Coastal Environmental Profile of

Negros Oriental Philippines

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Michael R. Alcala

COASTAL ENVIRONMENTAL PROFILE
OF
NEGROS ORIENTAL, PHILIPPINES

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Coastal Resource Management Project

of the

Department of Environment and Natural Resources

supported by the

United States Agency for International Development

2001

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2001
PRINTED IN CEBU CITY, PHILIPPINES

Citation: Yambao, A.C., A.T. White, W.E. Ablong and M.R. Alcala. 2001. *Coastal Environmental Profile of Negros Oriental, Philippines*. Coastal Resource Management Project, Cebu City, Philippines, 107 p.

This publication was made possible through support provided by the United States Agency for International Development (USAID) through Silliman University (Cooperative Agreement No. 492-0444-A-00-5110-00) and under the terms and conditions of Contract No. AID-492-C-00-96-00028-00 supporting the Coastal Resource Management Project. The opinions expressed herein are those of the author and do not necessarily reflect the views of the USAID. This publication may be reproduced or quoted in other publications as long as proper reference is made to the source.

Production: Ms. Leticia B. Dizon edited this document and Leslie S. Tinapay did the layout, cover design and graphics.

Photo credits: CRMP-Ting Matiao Foundation Staff

CRMP Document No. 29-CRM/2001

ISBN 971-92290-2-0

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ACRONYMS and ABBREVIATIONS

AFMA	Agriculture and Fisheries Modernization Act
BFAR	Bureau of Fisheries and Aquatic Resources
CAB	Central Azucarera de Bais
CBFMA	Community-Based Forest Management Agreement
CEMRINO	Centre for the Establishment of Marine Reserves in Negros Oriental
CENRO	Community Environment and Natural Resources Office
COE-CRM	Center of Excellence in Coastal Resource Management
CPDO	City Planning and Development Office
CPUE	catch per unit effort
CRM	coastal resource management
CRMP	Coastal Resource Management Project
DA	Department of Agriculture
DECS	Department of Education, Culture and Sports
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DND	Department of National Defense
DOST	Department of Science and Technology
DOTC	Department of Transport and Communications
ENRMD	Environment and Natural Resources Management Division
ERMP	Environmental Resource Management Project
FARMC	Fisheries and Aquatic Resources Management Council
ha	hectare
ICM	integrated coastal management
IEMP	Industrial and Environmental Management Project
IPUE	income per unit effort
km	kilometer
LEAP	Legal Environmental Advocacy Programme
LGC	Local Government Code
LGU	local government unit
MARINA	Maritime Industry Development Authority
MPDO	Municipal Planning Development Office0
MPN	most probable number
NEDA	National Economic and Development Authority
NGA	National government agency
NGO	nongovernment organization
NIPAS	National Integrated Protected Areas System
NPC	National Power Corporation
NSO	National Statistics Office
PAO	Provincial Agriculturist's Office
PCAMRD	Philippine Council for Aquatic and Marine Research and Development
PCG	Philippine Coast Guard

PCRA	participatory coastal resource assessment
PCRMC	Provincial Coastal Resource Management Council
PDC	Provincial Development Council
PDIP	Provincial Development and Investment Plan
PENRO	Provincial Environment and Natural Resources Office
PNP	Philippine National Police
PNP-MARICOM	Philippine Maritime Command
PPA	Philippine Ports Authority
PPDO	Provincial Planning Development Office
PSSD	Philippine Strategy for Sustainable Development
RA	Republic Act
RDC	Regional Development Council
SEP	Strategic Environmental Plan
SP	*Sangguniang Panlalawigan*
SUML	Silliman University Marine Laboratory
TMF	Ting Matiao Foundation
TWG	Technical Working Group
UNCLOS	United Nations Convention on the Law of the Sea
URSUMCO	Universal Robina Sugar Milling Company
USAID	United States Agency for International Development

ACKNOWLEDGMENTS

The preparation of this *Coastal Environmental Profile of Negros Oriental, Philippines* was made possible because of the assistance provided by the following local government units and national government agencies, nongovernment organizations, academic institutions, and people's organizations:

Provincial Government of Negros Oriental
Municipal Government of Manjuyod
City Government of Bais
City Government of Tanjay
Municipal Government of Amlan
Municipal Government of San Jose
Municipal Government of Sibulan
City Government of Dumaguete
Municipal Government of Bacong
Municipal Government of Dauin
Municipal Government of Siaton
Municipal Government of Zamboangita
Environment and Natural Resources Management Division
Department of Environment and Natural Resources (PENRO and CENRO)
National Statistics Office
Rotarian Martin "Ting" Matiao Foundation
Silliman University Marine Laboratory
Silliman University Center of Excellence in Coastal Resource Management (COE-CRM)
Fisheries and Aquatic Resources Management Councils (FARMCs) in the profile area, and those who participated in the conduct of PCRA in the area

The Coastal Resource Management Project (CRMP), an initiative of the Government of the Philippines funded by the United States Agency for International Development (USAID) and implemented by the Department of Environment and Natural Resources (DENR), is credited with overall support for this profile. The CRMP at the Negros Oriental Learning Area has been implemented with the Rotarian Martin "Ting" Matiao Foundation (TMF), an NGO working on community development and environmental management.

The following were also instrumental in the completion of this profile: Ms. Christy Bojos and Mr. Rey Bendijo, for the editorial comments and Jennifer M. Murphy, a CRMP student intern from the University of Washington, School of Marine Affairs; and the CRMP Negros Oriental Learning Area Staff.

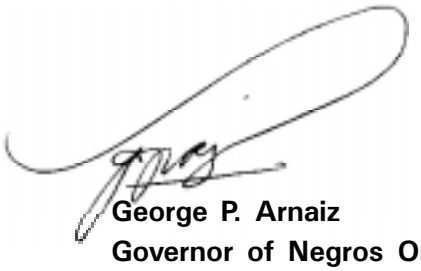
FOREWORD from the GOVERNOR

The promotion of ecologically sustainable development is an essential component of the Provincial Government's overall development thrust. In fact, in 1995, Negros Oriental received the "*Galing Pook*" award for excellence in innovation on local governance with regard to community-based resource management. Basically, a coastal province (only 3 out of 25 LGUs do not have coastlines), majority of the province's 1 million inhabitants feed on fish and other marine products daily. This is one of the reasons why coastal resource management (CRM) is high on its development agenda.

The Province is fortunate to be 1 of the 6 learning areas in the Philippines for the Coastal Resource Management Project (CRMP) of the United States Agency for International Development (USAID). Through CRMP's technical and training assistance, the province now has a growing number of people who are well-trained in CRM. Most of our coastal municipalities and cities have also adopted the best CRM practices. Some of them have allocated in their annual budgets sizeable amounts to advance CRM activities. A leading example is the Municipality of Sibulan which is 1 of 6 winners of this year's National Search for the Best Coastal Management Programs of the League of Municipalities of the Philippines.

I congratulate CRMP-Philippines for coming up with this *Coastal Environmental Profile of Negros Oriental*, the first of its kind in the province. As a source of information, this publication will certainly be of great help to researchers, planners, policy and decision-makers at all levels in formulating policies and programs to improve CRM. This profile also serves to strengthen our capacity to enhance coastal management efforts in the province and elsewhere. Our gratitude to CRMP for this initiative.

It is my hope that the users of this profile will collectively work for the sustainable management of our coastal resources for the economic and environmental well-being of our province.



George P. Arnaiz
Governor of Negros Oriental

PREFACE

Negros Oriental is distinguished by its long history of implementation of coastal management activities and projects. Management of the Negros coastal resources starting in the late 1970s has focused on the prevention and eradication of illegal and destructive fishing activities; the protection of coral reefs and seagrass beds through marine sanctuaries; the minimization of waste disposal into marine waters; and some restoration of mangrove and reef habitats. These forward looking projects have helped minimize losses from coastal habitat degradation and even attracted more support for such efforts.

The Coastal Resource Management Project for precisely this reason selected Negros as 1 of its 6 "learning areas". The keen intent of the local governments to improve their capability in managing coastal resources was an important factor. Now the Negros experience in coastal management is advancing again and becoming one of the first such profiles upon which to bare more carefully designed management plans. Indeed, in some ways the real implementation phase for Negros is only beginning.

This environmental profile provides an accessible body of information to guide coastal planning and management in the years to come. New data will come from monitoring the status of the Negros coasts but these new data will only have meaning in relation to a baseline which is summarized herein. The profile also provides many recommended policies for plans to be made at the municipal and provincial levels. It is hoped that Negros Oriental will continue to lead the way in protecting its coasts and that this profile will assist to refine the process.

The benefits derived from coastal resources in the Philippines and Negros Oriental cannot easily be measured, but if they are lost, many people will suffer and the loss will not be easily replaced. This profile is one important step closer to achieving integrated coastal management in Negros Oriental -- let us use it wisely.

Chapter 1
INTRODUCTION

BACKGROUND

Development of coastal areas is increasing all over the world, and this is no less true in the Philippines. With this development, there is increased pressure on marine resources and habitats. Many areas in the Philippines are struggling with the simultaneous needs for development and protection of their resources. This increasing pressure on the marine environment requires that effective and sustainable management be adopted in order to preserve and restore the habitats and resources for current and future generations.

The province of Negros Oriental, located in central Philippines, is endowed with vast marine resources that now, due to various pressures, are overexploited. The impact of such overexploitation is extensive in the coastal area. Most families there depend upon fisheries for their livelihood and a greater number supplement their diet with protein from the catch of part-time fishing or the gleaning of shallows at low tide. In addition, siltation, lack of wastewater treatment facilities and destructive fishing methods are degrading the marine habitats which support the marine resources.

In an effort to stem the tide of resource overexploitation and habitat destruction, Negros Oriental, with the help of the Coastal Resource Management Project (CRMP), is implementing integrated coastal management (ICM). Through the ICM process, community members, local government units (LGUs), resource users, nongovernment organizations (NGOs) and others participate in a process that will address these problems and improve conditions in the coastal area. Negros Oriental has a long history of involvement in CRM and therefore provides a strong foundation from which to begin the ICM process, which is a more comprehensive approach to CRM.

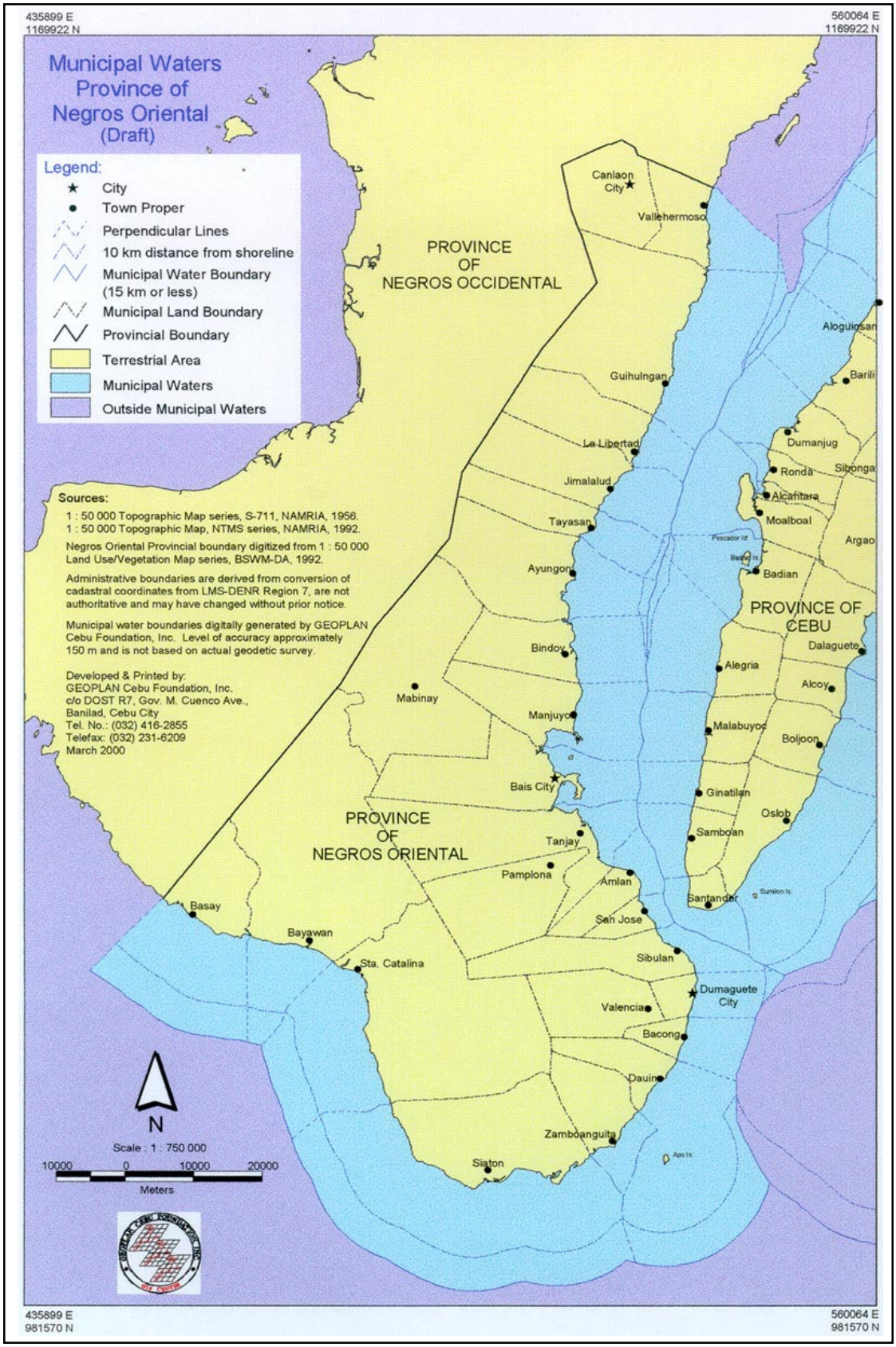


Figure 1.1. Municipal water boundaries of Negros Oriental (unofficial map).

The profile area in Negros Oriental covers 6 coastal municipalities and 3 cities, and 72 coastal *barangays*, including 3 islands. These 6 municipalities and 3 cities have a total land area of 1,592.5 km^2 and the 72 coastal *barangays* have a total population of 139,750 (NSO 1995). The profile area coastline covers 162 km. The northernmost municipality in the profile area is Manjuyod and the southernmost municipality is Siaton (Figure 1.1).

The municipality of Siaton was added to the profile area as an expansion site. It has a total area of 335.4 km^2 and covers a coastline of 51 km. The municipality comprises 14 coastal *barangays* with a population of 39,858 (NSO 1995).

SUMMARY OF COASTAL MANAGEMENT ISSUES

Community-based organizations, LGUs and community members themselves have identified many environmental issues and concerns that face the province of Negros Oriental. These prevailing issues and problems can be grouped into 3 categories: environmental, socioeconomic, and institutional and legal. The most pressing issues affecting the coastal area are:

- habitat destruction and degradation of coastal environment;
- depletion of resources and overfishing;
- destructive and illegal fishing practices;
- population pressure;
- lack of waste disposal facilities and pollution problems; and
- lack of planning and weakness in institutional capacities.

OBJECTIVES OF THIS PROFILE

This profile is an initial step in identifying different management issues and concerns to be addressed by the local communities, planners, and government agencies. This profile contains physical, geographical, biological, and socioeconomic characteristics of the profile area which provide a common starting point for management planning and establish baseline data for subsequent monitoring. The overall aim is to promote an integrated CRM for Negros Oriental that centers on sustainable resource use and management of the coastal resources.

The specific objectives are to:

- provide a source of information on the ecosystems, resources, and socioeconomic conditions of the area for planners, managers, researchers, communities, and government agencies;
- provide baseline data for subsequent monitoring and assessment, and identify critical gaps in data and information which may have to be filled through new research;
- identify key resource management issues, constraints, and opportunities for management and development of coastal resources; and

- provide a management tool for decision-making and implementation of integrated and community-based CRM.

The information used and compiled in this profile is based on both primary and secondary sources. The secondary data come from municipal and provincial profiles, reports, maps, government files, and research data. Primary data sources include firsthand interviews and surveys with local resource users, government units, and community members.

Chapter 2
PARTICIPATORY COASTAL RESOURCE ASSESSMENT

Participatory coastal resource assessment, or PCRA, is a method of assessing the status of the resources with extensive participation and contribution from the local resource users (Walters *et al*. 1998). Through this process, the local communities and outside facilitators are able to get a general picture of the area for making plans and programs for the sustainable use and management of the coastal and fisheries resources.

In the profile area, prior to the conduct of PCRA, CRM trainers in each of the municipality and city were identified. The CRM trainers are composed of representatives from the Municipal/City Planning Development Offices, representatives from the *barangay* councils, *Bantay Dagat*, fishers' organizations, NGOs, provincial and national government agencies were chosen by the respective *Sangguniang Bayan* and *Panlungsod* of the LGUs concerned.

