) (including marine and coastal) set aside by law or any other effective means to conserve and protect part or all of the enclosed environment and where management guidelines are established. A generic term referring to all declared areas governed by specific rules or guidelines intended to protect and manage activities within the enclosed area. Such areas include: marine sanctuary, marine reserve, marine park, fishery reserve, fish refuge or other local names. Rules usually prevent any fishing operation to take, catch or kill any marine organism within the designated body of water. Usually declared through a Municipal Ordinance or a Presidential Proclamation or national law in the case of National Integrated Protected Area System sites.

Maximum sustainable yield (MSY): The largest average quantity of harvest from a given fish stock within a period of time that can be sustained under existing conditions.

Migratory species: Any fishery species, which in the course of its life, travels over great distances in waters of the ocean as part of its behavioral adaptation for survival and speciation.

Multiple hook and line: A collective name applied to all handlines with multiple hooks including set or drift longlines. Multiple handlines are composed of a single vertical line with a small series of barbed hooks attached to it by spreaders at regular intervals.

Municipal fishers: Persons directly or indirectly engaged in municipal fishing and other related fishing activities.

Municipal fishing: Fishing vessels of 3 GT or less, or not requiring the use of fishing vessels.

Municipal waters: Waters included between two lines drawn perpendicular to the general coastline from points where the boundary lines of the municipality or city touch the sea at low tide and a third line parallel with the general coastline and 15 km from it. It also includes streams, lakes and tidal waters within the municipality, not being the subject of private ownership and not comprised within the national parks, public forests, timberlands and forest reserves. However, where two municipalities are so situated on the opposite shores that there is less than 15 km of waters between them, the third line shall be equally distant from the opposite shores of the respective municipalities.

Overfishing: Occurs when the quantity of fish harvested causes a net reduction of its population, thereby limiting production from the fish stock for the future.

Purse seine: A form of encircling net having a line at the bottom passing through rings attached to the net, which can be drawn or pursed.

Recruitment overfishing: Occurs when the adult fish population is caught in large quantities, such that reproduction is impaired.

Resource rent: Difference between the value of products produced from harvesting a publicly owned resource less the cost of producing it, where the cost includes the normal return to capital and normal return to labor.

Ringnet: Basic operation of a ringnet involves laying out the net in a circular fashion and then hauling it by closing the net below through a pull rope. The entire net is typically composed of panels that measure 30-60 m vertically and a total of 20 m horizontally up to the extended wings.

Round haul seine: This gear generally consists of a conical liftnet with a 5-7 m length cod-end. A fine-meshed net is usually adapted for the gear.

Scoop net: Also referred to as scoop seine which is basically a small purse seine employed as an accessory gear in hauling the catch direct from the large semicircular enclosure of deepwater fish corrals which may be devoid of a collecting pond or crib. It also refers to a fishing method wherein schools of fish lured towards surface waters by light are scooped out of the water with a circular net. Locally called *sudsud* (used in tandem with gas-powered lights locally called *petromax*).

Single hook and line: Also called simple handline or dropline. A single vertical line carrying one or two barbed, baited hooks and works simply by dropping it into the water and waiting for fish to bite. Its generic local name is *pasol* or *subid*.

Sonar: A fishing accessory that operates like a radar underwater (sonar) to detect the presence of fish schools. Very sophisticated and can be used to detect size of fish and water depth and to roughly identify the species within a large area of a fishing ground.

Spear gun: Locally called *pana* or *pamana*, sometimes *pana-suga*. It constitutes a hand instrument provided with pointed, barbed or barbless blades at the straight tip which are not detachable from the handle or shaft. It can be thrown by hand although sometimes shot from a gun or bowlike device. It is used at night or dawn, with a light source. Fishers may come in groups of two or three with one spear gun each.

Superlight: A fishing accessory which uses a dynamo and very strong lights above and under the water, which exploits the photosensitivity (i.e., being attracted to lights) of most fish.

Trawl: An active fishing gear consisting of a bag-shaped net with or without otter boards for opening, which is dragged or towed along the bottom or through the water column to take fishery species by straining them from the water.

Trophic level: A stage in a food chain that reflects the number of times energy has been transferred through feeding; for example, when plants are eaten by animals that are in turn eaten by predators.

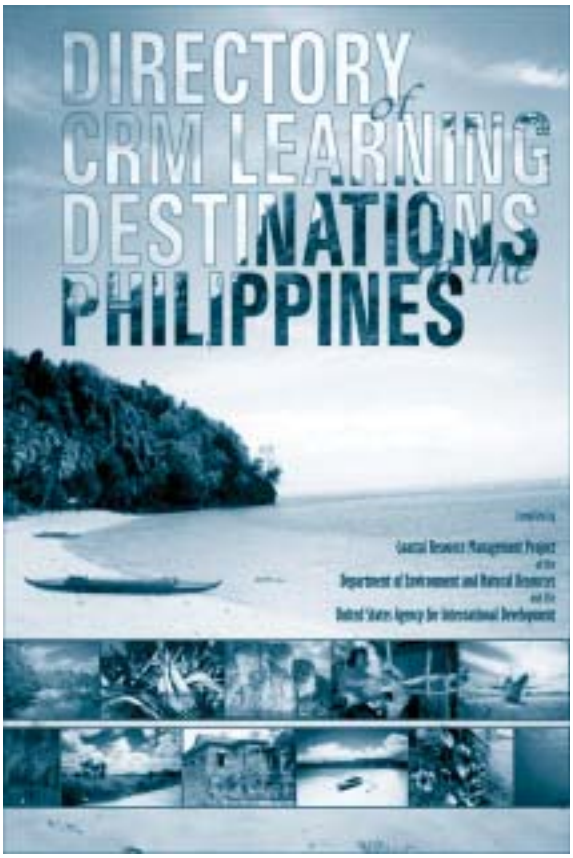
Appendix 2
Coastal Resource Management Showcases in Central Visayas*

"Sea to See": Coastal Resource Management Showcase Tours

In 2003–2004, the Coastal Resource Management Project (CRMP) of the Department of Environment and Natural Resources (DENR) and the United States Agency for International Development (USAID) embarked on an information, education and communication (IEC) strategy that would showcase municipalities and communities successfully implementing coastal resource management (CRM).

The strategy is anchored on the premise that if planned and implemented well, cross visits and study tours are tremendously cost-effective educational tools. They not only increase participants' awareness of CRM issues and solutions, but are often the fastest way to convince others of the benefits of resource management. While, indeed, cross visits are generally popular training activities in CRM, these remain underrated due to the absence of well-packaged and planned CRM study tour programs. The CRMP's "Sea to See": CRM Showcase Tours is an attempt to address this constraint.

The strategy envisions that showcased municipalities and communities can serve as CRM models, and that through the sharing of tangible lessons and experiences as well as interactive learning, targeted clientele – local government, nongovernment organizations (NGOs), people's organizations (POs), interested individuals and the private sector – will become motivated to adopt and implement CRM. They also offer an opportunity to "affirm" successes of local government units (LGUs) in CRM, based on affirmative feedback from local officials and community members.



Directory of CRM Learning Destinations in the Philippines handbook.

Each "CRM showcase" is a set of sound and replicable resource management and local governance models packaged in a study tour where relevant learning regarding CRM can occur quickly and collaboratively. Participants are exposed to modules of experiential, interactive and educative travel activities that feature varied coastal environments, best CRM

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practices and challenges, as well as snapshots of local coastal culture and history.

The CRM showcases were developed collaboratively with key stakeholders – in particular, the LGUs involved who are expected to operate, manage and market their respective study tour products. Potential showcase destinations were carefully chosen based on quality of CRM lessons they could offer, visitor appeal, and local commitment to operate and manage the tours.

Local government officials, NGOs and POs who want to know the dos and don'ts in CRM can learn from the provinces of Bohol, Negros Oriental and Cebu, where many pioneering efforts in CRM have taken place. These early CRM projects provide valuable lessons by the length of experience of communities and local governments that have tried various strategies in managing coastal resources. Specifically, showcased municipalities and communities in:

- Bohol - demonstrate how local governments, led by the provincial government, can be united in the fight against illegal fishing and how LGU leadership can truly make CRM happen;
- Cebu, the most urbanized province in Central Visayas - provide not just lessons but proof that CRM can happen against many odds; and
- Negros Oriental, where one of the earliest marine protected areas (MPAs) in the country was established - underscore not only the vital role of the community in promoting sustainable resource use, but also the importance and viability of collaborative and integrated management.

Mainstreaming Coastal Resource Management: The Bohol Experience

Today, Bohol and the islands within its jurisdiction are gaining a reputation as the place that holds some of the proven successes and most valuable lessons in CRM. During the CRM showcase tour, you will not only see for yourself the captivating sights that have made the island province a favorite tourist destination, but also be exposed to the strong sense of pride and cultural identity that Boholanos are nationally and internationally known for.

The Bohol circuit features the Bohol Environment Management Office (BEMO), the towns of Inabanga, Buenavista, Getafe, Guindulman, Dimiao and Baclayon.

Upon arrival in Tagbilaran City, tour participants will be briefed on the provincial government's CRM programs, particularly activities undertaken by BEMO. The provincial government has made it a priority to address illegal fishing and has established Coastal Law Enforcement Councils (CLECs) in each of the province's three congressional districts. It has also played a strong leadership role in catalyzing CRM at the municipal level through provision of technical and financial support.

Inabanga Municipal Hall, Bohol. (M. Gasalatan)

Inabanga: strong political will and local governance

Before the local government of Inabanga made CRM a basic service for its coastal constituents, the municipality was faced with almost overwhelming problems involving illegal and destructive fishing, siltation and soil erosion from upland deforestation, illegal cutting and conversion of mangroves, intrusion of commercial fishers in municipal waters, and an indifferent if not apathetic citizenry.

Things began to change in 1997. With technical assistance from CRMP and financial support from the Community-based Resource Management Project (CBRMP) of the World Bank and the Department of Finance, LGU leadership

flexed its muscles to implement CRM and a no-nonsense coastal law enforcement program. Through sheer political will and a commitment to sound ecological governance, the LGU has succeeded in rallying its constituents to support its vision and program for the sustainable use and management of its resources.

During the tour, you will be briefed on how the municipality has been able to substantially reduce illegal fishing, establish marine sanctuaries, reforest more than 300 ha of mangrove areas, provide alternative livelihood, organize functional and active fish wardens, and conduct capability training, among others. Today, Inabanga's fisherfolks enjoy increased fish catch (3-6 kg per fisher per day), consciously protect their coastal habitats and nurture a strong partnership with their LGUs.

Cultured oysters, Cambuhat, Buenavista, Bohol.

Buenavista: Cambuhat River and village tour

Cambuhat River is an unspoiled waterway that nurtures oysters, shrimps and fish. The tour takes you to a very pleasant paddleboat ride through the river, and you begin to appreciate the importance of river ecosystems within the overall coastal and marine environments. You also hear the story of how the villagers of Cambuhat have been transformed from being "abusers" to "guardians" of the river. Villagers proudly show you their oyster farms that produce excellent quality oysters and share with you their enthusiasm for the now thriving ecotourism enterprise they have ventured into.

The Cambuhat River and Village Tour was initiated by the municipal government of Buenavista, with assistance from CRMP and FCB Foundation, Inc. in 1998. CRMP provided technical assistance to residents in growing oysters and subsequently instilled upon them the importance of maintaining the integrity of this ecosystem to ensure sustainability of their livelihood. The river and village tour was born to combine the showcasing of the oyster farms and the intrinsic educational value of traversing through the river. Operated and managed by members of the cooperative, the tour also includes an orientation to quaint village life and the role of women in a fishing community. As villagers treat you to a sumptuous lunch of freshly harvested oysters and seafood, you learn more about their organization and the various livelihood initiatives they have undertaken. In April 2000, the tour was recognized by the Conservation International's Excellence in Ecotourism Awards, besting 67 entries from different parts of the world.

Banacon Mangrove Park, Getafe, Bohol.

Getafe's Banacon Mangrove Park: A walk or paddleboat ride through "Paden's highway"

The mangrove forest in Banacon Island in the northern town of Getafe is the fruit of one human's actions to make himself self-reliant. With barely 40 ha of dry and rocky land, Banacon Island was not hospitable to agricultural activities or for the planting of trees. Recognizing this, in 1959, Eugenio "Nong Denciong" Paden began to plant mangroves of the *Rhizophora* species, locally called *bakauan* as

alternative sources of wood for house construction and cooking fuel. Nong Denciong's initiatives did not go unnoticed, and his mangrove planting activities and methods were soon emulated by his family and fellow villagers. Over the years, through the initiative of the islanders and subsequent support from the Central Visayas Regional Project (CVRP) and the DENR, the mangrove plantation expanded to over 450 ha. It is now recognized as the largest human-made mangrove plantation in the Philippines, if not in the whole of Asia.

From Getafe, you take a short motorboat ride to Banacon Island, where villagers and members of the fisherfolk cooperative that manages the tour greet you for a brief orientation and some refreshments. They tell you the story of how the plantation came to be and share thoughts and insights on some of the continuing challenges of resource management. Depending on tide conditions, you then take a scenic paddleboat ride or walk through the "corridors" of the forest, amidst a cacophony of sounds and the sighting of endemic as well as migratory birds. A unique feature of the plantation is its "highway network," wherein the sea resembles that of a highway, with crisscrossing streets and alleys, populated by mangrove "settlements." The plantation's major "thoroughfare" is appropriately named "Paden's Highway" or "Paden's Pass" in honor of its founder.

Guindulman: Basdio Marine Sanctuary

On day two, start your day early; you would not want to miss the spectacle of schools of fish making the waters swirl. Take breakfast and interact with the members of the local POs. Then leisurely swim and snorkel in one of the most inviting coral gardens anywhere.

The town of Guindulman is 85 km southeast of Tagbilaran City and the oldest municipality in Bohol. In Barangay Basdio (a contraction of *bas diyo*, a Boholano phrase meaning "little sand"), residents consider the sea as a stable source of food and income. But years of illegal and destructive fishing practices have dwindled fish catch and degraded coastal habitats. With technical assistance from CRMP and BEMO, in 1999, the municipal government

Basdio Marine Sanctuary, Guindulman, Bohol. (M. Gasalatan)

and the community began earnest efforts to plan and implement CRM in their coastal barangays. A primary initiative of the LGU was to work with the fisherfolks in establishing and managing an 18.4 ha marine sanctuary. Initially resisted by some members of the community, the marine sanctuary is now a source of pride for the municipality. Today, even the most vocal critics of the sanctuary take part in protecting the area.

The tour allows you to swim and snorkel in the sanctuary's buffer zone, an underwater paradise even to the most jaded diver. Even from the guardhouse on the cliff overlooking the sanctuary, one can see the wealth of aquatic life – live and colorful corals, and teems of fish breaking into the surface of the crystal clear water. You can also take a paddleboat ride around the sanctuary that allows you not only to see this underwater marvel but also to view the burial caves on the face of the limestone cliffs overlooking the sea.

Dimiao: An integrated approach to resource management

In 1996, alarmed at rampant illegal fishing activities, indiscriminate throwing of wastes and coastal erosion, the local government of Dimiao established the Project Development of Resources, Education, Awareness and Management (DREAM). This project sought to involve residents in natural resource management.

As a start, the municipal government conducted environmental awareness activities in

both upland and coastal barangays and facilitated the integration of environmental education into the curriculum of the municipality's elementary and high schools. Soon after, a CRM program was put in place with the establishment of a marine reserve and fish sanctuary, reforestation of mangrove areas, establishment of an agroforestry demonstration farm and an improved garbage collection system. POs, including women's groups and fish wardens' associations, were likewise supported with capability and livelihood training.

The tour is an orientation on how strong political will and local leadership combined with concerted educational efforts can make citizens rally to the vision of improved resource management.

Fraser's dolphin, Pamilacan Island, Baclayon, Bohol. (W. Perrin)

Pamilacan Island's dolphin and whale watching tour: A story of transformation

The sea off Pamilacan Island, part of the jurisdiction of Baclayon town was known as a natural habitat for whale sharks and marine mammals. Fishers talked of those times when whale sharks as well as pods of dolphins and whales were readily observed from the beaches of the island. However, it was also a traditional livelihood for the island fishers to hunt these creatures. In fact, the island got its name from the word *pilak* or harpoon, the device used by fishers in hunting sharks. Fishers themselves agree that indiscriminate hunting has led to the decimation of these creatures' population.

The dolphin and whale watching tour was developed by the provincial government with the support of NGOs and concerned national agencies to promote awareness and appreciation of the role of these marine mammals and whale sharks to the overall marine ecosystem. It also served to provide an alternative livelihood for fishers who were once engaged in their hunting. Serving as "spotters" or guides, these transformed fishers take you on a delightful and fun journey to the natural playgrounds of these creatures of the wild. The tour package covers lunch as well as a snorkeling or swimming visit to the island's marine sanctuary, a favorite diving destination for local and foreign divers.

Mangrove boardwalk, Panadtaran, Candijay, Bohol. (M. Gasalatan)

Candijay: Mangrove adventure tour

Primarily a natural forest, the 596-ha mangrove area located in Barangay Panadtaran is one of the most biodiverse mangrove ecosystems in the Philippines. In 1996, 140 individuals formed the Panadtaran Mangrove Association (PAMAS). The mangrove forest is managed by PAMAS under a DENR-issued Community-based Forest Management Agreement. In 2001, CRMP helped PAMAS members develop the mangrove area into an ecotourism site. Through the assistance of the German Development Service, Bohol Provincial Tourism Office and FCB Foundation, Inc., boardwalks were built around the forest and signs installed identifying the different mangrove species in the area.

A walk into the Panadtaran mangrove forest is both exciting and educating. While balancing on the bamboo boardwalks, PAMAS members brief you on how mangroves are a life support system to all kinds of fish and marine animals, and how, in Panadtaran, these are a haven for growing shrimps, mud crabs and oysters. You see for yourself the wide range of mangrove species that grow in the area, the wealth of marine life that the mangrove ecosystem nurtures, and most of all, the indomitable spirit of the community members that ensures its continued protection and management.

Cebu Communities Fight the Odds

Nowhere in Central Visayas has the battle for CRM been more difficult than in Cebu. An urbanized province, conflict among resource users is highly pronounced. It is no surprise therefore that in many areas, people are wary of programs they fear would affect their livelihood.

The Cebu CRM showcase features four projects that became successes after long and difficult struggles among stakeholders: the Olango Bird and Seascape Tour, the Gilutongan Marine Sanctuary, the Kawasan Falls and Matutinao River in Badian, and the Saavedra Marine Sanctuary in Moalboal Town.

Olango birds and seascape tour

Every winter, many species of shorebirds escape the cold in temperate regions and fly towards the tropics where they feed on marine invertebrates and plants found on shores. The East Asian Migratory Flyway that includes the Philippines is one of the most important shorebird and waterbird migratory flyways in the world. About 77 species of migratory birds use this flyway. The wetlands of Olango Island were declared a protected area in 1992, and are also recognized by the Ramsar Convention as a wetland of international importance. At that time, only a handful understood the significance of these wetlands, and some residents even complained that the protected status gave the birds more preferential treatment than the residents of the island.

Olango Island Wildlife Sanctuary, Olango Island, Cebu.

Bird viewing with tour guide, Olango Island, Cebu.

In 1997, CRMP led efforts to address the concerns of the residents and also to determine how to effectively manage the island's resources. One of the activities initiated by CRMP was the community-based Olango Birds and Seascape Tour (OBST) that was designed to protect the wetlands while at the same time allow community members to earn from ecotourism. Despite a difficult start, the tour is now successfully operated and managed by the community's cooperative. It is an education not only on the importance of the wetlands ecosystems that serve as habitats to these migratory birds, but also an introduction to a community's resolve to protect and conserve what nature has uniquely endowed its residents with, and gain livelihood in the process. The tour will also provide you with a firsthand glimpse of life in this fishing village and a better appreciation of the island residents' relationship with their environment.

The OBST earned awards of excellence as an ecotourism project from the Conservation International and the British Airways. It also received the Public Relations Society of the Philippines' Anvil Award of Merit in 1999.

Gilutongan Island, Cebu.

Gilutongan Marine Sanctuary: A community Reborn

Village elders say that the waters around Gilutongan and nearby islands used to teem with fishes. But years of use of destructive fishing methods and overfishing resulted in deteriorating habitats and fish decline. With the island's environmental degradation, fish yields went down and so did the islanders' income and ability to provide for even their most basic needs. With the specter of poverty beginning to haunt them and guided by the passion and leadership of a few of their fishers as well as by conservation-oriented organizations, the villagers of Gilutongan began to mend their ways. But it wasn't easy.

In an effort to address the problem, a 10-ha marine sanctuary was established off Gilutongan Island, in the Municipality of Cordova in 1991. But management of the sanctuary was an on-and-off affair until 1998, when CRMP worked with the municipal government to plan and implement CRM. Since then, the LGU has made management of the sanctuary a priority program. The sanctuary was expanded to 14 ha and a budget was allocated for its regular operations and management. As the condition of the reef in the sanctuary improved, many divers and snorkelers became interested in Gilutongan. A users' fee program was subsequently implemented in 2001, generating substantial revenues for the municipality and the barangay. The sanctuary has not only improved fish population in the area. It also has revived the interest of divers in the Gilutongan Channel. It was reported that annual users' fees amount to almost PhP2 million, with 70% going to the municipality and 30% to the barangay.

The tour encourages you to swim or snorkel around the sanctuary's buffer zone. You will be amazed at the remarkable abundance of fishes as well as the presence of live coral cover in the area. Now considered a "must" diving destination in Cebu, divers consistently marvel at the diversity of fish species present, and how "tame" these sea creatures seem to be when they come in contact with humans.

Kawasan Falls, Badian, Cebu. (M. Gasalatan)

Matutinao River and Kawasan Falls, Badian

Day two of the showcase tour takes you to southwestern Cebu to visit Kawasan Falls and Matutinao River in Badian, and Barangay Saavedra in Moalboal. Despite its distance from metropolitan Cebu, Matutinao River and the more popular Kawasan Falls are favorite weekend destinations of urban residents and tourists. While many rivers in the metropolis were drying up or have become contaminated, Kawasan Falls flows ceaselessly, feeding the crystal-clear Matutinao River. It was no surprise to anyone that the river has consistently won awards as the one of the cleanest inland bodies of water in the country.

But tourism has its downside. While it brings economic gains, many visitors can desecrate the natural beauty of the place. Conflicts can also arise among private landowners and local government over developments along the river and around the

falls. To provide accommodations to increasing numbers of tourists, some landowners built cottages near the falls and on the riverbank, violating national laws on easement. There was also the increasing problem of pollution caused by the presence of garbage from the increasing number of visitors. It was not long before these problems and lack of planning and development guidelines (illustrated by the building of concrete cottages and bridges) threatened to make Matutinao and Kawasan unsightly. To address these brewing issues, the Matutinao River Ecosystem Development Council was organized to draft and implement an effective management plan. Hopes are high for the plan to see implementation and for stakeholders to be united in their vision for the sustainable use and management of their resources.

Saavedra Marine Sanctuary, Moalboal, Cebu. (L. Aliño)

The courage of Saavedra fisherfolk

Moalboal, 87 km southwest of Cebu City, is a well-known diving destination to local and foreign divers. Endowed with fringing coral reefs, its Pescador Island has been described as a "microcosm of what is best in Philippine diving." Three marine sanctuaries were established in Moalboal during the years of the CVRP. However, one stands out because of the fisherfolk's group that has protected it since 1987. This is the marine sanctuary in Sitio Bangag, Barangay Saavedra.

Pure tenacity and the belief that they are doing things right for themselves and the community are the reasons why the Saavedra Fish Sanctuary continues to thrive today. The 8.13 ha sanctuary is a testament of a community association's tremendous resolve and commitment. When the CVRP ended in the early 1990s, the fishers' association took it upon itself to continue pursuing the goals of the association and the objectives of the fish sanctuary.

In interactions with members of the association, you will learn the daunting challenges they had to face to protect what they have started, sometimes risking their lives or the political ire of some leaders in the process. However, these are now largely in the past, and the association now works closely with the municipal government in protecting the sanctuary and implementing a users' fee program. Recent reef assessments conducted by CRMP and the Coastal Conservation and Education Foundation show that live coral cover in the sanctuary is good, at 69%, and that reef fish show abundance and diversity.

Negros Oriental: Modeling the Way in CRM

The province is recognized as a pioneer in CRM, largely as a result of the work done by Silliman University's Marine Laboratory. It is known for the internationally acclaimed Apo Island Marine Sanctuary of the municipality of Dauin, which is largely regarded as a model of community-based resource management.

The Negros Oriental CRM showcase tour is a three-day educational journey to Apo Island, the dolphin-and-whale-watching project of the Bais City government, Dumaguete City's integrated CRM program and Silliman University's marine and wildlife conservation projects.

Apo Island Marine Sanctuary: Conservation does pay

Day one takes you to the town of Dauin, approximately 15 km from Dumaguete City. Dauin is the home municipality of Apo Island. Local officials brief you on the various CRM initiatives the municipality has taken, including the establishment of four sanctuaries within the town's municipal waters. As a welcome activity, and with time permitting, you may get the chance to see and listen to Dauin's famous and

Apo Island, Dauin, Negros Oriental.

Talabong Mangrove Forest, Bais City. (L. Aliño)

enchanting children's rondalla. Afterwards, it is a 30-minute boat ride to Apo Island.

Blessed with majestic limestone cliffs, fringing coral reefs and a spectacular diversity of marine life, Apo Island's success story has been told many times over, and its breathtaking underwater scenery immortalized in many documentary videos and photographs. The sanctuary was established in 1985 under the guidance of Silliman University. Initially, island residents resisted efforts of university scientists to introduce the concept of marine resource conservation. Gradually, the community learned the importance of the sanctuary to livelihood and was soon involved in its protection. Due to the biological diversity of Apo Island, it was proclaimed a National Seascape in 1994. Consequently, a Protected Area and Management Board (PAMB) was created to implement and oversee management policies for the sanctuary. For sometime now, a users' fee program has been in place and has earned for PAMB and the community, substantial fees that go to the sanctuary's management operations and to various village projects.

Women members of the cooperative serve as your guides during your stay in the island and provide a sumptuous lunch of fresh seafood. There is ample time for snorkeling, scuba diving or swimming. However, it is strongly advised to follow the sanctuary's rules and regulations on safety.

Bais City: Encounters with the wild

On day two, you will drive out to Bais City, approximately 45 minutes from Dumaguete City for a day in the sun, sand and sea, and a most delightful encounter with the dolphins and whales of Tañon Strait. Tañon Strait, the narrow sea between Negros and Cebu Islands is a well-known natural habitat of many species of dolphins and whales. A national law was passed prohibiting catching these in order to stop indiscriminate slaughtering.

The Bais City government enforced this ban, and recognizing a tourism potential, launched an information campaign to help the public understand the role of these marine animals to the overall marine environment and the importance of marine life conservation. Its marine ecological appreciation tour includes the pioneering dolphin-and-whale-watching tour in Tañon Strait. This tour is not to be missed. It is an education not only on the various species and behavior of dolphins and whales, but also an experience of sheer joy and pleasure at witnessing the natural antics of these marine animals in their natural playgrounds and habitats.

Dumaguete City: Integrating coastal resource management and solid waste management

Day three is a tour around Dumaguete City that includes a stop at Silliman University. Primarily known as a "university town," Dumaguete City officials and residents are just as proud of their reputation as one of the more environmentally oriented cities in the country.

Dumaguete City Ecological Park. (L. Aliño)

Philippine spotted deer, Silliman University Center for Tropical Conservation Studies. (L. Aliño)

The city seeks to strike a balance between the needs of the people and that of the environment through working partnerships with civil society, neighboring LGUs, provincial and national government agencies as well as with foreign donors and NGOs. Indications show that such balance is being achieved, with Dumaguete's pockets of urban forests, garbage-free streets and homes, absence of noise and air pollution, mandatory waste segregation, and rehabilitated coastal and marine ecosystems.