The initial task of the CRM trainers was the facilitation of PCRA in their respective municipality and city. A training on PCRA was conducted for them. After a thorough preparation by the trainers, PCRA was conducted in the pilot *barangays*.

IDENTIFICATION OF PILOT *BARANGAYS* FOR THE CONDUCT OF PCRA

Based on a guideline and eligibility criteria prepared by the CRMP and the LGUs shown in Table 2.1, the following were chosen as pilot PCRA *barangays*:

Manjuyod (Campuyo and Bolisong)
Bais (Okiot and Capiñahan)
Tanjay (Polo and Luca)
Amlan (Jugno and Tandayag)

Sibulan (Agan-an and Cangmating)
Dumaguete (Banilad and Bantayan)
Bacong (Buntis and San Miguel)
Dauin (Bulak and Apo Island/Lipayo)

During the PCRA, the municipal trainers conducted resource mapping, group interviews, and habitat assessment.

RESOURCE MAPPING AND THE PCRA PROCESS

Resource mapping involves indicating vital data on a 1:20,000 scale map of each municipality and city. Four types of data were indicated on the map: location of habitats, resources, uses, and issues. Habitats were drawn in the map using color codes: yellow for sandy beaches, brown for rocky shoreline, orange for inshore flats, dark green for mangroves, blue for estuary, dark blue for passes or channels, light green for seagrass, and red for coral reefs (Figure 2.1).

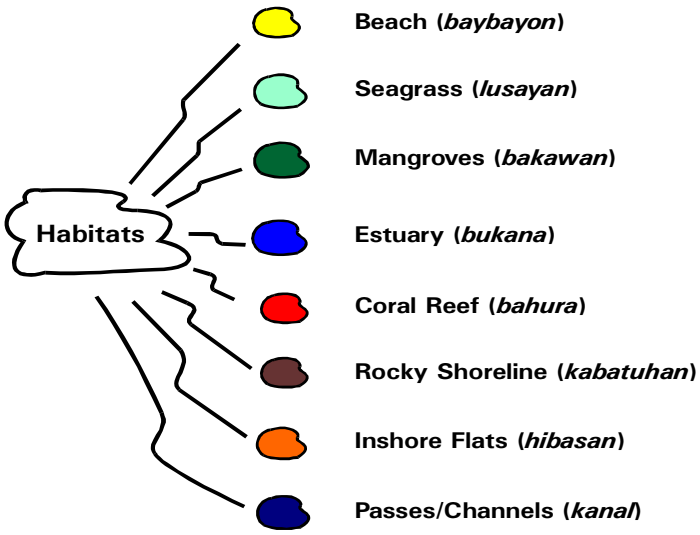


Figure 2.1. Habitats identified by the PCRA participants in the profile area.

Most abundant fish and other important resources found in the coastal area were also located in the map. The species of fish, invertebrates, seaweeds, and seagrasses were indicated in the map using number codes (Figure 2.2).

Pressing and relevant issues on the use and management of the coastal and fisheries resources were also mapped. Letters were used as code and placed on the map where such issues occurred.

Table 2.1. Guideline and eligibility criteria for the selection of participating *barangays* and fishers.

Municipality of Bacong	POINTS	Banilad	Sacsac	North Poblacion	South Poblacion	Buntis	San Miguel
CRITERIA	**Barangays**						
1. Must have marine habitats							
a. coastal forests	1						
b. beach	1						
c. tidal flat	1						
d. seagrass bed	1						
e. coral reef	1						
f. deep water	1						
2. Must have existing CRM initiative/activities							
a. marine sanctuary	1						
b. artificial reef	1						
c. mangrove reforestation/management	1						
d. aquaculture/seafarming	1						
3. Number of municipal fishers							
a. 251 - Above	6						
b. 201 - 250	5						
c. 151 - 200	4						
d. 101 - 150	3						
e. 50 - 100	2						
f. 1 - 49	1						
4. Has *Bantay-Dagat* organization							
a. active	2						
b. inactive	1						
5. Has fishers' association							
a. active	2						
b. inactive	1						
6. Has resource use issues/problems							
a. encroachment of commercial fishing	1						
b. destructive/illegal fishing	1						
c. squatting	1						
d. water pollution	1						
e. sand and water extraction	1						
f. siltation	1						
7. Interest/willingness to participate	1						
8. LGU priority	4						
9. Has proposed agro-industrial tourism, infrastructure development activities							
a. agro-industrial	1						
b. tourism	1						
c. squatting	1						
d. housing	1						
e. transport	1						
HIGHEST POSSIBLE SCORE	37						
RANK							

continued

Table 2.1. continued

Municipality of Bacong	POINTS										
CRITERIA	**NAME OF FISHER**										
FISHERFOLK											
1. Fishers											
a. full-time	2										
b. part-time	1										
2. Involvement in *Bantay Dagat*											
a. president	3										
b. officer	2										
c. member	1										
3. Involvement in fishers' association											
a. president	3										
b. officer	2										
c. member	1										
4. Involvement in CRM activities											
a. marine sanctuary	1										
b. artificial reefs	1										
c. mangrove reforestation/management	1										
d. aquaculture/seafarming	1										
5. Capability/potential to become a trainor	1										
6. Willingness to participate	1										
7. LGU priority	3										
HIGHEST POSSIBLE SCORE	17										
RANK											

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EVALUATED BY:

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APPROVED BY:

_____
CITY/MUNICIPAL MAYOR

DATE APPROVED: _____

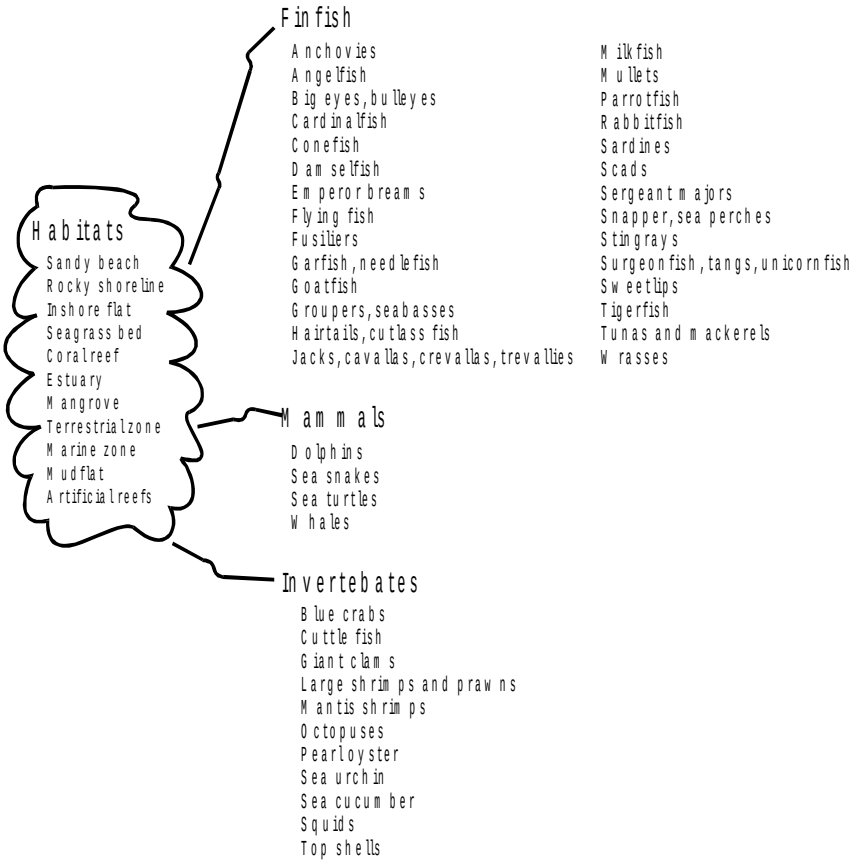


Figure 2.2. Coastal resources identified by the PCRA participants in the profile area.

Transect diagrams were also prepared to indicate the resources, uses, and issues in relation to the habitats found in the area (Figure 2.3). Calendar maps that show the monthly rainfall and wind patterns and the seasonal use of fishing gear were also prepared (Figure 2.4). Trend maps indicating the fish catch through a period of time were also prepared in each of the pilot *barangays* within the profile area (Figure 2.5).

To get critical information, such as socioeconomic and demographic, sociopolitical dynamics and livelihood activities, interview is the most effective tool. However, because of limited time, the municipal trainers conducted the group interviews. The group interviews became an avenue to gain in-depth analysis of sociopolitical activities as well as issues in the community.

Habitat assessment was conducted to evaluate the 4 coastal habitats in the municipalities and cities based on a simplified set of criteria (Figure 2.6). Other members of the communities were also involved in the habitat assessment.

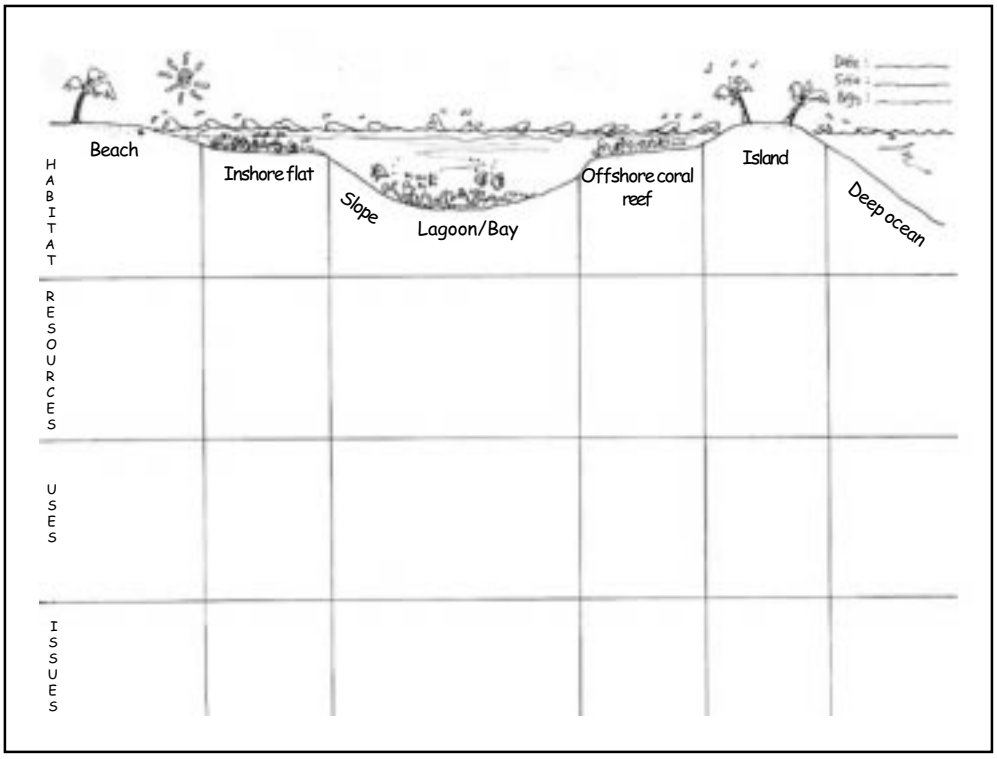


Figure 2.3. Transcect diagram.

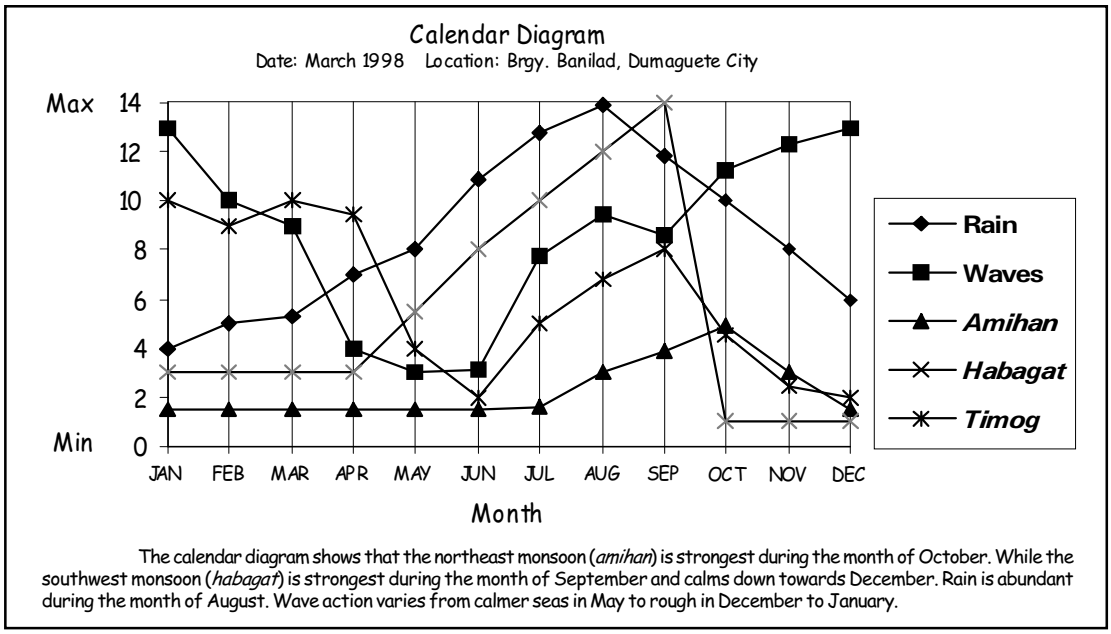


Figure 2.4. Calendar diagram for weather patterns in Barangay Banilad, Dumaguete City.

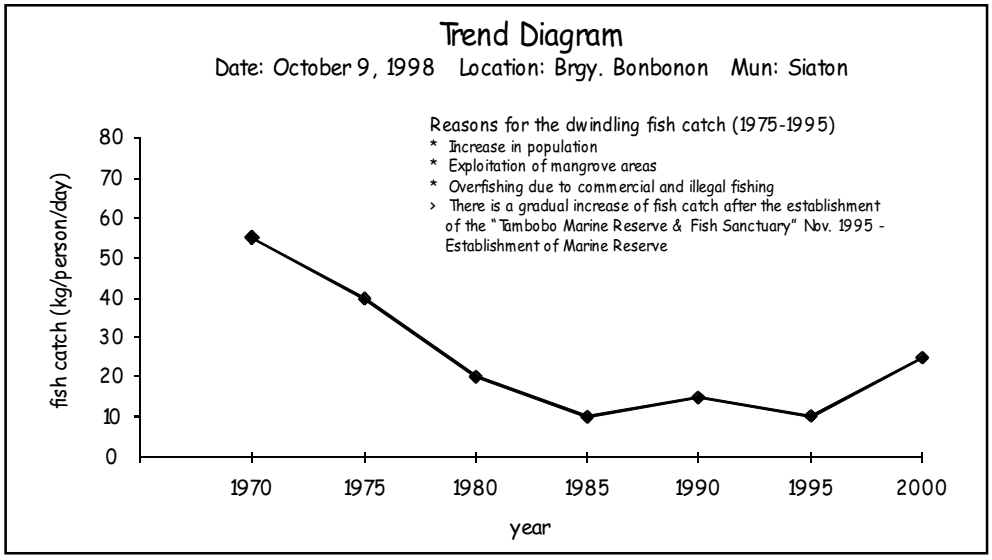


Figure 2.5. Trend diagram for Barangay Bonbonon, Siaton.

After the conduct of PCRA, feedback and validation sessions were conducted to ensure reliability of the data gathered. Copies of the results of the PCRA were given to the municipal trainers and the LGUs.

CONDITION	BEACH	SEAGRASS	CORAL REEF	MANGROVE
Excellent	Undisturbed wide beach	76-100% Live seagrass, no sediment	76-100% Live Coral Cover	76-100% No cutting or disturbance
Good	Undisturbed narrow beach	51-75% Suspended sediments only	51-75% Live Coral Cover	51-75% Cutting for firewood, poles
Fair	Some pollution, erosion, fallen trees	26-50% Seasonal sedimentation on bottom	26-50% Live Coral Cover	26-50% Fishponds
Poor/Low	Heavy pollution, seawalls, major erosion, modification	0-25% Permanent sedimentation on bottom	0-25% Live Coral Cover	0-25% Land or trees removed, reclamation

Figure 2.6. Simplified set of criteria for habitat assessment.