The tour takes you to the City Dumpsite and Ecological Park wherein you witness the effectiveness of the use of vermiculture in composting and the effectiveness of the city's mandatory waste segregation program. Through waste segregation at the household level, the amounts of nonbiodegradable garbage that finds its way into the dumpsite is reduced. In turn, through vermicomposting, biodegradable garbage is converted into organic fertilizers and sold to farmers. The city government is thus able to prolong the life span of the 1-ha dumpsite. As proof that the dumpsite is indeed an ecological park, check out the aviary within the compound and the clean condition of the river that runs through the facility.

You will also make a stop at the city's new and modern abattoir. Realizing that the old abattoir was a major contributor to the seawater, Dumaguete City invested in the relocation and construction of a new and modern abattoir that includes a biological treatment facility for wastewater. This has resulted in a considerable reduction of wastewater pollution in the coastal areas.

Silliman University Marine Laboratory and Center for Tropical Conservation Studies

Silliman University's Marine Laboratory has poured efforts into enabling local communities to manage their coastal resources. Its assistance to local government and communities ranges from conducting baseline research on coastal ecosystems to educating people on CRM. A visit to the laboratory exposes you to the importance of scientific research in CRM. Likewise, the collection of bones and skeletal remains of whales and dolphins, corals, shells, seagrasses, fishes and invertebrate specimens indicate the vast underwater wealth of Tañon Strait from where these were largely collected. There are also live specimens of various mangrove species, giant clams, huge-sized grouper *(lapulapu)* as well as crocodiles.

The Center for Tropical Conservation Studies, A.Y. Reyes Zoological and Botanical Garden, is a wooded area in the center of the city that provides home to 16 animal species as well as plants and trees that are indigenous to the Philippines. It has contributed to raising public awareness on wildlife conservation.

Appendix 3
Inventory of Fishing Gears in Central Visayas

Background

Primary and secondary data collected from August 2003 to January 2004 provide a general picture of the state of the municipal fisheries sector in Central Visayas. The current realities of the commonly regarded sustenance fisheries sector are presented. Estimates are shown on the number of fishing craft and gears, number of fishers, types of fishing activities, their catch rates and the major species they are catching, and issues that weigh down on the sector. To emphasize the magnitude of various key information, figures were expressed as density, relative to the extent of coastline of each to the local government units (LGUs) or fishing ground. The information also allowed us to evaluate, though to a lesser extent, other relevant details, such as exploitation patterns of various gears, degrees of fishing pressure they exert on the fish resources and size selectivity of common fishing gears.

To characterize the municipal capture fisheries of Central Visayas, key informant interviews were conducted in representative coastal barangays of all municipalities of the four provinces of the region. Between 40 and 50% of the coastal barangays in the mainland and all island barangays were covered by the interviews. The mainland coastal barangays were selected in consultation with the Municipal Agriculture Officer and the Agriculture Technician who have fisheries functions. Coastal barangays were classified into sizes and common attributes. Characteristics considered were size of fisher population, typical fishing gears used and coastline topography. Between 40 and 50% from each category was taken as sample, and estimates were based on the ratio of samples to the total in each category. Coastal barangays with very unique attributes were automatically included and separately taken into account. This is especially true for island barangays, barangays within the town proper, or barangays exclusively fishing for a specific commodity like tuna, giant squid and manta ray. Key informants were selected from knowledgeable people in the community such as the barangay chair, president of people's organizations, members of Bantay-Dagat, fish wardens and chair of the Barangay Fisheries and Aquatic Resources Management Council.

In those selected barangays, the following information was collected: number of motorized and nonmotorized fishing craft; estimate number of fishers; number of each fishing gear type; documentation of fishing gears (see Appendix 4 for photo or drawing); design and specifications of documented fishing gears; estimates of catch per unit effort for each fishing gear type reflecting seasonal variation; and indicative catch composition of each fishing gear type reflecting seasonal variation. Issues related to municipal capture fisheries raised by the fishers were also documented. Data gathered from representative barangays were used to make estimates of key statistics for each municipality that were later consolidated by province and by ecosystem.

Fishers and Fishing Craft

In the province of Siquijor (Table A3-1), the municipality of Siquijor has the most number of fishers and of fishing boats per kilometer of coastline. Maria and Lazi have the fewest. In terms of motorized boats per kilometer of coastline, Enrique Villanueva has the highest, followed by San Juan. This is brought about by

the significant number of fishers engaged in catching larger pelagic species in Bohol Sea and East Sulu Sea, and this requires the use of motorized fishing craft. There is also significantly higher density of nonmotorized fishing craft in Siquijor (68 boats per kilometer of coastline) than in the other municipalities of the island province. The fishers-to-fishing-boat ratios are relatively lower in Siquijor, Lazi and Maria (indicating more ownership of fishing vessels) than in Enrique Villanueva, San Juan and Larena.

In Negros Oriental (Table A3-2), Siaton, Manjuyod and Bais City have relatively higher number of fishers and fishing craft than the rest of the coastal municipalities while Jimalalud and Bindoy have the lowest. The municipalities with relatively higher number of fishers and fishing craft per kilometer of coastline are Manjuyod, Dumaguete City and Zamboanguita. Per kilometer of coastline, there are more motorized fishing boats in Manjuyod and Siaton and more nonmotorized boats in San Jose, Zamboanguita, La Libertad, Dumaguete City, Dauin, Sibulan and Bacong than in the other coastal municipalities of the province. Fishers-to-fishing-boat ratio is very low in Bindoy, San Jose and Sibulan while it is quite high in Guihulngan and Bais City.

In the province of Bohol (Table A3-3), coastal municipalities located along the Danajon Bank have relatively higher number of fishers and fishing craft per kilometer of coastline than the rest, while those in the southeast portion of the island have the lowest. Concentration of motorized fishing craft is highest in Talibon and Bien Unido while it is lowest in Anda and Garcia Hernandez. Bien Unido has also the highest concentration of nonmotorized craft while Lila has the lowest. There is generally a ratio of about 1-2 fishers to 1 boat, except in Jagna and Garcia Hernandez.

In the province of Cebu, the municipalities of Bantayan and Daanbantayan have the highest counts of fishers and fishing craft while Compostela, Consolacion, Minglanilla and Alcantara are among those which have the lowest (Table A3-4). The municipalities with the highest number of fishers and fishing boats per kilometer of coastline are Talisay City, Madridejos and Cordova while those with the lowest are Catmon, Consolacion, Santander and Moalboal. Concentration of motorized boats is highest in Talisay City and Madridejos while that of nonmotorized boats is highest in Cordova. In general, there is a ratio of more or less 1-2 fishers for every fishing boat, except in Bogo, Dumanjug, Pinamungahan, Toledo City and Lapu-lapu City.

Fishing Gears

Hook and lines (49%), gillnets (20%) and jigs (15%) are the dominant fishing gears in Central Visayas. The estimated numbers of each generic fishing gear type by province are given in Tables A3-5 – A3-8. The frequently used gears are the multiple hook and lines, simple hook and lines, squid jig, drift gillnet and bottom set gillnet.

Table A3-1. Estimated total number of fishers and boats in the 6 coastal municipalities of Siquijor province, 2003 (Armada *et al*. 2003).

Municipality	Fishers	Boats		Fisher-to-boat ratio	Coastal density (per km coastline)		
					Fishers	Boats	
		Nonmotorized	Motorized			Motorized	Nonmotorized
Enrique Villanueva	788	313	123	1.8	71.6	11.2	28.5
Maria	606	315	88	1.5	26.4	3.8	13.7
Lazi	452	227	106	1.4	28.3	6.6	14.2
San Juan	1,063	396	166	1.9	56.0	8.7	20.8
Siquijor	2,021	1,426	129	1.3	96.2	6.1	67.9
Larena	455	181	47	2.0	41.4	4.3	16.5
Total/Average	5,385	2,858	659	1.7	53.3	6.8	26.9

Table A3-2. Estimated total number of fishers and boats in the 21 coastal municipalities of Negros Oriental province, 2003.

Municipality	Fishers	Boats		Fisher-to-boat ratio	Coastal density (per km coastline)		
					Fishers	Boats	
		Nonmotorized	Motorized			Motorized	Nonmotorized
Vallehermoso	693	341	104	1.6	53.3	8.0	26.2
Guihulngan	1,324	224	268	2.7	49.0	9.9	8.3
La Libertad	1,050	624	96	1.5	116.7	10.7	69.3
Jimalalud	209	108	23	1.6	23.2	2.6	12.0
Tayasan	430	210	127	1.3	53.8	15.9	26.3
Ayungon	397	184	121	1.3	22.1	6.7	10.2
Bindoy	325	93	198	1.1	25.0	15.2	7.2
Manjuyod	2,434	528	949	1.7	152.1	59.3	33.0
Bais City	2,514	520	591	2.3	83.8	19.7	17.3
Tanjay City	607	194	216	1.5	32.0	11.4	10.2
Amlan	432	222	105	1.3	61.7	15.0	31.7
San Jose	714	480	102	1.2	119.0	17.0	80.0
Sibulan	772	455	170	1.2	85.8	18.9	50.6
Dumaguete City	1,039	457	206	1.6	148.4	29.4	65.3
Bacong	521	305	77	1.4	74.4	11.0	43.6
Dauin	1,076	628	99	1.5	107.6	9.9	62.8
Zamboanguita	1,508	763	317	1.4	137.1	28.8	69.4
Siaton	3,148	584	1,302	1.7	101.6	42.0	18.8
Santa Catalina	1,476	470	292	1.9	26.8	5.3	8.5
Bayawan City	1,108	304	362	1.7	79.1	25.9	21.7
Basay	508	232	118	1.5	42.3	9.8	19.3
Total/Average	22,285	7,926	5,843	1.6	75.9	17.7	32.9

Table A3-3. Estimated total number of fishers and boats in the 29 coastal municipalities of Bohol province, 2003.

Municipality	Fishers	Boats		Fisher-to-boat ratio	Coastal density (per km coastline)		
					Fishers	Boats	
		Nonmotorized	Motorized			Motorized	Nonmotorized
Tagbilaran City	719	273	328	1.2	57.8	26.3	21.9
Cortes	363	233	54	1.3	139.6	20.8	89.6
Maribojoc	362	159	60	1.7	36.2	6.0	15.9
Loon	1,544	933	378	1.2	64.3	15.8	38.9
Calape	1,006	458	314	1.3	67.1	20.9	30.5
Tubigon	1,670	261	620	1.9	128.5	47.7	20.1
Clarin	335	150	84	1.4	47.9	12.0	21.4
Inabanga	2,281	874	629	1.5	162.9	44.9	62.4
Buenavista	1,000	492	159	1.5	125.0	19.9	61.5
Getafe	2,170	700	664	1.6	127.7	39.1	41.2
Talibon	3,476	750	1,490	1.6	165.5	71.0	35.7
Bien Unido	3,176	840	940	1.8	264.7	78.3	70.0
Ubay	1,492	406	380	1.9	38.3	9.7	10.4
Pres. C.P. Garcia	2,093	610	591	1.7	36.7	10.4	10.7
Mabini	1,256	608	156	1.6	43.3	5.4	21.0
Candijay	283	156	91	1.2	28.3	9.1	15.6
Anda	1,048	550	70	1.7	55.2	3.7	28.9
Guindulman	596	262	126	1.5	37.3	7.9	16.4
Duero	466	250	77	1.4	68.5	11.3	36.7
Jagna	1,187	268	219	2.4	84.8	15.6	19.1
Garcia Hernandez	473	145	73	2.2	29.6	4.6	9.1
Valencia	418	122	171	1.4	63.6	26.0	18.6
Dimiao	391	220	59	1.4	65.2	9.8	36.7
Lila	348	60	162	1.6	40.1	18.7	6.9
Loay	472	286	80	1.3	42.9	7.3	26.0
Alburquerque	402	80	122	2.0	80.4	24.4	16.0
Baclayon	637	158	213	1.7	57.2	19.1	14.2
Dauis	1,634	502	286	2.1	66.6	11.7	20.5
Panglao	1,655	880	356	1.3	66.2	14.2	35.2
Total/Average	32,953	11,686	8,952	1.6	79.0	21.0	29.3

Table A3-4. Estimated total number of fishers and boats in the 53 coastal municipalities of Cebu province, 2003.