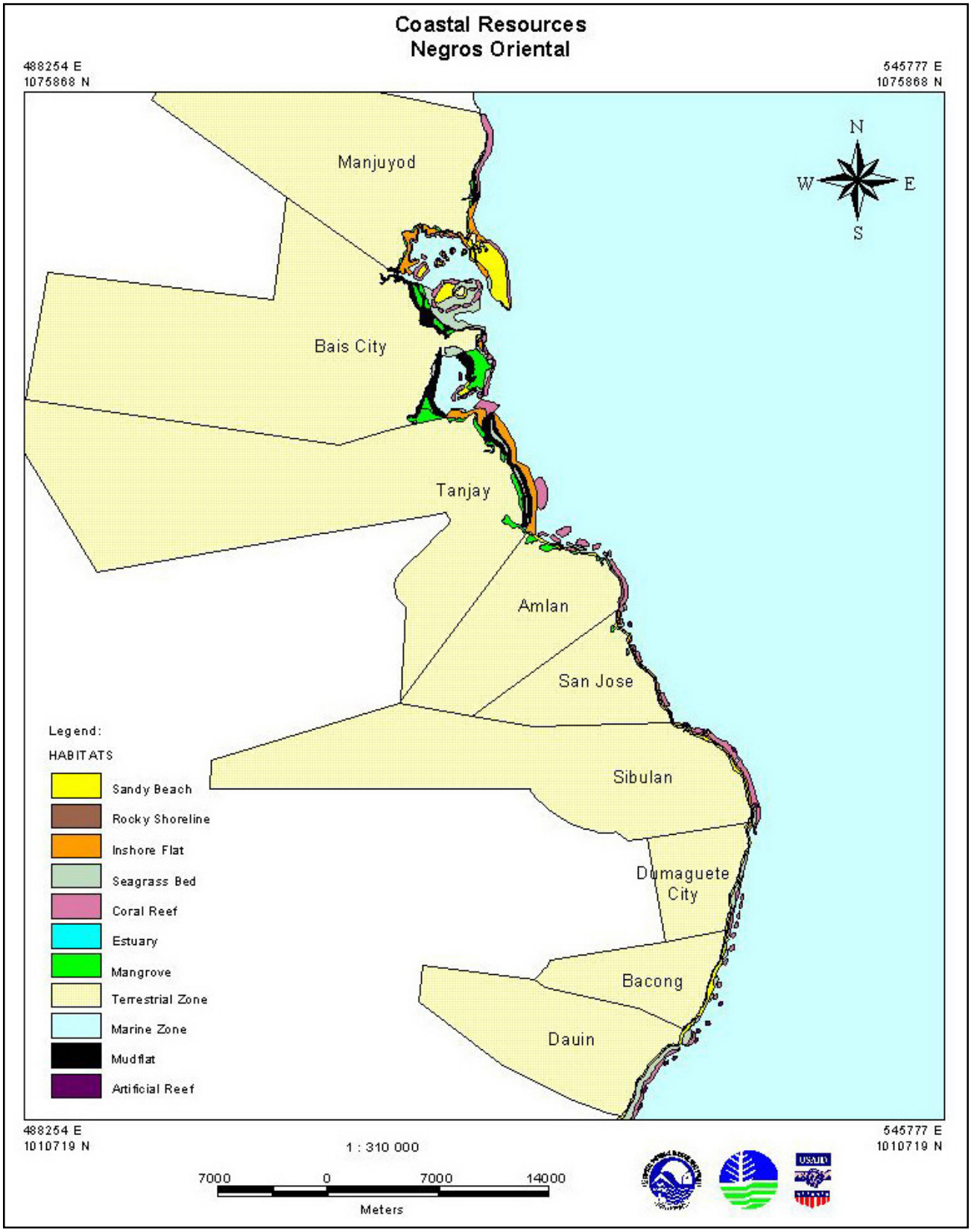


Figure 2.7. Coastal resource map of Negros Oriental.

PCRA RESULTS

The 3 cities and 6 municipalities where PCRA was conducted are shown on Figure 2.7. The habitats are mapped and comprise a narrow band along the shoreline which is expanded in separate maps. The total area of habitats is listed below:

Area per Habitat (Whole Profile Area)

Sandy beach	1,219 ha
Rocky shoreline	107 ha
Inshore flat	1,049 ha
Seagrass bed	1,255 ha
Coral reef	1,589 ha
Estuary	25 ha
Mangrove	861 ha
Mudflat	948 ha
Artificial reef	93 ha

Amlan

Of the 8 *barangays* of Amlan, 5 are coastal. Around 90 percent of the population live near the coastal area; the entire population is dependent on fisheries.

As seen in Figure 2.8, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 119 ha
- Inshore flat 107 ha
- Seagrass bed 160 ha
- Coral reef 95 ha
- Estuary 12 ha
- Mangrove 47 ha
- Mudflat 175 ha

The most abundant fishery resources are fusiliers, milkfish, tunas and mackerels, blue crabs, mantis shrimps, and octopuses.

AMLAN FACTS AND FIGURES

Barangays (8): Bio-os, Jantianon, Jugno, Mag-abo, Poblacion, Silab, Tambojangin, Tandayag

Coastal *Barangays* (5): Bio-os, Jugno, Mag-abo, Poblacion, Tandayag

Total Land Area: 5,900 ha

Length of Coastline: 7 km

The coastal resources of Amlan are most affected by problems of overfishing, beach and shoreline erosion, siltation, mangrove overharvesting, encroachment by fishers from other municipalities, lack of security of tenure on land and/or home lot. Fishing methods used are bottom set gill nets, fish and crab pots, hook and lines, hand lines, jiggers, spears, and mariculture. Specific resources, uses, and issues in the 5 coastal *barangays* of Amlan are presented in Figure 2.9.

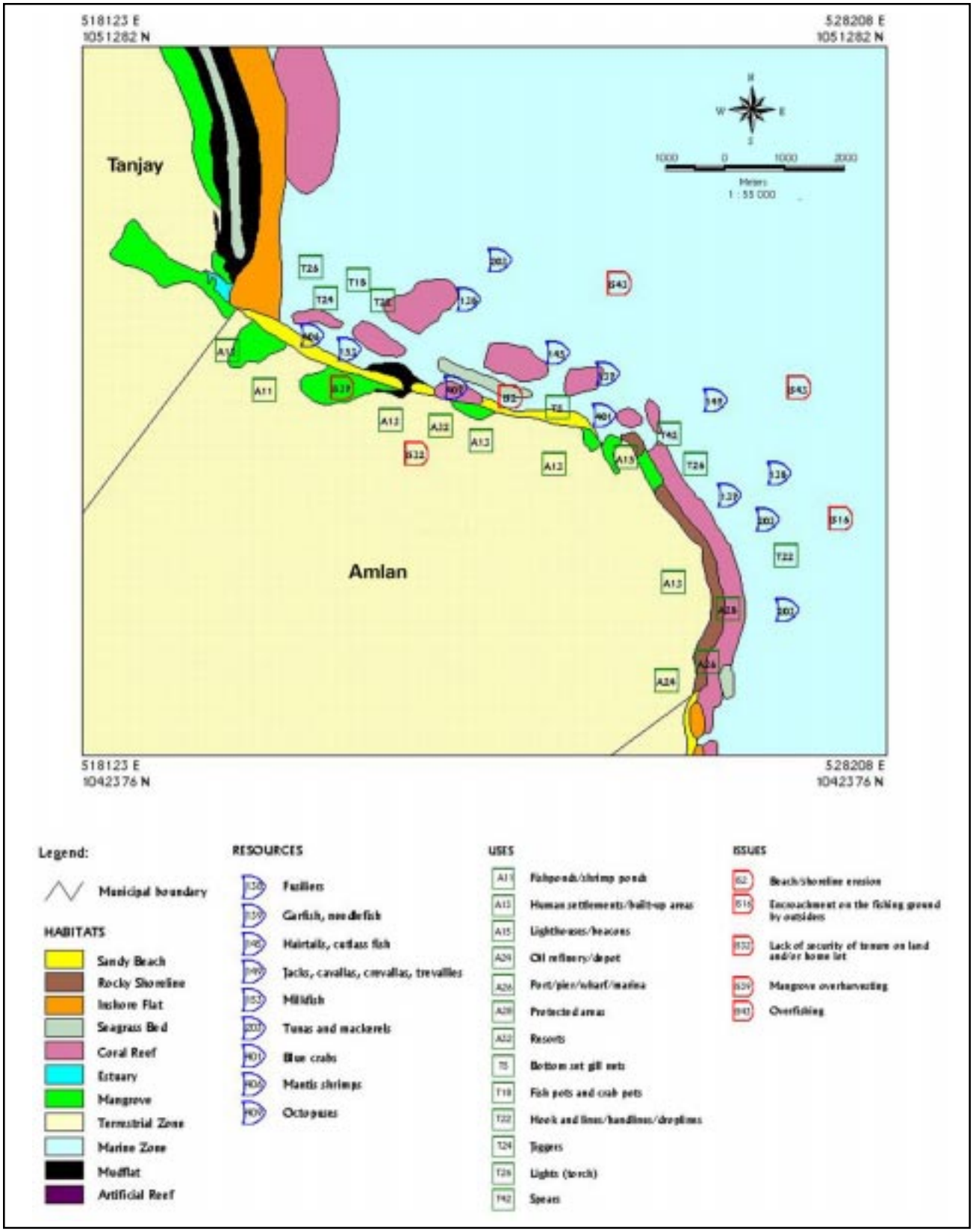


Figure 2.8. Coastal resource map of Amlan.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	*tubo*, *balay*, *tindahan*, beach houses, *lubi*, *bomba*, *nipa*, *saging*, cable station, *kahoy*, *bebe*, *baboyan*, *sakayan*, *talisay*, *pato*, *sapa*	*sakayan*, l*ubi nga nangatumba*, *alagukoy*, trawl, *atabay*, *kagang*, *banca*, *bulularan sa isda*, *sahid*, *talisay*, *isda*	*alagukoy*, *baboy*, *manok*, *hipan*, *sakayan*, trawl, *kawayang tinapok*, shells, *lambay*, *balat*, *hipon*, eel, *oso-os*, *pasayan*, *bangus* fry	shell, *lambay*, *balat*, *hipan*, *tuyom*, *bahagbahag*, *danggit*, *katambak*, *botbot*, *balawis*, *kasag*, star fish, *salawaki*	*iho*, *kinsan*, *tamarong*, *anduhaw*, *litki*, *mayamaya*, *lapu-lapu*, *mamsa*, *takot*, *gabon*, *palata*, *botete*, *kugita*, *holikihok*, *alibangbang*, *solid*, *indangan*, *kulansihan*, *timbungan*, *tiki*, *mamsa*, *quiampao*
Uses	*pagkaon*, *materyales*, *baligya*, *kalamay*, *puloy-an sa katawhan*	*panagat*, *panginabuhi*, *kaon-baligya-materyales*, *panginabuhi sa katawhan*, *panguha sa isda*, *para paglaba*, *panghugas*, *salakayan*, *bularan*, *pasilonganan*	*pagkaon*, *baligya*, *makatunok*, *makatunok apan makaon*, *dili makaon*, *ika baligya*, *paon sa isda*	*pagkaon*, *bihod*, *makatunok*, *mabaligya*, *makadaot*	
Issues	*baha*, *mga sagbot*, *dili maayong talan-awon sa umalage*	*mga binalibag nga* plastic, *mga basiyo nga lata*, *batak nga bildo*, *mga bunot*, *tinag-an nga saging*, *baha*	*makita sa honasan nga ang mga lata nag-igdal sa balas*	*minos ug kuha*, *maayo ang lusay kay makapasilong ang mga isda*	

Figure 2.9. Amlan transect diagram (Barangay Jugno).

Bacong

Of the 22 *barangays* of Bacong, 7 are coastal. Although only 47.33 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.10, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 116 ha
- Inshore flat 28 ha
- Seagrass bed 56 ha
- Coral reef 86 ha

The most abundant fishery resources are fusiliers, goatfish, snappers, surgeon fish, tunas, and mackerels. Fishing methods used are hook and lines, hand lines, drop lines, fish and crab pots, bottom set gill nets, and spears.

The coastal resources of Bacong are beset by problems and issues such as beach/soil erosion, encroachment on the fishing grounds by outsiders, lack of alternative livelihood, overfishing, and quarrying/sand and gravel extraction. Specific resources, uses, and issues in the 7 coastal *barangays* of Bacong are presented in Figure 2.11.

BACONG FACTS AND FIGURES

Barangays (22): Balayagmanok, Banilad, Buntis, Buntod, Calangag, Combado, Doldol, Isugan, Liptong, Lutao, Magsuhot, Malabago, Mampas, North Poblacion, Sacsac, San Miguel, South Poblacion, Sulodpan, Timbanga, Timbao, Tubod, West Poblacion

Coastal *Barangays* (7): Banilad, Buntis, North Poblacion, Sacsac, San Miguel, South Poblacion, West Poblacion

Total Land Area: 4,126 ha

Length of Coastline: 7 km

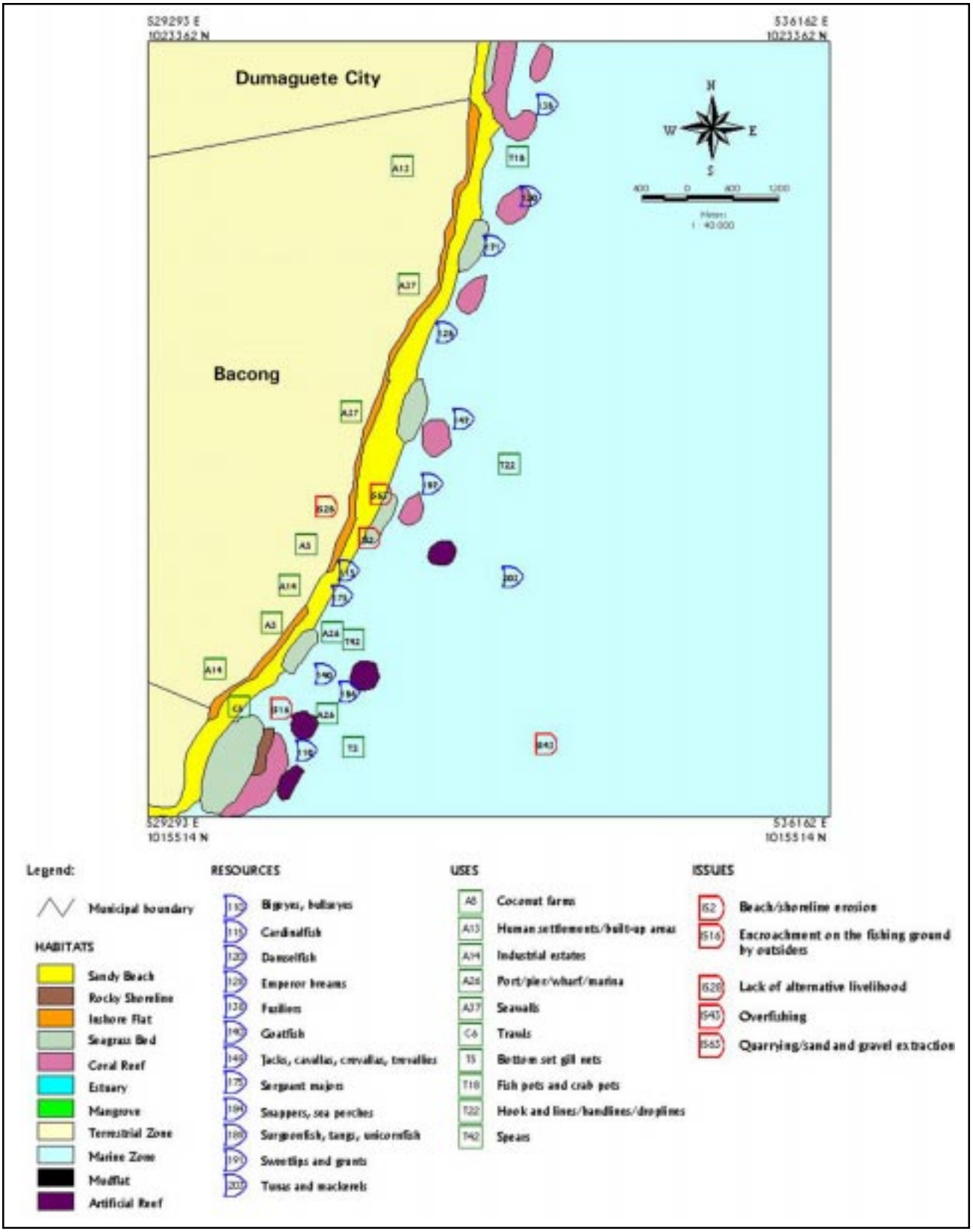


Figure 2.10. Coastal resource map of Bacong.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	squash, banana, coconut, *saksak*, *nipa*, bougainvilla, people, bamboos, grasses, *kangkong*, cucumber, ampalaya, tomatoes, string beans, ricefields, eggplant, cows, carabaos, chicken, pigs, houses, ducks, goat, trees, *tabagsoy*	*banca*, mangrove, cottages, fish ponds, *talisay* trees, coconuts, chicken, pigs, houses, starfish, crabs, fish traps, algae, beach sand, fishing net, dead corals, beach resort, carabao, chapel	seaweeds, *alagukoy*, fish, starfish, stones, crabs, algae, cottages, mangroves, dead trees, *bancas*	fishes, corals, seagrass	
Uses	vegetation, crop production, housing purposes, food, shelter, beautification	tourism, shade, foods, recreation purposes, tourism, food, shelter	firewood, food, tourism, fishing, fish nurseries	fish shelter, breeding place, food	
Issues	waste	waste	waste		

Figure 2.11. Bacong transect diagram (Barangay Banilad).

Bais City

Of the 35 *barangays* of Bais, 13 are coastal. Although only 24 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.12, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 316 ha
- Rocky shoreline 17 ha
- Inshore flat 49 ha
- Seagrass bed 677 ha
- Coral reef 343 ha
- Mangrove 344 ha
- Mudflat 511 ha

The most abundant fishery resources are anchovies, fusiliers, groupers, milkfish, mullets, rabbitfish, slipmouth, and oyster.

The coastal resources of Bais are beset by problems and issues such as encroachment by fishers from neighboring municipalities, lack of security of tenure on land and/or home lot, and overfishing. Fishing methods used are fish cages, fish and crab pots, hook and lines, hand lines, troll lines, and mariculture. Specific resources, uses, and issues in the 13 coastal *barangays* of Bais are presented in Figure 2.13.

BAIS FACTS AND FIGURES

Barangays (35): Barangay 1 (Poblacion), Barangay 2, Basak, Biñohon, Cabanlutan, Calasgaan, Cambagahan, Cambaguio, Cambajao, Cambuilao, Canlargo, Capiñahan, Consolacion, Dansulan, Hangyad, Katacgahan, La Paz, Lonoy, Looc, Mabunao, Manlipac, Mansangaban, Okiot (Pulong Dako), Olympia, Panala-an, Panam-angan, Rosario, Sab-ahan, San Isidro, Tagpo, Talongon, Tamisu, Tamogong, Tangcologan, Valencia

Coastal *Barangays* (13): Barangay 2, Biñohon, Calasgaan, Cambuilao, Canlargo, Capiñahan, Looc, Okiot (Pulong Dako), Olympia, San Isidro, Talongon, Tamisu, Tangcologan

Total Land Area: 31,700 ha

Length of Coastline: 30 km

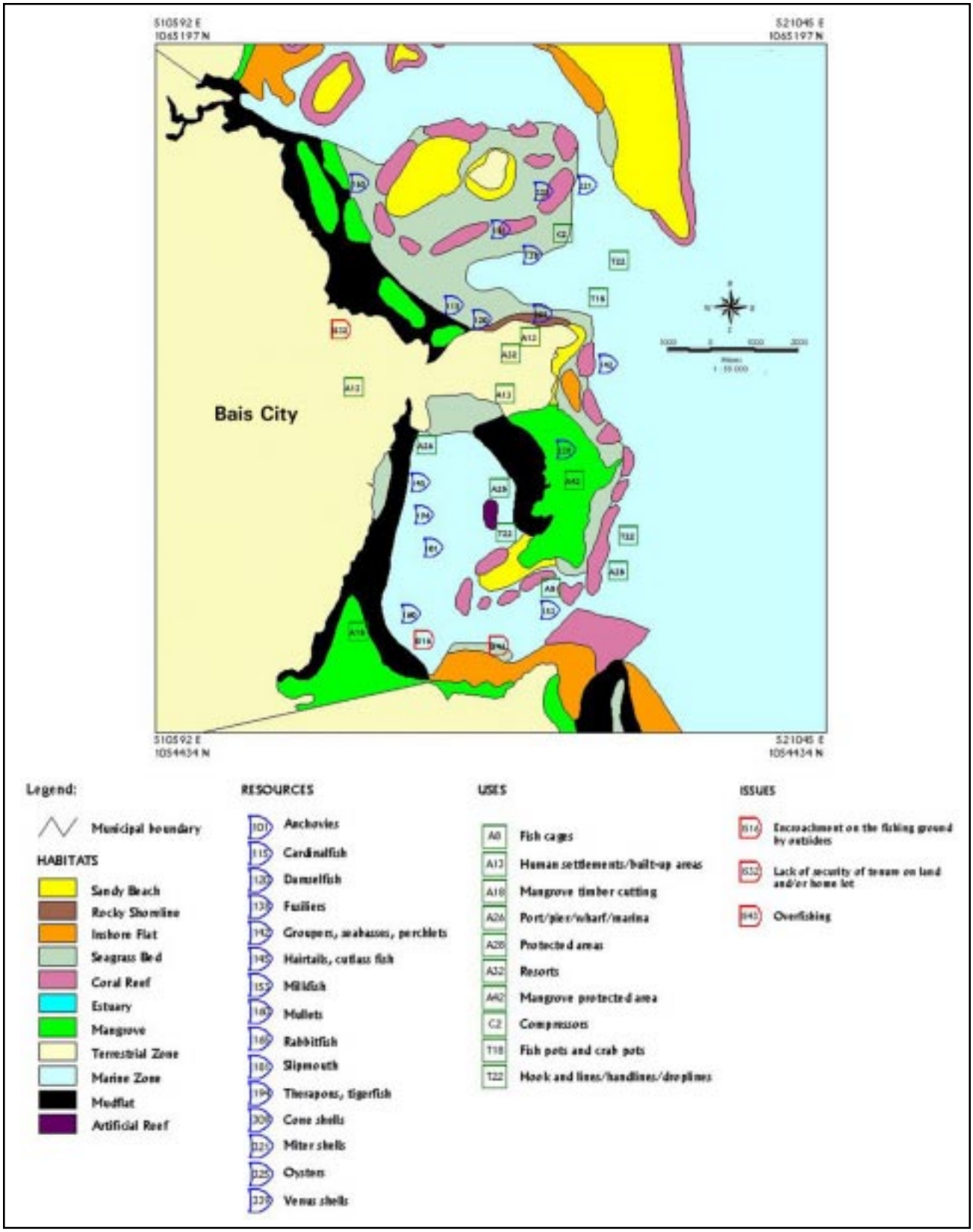


Figure 2.12. Coastal resource map of Bais.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	fruit trees, rocks, houses, bamboo trees, basketball court, cottages	houses, buildings, *sisi*, *dalo-dalo*, *tamasakan*, *bersala*, *dagokoy*	*aninikad*, *lokot*, *danggit*, *tamasakan*, crabs, *bigiw*	*palata*, *ibis*, *kapal*, *lambayan*	*danggit*, *molmol*, *balo*
Uses	food, family dwelling, recreation, commercial purposes	food, family dwelling, commercial uses	food consumption, commercial	food consumption, commercial uses	food consumption, commercial uses
Issues	presence of solid wastes, no toilets, unpaid loans	presence of solid wastes	*nagkadyutay ang isda ug kinhason*	*nagkadyutay ang mga isda*	*nagkadyutay ang mga isda*

Figure 2.13. Bais transect diagram (Barangay Okiot).

Dauin

Of the 23 *barangays* of Dauin, 9 are coastal. Although only 48 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.14, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 125 ha
- Rocky shoreline 1 ha
- Inshore flat 1 ha
- Seagrass bed 24 ha
- Coral reef 12 ha

The most abundant fishery resources are anchovies, flying fish, jacks, snappers, and tunas and mackerels. Fishing methods used are gleaning, bottom set gill nets, fish and crab pots, hook and lines, hand lines, drop lines and spears.

The coastal resources of Dauin are beset by problems and issues such as encroachment on the fishing grounds by outsiders, illegal fishing, overfishing, and, administrative and legal issues. Specific resources, uses, and issues in the 9 coastal *barangays* of Dauin are presented in Figure 2.15.

DAUIN FACTS AND FIGURES

Barangays (23): Anahawan, Apo Island, Bagacay, Baslay, Batuhon Dako, Boloc-Boloc, Bulak, Bunga, Casile, Libjo, Lipayo, Maayong Tubig, Mag-aso, Magsaysay, Masaplod Norte, Masaplod Sur, Mulungay Dako, Panubtuban, Poblacion District 1, Poblacion District 2, Poblacion District 3, Tugawe, Tunga-tunga

Coastal *Barangays* (9): Apo Island, Bulak, Lipayo, Maayong Tubig, Masaplod Norte, Masaplod Sur, Poblacion District 1, Poblacion District 2, Poblacion District 3

Total Land Area: 11,400 ha

Length of Coastline: 10 km

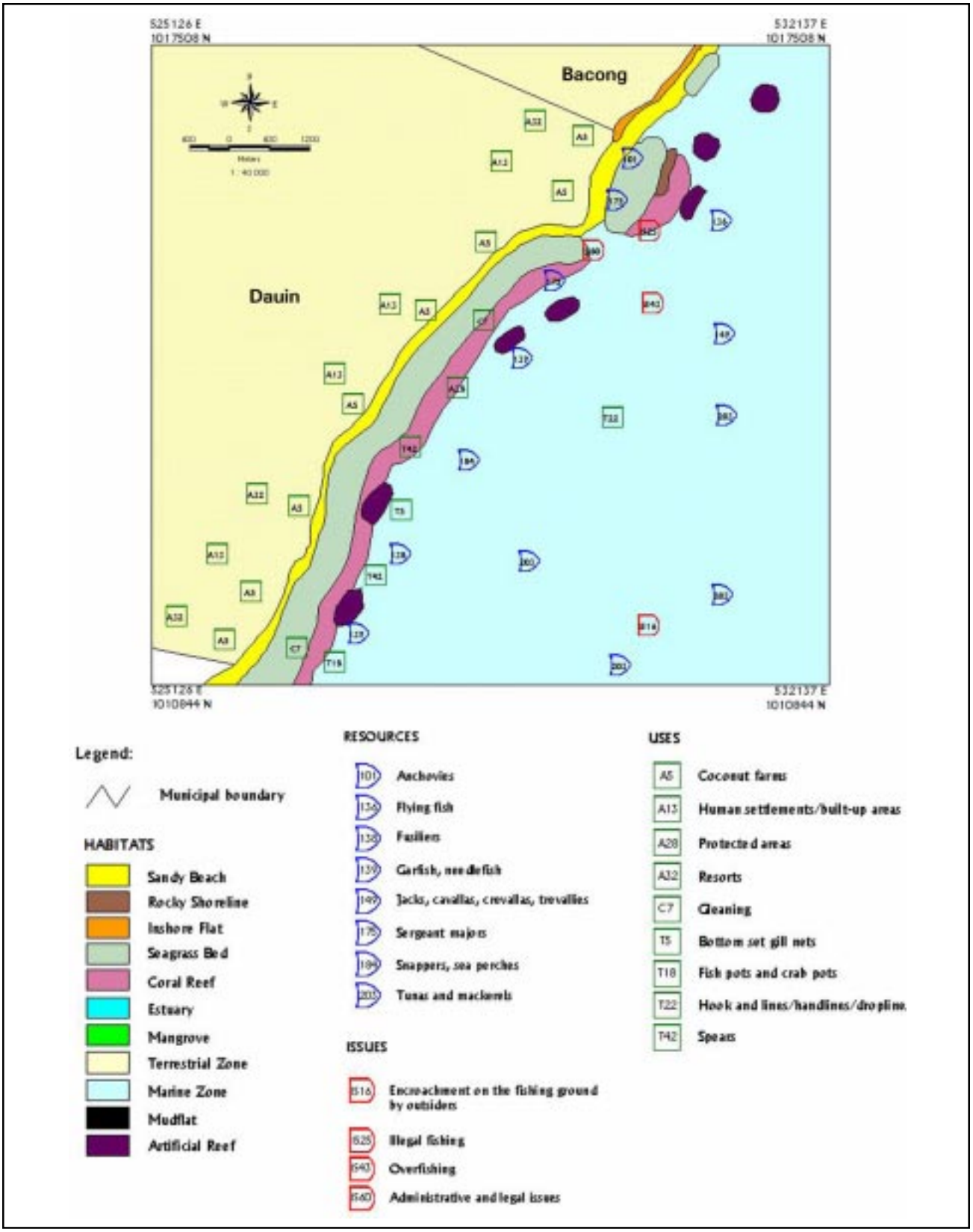


Figure 2.14. Coastal resource map of Dauin.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	fruit trees, rocks, houses, bamboo trees, basketball court, cottages	houses, buildings, *sisi*, *dalo-dalo*, *tamasakan*, *bersala*, *dagokoy*	*aninikad*, *lokot*, *danggit*, *tamasakan*, crabs, *bigiw*	*palata*, *ibis*, *kapal*, *lambayan*	*danggit*, *molmol*, *balo*
Uses	food, family dwelling, recreation, commercial purposes	food, family dwelling, commercial uses	food consumption, commercial	food consumption, commercial uses	food consumption, commercial uses
Issues	presence of solid wastes, no toilets, unpaid loans	presence of solid wastes	*nagkadyutay ang isda ug kinhason*	*nagkadyutay ang mga isda*	*nagkadyutay ang mga isda*

Figure 2.15. Dauin transect diagram (Barangay Bulak).

Dumaguete City

Of the 30 *barangays* of Dumaguete City, 9 are coastal. Although only 38 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.16, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 67 ha
- Inshore flat 25 ha
- Seagrass bed 83 ha
- Coral reef 73 ha

The most abundant fishery resources are goatfish, parrotfish, rabbitfish, tunas and mackerels, marine catfish, octopuses, and squids. Fishing methods used are hook and lines, hand lines, drop lines, bottom set gill nets, and spears.

The coastal resources of Dumaguete City are beset by problems and issues such as destructive fishing, lack of alternative livelihood, overfishing, and reclamation. Specific resources, uses, and issues in the 9 coastal *barangays* of Dumaguete City are presented in Figure 2.17.

DUMAGUETE FACTS AND FIGURES

Barangays (30): Bagacay, Bajumpandan, Balugo, Banilad, Bantayan, Barangay 1 (Tinago), Barangay 2 (Poblacion), Barangay 3 (Poblacion), Barangay 4 (Boulevard), Barangay 5 (Poblacion), Barangay 6 (Poblacion), Barangay 7 (Poblacion), Barangay 8 (Poblacion), Batinguel, Buñao, Cadawinonan, Calindagan, Camanjac, Candau-ay, Cantil-e, Daro, Junob, Looc, Mangnao, Motong, Piapi, Pulantubig, Tabuc-tubig, Taclobo, Talay

Coastal *Barangays* (9): Banilad, Bantayan, Barangay 1 (Tinago), Barangay 3 (Poblacion), Barangay 4 (Boulevard), Calindagan, Looc, Mangnao, Piapi

Total Land Area: 3,426 ha

Length of Coastline: 7 km

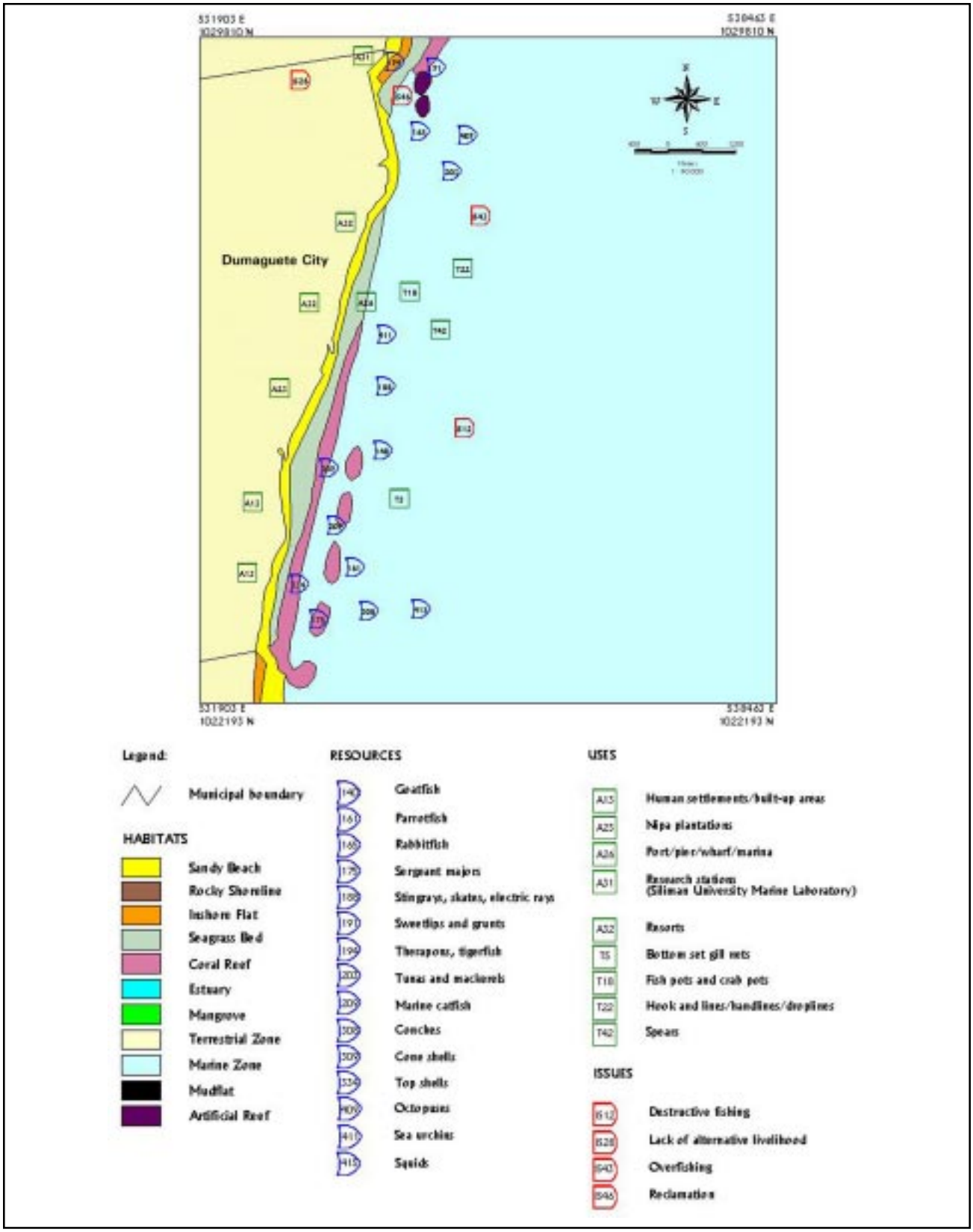


Figure 2.16. Coastal resource map of Dumaguete City.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	fruit trees, rocks, houses, bamboo trees, basketball court, cottages	houses, buildings, *sisi*, *dalo-dalo*, *tamasakan*, *bersala*, *dagokoy*	*aninikad*, *lokot*, *danggit*, *tamasakan*, crabs, *bigiw*	*palata*, *ibis*, *kapal*, *lambayan*	*danggit*, *molmol*, *balo*
Uses	food, family dwelling, recreation, commercial purposes	food, family dwelling, commercial uses	food consumption, commercial	food consumption, commercial uses	food consumption, commercial uses
Issues	presence of solid wastes, no toilets, unpaid loans	presence of solid wastes	*nagkadyutay ang isda ug kinhason*	*nagkadyutay ang mga isda*	*nagkadyutay ang mga isda*

Figure 2.17. Dumaguete transect diagram (Barangay Bantayan).