Municipality	Fishers	Boats		Fisher-to-boat ratio	Coastal density (per km coastline)		
					Fishers	Boats	
		Nonmotorized	Motorized			Motorized	Nonmotorized
Daanbantayan	5,722	1,165	2,189	1.7	111.3	42.6	22.7
Medellin	1,208	201	488	1.8	33.0	13.3	5.5
Bogo	3,978	270	1,062	3.0	170.7	45.6	11.6
Tabogon	722	314	137	1.6	49.7	9.4	21.6
Borbon	604	206	224	1.4	52.9	19.6	18.0
Sogod	517	263	122	1.3	55.7	13.1	28.3
Catmon	250	176	58	1.1	16.6	3.8	11.7
Carmen	466	314	130	1.1	33.3	9.3	22.4
Danao City	658	173	138	2.1	52.6	11.0	13.8
Compostela	152	63	49	1.4	33.0	10.6	13.7
Liloan	1,004	358	315	1.5	59.0	18.5	21.0
Consolacion	194	45	59	1.9	14.5	4.4	3.4
Mandaue City	387	187	67	1.5	24.4	4.2	11.8
Cebu City	396	148	112	1.5	23.5	6.6	8.8
Talisay City	2,052	240	1,000	1.7	244.0	118.9	28.5
Minglanilla	156	38	60	1.6	28.4	10.9	6.9
Naga	512	176	112	1.8	51.3	11.2	17.6
San Fernando	552	215	182	1.4	60.2	19.8	23.4
Carcar	613	266	98	1.7	40.8	6.5	17.7
Sibonga	334	121	152	1.2	25.1	11.4	9.1
Argao	998	570	216	1.3	39.3	8.5	22.4
Dalaguete	1,040	420	432	1.2	67.9	28.2	27.4
Alcoy	257	192	30	1.2	33.0	3.8	24.6
Boljoon	625	216	127	1.8	60.7	12.3	21.0
Oslob	1,458	930	272	1.2	64.0	11.9	40.8
Santander	210	134	36	1.2	17.5	3.0	11.2
Samboan	590	368	172	1.1	53.6	15.6	33.5
Ginatilan	455	250	32	1.6	56.9	4.0	31.3
Malabuyoc	709	335	85	1.7	54.5	6.5	25.8
Alegria	947	385	222	1.6	72.9	17.1	29.6
Badian	954	385	203	1.6	41.5	8.8	16.7
Moalboal	230	153	61	1.1	8.5	2.3	5.7
Alcantara	103	94	6	1.0	20.6	1.2	18.8
Ronda	516	376	26	1.3	73.7	3.7	53.7
Dumanjug	971	210	68	3.5	60.7	4.3	13.1
Barili	754	302	258	1.4	44.4	15.2	17.8
Aloguinsan	326	75	115	1.7	40.0	14.1	9.2
Pinamungahan	1,207	235	297	2.3	72.3	17.8	14.1
Toledo City	2,307	386	576	2.4	123.9	30.9	20.7
Balamban	1,372	390	530	1.5	99.9	38.6	28.4
Asturias	1,491	798	152	1.6	94.7	9.7	50.7
Tuburan	1,112	402	328	1.5	46.5	13.7	16.8
Tabuelan	695	423	110	1.3	52.1	8.3	31.7
San Remigio	1,404	377	489	1.6	34.9	12.1	9.4
Santa Fe	1,512	497	525	1.5	41.8	14.5	13.7
Bantayan	7,790	4,020	1,710	1.4	125.7	27.6	64.9
Madridejos	3,331	851	1,271	1.6	212.8	81.2	54.4
Pilar	1,610	770	192	1.7	51.1	6.1	24.4
Tudela	910	410	149	1.6	54.7	9.0	24.6
Poro	1,149	592	120	1.6	44.1	4.6	22.7
San Francisco	1,772	555	469	1.7	34.6	9.1	10.8
Lapu-lapu City	3,825	1,142	545	2.3	79.7	11.4	23.8
Cordova	2,641	1,498	213	1.5	203.2	16.4	115.2
Total/Average	65,748	23,680	16,791	1.6	62.2	16.3	23.5

Table A3-5. Inventory of fishing gears by province of Central Visayas: hand instruments, hook and lines, and jigs.

Fishing gear	Common local names	Province				Total
		Bohol	Cebu	Negros Oriental	Siquijor	
Hand instruments						
Scoop net	*Sapyaw, sibot, sikpaw*	159	101		50	310
Scoop net with lights	*Panulo, paapong, salakab*	1,576	2,389	1,634		5,599
Spear fishing	*Pamana, panungkit, gantaaw*	1,268	4,436	886	224	6,814
Spear fishing with compressor	*Pana-compressor, buso*	284	236	2		522
Spear fishing with light	*Pana-panuga, panamal*	490	422	20		932
Hook and lines						
Bottom set - surface set longline	*Panalabay, pakatay, salabay*	706		1,480		2,186
Bottom set longline	*Kitang, palangre, palabay*	2,075	4,481	2,916	233	9,705
Hook and line	*Pasol, habyog, tonton*	7,335	14,446	5,408	4,170	31,359
Hook and line with float	*Pataw, palagdas, pahawin*	269	2,314	4,056		6,639
Multiple handline	*Barangay, lasdak, undak*	6,652	15,798	8,418	2,700	33,568
Surface set longline	*Bahan, tapsay, pakaras*	186	2,230	258	889	3,563
Troll line	*Subid, limbag, adis-adis*		4,607	759	31	5,397
Jigs						
Fish jig	*Kab-it, saranggat, helicopter*	165	2,368	234		2,767
Octopus jig	*Pangati*			5		5
Squid jig	*Angkla, subid, saranggat*	5,718	15,242	5,466	1,416	27,842

Table A3-6. Inventory of fishing gears by province of Central Visayas: traps, pots and gillnets.

Fishing gear	Common local names	Province				Total
		Bohol	Cebu	Negros Oriental	Siquijor	
Traps and pots						
Bamboo fish trap	*Dupa-dupa*	18				18
Crab liftnet	*Sapyaw, bintol, skylab*	266	59	34		359
Crab pot	*Panggal, gulo-gulo, ligid*	645	965	205		1,815
Eel pot	*Bantak, pangbakasi*	48	99		185	332
Fish pot	*Bubo, panggal, timing*	774	2,886	826	485	4,971
Nautilus pot	*Bubo panglagang*		14	16		30
Shrimp pot	*Bubo pangsapayan/ pasayan*	62		3		65
Squid pot	*Bubo/panggal pangnokos*	30	1,122	2		1,154
Gillnets						
Bottom set gillnet	*Palugdang, pamahala, palubog*	3,702	7,636	1,621	340	13,299
Drift gillnet	*Kurantay, paanod, palaran*	4,277	8,092	1,889	491	14,749
Drive-in gillnet	*Bahan, sagiwsiw, tapsay*	141	704	85	32	962
Encircling gillnet	*Likos, panglihos, kayagkag*	83	1,120	425	160	1,788
Gillnet (unspecified)	*Pukot*	12		5		17
Set gillnet	*Kayagkag, patulay*	4	632	256		892
Surface set - encircling gillnet	*Pangnokos, pangsulid*	8	815	4		827
Surface set gillnet	*Palutaw, patuloy, kurantay*	1,274	622	1,468	78	3,442
Trammel net	Triple-net, double-net, *padlas*	1,020	1,613	190	296	3,119

Table A3-7. Inventory of fishing gears by province of Central Visayas: impounding gears, dragnets and seines.

Fishing gear	Common local names	Province				Total
		Bohol	Cebu	Negros Oriental	Siquijor	
Impounding gears						
Miracle hole (artificial reef)	*Gango, amatong, balirong*	161	1,029	221	2	1,413
Bagnet	*Basnig, tapay, iwag, sabinit*	22	112	15		149
Barrier net	*Pahubas, pang-ali*	13	8			21
Filter net	*Tangab, lukob, sanggab,*	22	369			391
Fish corral	*Bungsod, dumpil, punot*	1,201	1,055	613	47	2,916
Liftnets	*Sapyaw, sabinit, surambao*			159		159
Stationary liftnet	New look, *bintol*	69	17	80	5	171
Dragnets and seines						
Baby trawl	*Parakaya, palakaya*	151	25			176
Beach seine	*Baling, sahid, sarap, aghid*	323	741	465	35	1,564
Danish seine	*Hulbot-hulbot, liba-liba,* zipper	208	38			246
Fry dozer	Trawl, *saplad*	240	1,472	3,199		4,911
Mechanized pushnet	*Baling,* baby trawl, *sudsud*		155			155
Midwater trawl	*Palupad, sapyaw*	10	22			32
Other seines, seine nets	*Sabinit, pukot binulsahan*		48	7		55
Purse seine	*Kubkub, likum-likum*		4	64		68
Pushnets, scissor nets	*Sahid, sudsud, salibot*	500	1,836	664	110	3,110
Ringnet	*Likum, hapa hapa*	26	7			33
Round haul seine	*Lawag, sabinit, sapyaw*	24	140			164

Table A3-8. Inventory of fishing gears by province of Central Visayas: miscellaneous fishing gears.

Fishing gear	Common local names	Province				Total
		Bohol	Cebu	Negros Oriental	Siquijor	
Others						
Abalone fishing	*Pangkapinan*				92	92
Blast fishing	*Paniro*	49	102			151
Castnet	*Laya*	70	309			379
Crab fishing, picking	*Pangkasag, panikop*	10	13			23
Diving for ornamentals	*Sawm pangsimilya*	31	44			75
Gleaning	*Panginhas*		802		1,170	1,972
Lobster fishing	*Pangmantaba*		8			8
Octopus lure	*Pangtamaa, pangugita*	13	20	15		48
Poison, rotenone fishing	*Panuble, panghilo, panguskus*	7				7
Sea cucumber collecting	*Pangbat, panulo ug bat*	294	16			310
Sea urchin picking	*Panuyom, pangswaki*	30	8			38
Shell dredging (rake)	*Imbaw panginhas*		40			40
Shell/pearl diving	*Panawm ug kinhason, sarap*	38	70			108
Sponge diving	Sponge diving, *panawm*		4			4
Starfish diving	Starfish diving, *panawm*		40			40

Appendix 4
Fishing Gears in Central Visayas

There are various fishing gears in Central Visayas. These can be divided into four categories:

1. hand instruments, hook and lines, and jigs;
2. traps, pots and gillnets;
3. impounding gears, dragnets and seines; and
4. miscellaneous gears.

A brief description of each gear is given below, with diagrams where appropriate.

Description of Gear

Type 1: Hand Instruments, Hook and Lines, and Jigs (see Table A4-1)

Hand instruments

Scoop net

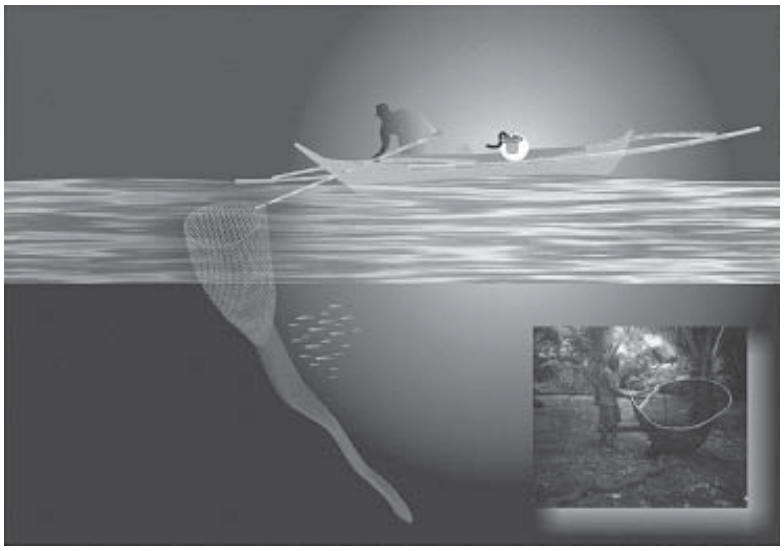
A scoop net is a traditional fishing accessory used to catch or contain caught fish. The gear is made commonly of a meshed net formed into a bag that sags to a desired depth. Following the tradition of the anchovy fishing industry, scoop nets are modified into larger outfits built with a mouth diameter of 1 m or more. The peak months of operation are between October and December. Gas lamps (*petromax*) are used to attract fish schools on dark or moonless nights.

Spear

There are two types of spear, one is the harpoon and the other is the spear gun. The harpoon is basically made of a wooden pole with sharp steel tips at one end. It is normally used in shallow areas to kill inactive fish. The spear gun consists of a homemade wooden gun with rubber sling. The gear is singularly pointed usually with a suspended twine long enough to keep the device retrievable. The gear is complemented with diving implements like makeshift goggles and flippers to assist the spear diver during deep fishing pursuit.

Another fishing accessory used in tandem with spear gun fishing operations is locally made

Scoop net with light (*sikpaw pamolinao*)



Gear specifications:

Netting:	knotless multi PA fine-meshed net (cod end)	Handle:	bamboo pole
		Accessory:	petromax light
Length:	10.0 - 13.2 m		
Diameter:	1.0 - 3.3 m		

air compressor which allow divers to stay for long periods under water. Usually, a group of four to six fishers is formed to complete a compressor fishing outfit and compressor fishers usually dive very deep and stay for long periods of time. Their unawareness on the safety aspects of diving has led to many fatalities and paralysis of fishers around the region and the country as a whole, and this fishing accessory is very dangerous.

Hook and lines

Simple hook and line

A simple hook and line is basically made with one or two hooks. This kind of gear is the most common and versatile type, which can be used both in shallow and offshore waters. A shallow set or bottom set handline uses smaller hooks while offshore and pelagic-oriented gears are complemented with larger hooks. A typical hook and line is constructed with one hook, although with similar features, two hooks or more are used along with the primary hook to add attribute to the gear. A basic hook and line is made of a hook suspended to an extended mainline averaging 100 m in length, usually reeled to a homemade spool of bamboo or wooden cylinder. Operation may last throughout the day until supply of bait is consumed or until desired catch is attained.

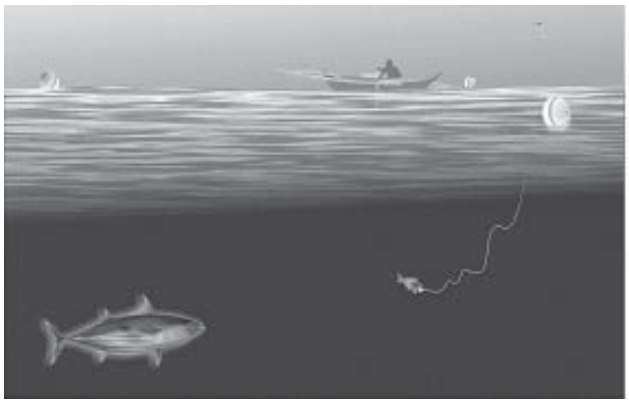
Hook and line with float

This type of single hook and line is accessorized with a float used to set the gear adrift with the current. Customarily, the gear uses a live bait to attract large target fish. The gear is customarily employed in numbers of 5 to 50 units to augment the operative range. Gear operation is typically offshore and in open water to avoid engagement with other gears. Each unit is released at intervals, with several meters of line set loose from the float. The released unit is allowed to move around with the live bait attached. Units are monitored from time to time to avoid loss. In most cases, motorized boats are preferred to better pursue fleeing individuals.

Multiple handline

This type of handline uses multiple hooks suspended equidistant to a mainline. Generally, artificial bait made of silk thread and / or chicken and other bird feathers are used. The basic operation of the gear involves tugging of the line in a regular up and down motion. The time of operation typically falls within the few hours during dawn and dusk periods where a slight portion of the sun lights the sea surface. During these periods, the artificial bait (silk thread) is said to be most attractive to pelagic fish. Occasionally in some areas, a slice of fish or frog's meat is used to complement the artificial bait.