Manjuyod

Of the 27 *barangays* of Manjuyod, 10 are coastal. Although only 41.5 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.18 the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 385 ha
- Rocky shoreline 10 ha
- Inshore flat 322 ha
- Seagrass bed 35 ha
- Coral reef 327 ha
- Estuary 6 ha
- Mangroves 87 ha
- Mudflat 39 ha

The most abundant fishery resources are anchovies, cornetfish, emperor breams, flatfish, groupers, jacks, mullets, parrotfish, tunas and mackerels, cuttlefish, and octopuses. Fishing methods used are bottom set gill nets, fish and crab pots, hook and lines, hand lines, drop lines, spears, and mariculture.

The coastal resources of Manjuyod are beset by problems and issues such as siltation, boundary issue, human intrusion in the foreshore area, destructive fishing practices, weak law enforcement, lack of alternative livelihood, and pollution. Specific resources, uses, and issues in the 10 coastal *barangays* of Manjuyod are presented in Figure 2.19.

MANJUYOD FACTS AND FIGURES

Barangays (27): Alangilanan, Bagtic, Balaas, Bantolinao, Bolisong, Butong, Campuyo, Candabong, Concepcion, Dunggo-an, Kauswagan, Lamogong, Libjo, Maaslum, Mandalupang, Panciao, Poblacion, Sacsac, Salvacion, San Isidro, San Jose, Santa Monica, Suba, Sundoan, Tanglad, Tubod, Tupas

Coastal *Barangays* (10): Alangilanan, Balaas, Bolisong, Campuyo, Dunggo-an, Maaslum, Poblacion, San Jose, Suba, Sundoan

Total Land Area: 26,460 ha

Length of Coastline: 16 km

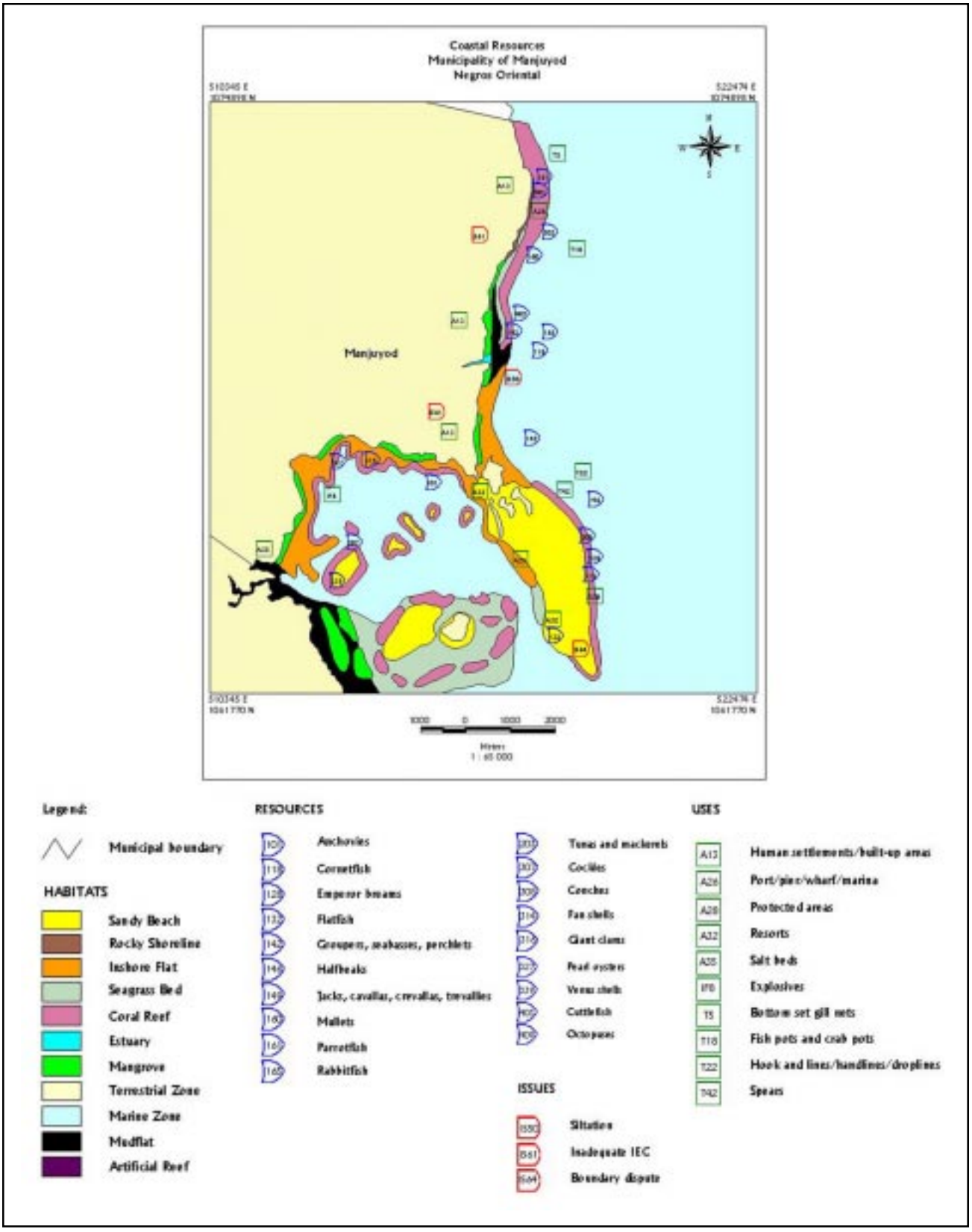


Figure 2.18. Coastal resource map of Manjuyod.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/ mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	bamboo, coconut, star apple, mahogany, *sampaloc*, *santol*, guava, *ipil-ipil*, *cacao*, *mansanitas*, *lomboy*, bakery, *sari-sari* store, tricycle, easy ride, *gmelina*, *papaya*, *tambis*, *aroma*, mango, school, waiting shed, fire tree, neem tree, napier, *talisay*, banana, L2 system, salt beds, fish pond, bodega (salt), houses, acacia tree, *doldol*, *calachuchi*	sand, gravel, algae, seagrass, house, *aroma*, chapel, motorized boat, *banca*, electricity, coconut, *talisay* tree, *ipil-ipil*, mangrove (*bungarol* and *bakhaw*), shell (*balisala*, *litub*, *tuway*), crabs		*bolinao*, *litob*, *kasag*, *balisala*, *lambay*, *batoltol*, *balat*, *aninikad*, *sihi*, *tabono*, *odpan*, shrimp, shells, *punaw*, *poñete*, *bolocboloc*, *basilsil*, *bulanbulan*, *bolalo*, *layagan*, *kalanghoga*, *dagatan*, *tahong*, *bangus* fry, *botabota*, sea cucumber, crabs	fish, squids, crabs, *anduhaw*, *ihalason*, *kitong*, *baha-ulo*, *kinsan*, *malaguna*, *tamarong*, *hinok*, *bakay*, *bungo*, *tangigue*, *malangs*i, *bolinao*, *gisaw*, *bugaong*, shark, dolphin, *dalopapa*, *balo*, *lumayagan*, *lagaw*, *pangaluwan*, *pugapo*, *ulanulan*, *piyampi*, *butiti*
Uses	housemaking, food, employment, transportation for riding public, shade, education, commercial, firewood, shed, residential, source of income, employment, water supply	hollow block making, concreting purposes, income, shelter, food, commercial, residential, breeding place for *bangus* fry		income for fishermen, food, commercial	food, income, commercial
Issues	illegal cutting of coconut trees, inadequate water for drinking, poverty, low compensation (laborers), dusty and rough road (during hauling of molasses and sugar)	inadequate water supply for drinking, poverty, some have no toilet, dumpsite for garbage, pollution from molasses		illegal fishing (using *hilo sa mangga*)	light boat (outsiders), fishing with the use of compressor

Figure 2.19. Manjuyod transect diagram (Barangay Campuyo).

San Jose

Of the 14 *barangays* of San Jose, 6 are coastal. Although only 56 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.20, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 29 ha
- Rocky shoreline 25 ha
- Inshore flat 55 ha
- Seagrass bed 8 ha
- Coral reef 3 ha
- Mangroves 15 ha

The most abundant fishery resources are fusiliers, groupers, parrotfish, rabbitfish, sardines, herring, surgeonfish, tunas and mackerels, blue crabs, mud crabs, octopuses, and squids. Fishing methods used are bottom set gill nets, fish and crab pots, hook and lines, drop lines, multiple hook and line, spears, and mariculture. Specific resources, uses, and issues in the 6 coastal *barangays* of San Jose are presented in Figure 2.21.

SAN JOSE FACTS AND FIGURES

Barangays (14): Basak, Basiao, Cambaloctot, Cangcawas, Janayjanay, Jilocon, Naiba, Poblacion, San Roque, Siapo, Sra. Acion, Sto. Niño, Tampi, Tapon Norte

Coastal *Barangays* (6): Jilocon, Poblacion, Sra. Acion, Sto. Niño, Tampi, Tapon Norte

Total Land Area: 5,400 ha

Length of Coastline: 6 km

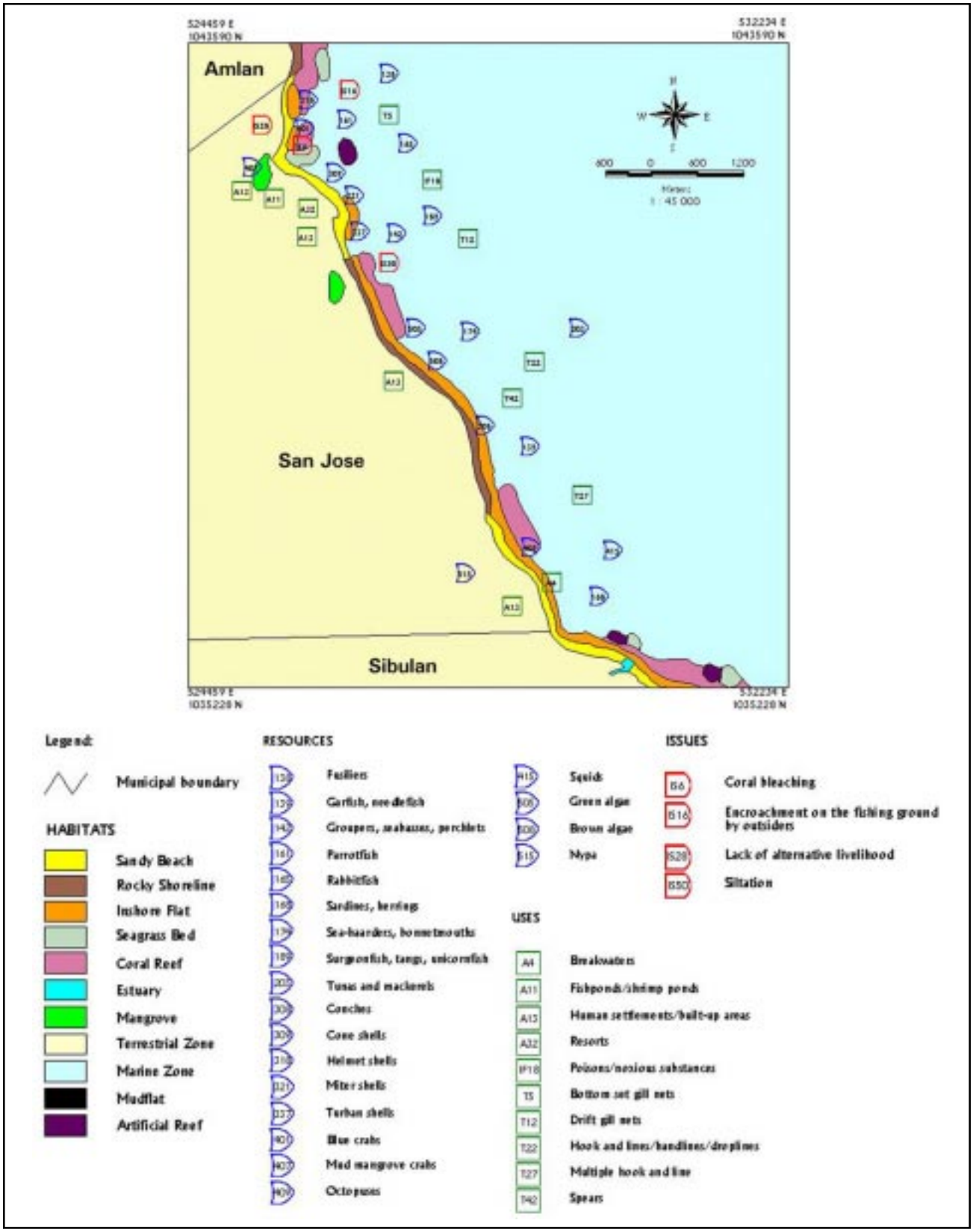


Figure 2.20. Coastal resource map of San Jose.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	*balay*, avocado, *lubi*, chapel, *manga*, *kamansi*, *santol*, artisian wells, communal faucets, nursery, *saging*, *gmelina*, *nipa* (fish pond), japenese, *baboy*, basketball court, *pagatpat*, *bungarol*	highway, *balay*, *lubi*, guava, *manok*, ornamental plants, *amimihid*, *tamasak*, *buga-ong, pagatpat, bakhaw,* plastic, *saho lipata*	plastic (in dumping area), coconut trees (uprooted), *balay*, *lubi*, private cottage, *sakayan*, *talisay*, *baboy*	*tuyom*, *salawaki*, *balat,* starfish, *salanay*, *puskan*, *palata*, *lawig*, *tamala*, *silong-silong*, *baklid*, *lusay*, *tuyom*, *dali-dali*	*anduhaw*, *manalangsi*, *solid*, *bulan-bulan*, *bagis*, *indangan*, *tulingan*, *cob-cob*, *kulansihon*, *hulokihok*
Uses	*consumo*, *balay-puloy-anan*, chapel- for religious activities, marine sanctuary, fishpond (fish culture)	*consumo*, *balay-puloy-anan*, *prebensyon sa kusog nga balod*, *puloy-anan sa gagmayng isda*	consumo, *puloy-anan*, *sakayan-gamit sa panagat*, *kapasilungan*	*consumo*, *baligya*,	*consumo*, *baligya*, communal fishing
Issues	issue on installation of individual water connections, flooding during heavy rains	presence of squatters, improper waste disposal	improper waste disposal, coconut trees are uprooted due to strong current	coral bleaching	use of compressor, fish catch, fishing by outsiders, presence of *cob-cob* commercial fishing vessels, fish catch of marginal fishermen

Figure 2.21. San Jose transect diagram (Barangay Jilocon).