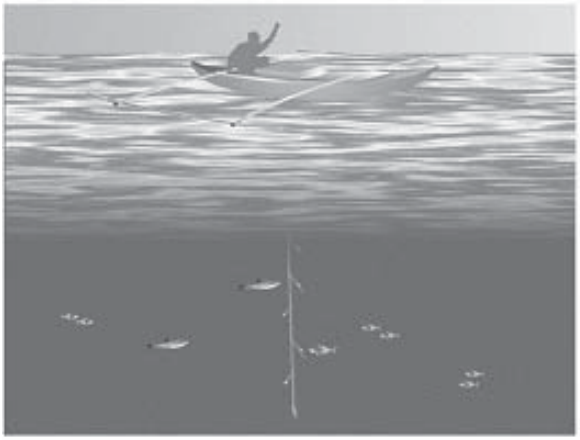
Hook and line with float (*pataw pataw, patlaw*)

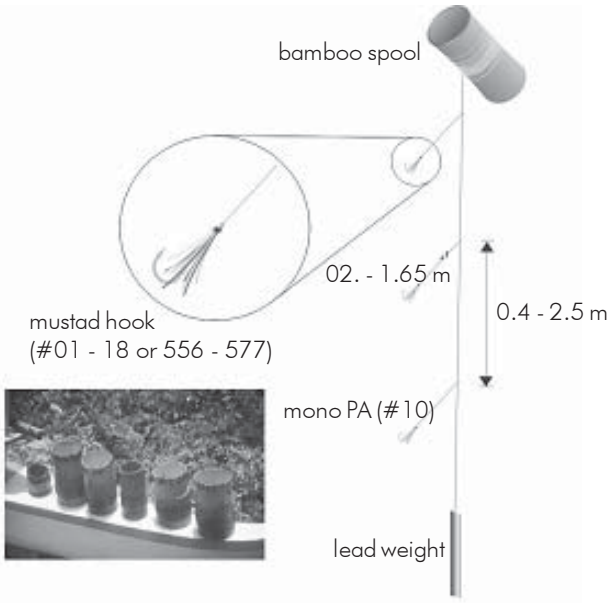


Gear specifications:

Mainline:	monofilament PA (# 120)	Float:	styrofoam or bamboo tube
Branchline:	monofilament PA (# 80)	Sinker:	none
Hook sizes:	01 - 18 or 560 - 572	Bait:	live fish (small pelagics)
Units per setting: 3 - 50			

Multiple handline (*undak, bira-bira*)





Gear specifications:

Mainline: monofilament PA (# 30 - 50)
Branchline: monofilament PA (# 5 - 10)
Number of hooks: 5 - 250 pieces

Float: styrofoam or bamboo tube
Sinker: lead or steel weight
Bait: silk thread, chicken feather, fish meat

Drag handline (*tapsay, bahan, pakaras*)

Gear specifications:

Lead rope: multifilament PE (# 8 - 16)
Mainline: monofilament PA (# 120)
Branchline: monofilament PA (# 80)
Hook sizes: 02 - 17 (large demersals)
557 - 576 (small demersals)
Number of hooks: 10 -16 pieces

Float: synthetic or plastic tubing
Anchor: iron bar (6 kg)
Bait: silk thread, chicken feather, plastic tubings (dextrose hose)

Operation of the gear is also often done near fish aggregating devices where available. Such devices are much preferred by fishers as these enable them to fish throughout the day.

This type of multiple handline is used to catch large pelagics. The gear is operated vertical to the surface, flanked by two motorized boats that move at high speed. Usually, the line is stretched to an utmost length but allowing adjustable sag to attain maximum speed. The outfit usually utilizes an average of 16 hooks at 1-5 m intervals. Typically, the hooks are baited artificially with luminous colored threads protected with transparent dextrose tubing enclosing the hook at its base.

Bottomset longline

A bottomset longline is a fishing line that uses at least 40 up to 1,100 hooks suspended along the length of a mainline primarily to catch demersal fish species. This gear is usually set in deep waters, but in some cases, fishers may opt to set the line from shallow to deep area. A typical outfit is usually installed and kept in a box, hooks placed individually in gaps along the frame of the box to ease the laying of baits. Hooks used range from small to large sizes, depending on the available species by area and depth of fishing ground. Soaking operation of gear is traditionally a 5 to 12-hour procedure and usually an overnight undertaking wherein the fishers leave the outfit until the next day for harvest. However, in most distant fishing grounds, fishers may opt to wait until hauling to reduce operating cost and to avoid loss of gear due primarily to theft. In most cases, fishers also opt to carry out another gear operation during the period of soaking to maximize time and travel.

Surface-set longline

This is a fishing line that uses multiple hooks along a suspended mainline set at mid-section below the water surface. This targets pelagic fish species and is usually set either anchored or adrift during operation. Such gear may consist of 60-1,000 hooks, affixed at equal intervals from each other along the mainline. The gear is basically utilized with larger hooks and baited with a sufficient amount of fish meat to endure a half-day soaking operation.

Troll line

A troll line is basically a multiple handline towed usually by a nonmotorized boat on normal

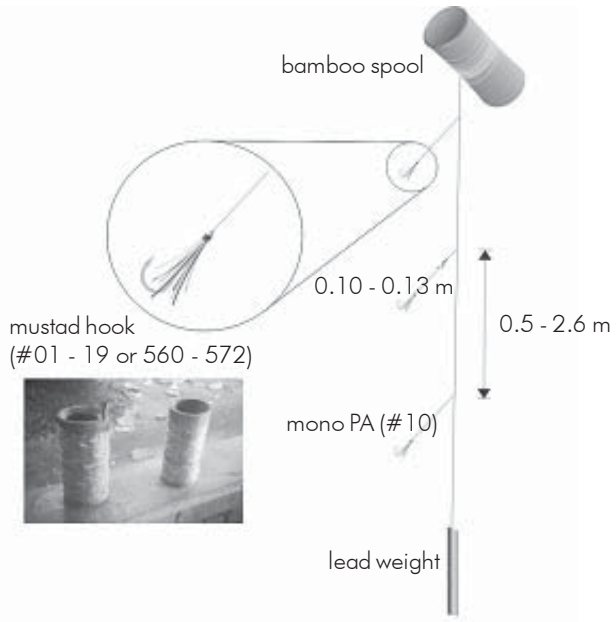
Bottomset longline (*palangre, kitang*)

Gear specifications:

Lead rope:	multifilament PE (# 8 - 16)	Float:	synthetic or plastic tubing
Mainline:	monofilament PA (# 120)	Anchor:	iron bar (6 kg)
Branchline:	monofilament PA (# 80)	Bait:	fish, squid and shrimp meat
Hook sizes:	02 - 17 (large demersals)		
	557 - 576 (small demersals)		

Number of hooks: 10 - 2,000 pieces

Troll line (*subid sa isda*)



Gear specifications:

Mainline:	monofilament PA (# 30 - 50)	Float:	styrofoam or bamboo tube
Branchline:	monofilament PA (# 5 - 10)	Sinker:	lead or steel weight
Number of hooks:	1 - 160 pieces	Bait:	silk thread, chicken feather, fish meat

paddling speed. Operation of the gear involves casting the line into a depth and then dragging it along slowly. In most cases, such operation is more effective when close to fish aggregating devices. Similar to other multiple handlines, a troll line is also artificially baited with silk thread.

Jigs

Fish jig

This type of jig is used specifically to catch *Selar crumenophthalmus (tamarong*). The gear is basically made of a molded lead, which also serves as a weight. The lead is constructed with homemade stainless hooks placed at the base to form a jig. The lead is suspended by a line with an average length of 10 m. The gear uses artificial bait made of colored plastic which is affixed to the line a few cm above the jig. In addition to the artificial bait, some fishers also cast minced fish meat to the water surface to attract nearby fish. When the fisher detects that fish have gathered around the artificial bait, he suddenly yanks the gear in full to hook the fish.

Octopus jig

This jig is designed specifically to attract and catch octopus. The gear is made of lead which is shaped into a fish with added appendages in the sides purposely to entangle an octopus. It is made without hooks since the gear may only serve to entangle the species.

Squid jig

The most common jig typically resembles a lead weight with hooks. The outfit of this type uses bait made of silver paper (usually taken from cigarette boxes). Squids are said to be attracted to the white tint whenever the gear is in motion. Sometimes, the bait is supplemented with slices of squid parts like tentacles to attract other squids. Another type of squid jig is a fashioned figurine of a shrimp. It is made of wood and decorated with colorful paints and weights. The gear is generally operated similar to a troll line on a paddle-boat which moves at a slow speed. Normally in an operation, a single jig is dragged along just below the surface. In some areas, a series of from four to five jigs are used with 2 m intervals between the two jigs.

Squid jig (*subid pangnokus*)

Gear specifications:
Mainline: monofilament PA (# 120)
Branchline: monofilament PA (# 80)
Hook sizes: 560 - 570 (stainless)
Number of hooks: 4 - 8 pieces

Sinker: lead weight
Bait: white paper, squid parts

Squid jig (*subid pangnokus*)

Gear specifications:
Mainline: monofilament PA (# 120)
Branchline: monofilament PA (# 80)
Hook sizes: 560 - 565 (home-made)
Number of hooks: 1 - 5 pieces

Accessories: silk thread, nylon and beads
Sinker: lead weight

Type 2: Traps, Pots and Gillnets (see Table A4-2)

Traps and pots

Bamboo fish trap

This is a unique trap that uses only a bamboo shaft to house and entrap fish which move into the trap to hide. The gear is made with bamboo 1 m in length, hollowed through the nodes and usually set in groups of 30-50 units per setting. The gear has an opening at each end, which fish can enter but may not leave. It is baited with a fish or frog meat placed inside the shaft. Hauling is done on a daily basis, or sometimes for two days or more before retrieval.

Crab liftnet

This is a portable liftnet used in shallow waters to catch crabs. The gear is commonly made with square monofilament netting as base and two intersecting bamboos that form an arch from which hooked bait may be suspended. The gear is attached to a line with a float marker. It

Table A4-1. Hand instruments, hook and lines, and jigs found in Central Visayas and their generic English and local names.

English name	Local name
Hand instruments	
Scoop net	*Sapyaw, sibot, sikpaw*
Scoop net with lights	*Iwag, panulo, panuga, paapong, salakab*
Spear fishing	*Pamana, panungkit, panagi, panirip, sapang, sagangat, gantaaw*
Spear fishing with compressor	*Pana-compressor, buso*
Spear fishing with light	*Pana-panuga, panamal*
Hook and lines	
Bottom set – surface set longline	*Panalabay, pakatay, salabay*
Bottom set longline	*Kitang, palangre, palabay, katay, palagnas, taktakon*
Hook and line	*Pasol, labyog, habyog, tonton, latak, bira-bira, pahawin, padlas, palagdas*
Hook and line with float	*Pataw-pataw, patlaw, palagdas, pahawin, palaktaw, palayaw*
Multiple handline	*Barangay, bira-bira, birik-birik, bunso-bunso, cha-cha, kitang sa payao, lasdak, lago-lo, panonton, bundak, undak, yugyug*
Surface set longline	*Bahan-bahan, tapsay, pakaras, semi-tapsay, missile-missile, subid panulingan, palabay, salabay, pamirit*
Troll line	*Subid, subid-subid, limbag, pambawo, rentex, adis-adis*
Jigs	
Fish jig	*Kab-it, sab-it, saranggat sa gutob/tamarong, saranggat sa danggit/kitong, helicopter*
Octopus jig	*Pangati*
Squid jig	*Angkla, blinker, kati-kati, tina-tina, saranggat, kawil, aranyas, panglumayagan, pangdalupapa, uwang-uwang, subid pangnokos*

is operated in series of 2-50 units set in shallow coastal waters, near mangroves and along rivers. The set gears are checked by the hour throughout the day. Nets with crabs are simply lifted out of the water to harvest.

Crab pot

A typical pot is fashioned with a simple single apical nonreturning valve to serve as the entrance for the crab. The gear is often baited with fish or frog meat placed at mid-section, usually contained in a receptacle to ensure they are not consumed. Outfits are custom-made bamboo woven into a receptacle. Sometimes, the gear is outfitted with synthetic netting on a bamboo frame. Crab pot designs may vary in different areas. The most common is the dome-shaped pot with an apical entry and measures 0.2-0.5 m in diameter. In some areas, the spherical type is more common where a single valve is located at the side.

The gear is usually set at 6-10 m intervals in depths of 5-20 m. One set may consist of 30-100 units. Gear soaking usually takes overnight. Baits may be reused, but ideally, they are replaced daily to be more effective.

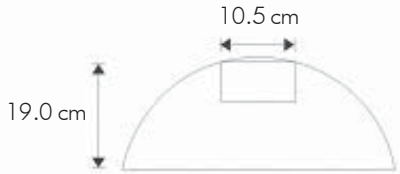
Eel pot

This is a simple homemade pot used specifically to catch eels. The gear is made typically of rattan strings woven into a capsule built with an opening that serves as entrance at one end, and another smaller opening that is secured shut with a stopper at the other end. In some areas, the gear is made from used plastic receptacles or bottles instead of woven rattan. Such alternative material is easily prepared by perforating the bottle surface and then installing a nonreturning valve at mouth opening. Operation is usually carried out in the morning, allowing regular time checks to inspect for any catch.

Fish pot/trap

A fish pot/trap is usually made of bamboo lattice net and wooden frame. It is constructed with one to four nonreturning valves that are placed structurally along the sides of the gear. When the gear is made into large outfits, a maximum of two units are deployed per operation. Usually, however, an average of 5 smaller units are installed and hauled in a day. Medium-sized outfits are harvested in 3-5 days

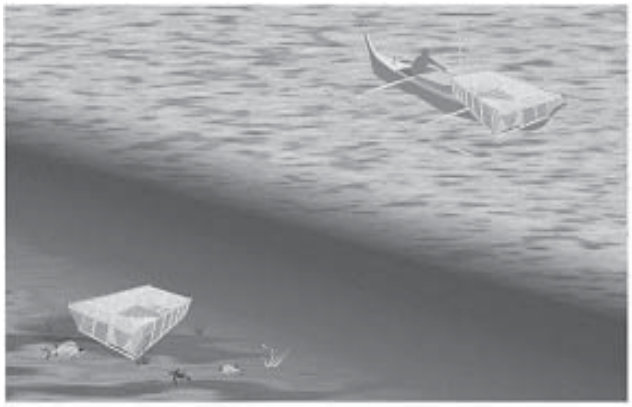
Crab pot (*panggal pangasag, gulo-gulo*)

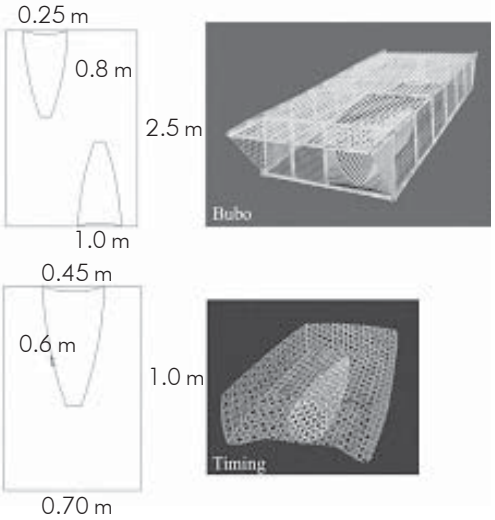


Gear specifications:

Mainline:	bamboo frame bamboo lattice / multi PE net	Riggings Mainline: Branchline:	 multifilament PE multi PE (L=1.0 m)
Dimensions Diameter: Height: NRV ø:	 0.18 - 0.53 m 0.15 - 0.23 m 0.08 - 0.13 m	Units per setting: Interval: Bait:	10 - 120 pieces 6 - 12 m trash fish, frogs and chicken meat

Fish trap (*bubo pangisda, timing*)





Gear specifications:

Materials:	bamboo and wooden frame bamboo lattice net knotless synthetic net multifilament PE netting	Units per setting: Number of NRVs: Interval: Bait:	3 - 50 pieces 1 - 4 1.65 - 16.50 m fish and frog meat

intervals. Large fish traps are well harvested on a monthly basis with regular dive checks to inspect for any harvestable items. With large traps, baits are no longer required. Small fish caught in the gear serve as bait for much larger prize catch.

Shrimp pot

This trap is specifically designed to catch shrimps either along rivers or in estuaries. One outfit consists basically of a cylindrical frame that is covered with fine-meshed netting. A small entrance is constructed on one side, with an inward flap of netting that serves as a

nonreturning device with minced trash fish used as bait. The gear may be suspended above ground using a bamboo pole, which may also serve as a marker. Each marker bears a single outfit. Bamboo poles used to hang the gear are usually placed in depths of 5 m while the traps are suspended 2 m below surface. Alternatively, the traps may be suspended close to the bottom along a main rope. In an operation, 20-30 outfits may be set at 5-m distance from each other.

Squid pot

A squid pot is a simple box-frame trap operated to catch squids using squid eggs as bait. The trap is essentially made of a frame, bamboo slats and sometimes with meshed nettings. An apical entrance is made with an open valve with bamboo slat teeth to prevent escape of caught squids. Multiple units with 2-3 m intervals are set individually, usually to a depth of 10 m. In an operation, 20-50 units may be soaked for several days before harvest.

Gillnets

Bottomset gillnet

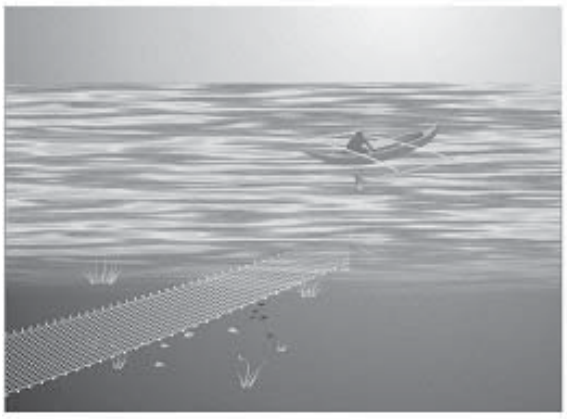
A bottomset gillnet is specifically designed to catch demersal species. It is generally constructed at 1-5 m in depth. Built with at least 1-10 panels, the gear may be set at depths of 2-100 m. Each panel is constructed with an average 130 m in length. The gear is normally employed on overnight soaking operation to a maximum of 24 hours. Sometimes it may be operated by the hour before the net is hauled and relocated to another area for its next operation.

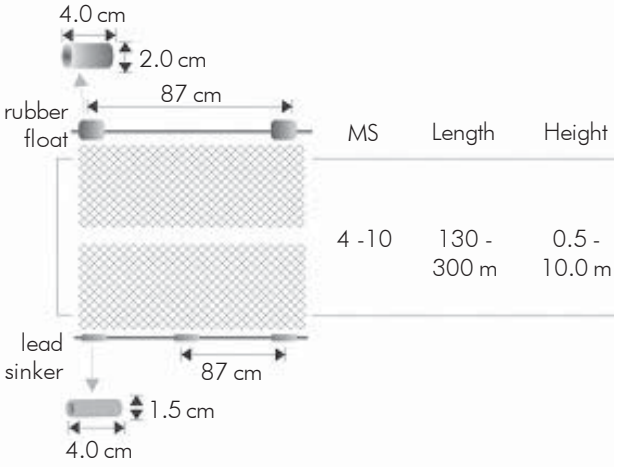
Drift gillnet

This is a type of surface gillnet designed to drift with the current to catch pelagic species. It is generally built with deep-bodied panels, usually with an average height of 12 m. The gear can only use a few number of panels, ranging from 1 to 20 since it may tend to run into other fishing units and even boats during operation. Panels are built with an average length of 80 m, using a range of mesh sizes for particular species in season. This gillnet uses styrofoam buoys with adjustable lines to allow the panels to be lowered to the desired depths. Schools of fish are tracked down according to their swimming depth. Buoys are adjusted one at a time until the desired depth is attained.

This gear is usually placed perpendicular to the projected water current. One type is

Bottomset gillnet (*palundag, palugdang*)

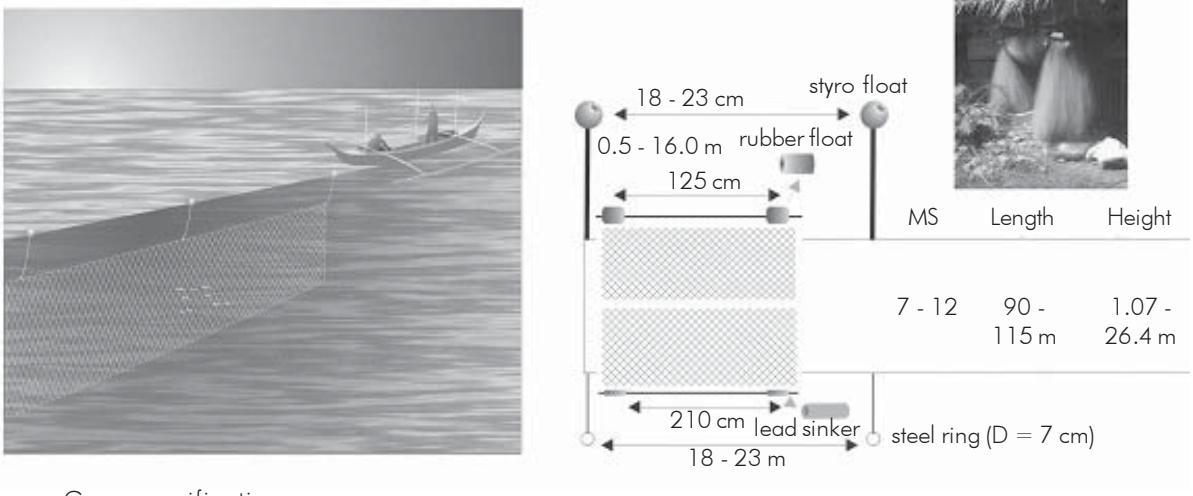




Gear specifications:
Net: monofilament PA (f 10 - 30)
Total length: 300 - 1,000 m
No. of panels: 1 - 12 units
Mainline: multifilament PE (no. 5 -7)

Riggings
Floats: rubber (cylindrical)
Sinker: lead
Buoy marker: synthetic gallon or styrofoam (spherical)
Anchor: iron rod (5 kg)

Drift gillnet (*palaran, kurantay*)



Gear specifications:
Net: monofilament PA (f 10 - 20)
monofilament pamo net (f 1.0 - 1.5 mm)
Total length: 95 - 470 m
No. of panels: 1 - 8 units
Mainline: multifilament PE (no. 5 - 10)

Riggings
Floats: rubber or synthetic (3 x 4 cm)
Sinkers: lead (1.5 x 4 cm, 2 x 3 cm)
Buoy: styrofoam (f 28 - 30 cm)

operated in a zigzag fashion purposely used for species of needlefish and flying fish. This gear is occasionally maintained and adjusted to the figure during operation. Operation requires constant adjustment and maintenance with the setting formation of the gear.

Drive-in gillnet

This is a type of surface gillnet that uses scare lines to drive the school of fish towards the net where they are gilled or entangled. This type requires 1-3 panels which may be used to encircle the fish school. Scare lines are enhanced with plastic straws or strips of synthetic sack to cause commotion once the line is set and heaved enclosing the school of fish. Scare lines can be as long as 200 m.

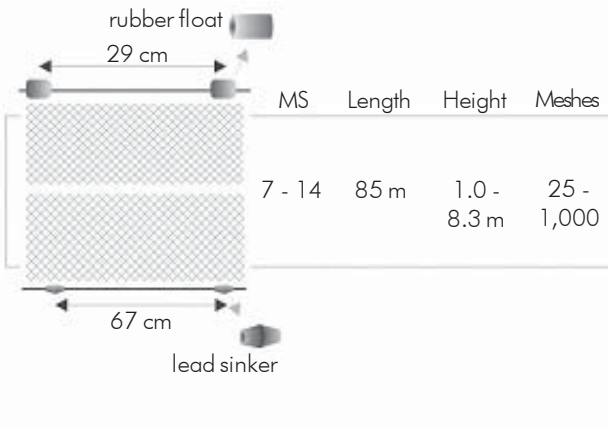
In most cases, the operation requires two motorized boats. Once a fish school is located, the boats pursue the target with the scare line. Flanked by the two boats, the scare line is set to a circular run, allowing it to partially enclose the target. Once the speed and direction of the fish are estimated, the boats will start to surround the moving target. Subsequently, the net is rapidly released encircling the primary boat, while the scare line is continuously heaved to a close by the second boat. As the perimeter of the enclosure becomes smaller, the fish are further driven into the net, and the catch is then hauled.

This gear is sometimes operated at random in search of fish schools. With this method, the operation is carried out briefly and repeatedly in different locations. Often, the gear utilizes a single panel set to the surface in a straight line with two scare lines tied at each end. Each scare line is drawn by a motorized boat, which will guide the line into a circular range, enclosing a prospected fishing area. As each boat reaches the net, the accessory line is immediately heaved manually to a close, driving the fish towards the net.

Encircling gillnet

The mode of operation for this type of surface gillnet is to enclose and capture a detected school of pelagic fish. The gear design is generally similar with any surface gillnet, although a typical operation normally requires a single panel. A panel is usually built with an average length of 100 m and with a depth of 3-25 m. Using a standard mesh size for certain species, each outfit is used only during the specific fishing season of that species. Common

Drive-in gillnet (*sagiwsiw, bahan*)

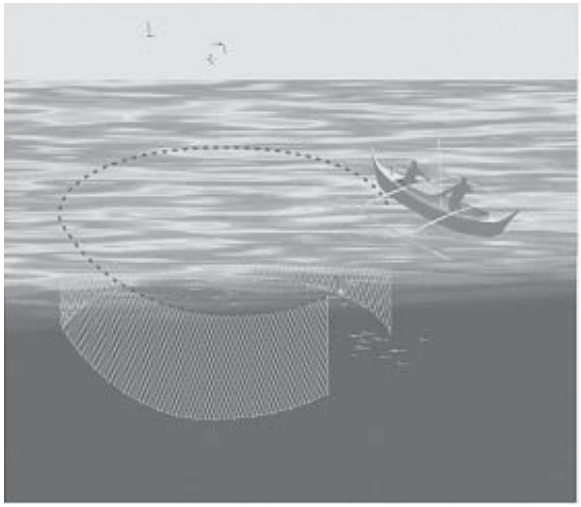


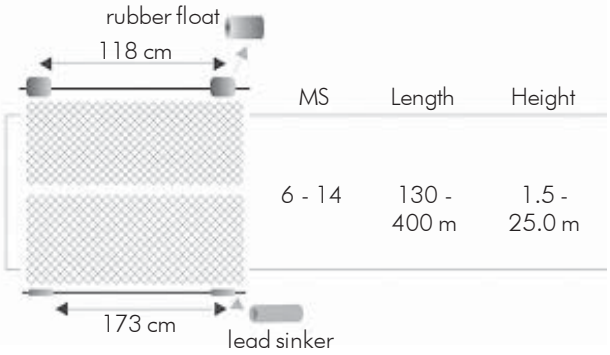
MS	Length	Height	Meshes
7 - 14	85 m	1.0 - 8.3 m	25 - 1,000

Gear specifications:
Net: monofilament PA (f 10 - 20)
Total length: 150 - 500 m
No. of panels: 1 - 6 units
Mainline: multifilament PE (no. 5 - 10)

Riggings
Floats: rubber or synthetic (3 x 4 cm)
Sinkers: lead (1.5 x 4 cm, 2 x 3 cm)
Scareline: multi PE (L = 320 m)

Encircling gillnet (*likos, kayagkag*)





MS	Length	Height
6 - 14	130 - 400 m	1.5 - 25.0 m

Gear specifications:
Net: monofilament PA (f 10 - 20)
monofilament pamo net (f 1.0 - 1.5 mm)
Total length: 330 - 400 m
No. of panels: 1 - 4 units
Mainline: multifilament PE (no. 5 - 10)

Riggings
Floats: rubber or synthetic (3 x 4 cm)
Sinkers: lead (1.5 x 4 cm, 2 x 3 cm)

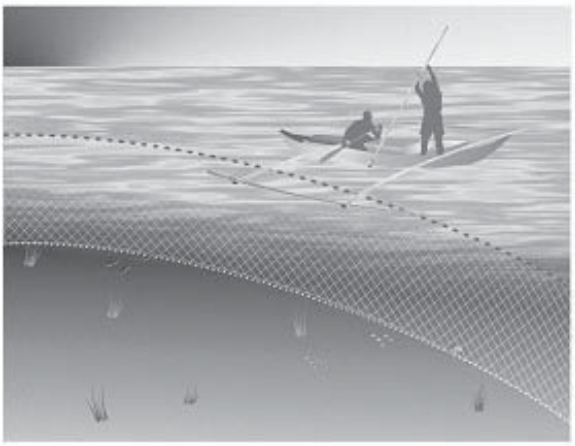
encircling gillnets use 10-12 knot mesh sizes designed to catch herring and sardine species.