Sibulan

Of the 15 *barangays* of Sibulan, 6 are coastal. Although only 21 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.22, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 108 ha
- Rocky shoreline 4 ha
- Inshore flat 94 ha
- Seagrass bed 14 ha
- Coral reef 198 ha
- Estuary 3 ha

The most abundant fishery resources are flying fish, fusiliers, goatfish, groupers, parrotfish, rabbitfish, surgeonfish, tunas and mackerels, blue crabs and sea cucumbers. Fishing methods used are fish and crab pots, hook and lines, hand lines and drop lines, and bottom set gill nets.

SIBULAN FACTS AND FIGURES

Barangays (15): Agan-an, Ajong, Balugo, Bolocboloc, Calabnugan, Cangmating, Enrique Villanueva, Looc, Magatas, Maningcao, Maslog, Poblacion, San Antonio, Tubigon, Tubtubon

Coastal *Barangays* (6): Agan-an, Ajong, Cangmating, Looc, Maslog, Poblacion

Total Land Area: 16,300 ha

Length of Coastline: 9 km

The coastal resources of Sibulan are beset by problems and issues such as beach/shoreline erosion, closed access to sea, encroachment by fishers from other municipalities, lack of alternative livelihood, lack of security of tenure on land and/or home lot, and siltation. Specific resources, uses, and issues in the 6 coastal *barangays* of Sibulan are presented in Figure 2.23.

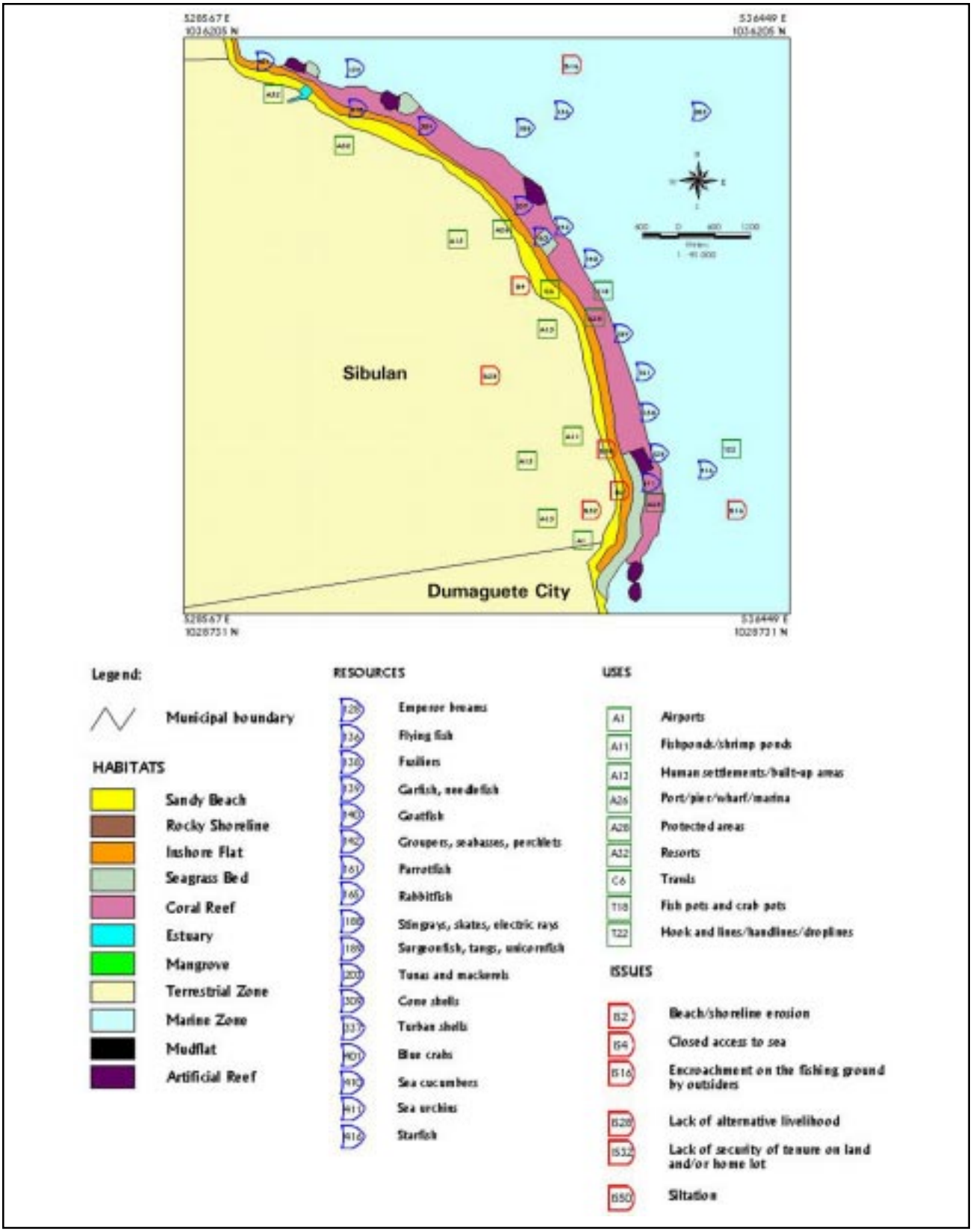


Figure 2.22. Coastal resource map of Sibulan.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/ mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	*manga*, *baka*, *saging*, *bayabas*, *kapayas*, *humayan*, *tangkongan*, *kagang*, *balay*, *baraks*, irrigation control, guide construction, fighting cocks, *barangay* road, electric lines/post, deep well, private land, livestock (chicken, goat, duck), grasses, *nipa*, coconut trees, *aroma*, fish pond, *bangus*, residential, *kalubihan*, *kahumayan*, *babuyan*	*aroma*, cottage, *iro*, *sakayan*, *tawo*, runway, hotel, *balay*, *pangkalan*, *manok*, *salapati*, *itik*, *atabay*, *tubig sa atabay*, *para inom ug laba*, local tourist/*pinoy*, *aroma* trees, houses, store, *bakhaw*, *aroma*, *sagbot*	sand, children, shells	seahorse, *labayan*, *tawi-ud*, *bulagbog*, *balawis*, *lambay*, *dalidali*, *oson*, *takla*, *kinhason*, *balat*, *botbot*, *donsol*, *bahagbahag*, starfish, *tuyom*, *salawaki*, *balakasi*, seagrass, *koyogkoyog*, brown algae, *gulaman*, *bubo*, *timbungan*, fish trap (*tay-ong malubgas*), corals, *guso*, table corals, oyster, fishes, shells, crabs, rocks, hook and lines, *mamsa*, *bagis*	solid, *bagis*, *bangkulisan*, *mamsa*, *lan-ohan*, *lapu-lapu*, *mayamaya*, *malasugi*, *dugso*, *toungan*, *indangan*
Uses	*baligya*, *para tari*, *barangay* road, electricity, water, generating income, nipa (roofing), tree (firewood), business (private), commercial	waste used as fertilizer, *baka ibaligya*, *turismo*, *sakayan para panagat*, runway, *nakatabang pagpugong sa kusog nga sulog*, income generating, firewood, recreation, revenue	recreation, docking (boat), gleaning, *manulo ug pasayan ug lambay*	*kaon*, *baligya*, *tay-ong* food supply, habitat for fishes, seashell, gathering *gulaman* (food salad), fish sanctuary, *bubo,* tourist attraction, fishing	*baligya*, *kaon*
Issues	*basura*, plastic, *kulang ang tubig sa* irrigation, needs - deed of donation for *barangay* road to be asphalted, poor drainage system, poor sanitation, waste disposal	overdiking, *basura*, pending case-re: private land (Kwan), no building permit due to pending case, sewerage system, pollution	pollutant (cans, garbages) plastic, twigs	*bubo*, coral destruction, (octopus), SCUBA with speargun, pollutant (cans), plastic, siltation, stealing of fish from the *bubo*, destruction of corals, presence of SCUBA divers (police), compressor, presence of *bubo* (owned by Bantayan people), destruction of coral reefs	SCUBA diving with speargun, *bubo*, *sahid*, *pukot*, *cobcob*

Figure 2.23. Sibulan transect diagram (*B*arangay Agan-an).

Tanjay City

Of the 24 *barangays* of Tanjay, 9 are coastal. Although only 36 percent of the population live near the coastal area, the entire population is dependent on fisheries.

As seen in Figure 2.24, the areas of habitats mapped through the PCRA are as follows:

- Sandy beach 32 ha
- Inshore flat 459 ha
- Seagrass bed 11 ha
- Coral reef 218 ha
- Estuary 16 ha
- Mangroves 389 ha
- Mudflat 394 ha

The most abundant fishery resources are anchovies, fusiliers, groupers, goatfish, milkfish, rabbitfish, tunas and mackerels, mussels, oysters, shrimps and prawns, sea cucumbers and squids.

The coastal resources of Tanjay are beset by problems and issues such as overfishing, beach and shoreline erosion, mangrove overharvesting, and siltation. Fishing methods used are bottom set gill nets, fish and crab pots, hook and lines, hand lines, and mariculture. Specific resources, uses, and issues in the 9 coastal *barangays* of Tanjay are presented in Figure 2.25.

TANJAY FACTS AND FIGURES

Barangays (24): Azagra, Bahian, Barangay 1 (Poblacion), Barangay 2 (Poblacion), Barangay 3 (Poblacion), Barangay 4 (Tambacan), Barangay 5 (Poblacion), Barangay 6 (Ilawod), Barangay 7 (Loton), Barangay 8 (Poblacion), Barangay 9 (Poblacion), Luca, Manipis, Novallas, Obogon, Pal-ew, Polo, San Isidro, San Jose, San Miguel, Sta. Cruz Nuevo, Sta. Cruz Viejo, Sto. Niño, Tugas

Coastal *Barangays* (9): Barangay 4 (Tambacan), Barangay 6 (Ilawod), Barangay 7 (Loton), Luca, Manipis, Polo, San Isidro, Sta. Cruz Viejo, Tugas

Total Land Area: 53,900 ha

Length of Coastline: 19 km

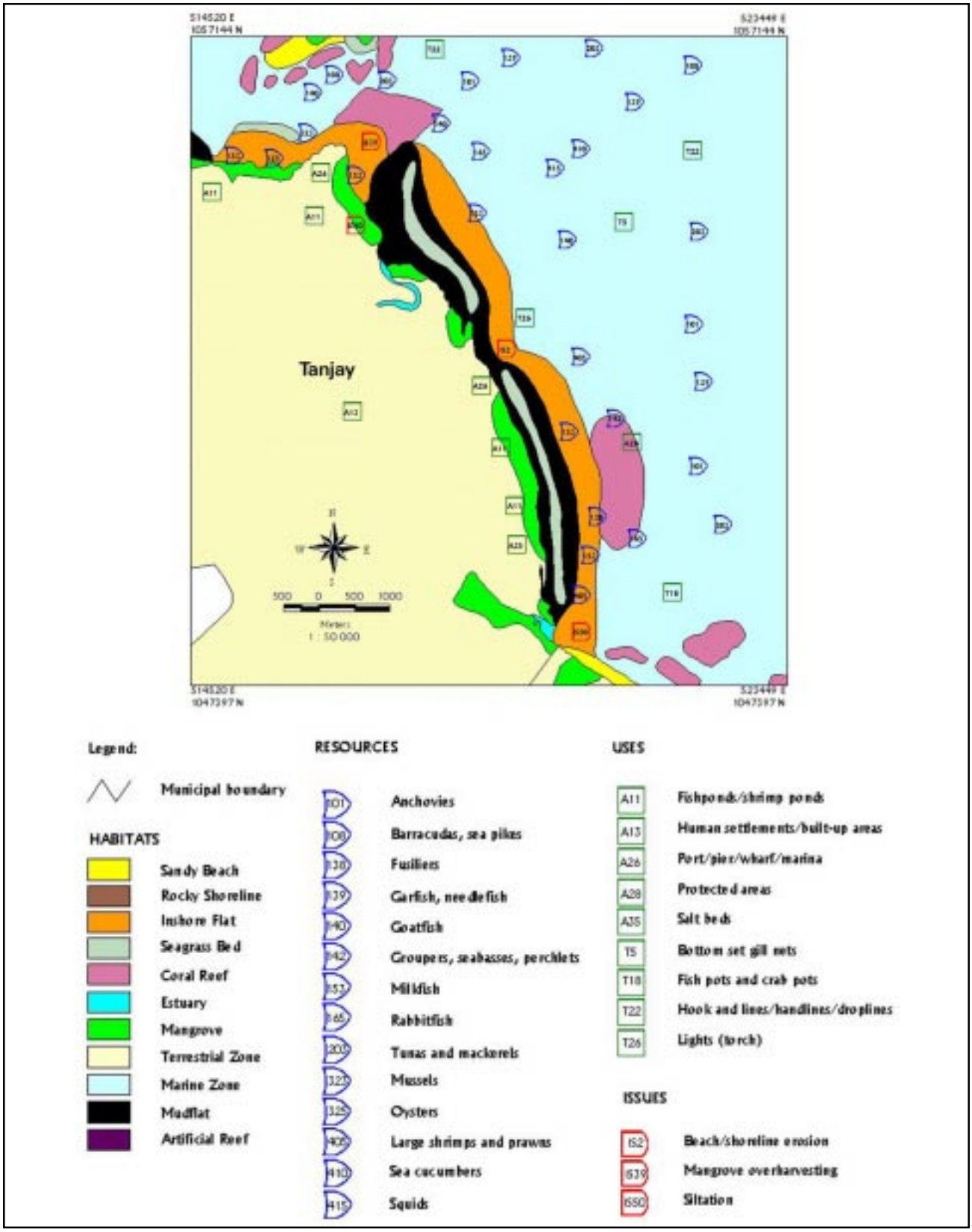


Figure 2.24. Coastal resource map of Tanjay.

	HABITATS				
	Land	**Shoreline**	**Sandy beach/ mudflat**	**Seagrass bed/coral reef/inshore flat**	**Marine zone**
Resources	houses, goat, pig, chicken, cow, store, melon, rice mil, waiting shed, grassland, basketball court, warehouse, chapel, ricefield, sugarcane, coconut, *nipa*, carabao	fishpond, *buli*, *nipa* plantation, hot spring, goat, mangrove, ducks, houses, carabao, coconut, pig, banana, pine tree, *ipil-ipil*, grassland, sugarcane, school, ricefield, waiting shed, warehouse	white sand	coral reef, *sisi*, seaweeds, *bulanbulan*, *danggit*, *tapoktapok*, *sasing*, *tilodtilod*, *balat*, *bangus* fry, *bungsod*, cule shell, *hunsoyhunsoy*, *punaw*, *balagbalag*, *aninihid*, *tuyom*, *litog*, seagrass, *lampirong*, *labayan*, *saroksarok*, *palata*	*pating*, *pagi*, *aripoles*, *danggit*, *aslos*, *kitong*, *pagatpatla*, *kilko*, *kabalyas*, *bolinao*, *anduhaw*, *lapulapu*, *bilongbilong*, *malasugi*, *samolok*, *lawlaw*, *hinok*, *ulanulan*, *tabiles*, *gisaw*, *bugaong*, *labayan*, *puget*
Uses	public use, food, source of income, employment, recreation, religious activity	source of income, firewood, food, employment, recreation, education	recreation	food, source of income, employment, decoration	food, source of income
Issues	improper disposal of animal waste	occasional cutting of mangrove	not well developed		encroachment of outside fishers-

Figure 2.25. Tanjay transect diagram (Barangay Luca).

Resource mapping in the municipality of Siaton.

Participatory mapping of resources helps increase awareness and commitment.

Calendar diagram, depicting the wind and rain patterns over the year as reported in Brgy. Bonbonon.

Problems, recommendations, and insights of the PCRA held on 8-9 October 1998 during the feedback session.

Transect diagram as reported by the barangay *captain of Bonbonon.*

The mangrove group assess the situation near the Silliman Marine Laboratory in Dumaguete City.

Laying out of 100 m transect rope for the coral reef assessment.

Ting Matiao Foundation staff prepare for the mangrove assessment.

Very murky water prevented the coral reef assessment in Brgy. Polo, Tanjay.

The seagrass group ready for the assessment at Silliman Beach.

The barangay *folks take a serious look at the quality of their mangroves in Barangay Luca, Tanjay.*

Transect method of assessing the coral reef status and condition.

The fisherfolks of Apo Island list down the issues and problems during the participatory monitoring and evaluation of the marine reserve.

A dead coral after coral bleaching caused by the El Niño phenomenon of 1998.

Bantay Dagat *apprehended fishers and confiscated these fishing paraphernalia within the Agan-an Marine Reserve in Sibulan.*

Participatory monitoring and evaluation of Agan-an Marine Reserve, Sibulan.

Presentation of proposed policies and guidelines during the barangay *consultation of the CRM plan of Bacong.*

Participatory monitoring and evaluation of marine reserve at Tandayag, Amlan.

SUMMARY

The coastline area described by the PCRA maps includes habitat areas of coral reefs, mangroves, mudflats, and estuaries, which are all very productive ecosystems. In addition, sandy beaches cover more than 1,200 ha that are useful to local residents and with tourism potential. Because Negros is a high island, the width of coastal habitats bordering the shoreline is narrow. Thus, the total area of habitat in relation to coastal length is quite small. This highlights the need to carefully protect these existing productive ecosystems from the many human impacts noted.

Chapter 3
PHYSICAL FEATURES

This chapter provides background information on the land characteristics, hydrology, water quality, and climate of the profile area, which are esential in providing strategies and interventions for the proper management of the area.

LAND CHARACTERISTICS

Negros Oriental is located in the Central Visayas region of the Philippines and is in the eastern part of the 2-province Negros Island. It lies approximately 620 km from the capital city of Manila, at roughly 122^0 30′ E, 9^0 00′ N and 123^0 30′ E, 10^0 30′ N (Montebon 1995). The province of Negros Oriental occupies a total land area of 5,402.3 km^2 (540,230 ha) and is the largest of the 4 provinces in the Central Visayas Region. The 3 cities and 6 municipalities covered in this profile have a total land area of 1,927.9 km^2 (Table 3.1). It covers 162 km of coastline, stretching from the municipality of Manjuyod in the north to the municipality of Siaton, the southernmost municipality.

About 30 percent of the land area of the province is flat, mainly along the coastline, and the rest of land contains mountains, valleys, and plateaus. Of the total land area of Negros Oriental, only 16.39 percent (88,543.7 ha) is considered prime agricultural land (PPDO 1999), although approximately 65 percent of the land in the province is used for agriculture and pasture or range land, according to the Provincial Development and Investment Plan (PDIP). The agricultural land is mainly comprised of 4 types of soil: Isabela Clay, La Castellana Clay, Loam Special, and Faraon Clay. Almost 50 percent of the land in the province is classified as certified alienable and disposable and 37 percent of the land is classified forestland. The remaining land is unclassified forestland (PPDO 1999). Upland

Table 3.1. The land area and length of shoreline of the profile area.

Municipality/City	Land area (in km^2)	Length of shoreline (km)	Total number of *barangays*	Total number of coastal *barangays*
Manjuyod	264.60	16	27	10
Bais	316.90	30	35	112
Tanjay	539.30	19	24	9
Amlan	59.40	7	8	5
San Jose	54.40	6	14	5
Sibulan	163.00	9	15	6
Dumaguete	34.26	7	30	9
Bacong	42.07	7	22	7
Dauin	114.10	10	23	9
Siaton	335.40	51	26	14
Profile area	**1,923.43**	**162**	**224**	**86**
Entire province	**5,402.30**	**348**	**556**	**169**

(hills and mountain ranges) and lowland (plains) are mainly utilized for agriculture and beach fronts are developed for the tourism industry.

Low serrated mountain ranges separate Negros Oriental from Negros Occidental, the western province of Negros Island. The highest peak is Canlaon Volcano (2,465 m above sea level) in Canlaon City. The next highest peak is Cuernos de Negros, locally known as Mt. Talinis, overlooking Dumaguete City with an elevation of 2,000 m above sea level.

HYDROLOGY

There are a number of river systems and a few lakes within the profile area. Many of the river systems discharge into the Tañon Strait, though some dry up before reaching the coast (IEMP 1997). Some of these river systems are principal (critical) watersheds and drainage systems, while others are used for irrigation (Table 3.2). The watershed areas are protected and reforestation is now going on.

There are 3 lakes within the profile area: the twin lakes Balinsasayao and Danao in the mountains of Sibulan and Lake Balanan in Siaton. All 3 lakes are tourist attractions for camping and outdoor recreation, although Lake Balanan was originally proposed as a site for a hydro-electric plant. Other water bodies are used to provide cheap electricity, such as the National Power Corporation (NPC) hydro-electric plant in Pasalan Falls, Amlan which supplies electricity from Bais to Dumaguete.

WATER QUALITY

Dinoflagellates are common among harmful algae reported in the Southeast Asian waters. *Pyrodinium bahamense* is the most common species causing toxic red tides in the Philippines. Although most of the dinoflagellates identified were non-toxic, any bloom may lower water quality and cause anoxia or de-oxygenation of the water (Calumpong *et al*. 1997). The distribution of plankton in the different learning sites covered by the SUML survey is presented in Figures 3.1, 3.2, and 3.3.

Table 3.2. Negros Oriental critical watersheds.

Watershed/drainage way	Area (km^2)	Total agricultural area (ha)
Guihulngan River	89.87	4,937.00
La Libertad River	213.00	5,816.00
Tibiauan River	33.28	998.00
Pangalaycayan River	160.88	4,438.00
Manjuyod River	53.26	3,329.00
Lutao River	147.57	4,327.00
Tanjay River	215.00	9,419.00
Pagatban River	108.73	889.00
Bayawan River	434.00	12,727.00
Sebastian River	349.50	7,877.00
Tolong River	90.43	4,660.00
Cauitan River	85.00	1,189.00
Siaton River	228.00	3,428.00
Canaod River	107.07	3,861.00
Total	**2,315.59**	**67,895.00**

Source: PPDO (1999)

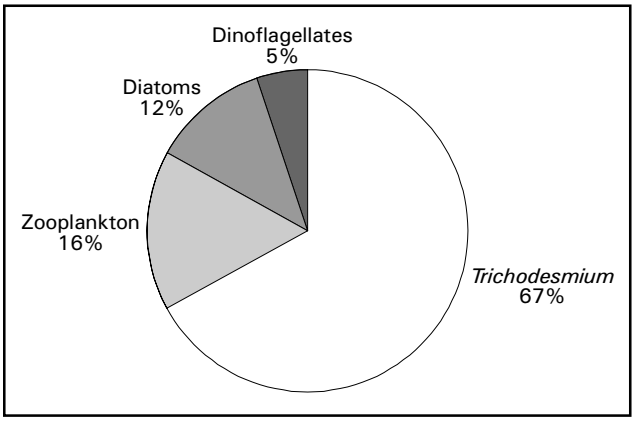


Figure 3.1. Distribution of plankton in Apo Island using horizontal and vertical tows (day and night).

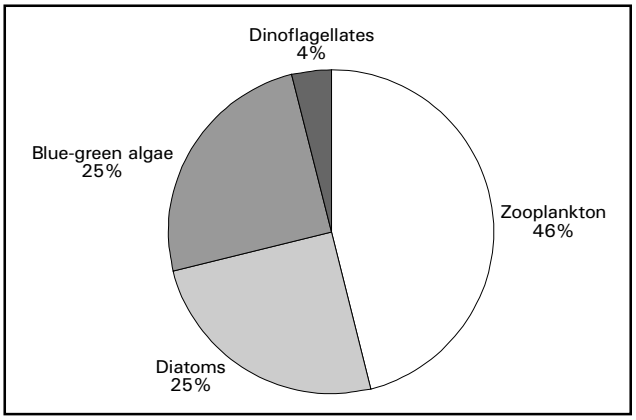


Figure 3.2. Distribution of plankton in Bais Bay using horizontal and vertical tows (day and night).

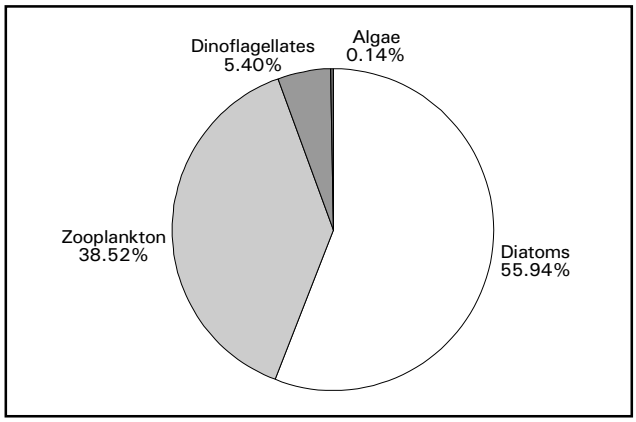


Figure 3.3. Distribution of plankton in Dumaguete using horizontal and vertical tows (day and night).

Most probable number (MPN) of total coliform per 100 ml of seawater was sampled by the SUML in the vicinity of Dumaguete City. The MPN of the different sampling sites is presented in Table 3.3. All yielded positive results for total coliform with the highest count observed in Barangay Calindagan, Dumaguete City, which could be attributed to the concentration of coastal residences in that locality. Garbage and domestic waste, especially of fecal origin were the primary source of contamination in the area (Calumpong *et al*. 1997). High counts of coliform were obtained also in the Boulevard/Pier and Lo-oc area. Sewage from Dumaguete City empties into these areas. Household interviews conducted by SUML indicated that a majority of the respondents, 60 percent, in the Lo-oc area had no toilets. Thus, human waste presumably goes to the sea. Based on these results, Barangay Calindagan is classified as Class SB - safe for swimming and fishing but not for culture and harvest of seafoods (such as bivalves and mollusks). Other stations sampled had MPN of less than 70 and are classified as Class SA, which is suitable for most mariculture activities, tourism, and recreation (DENR AO No. 34).

Table 3.3. Most probable number of total coliform counts per 100 ml of seawater sampled from the coastal waters of Dumaguete City (n = 3).

Stations	Nearshore	0.5 km offshore	1 km offshore
Agan-an	12	0	10
Bantayan	25	2	26
Looc	39	50	15
Boulevard-Pier Area	50	15	39
Tinago	25	2	25
Canday-ong	19	11	25
Calindagan	254	57	183
MEAN	61	20	46
MEAN ALL STATIONS = 42			

Source: Calumpong et al. *(1997)*

CLIMATE

The climate of the province of Negros Oriental is characterized by a short dry season from 1 to 3 months with the absence of a pronounced rainy season, known also as a Type III climate condition. A dry month is one in which rainfall is less than 2 inches. Although the northern part of the province experiences occasional typhoons, the profile area is seldom hit by typhoons and has a low annual rainfall by Philippine standards (Table 3.4).

The temperature range for the entire province is relatively uniform from 26.1 to 27.7°C. The maximum temperature is about 34.8°C and the minimum is about 20.9°C. Humidity for the whole province ranges from 77 to 80 percent with an annual average of 78 percent. From June to September the prevailing wind is the southwest monsoon, locally known as *habagat*, while the northeast monsoon, *amihan*, prevails during November to February. The season for variable winds is from March to May. Tropical typhoons rarely visit the province (PPDO 1999).

Table 3.4. Average monthly rainfall and number of rainy days in the province.

Months	No. of rainy days	Average monthly rainfall in Negros Oriental (millimeters)
January	21	93.10
February	12	12.90
March	17	69.70
April	8	43.30
May	18	118.60
June	17	94.40
July	6	12.50
August	21	140.80
September	20	111.00
October	14	44.90
November	15	178.10
December	12	76.10

Source: PPDO (1992 SEP)

SUMMARY

The profile area bordering a mountainous and steep island receives much freshwater run-off from about 14 rivers. Thus the main pollution in nearshore areas is sediment carried by the rivers. Only Dumaguete City shows significant coliform contamination. Toxic algal blooms do not generally occur in the area. The climate is mild with less rainfall than average for Philippines. Typhoons are rare.

Chapter 4
NATURAL RESOURCES

This chapter provides background information on the status of the mineral resources, forest resources, and coastal resources in the profile area, which help determine the best resource use and approach to resource management.

MINERAL RESOURCES

The province of Negros Oriental has a variety of mineral resources of important economic value with copper topping the list. In the profile area, minor deposits of copper are found in the Manjuyod, Sibulan, Bacong, and Dauin area (OPA 1990). Iron and its related compounds of magnetite, pyrite, and marcasite are also found in Sibulan. Solar salt is made in Tanjay, Bais City, and Manjuyod. Other deposits include limestone, dolomite, diatomite, manganese, galena, gypsum, phosphate, and china clay (OPA 1990). Commercial deposits of red burning clay are mostly found in the southeastern portion of Negros Oriental; however, some deposits are spread throughout the profile area. Sand and gravel is also extracted from municipalities in the province and in the profile area. A total of 103,000 m^3 of sand and gravel has been extracted in recent years (PPDO 1999).

UPLAND FOREST RESOURCES

Total good forestland in the province of Negros Oriental is believed to be only 5 percent (27,011 ha) of the total land area of the province (540,230 ha). This low forest cover is due to illegal logging activities that are difficult to stop despite government efforts to formulate laws and enforce prohibition. According to PPDO (1992), forestland is 281,386 ha and is broken down into 5 categories. The categories and the respective areas are summarized in Table 4.1.

Table 4.1. Forestland categories and their corresponding areas.

Forestland categories	Area (ha)
Unclassified	63,091
Established for reserves	8,570
Established for timberland	207,718
National Parks GRBS/WA	1,906
Fishponds	101
Total	**281,386**

Source: PPDO (1992)

Since the late 1800s, forested areas in the province have been exploited. A series of maps shows the dramatic decline in forested areas (primary forest) on Negros Island from 1890 to 1984 (Tiempo 1994). In connection with the provincial government's thrust to rehabilitate forest cover and restore forest habitats, different agencies in the province have undertaken reforestation projects (Table 4.2).

Table 4.2. Total area covered and planted by reforestation projects.

Reforestation projects	Total area covered (ha)	Total area planted (ha)
Mabinay reforestation	4,035.00	7,173.00
New Talinis reforestation	11,507.00	1,156.00
Contract reforestation	9,864.00	8,335.10
Total	**25,406.00**	**16,664.10**

Source: PPDO (1992)

COASTAL RESOURCES

Mangroves

Ecologically, mangroves are an important resource because they help sustain the coastal fisheries in the province. The following are some of the ecological functions of mangrove communities:

- providing shelter, breeding and nursery grounds for fish and other invertebrates that inhabit the mangrove area;
- providing nutrients as well as detritus that accumulate from decaying plant matter and are exported by tides to the nearby communities (seagrass and coral reefs); and
- protecting the coastline by preventing erosion that brings about siltation and sedimentation.

Mangrove habitats also support wildlife such as birds and reptiles. Mangrove trees are utilized by the local resource users for firewood and lumber, while mangrove areas are often cleared for settlement and conversion to fishponds.

Total mangrove area for the whole province of Negros Oriental is 5,030 ha, including mangrove areas mixed with cropland, fishponds derived from mangrove areas, and mangrove

areas in combination with built-up areas or settlements (PPDO 1999). Silliman University Marine Laboratory (SUML) conducted a survey within the profile area in which 3 sites were selected based on the concentration of mangrove species there. The 3 sites are Apo Island, Dauin; Dumaguete City; and Bais Bay, Bais City. The total mangrove area within the profile area based on the 3 sites was approximately 265 ha: 264 ha in Bais, 0.30 ha in Apo Island, and 0.25 ha in Dumaguete. (Calumpong *et al*. 1997). The Talabong Mangrove Reserve in Bais Bay has the largest mangrove cover in the province of Negros Oriental.

There has been a drastic decrease of mangrove area within this century. In the 1920s, the coastline of Dumaguete from Banilad to Sibulan was fringed with lush mangroves, but due to land reclamation only small patches remain in Banilad and Bantayan. In 1979, the mangrove area in the Bais Bay area was estimated at 811.6 ha (Biña *et al*. 1979; De Leon *et al*. 1991). This declined to 250 ha due to fishpond conversion (Calumpong and Serate 1994). However, the coverage has increased to 265 ha as a result of reforestation. There were efforts in 1993-95 to enhance mangrove areas on Apo Island, but they were met with limited success due to substrate unsuitability (Calumpong *et al*. 1997).

There are 25 different species of mangroves and associated species in the sites sampled by the SUML (Table 4.3). Apo Island, Dauin has the least number of species, 8. Due to reforestation efforts of the Philippine Coast Guard (PCG) and the Department of Environment and Natural Resources (DENR), *Rhizophora mucronata* is the dominant species there. In Bantayan, Dumaguete City, there are 16 species of mangroves, 5 of which are natural growth and the rest had been planted under the Environmental Resource Management Project (ERMP) of Silliman University. Bais Bay has the most number of species, 22, including 10 families of mangrove-associated species (Calumpong *et al*. 1997).

The CRMP conducted a survey within the profile area in 3 selected sites. The sites are the municipalities of Amlan, Manjuyod and the city of Tanjay.

The municipality of Amlan has a total of 23 mangrove and associated species which can be found in Barangay Tandayag (which has 8 species), Jugno (15 species), and Bio-os (17 species). *Rhizophora stylosa*, *Sonneratia alba*, *Avicennia lanata*, *Ceriops decandra*, and *Lumnitzera racemosa* are the more common species in the municipality.