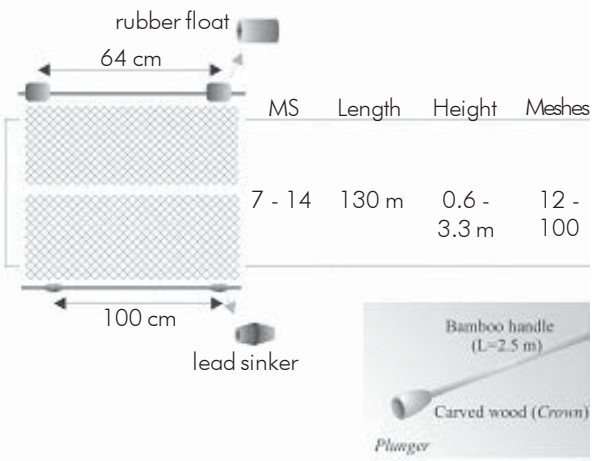
Most of the time, an encircling mode is adapted once the pursued school of fish is located. The fisher, numbering from 3 to 5 in a boat, may undertake up to 5 hauls per trip depending on either the size of the school or boat capacity.

Set gillnet

This type of gillnet is designed and set primarily to a specified zone allowing the gear to suspend afloat while the net is dropped close to the bottom. Its function is to operate in shallow areas to catch schools of fish. In most cases, gillnets are assisted by "plungers" used to redirect the unsuspecting fish with sudden noise towards the net. Plungers are usually made of coconut

Set gillnet with plunger (*lamba, dumbol*)





Gear specifications:
Net: monofilament PA (f 10 - 20)
Total length: 200 - 500 m
No. of panels: 1- 5 units
Mainline: multifilament PE (no. 5 - 10)

Riggings
Floats: rubber or synthetic (3 x 4 cm)
Sinkers: lead (1.5 x 4 cm, 2 x 3 cm)

shell placed at one end of a pole. Sometimes, when plungers are not permitted in the area, stones or even up to 10 swimmers are used as substitute. As the net is released in an open circle, the fishers jump into the water at intervals close to the mouth of the gear. The fishers will then produce noise using their hands, swimming towards the center of the net forcing the enclosed fish to a commotion, and eventually to become gilled or entangled in the net. Set gillnets are commonly designed at 1.65 m in height utilizing mostly a single panel.

Surface-set gillnet

This gear is typically set to obstruct the path of an incoming school of fish. An operation requires a fast phase soaking to hauling scheme to prevent fish from escaping. These gillnets are basically made with panels ranging from 90 to 220 m in length and a standard height of from 8 to 10 m. Mesh sizes usually range from 8 to 14 knots per 6 inches of net stretched out (the standard term used to describe mesh size in a fishing gear).

Trammel net

This type of gillnet employs two or more overlapping meshed panels used to gill and entangle target species. It is usually operated in a short period of soaking and hauling by a single person. It is set along shores and shallow areas to enable a regular checkup of the catch. It may also be operated in coordination with plungers, stone throwing and human scaring to aggregate the fish and cause them to be gilled or entangled, similar to the operation of set gillnets.

Type 3: Impounding Gears, Dragnets and Seines (see Table A4-3)

Impounding gears

Miracle hole

A miracle hole functions as a makeshift artificial reef and is usually made of rocks, palm fronds and other locally available items. The structure is fashioned into a coral habitat where different species of fish are likely to seek shelter and eventually establish territories after some period. It is initially formed by hollowing an area with a diameter of between 1.5 and 5 m, with a depth of 0.25 m. The hole then traps fish after the waters have receded during low tide. The hole is concealed with rocks, mangrove branches and other available materials such as tires. Collection and harvest of fish is done on a monthly basis up to a maximum of 6 months.

Table A4-2. Traps, pots and gillnets found in Central Visayas and their generic English and local names.

English name	Local name
Traps and pots	
Bamboo fish trap	*Dupa-dupa*
Crab liftnet	*Sapyaw, bintol, skylab*
Crab pot	*Panggal panglambay/alimango/kasag, gulo-gulo, ligid*
Eel pot	*Bantak, pangbakasi*
Fish pot	*Bubo pang-isda, panggal pang-isda, palan-an, timing pang-isda*
Nautilus pot	*Bubo panglagang*
Shrimp pot	*Bubo pangsapayan/pasayan*
Squid pot	*Bubo/panggal pangnokos*
Gillnets	
Bottom-set gillnet	*Palundag, patugkad, palubog, palunod, pataan, palagdas, paunlod, pabatang, patayad, kayagkag, kurantay, pamahala, pabhas, lamba, padumog, panglambay*
Drift gillnet	*Paanod, palaran, barangay*
Drive-in gillnet	*Bahan, sagiwsiw, tapsay, taksay, tikab, dagoydoy (pangnokos), kural-kural (pangbalo)*
Encircling gillnet	*Likos, panglihos, kayagkag, tamba*
Gillnet (unspecified)	*Pukot*
Set gillnet	*Bungkol, kayagkag, panggisaw, pamasayan, patulay*
Surface set – encircling gillnet	*Pangnokos, panglumayagan, pangsulid, pang-uwan-uwan*
Surface set gillnet	*Palutaw, hanger, patuloy, patulay, kurantay, patayad, patuong*
Trammel net	Triple-net, double-net, *padlas, paninsin*

Before harvest, a net is used to enclose the structure along with the fish that have sought shelter in it. In areas where the tides recede almost completely, the contained fish can be scooped easily out of the miracle hole during harvest. In most cases, however, the contained fish are forced to swim to the surface by the noise made by beating rocks just above the hole. Sometimes, to ease collection, dangerous poisons such as sodium cyanide, or even the root vine *Tobli* (containing the active chemical rotenone) is used to stun and poison the fish.

Bagnet

This is a liftnet that is operated from a boat. It consists of a fine-meshed net that resembles an inverted mosquito net. The net usually has a diameter of 20 m and a height of 10 m. Each corner of the quadrangular net is suspended by a rope that runs through a pulley. At times an additional rope support is placed at mid-section of the net. Hauling operation commences once schools of fish have gathered under the light. Lighting operations usually last for 3 hours; up to 3 hauls can be carried out a night when conditions are right.

Barrier net

This is a typical gillnet or fine-meshed net set before the onset of the outgoing (ebb) tide to catch schools of fish that move with the receding waters. A barrier net usually consists of a single panel with a length of 30-100 m and with a height of 1 m. In certain areas, it is purportedly as long as a kilometer. The gear is customarily assembled with meshed netting (7 knots).

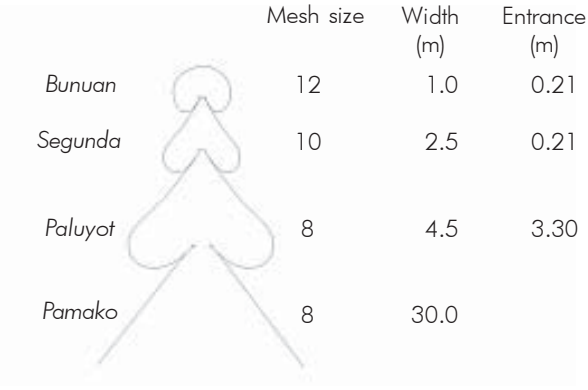
Filter net

This is a passive gear that is usually operated between tides to capture target species. It is made of a conical net suspended in steady bamboo scaffolds. It can be set facing either towards or against the movement of the current.

Fish corral

This gear is generally constructed along the shallow area where the onset of low tide allows its hauling operation. The gear is basically made of bamboo poles as primary structures for support. Dividers and fences are made of knotless mesh nettings. The outfit is typically supplemented with two wings and sometimes a guiding barrier or leader net of 50 m in length to redirect the schools of fish into the compartments.

Fish corral (*bungsod, punot*)



	Mesh size	Width (m)	Entrance (m)
Bunuan	12	1.0	0.21
Segunda	10	2.5	0.21
Paluyot	8	4.5	3.30
Pamako	8	30.0	

Gear specifications:

Net: knotless net
multifilament PE / PVA
Mesh sizes: 16 - 20 knots
Structure: bamboo poles
mangrove branches

Hauling accessory: fine-meshed bagnet
scoop nets
built-in traps

Most fish corrals are built with three compartments, each with a distinctive diameter and access doors leading the fish into the final collecting chamber. In some areas, fish corrals are built offshore and are typically constructed with a single compartment but with attached miniature traps or chambers for collection. These miniature traps are commonly placed at opposite ends of the chamber. Such chambers (*sigin*) are built like trapping devices where the fish are guided into their opening. Caught fish are usually guided into the device by using a fine-meshed net piloted by two fishers. The net is made into a single panel large enough to cover the entire compartment from one end to the other, which will funnel the contained fish to the *sigin* during the harvest operation.

Stationary liftnet

A stationary liftnet is operated effectively during the dark phase of the moon. It uses light to attract schools of fish. The net is usually made of fine-meshed netting fashioned into an inverted mosquito net. The liftnet is operated on a stationary bamboo structure with wooden platforms in waters with depths of 3-5 m. The gear is accessorized with lighting devices or *petromax* (light using gas) to attract schools of fish after dusk. An operation may require at least two fishes when manual winches are available for an effortless hauling. Otherwise, up to 10 fishers may assist in the hauling of the net.

Dragnets and seines

Baby trawl (otter trawl)

An otter trawl consists of a conical net that is operated by dragging the gear to catch fish. The net is constructed with two wings each guided by an otter board that glides in almost opposing direction during the dragging operation. The gear is generally made with a sizeable opening to augment the aperture range during breaching. The net is typically built with an extended rear (cod) end usually customized with a fine-meshed net.

Beach seine

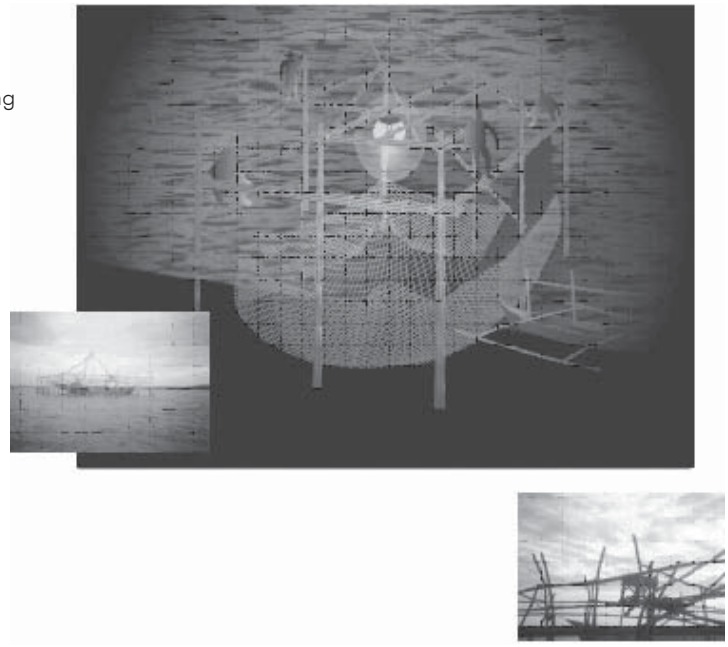
This is a seine net that is usually constructed with an average of 100 m stretch panel of monofilament netting. At the center, a conical end is fitted to a length of 10 m, usually bearing fine-meshed netting. The seine is assembled to cover a depth of 1-7 m of water. The outfit is primarily supplemented with synthetic floats with corresponding sinkers. Operation of the gear is traditionally done on desired sandy beaches normally operating with a maximum of three hauls. Six to twelve persons may be involved in an operation. A beach seine is typically released in a circular range along shores guided by a fisher on a paddled vessel. As the setting of the net is completed, hauling operation is immediately undertaken by drawing

Stationary liftnet (*ne w Look*)

Gear specifications:
Net
- Material: knotless multifilament netting (f 1.5 mm)
- Mesh size: 22 - 28 knots fine-meshed cod end

Platform
- Material: bamboo and wood
- Dimension
  - Width: 10 -15 m
  - Total height: 8 - 15 m

Auxiliary outfits:
- *petromax* lamp
- manual winches
- pulleys (riggings)



the gear to the shore through pull ropes on each wing. The entire hauling operation usually takes several hours to complete.

In some areas, a beach seine is set and hauled offshore, employing a nonmotorized boat as a platform, while a motorized boat maneuvers and guides the nonmotorized vessel to the desired offshore area. Such outfits are found mainly in Negros Oriental, operating mostly within the Tañon Strait.

Ringnet

The basic operation of a ringnet involves paying out the net in a circular fashion and then hauling it by closing the net below through a pull rope. The entire net is typically composed of panels that measure 30-60 m vertically and a total of 20 m horizontally up to the extended wings. The net is fitted with synthetic floats and sinkers, and is complemented with accessory rings used to house the pull ropes.

Danish seine

This type of seine is basically operated with a tom weight used to draw and haul the net. The net is a typical extended panel with a cod end at the center. Each panel or wing serves as an enclosing barrier set in a circular range at the ocean floor. Wings are each suspended with a pull rope usually ornamented with plastic or synthetic strips to scare and guide the enclosed fish into the cod end. Each of the pull ropes or scare lines is drawn through a tom weight purposely to close the net while still at the bottom. The tom weight acts as a pulley through which the pull ropes are fitted and drawn from the boat. The weight is suspended separately from the boat and is hauled in as soon as the hauling of the net is close to completion.

Mechanized pushnet

This is a type of scissor net suspended at the front of a motorized vessel to catch target species (i.e., shrimp and *Acetes* spp.) in deeper waters. The operation of the gear is undertaken with gradual speed, allowing the fish to funnel into the cod end. Outfits are usually built with an opening of 1 m. The net may extend to a total length of 11 m, from the opening to the cod end. The supporting bamboo poles measure 5-8 m in length. Operation is carried out normally in the morning and may last up to 3 hours.

Pushnet or scissor net

A scissor net is a collapsible fishing outfit basically made of screen netting with a cod end, used primarily to catch shrimps and other related species. The net is supported by intersecting bamboo poles bolted at offset center. Each pole is fitted with a wooden shoe at the front end to enable the gear to glide over muddy bottoms. Scissor nets or pushnets are generally assembled with 1-5 m stretch width at the opening. A miniature type of this gear is also in use. It only has a width of 0.6 m and is typically used for small fish targets in shallow shores. A single fisher usually operates the gear by thrusting the outfit forward towards the catch allowing the waters to filter through the net.

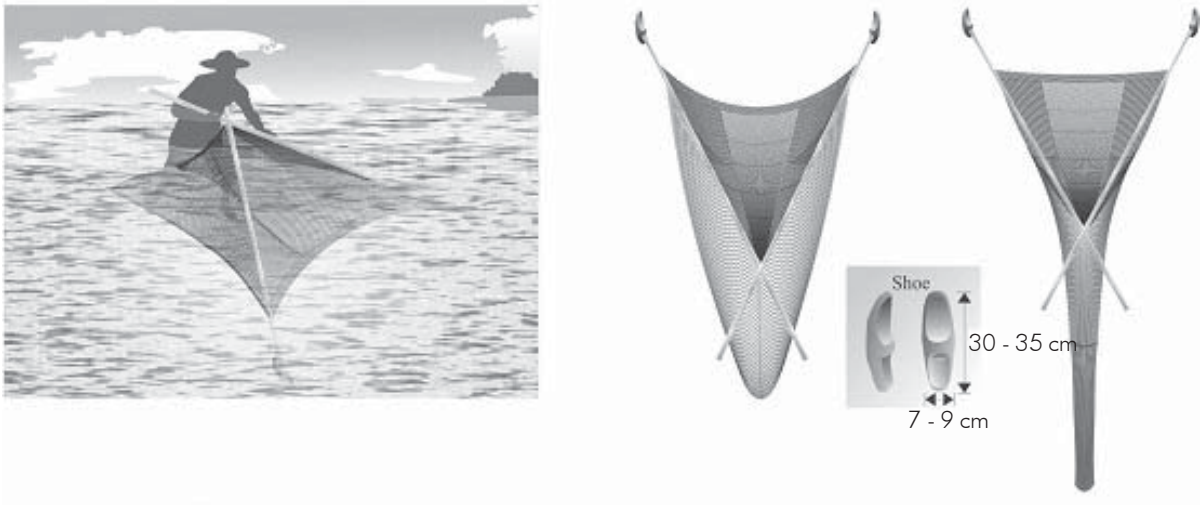
Round haul seine

This is locally known as *lawag* in Danajon Reef and *sabinit* in Tañon Strait areas. The gear generally consists of a conical liftnet with a 5-7 m length cod end. A fine-meshed net is usually adapted for the gear, which catches primarily small species, e.g., anchovies (*Stolephorus sp.).* The conical net is typically constructed with a single floatline with styrofoam floats. At the bottom of the net are corresponding weights called *ungka*. The net is suspended with rope support at each side leading to the vessel. Operation of the gear usually involves two boats called *bandong*, where usually the first vessel bears the net for transport. Headed by a master fisher (*arais*) and a first mate *(segunda)*, each vessel is complemented with a regular crew of 10 (*mangabays*). Most often, the fleet welcomes additional hands (*singalong*) as reinforcement. Each *bandong* comes with a special crew called *donger*, whose specific goal is to keep the vessel stable during the operation.

Each vessel is mounted with a small red lamp to function as a distance indicator between vessels during operation. An operation is usually undertaken with three light boats (*dapitan*). Each leaves ahead of the main boats for the fishing grounds to secure a place for the operation. Light boats require at least 2 hours for accumulating schools before a harvest is initiated. They are operated by a single person called *lamparista*, who directs where and when the net must be laid out.

Usually, the net is positioned against the water current facing the incoming school of fish. The net is deployed between the two boats allowing the second boat to hold one end of the

Scissor net (*sud sud*)



Gear specifications:

Netting:	knotless mono PA multifilament kuralon	Frame:	bamboo poles (L = 2.5 - 3.0 m)
		Shoe:	wood
Mesh size			
	Body: 13 - 22 knots		
	Cod end: fine-meshed net		

Table A4-3. Impounding gears, dragnets and seines found in Central Visayas and their generic English and local names.

English name	Local name
Impounding gears	
Miracle hole (artificial reef)	*Gango, tapal, amatong, atob, bangag, balirong*
Bagnet	*Basnig, tapay, iwag, sabinit*
Barrier net	*Pahubas, pang-ali*
Filter net	*Tangab, lukob, sanggab, pang-uyap*
Fish corral	*Bungsod, pahubas, dumpil, punot, hampas, tower, paugmad, paril*
Liftnet	*Pataan, paatang, sapyaw, sabinit, surambao*
Stationary liftnet	New look, *bintol*
Dragnets and seines	
Baby trawl	*Parakaya, palakaya*
Beach seine	*Baling, sahid, sarap, sabay, dalahis, aghid, agid*
Danish seine	*Hulbot-hulbot, liba-liba, zipper, sipong*
Fry dozer	*Trol, saplad*
Mechanized pushnet	*Baling, baby trawl, sudsud, sudsud pamasayan, sudsud pang-uyabang*
Midwater trawl	*Palupad, sapyaw*
Other seines, seine nets	*Sabinit, pukot binulsahan*
Purse seine	*Kubkub, likum-likum, semi-kubkub*
Pushnets, scissor nets	*Sahid, sudsud, habal-habal, salibot, trawl*
Ringnet	*Likum*
Round haul seine	*Lawag*

net while the first boat pays out the net. Each vessel must be secured with an anchor to keep it stable against the current. A sole *donger* for each vessel is assigned to maintain the position of the boat all throughout the operation. When the net is finally in place, the light boat will gradually maneuver forward, guiding the school of fish under the light to the center of the net. As the light boat nears the center, the net is immediately hauled in, first lifting the bottom part with the weights to secure the catch, and then the rest of the net.

Type 4: Miscellaneous Gears (see Table A4-4)

Castnet

A castnet is a circular outfit that uses meshed netting to catch fish in shallow areas. The gear is complemented with weights at the rim to allow the net to sink instantly to the bottom, thus, containing the fish in range. Basic operation involves casting the net out to a distance covering a maximum portion to enclose fish schools.

Octopus lure

A simple octopus lure may consist of a stone tied at the end of a fishing line. It may be either bare or wrapped with strips of white cloth. Another design makes use of a mollusk shell in lieu of the stone, and it is fitted with hooks at the sides, and sometimes other attractive paraphernalia like colored silk thread. Both the stone and the shell serve primarily to lure the octopus close to shore where the fisher may grasp the octopus bare-hand. Attaching hooks to a shell is an innovative method to secure the octopus that may mistake the mollusk for a meal.

Table A4-4. Miscellaneous fishing gears found in Central Visayas and their generic English and local names.

English name	Local name
Abalone fishing	*Pangkapinan*
Blast fishing	*Paniro*
Castnet	*Laya*
Crab fishing, picking	*Pangkasag, panikop, mano-mano*
Diving for ornamentals	*Sawm pangsimilya*
Gleaning	*Panginhas*
Lobster fishing	*Pangmantaba*
Octopus lure	*Pangtamaa, pangugita*
Poison, rotenone fishing	*Panuble, panghilo, panguskus*
Sea cucumber collecting	*Pangbat, panulo ug bat*
Sea urchin picking	*Panuyom, pangswaki*
Shell dredging (rake)	*Imbaw panginhas*
Shell/pearl diving	*Panawm ug kinhason, sarap*
Sponge diving	*Panawm*
Starfish diving	*Panawm*

Appendix 5
Directory of Participants Involved in the Profiling Process

Bohol

Bolasco,M.E. *Municipal Agriculture Officer, Local Government Unit-Maribojoc*
Boligao, V.R. *Agriculture Technologist, Tubigon*
Galabo, R.T. *Municipal Planning and Development Coordinator, Jagna*
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Piquero, D.D. *Area Coordinator, Environmental Legal Assistance Center (ELAC)*
Regacho, R. *CRM Section Head, BEMO, Tagbilaran City*
Salgados Jr., A.S. *CRM Program Officer, Bohol Environment Management Office (BEMO), Tagbilaran City*
Tuyugon, T.C. *Assistant Professor, Central Visayas State College of Agriculture, Forestry and Technology, Cogtong, Candijay*

Cebu

Alcaria, J.A. *Sr. Science Research Specialist, Department of Environment and Natural Resources, Banilad, Mandaue City*
Amadar, L.B. *Municipal Agriculture Officer, Dumanjug*
Camacho, C.D. *Provincial Police Office, Lahug*
Camongay, Ma. V.L. *Agriculture Technologist, Carmen*
Cielo, A.T. *Aquaculturist, PAO*
Delfierro Sr., A.M. *Operation Officer, Mandaue City Police Office*
Delos Santos, Ma. E.B. *Operations Officer, Police Office, PNP*
Jayson, E.P. *Vice Chair, Municipal Fisheries and Aquatic Resource Management Council (MFARMC), Carmen*
Jusay, A.Y. *Secretary General, Bisayas Alliance of Fishers and Operators for Reform*
Ochea, D.A. *Municipal Agriculture Officer, Liloan*
Rendon, R.R. *Regional PEDO, Police Regional Office – 7*
Villaganas, R.E. *Municipal Agriculture Officer, San Remegio*

Negros Oriental

Aro, L.Y. *Provincial Fishery Officer, BFAR*
Balauro, R.B. *Aquaculture Technologist, Bindoy, Provincial Agriculturist Office (PAO)*
Barillo, M.M. *Coastal Resource Management (CRM) Coordinator, Environment and Natural Resources Division (ENRD), Office of the Governor*
Baugbog, C.A. *Kakasaka Foundation, Inc.*
Dela Peña, J.E. *Project Development Officer, ENRD, Office of the Governor*
Epifras, P.E. *Provincial PEDO, Philippine National Police (PNP)*
Francisco, J.V. *Sr. Aquaculturist, Provincial Agriculturist Office*
Jusay, L.M. P*resident, Bisayas Alliance of Fishers and Operators for Reform*
Majam, R.R. *Sr. Aquaculturist, PAO, Dumaguete City*
Mepaña, F.T. *Provincial Fishery Officer, Bureau of Fisheries and Aquatic Resources (BFAR)*
Merced Jr., A.V. *Executive Director, RTN, Martin "Ting" Matiao Foundation, Inc.*
Stockwell, B.L. *Fisheries Researcher, Silliman University Marine Laboratory*

Siquijor

Arcaya, J.A. *Municipal Agriculture Officer, Larena*
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Estrellada, G.F. *Provincial Planning and Development Coordinator, Siquijor Provincial Government*
Larrobis, C.A. *Deputy Chief, Siquijor Provincial Police Office*
Mamhot, L.Y. *Municipal Planning and Development Coordinator, San Juan*
Miquiabas, V.B. *Director, Research, Development, Planning and Evaluation and Extension, Siquijor State College, Larena*
Tejano, A.M. *Sangguniang Bayan, Enrique Villanueva*

Panel of Reviewers

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Blanco, A.P. *National Director, Project Seahorse Foundation for Marine Conservation*
Canivel, J.A. *Executive Director, ELAC*
Corrales, C.M. *Regional Director, BFAR - Region 7*
Cruz, R.P. *Chief, Economic Development Division, National Economic and Development Authority-Region 7, Cebu City*
Elpusan, B.E. *Administrative Officer, PNP CIDG, Cebu City*
Jatulan, W.P. *Deputy Chief of Party, Coastal Resource Management Project (CRMP)*
Juario, J.V. *Professor, University of the Philippines-Cebu*
Sayson, P. *Chief, Fisheries Resource Management Division, BFAR–Region 7*
White, A.T. *Chief of Party, CRMP*

Others

Arcamo, S. *Chief, Fisheries and Resource Management Division, BFAR Central Office, Quezon City*
Bautista, A.S. *Project Manager, World Wide Fund for Nature-Philippines*
Dasilao Jr., J. *Chief, Marine Research Division, Philippine Council for Aquatic and Marine Research and Development, Laguna*

Commercial Fishing Operators

Banggay, A. *(ringnet, Dumaguete City)*
Capundag, J. *(licom, San Juan)*
Chavez, E. and Chavez, C. *(ringnet, Tagbilaran City)*
Chavez, V. and Chavez, V. *(Danish seine, Bantayan)*
Ducay, A. *(Danish seine, Bantayan)*
Ducay, S. *(Danish seine, Bantayan)*
Guillena, S. *(ringnet, Dauis)*
Ipon, V. *(hook and line, Bayawan City)*
Kaquilala, F. *(Danish seine, Bantayan)*
Kaquilala, T. *(Danish seine, Bantayan)*
Santillan, C. *(Danish seine, Bantayan)*

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Book 2: Legal and jurisdictional framework for coastal management

Book 3: Coastal resource management planning

Book 4: Involving communities in coastal management

Book 5: Managing coastal habitats and marine protected areas

Book 6: Managing municipal fisheries

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This profile provides a comprehensive snapshot of the state of fisheries, and their supporting habitats and marine environment in the Central Visayas. It makes essential current information accessible so that fisheries stakeholders and agencies can plan for much improved coastal and fisheries management in the region. With such information, policy and management decisions will be informed on how to bring back fisheries to sustainable levels of use. Enhanced coastal economies and social well being as well as a healthier marine environment can be some of the fruits of acting on the data and recommendations contained in this profile.

An Initiative of the Department of Agriculture-Bureau of Fisheries and Aquatic Resources 7
in collaboration with the Coastal Resource Management Project
of the Department of Environment and Natural Resources, Regional Development Council of Region 7,
Provincial and Municipal Local Government Units of Bohol, Cebu, Negros Oriental and Siquijor.