The mangroves in the city of Tanjay are found in the coastal *barangays* of Polo down to Sta. Cruz Viejo. The city has a total of 29 mangrove and mangrove-associated species. *Avicennia marina*, *A. officinalis*, *Sonneratia alba*, and *Rhizophora* spp. are the commonly encountered species. The largest and most diverse mangrove community is in Barangay Polo which has 24 species. The total mangrove area of the city, including *nipa* (*Nypa fruticans*) plantations, covers approximately 112 ha. Reforestation efforts in Tanjay are carried out (by fishpond operators and some coastal residents) primarily to protect fishponds and property from erosion especially during *amihan* (north east monsoon) months.

Table 4.3. List of mangrove and associated species in Manjuyod, Bais, Tanjay, Amlan, Dumaguete, and Dauin.

Species Name	Common Name	Manjuyod	Bais	Tanjay	Amlan	Dumaguete	Dauin
1.**RHIZOPHORACEAE**							
Rhizophora apiculata	*Bakauan-lalake*	+	+	+	+	+	--
Rhizophora mucronata	*Bakauan-babae*	+	+	+	+	+	+
Rhizophora stylosa	*Bakauan-bato/bankau*	+	+	+	+	+	--
Bruguiera cylindrica	*Pototan-lalake*	+	+	+	+	+	--
Bruguiera gymnorrhiza	*Busain*	--	+	+	+	+	--
Bruguiera sexangula	*Pototan*	--	+	+	+	+	--
Ceriops decandra	*Hangalay/Malatungog*	+	+	+	+	+	--
Ceriops tagal	*Tungog*	--	+	+	--	+	--
2.**AVICENNIACEAE**							
Avicennia alba	*Bungalon puti*	+	+	--	+	--	+
Avicennia lanata	*Bungalon*	+	+	+	+	--	--
Avicennia marina	*Piapi*	+	+	+	+	+	+
Avicennia officinalis	*Api-api*	+	+	+	+	--	--
3.**SONNERATIACEAE**							
Sonneratia alba	*Pagatpat*	+	+	+	+	+	--
Sonneratia caseolaris	*Pedada*	--		--		--	--
4.**COMBRETACEAE**							
Lumnitzera littorea	*Tabau*	+	+	--	+	+	+
Lumnitzera racemosa	*Sagasa/Baras-baras*	--		+	+	--	--
Terminalia catappa	*Talisay*	--		+		+	--
5.**MELIACEAE**							
Xylocarpus granatum	*Tabigi*	--	--	+	+	--	--
Xylocarpus moluccensis	*Piagau*	--	--	+	+	--	--
Xylocarpus rumphii		+		+	--	--	--
6.**MYRSINACEAE**							
Aegiceras corniculatum	*Saging-saging*	--	+	+	--	+	--
7.**RUBIACEAE**							
Scyiphiphora hydrophyllacea	*Nilad*	--	--	+	+	--	--
8.**EUPHORBIACEAE**							
Excoecaria agallocha	*Alipata*	+	+	+	+	+	+
9.**PALMAE**							
Nypa fruticans	*Nipa*	+	+	+	+	+	--
10. **MYRTACEAE**							
Osbornia octodonta	*Tualis*	--	--	+	+	--	--
11. **ACANTHACEAE**							
*Acanthus ilicifolius**	*Diliuario*	+	+	+	+	+	--
12. **BIGNONIACEAE**							
*Dolichandrone spathacea**	*Tui/Bito-bitoon*	--	+	+	+	+	+
13. **STERCULIACEAE**							
*Heritiera littoralis**	*Dungon*	--	--	+	+	--	--
14. **FABACEAE**							
*Derris trifoliata**	*Tuble*	--	--	+	--	--	--
*Prosopis vidaliana**	*Aroma*	+		+	+	--	--
15. **BARRINGTONIACEAE**							
Barringtonia sp.*	*Bito-on*	+	--	+	+	--	--
16. **TILIACEAE**							
Brownlowia sp.*	*Amagos*	--	--	+	--	--	--
17. **CAESALPINIACEAE**							
*Intsia bijuga**	*Ipil*	--	--	+	--	--	--
18. **ASCLEPIADACEAE**							
*Finlaysonia maritima**	*Balagon*	+	--	+	--	--	--

*Legend: + = present; -- = absent; * = mangrove associated species*
Source: Calumpong et al. *(1997)*

Rhizophora stylosa and *R. mucronata* are commonly used for planting because they are easy to plant and propagules are easily obtained.

A total of 16 mangrove and mangrove-associated species can be found in the municipality of Manjuyod. Commonly encountered species in the municipality are *Avicennia marina*, *Sonneratia alba*, and *Rhizophora stylosa*. Barangay Suba has the highest number of species (13) while the rest of the *barangays* in Manjuyod have 5-7 species each. The total mangrove area in the municipality covers 47.04 ha (MPDO 1999). Most mangrove plantations (*Rhizophora* spp.) in Manjuyod were initiated by the Central Visayas Regional Project-I (CVRP-I) which provided residents with planting materials. Seventy-four coastal residents hold Certificate of Stewardship Contracts (CSCs issued by the DENR). Approximately 33 ha was allocated to them, according to the 1999 DENR CENRO I Report.

On Apo Island, the mean density of saplings is 5,000 stems per ha but with very patchy distribution. Due to massive reforestation efforts in the Talabong Mangrove Reserve, Bais Bay, the distribution of saplings is higher there, with average densities of 11,250 + 8,954.54 for *R. mucronata* and 22,187 + 3,437.50 for *Avicennia marina*. Luca, Canlargo, Bais has a density of 4,000 stems per ha with *Sonneratia alba* as the dominant species. Dunggu-an, Manjuyod has a density of 2,000 stems per ha with the dominant species being *Rhizophora* (Calumpong *et al*. 1997).

The mangrove soil in Apo Island, Dauin is primarily composed of a range from fine sand to coarse sand. This soil composition favors the growth of *Avicennia*, *Sonneratia,* and *Exocoecaria*. In Bais Bay, major soil composition varied from very fine sand to fine sand. This substrate favors the growth of *Rhizophora* species. De Leon *et al*. (1991) report the predominance of medium sand attributed to the high organic matter in the mangrove area in Bais Bay. Contrary to the soil composition in Apo Island and Bais Bay, the soil composition of the mangrove area in Bantayan, Dumaguete City is clay (Calumpong *et al*. 1997).

Seagrass and Algal Beds

Seagrass and algal beds are a common resource found in the nearshore areas of the profile area. They form an important shallow water marine ecosystem because:

- they reduce current velocity and erosion by binding the sediments;
- they provide food directly and indirectly to the nearby ecosystems; and
- they also provide a high diversity of habitats and substrata to numerous marine organisms (Thayer and Phillips 1977; Thayer *et al*. 1978).

A strong positive correlation exists between the dominant substrate and the dominant vegetation. In Bais Bay and Dumaguete, where the substrate type is sand, sand/silt or sand/mud, the dominant vegetation is seagrass, while on Apo Island, where the substrate type is limestone and hard or soft coral, the dominant vegetation is turf algae.

There are 8 species of seagrasses belonging to 6 genera that were identified within the profile area as shown in Table 4.4. Seagrass areas cover about 140 km of coastline stretching from Bais Bay in the north to Dauin in the south. Based on the survey in 3 sites (Bais, Dumaguete, Apo Island), Bais Bay has the most seagrass cover, 200 ha. In contrast, seagrass in Dumaguete covers only 26.9 ha and Apo Island has no seagrass cover. Mats of *Gracilaria* and *Laurencia* seasonally cover the seagrass beds fronting Talabong, Bais Bay (Calumpong *et al*. 1997).

Table 4.4. Seagrass species identified within the profile area.

DIVISION ANTHOPHYTA
Family Potamogetonaceae
Cymodocea rotundata
Cymodocea serrulata
Halodule pinifolia
Halodule uninervis
Syringodium isoetifolium
Family Hydrocharitaceae
Enhalus acoroides
Halophila ovalis
Thalassia hemprichii

Source: Calumpong et al. *(1997)*

A total of 103 algal species belonging to 65 genera were identified within the profile area. These algal species are grouped into 4 divisions with the red algae group dominating (Calumpong *et al*. 1997):

- *Rhodophyta* (red algae) - 53 species
- *Chlorophyta* (green algae) - 33 species
- *Phaeophyta* (brown algae) -16 species
- *Cyanophyta* (blue green algae) -1 species

Apo Island has the greatest algal diversity, 83 species, while in Bais Bay there are only 44 species. On Apo Island, there is a mixed algal bed in the first 10 m consisting of green alga *Enteromorpha clathrata*, the red alga *Gellidiella acerosa*, and the brown alga *Sargassum*. Algal beds extending from 20-25 m shoreward occupy 0.3 ha (Calumpong *et al*. 1997).

Coral Reefs

Coral reefs are one of the nation's most valuable natural resources, serving as an important source of food and providing opportunities for jobs, business, and support to the tourism industry. In Negros Oriental, coral reefs are estimated to cover an area of 26.5 km^2 and are distributed non-continuously along 186 km of coastline with an average width of 143 m (Montebon 1995).

A total of 121 scleractinian species and genera of corals belonging to 14 families and 4 species of non-scleractinian corals were identified in 3 survey stations (Bais, Dumaguete, and Apo Island) (SUML 1997) (Table 4.5). Taxonomic studies in marine reserve areas conducted by the Centre for the Establishment of Marine Reserves in Negros Oriental (CEMRINO, Inc.) in 1995-1996 show that Apo Island has the highest number of coral species throughout Negros Oriental.

Table 4.5. Coral species in Negros Oriental.

HARD CORALS	
Scleractinian Corals	
Order Scleractinia	
Family Acroporidae	Family Mussidae
Family Agariciidae	Family Oculinidae
Family Caryophyllidae	Family Pectiniidae
Family Dendrophylliidae	Family Pocilloporidae
Family Faviidae	Family Poritidae
Family Fungiidae	Family Siderastreidae
Family Merulinidae	Family Trachyphylliidae
Non-Scleractinian corals	
Order Coenothecalia	
Family Helioporidae	
Order Milleporina	
Family Milleporidae	
SOFT CORALS	
Order Alcyonacea	
Alcyonium	Paralemnalia
Asterospicularia	Sarcophyton
Cespitularia	Sinularia
Lemnalia	Xenia
Lobophyton	
Nephthea	

Source: Calumpong et al. *(1997)*

Wide area surveys of the coral reefs in Negros Oriental using the manta tow reconnaissance technique were conducted by Montebon in 1995 to assess shallow water reefs along the coastline of the province. The results of the manta tow survey for the profile area are presented in Figure 4.1. The results show that only 5 percent of the total area of coral reefs in Negros Oriental have "excellent" coral cover (with a score of 5) while more than 50 percent of the reefs (cumulative of categories 0, 1, and 2) are in "poor" condition (Montebon 1995). Table 4.6 presents the relative proportion of percent cover with their corresponding area per category score. Table 4.7 shows a comparison between live coral cover from 103 transect-quadrat stations by Gomez *et al*. (1981) of Negros Oriental in the past (1981) and recent results of the manta tow cover data.

Mean percent cover of benthic categories using random quadrat (RQ) method in each station in the 3 sites conducted by the SUML is shown in Table 4.8. From the results of the random quadrat method, Apo Island has the highest mean total coral cover (82.9 percent) in all of the sites.

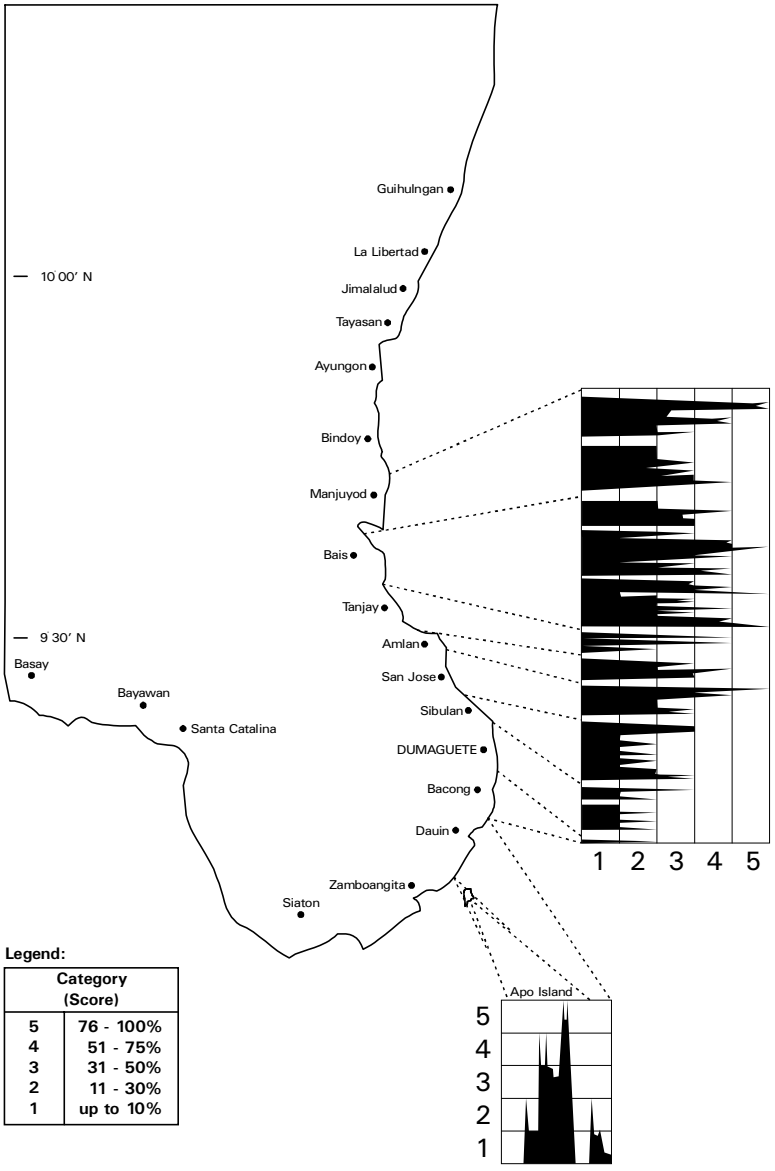


Figure 4.1. Coral cover based on the large scale survey (manta tow).
Source: Montebon (1995)

Table 4.6. Relative proportion (percent cover) with corresponding area per category score of the different benthos for the Negros Oriental province.

Category (Score)		Hard coral	Area (km^2)	Soft coral	Area (km^2)	Dead coral	Area (km^2)
5	76 - 100 %	5 %	1.33	0 %	0	0 %	0
4	51 - 75 %	14 %	3.71	2 %	0.53	0 %	0
3	31 - 50 %	25 %	6.63	6 %	1.59	0 %	0
2	11 - 30 %	30 %	7.95	12 %	3.18	0 %	0
1	up to 10 %	23 %	6.1	46 %	12.19	11 %	2.92
0	none %	3 %	0.8	34 %	9.01	89 %	23.59
Total		100 %	26.5	100 %	26.5	100 %	26.5

Source: Montebon (1995)

Table 4.7. Live coral cover for Negros Oriental for 1981 and 1995.

Coral cover	1981[1]	1995[2]
50 - 100 %	31 %	19 %
30 - 50 %	29 %	25 %
10 - 30 %	29 %	30 %
0 - 10 %	11 %	26 %

Source: [1]103 transect-quadrat stations by Gomez et al. *(1981)*
[2]Manta tow data of 186 km of coastline (Montebon 1995)

Table 4.8. Mean percent cover of benthic categories using random quadrat method at 3 Negros sites.

Stations	Corals				Flora	Other fauna	Abiotic			
	Hard	Soft	Dead	Total	Algae		Rubble	Sand	Silt	Rock
Apo Island	28.75	53.5	0.63	82.92			4.06	3.23		9.79
Bais Bay	36.56	12.2	7.5	56.25		0.94	14.84	17.19	1.88	8.91
Dumaguete	43.33	3.75	8.96	56.04	2.6	4.79	14.13	19.24		3.19
Mean	36.22	23.2	5.69	65.07	0.87	1.91	11.01	13.22	0.63	7.3

Source: Calumpong et al. *(1997)*

Negros Oriental is known for its marine sanctuaries or reserves. Apo Island marine reserve is one of the known sanctuaries not only in the country but in the Southeast Asian Region. It serves as a model to other areas in the country. Table 4.9 shows the marine sanctuaries/reserves found in the profile area.

Table 4.9. Marine sanctuaries/reserves in the profile area.

Municipality/ City	Name of sanctuary	Location	Area covered (ha)	Year established
Amlan	Bio-os Marine Reserve	Brgy. Bio-os	8.87	1999
	Tandayag Marine Reserve	Brgy. Tandayag	6	1996
Bais	Okiot/Sanlagan Marine Reserve	Brgy. Okiot	1	1994
Tanjay	Polo Marine Reserve	Brgy. Polo	2	1995
Sibulan	Cangmating Marine Reserve	Brgy. Cangmating	6	1997
	Agan-an Marine Reserve	Brgy. Agan-an	6	1998
San Jose	Poblacion Marine Reserve	Brgy. Poblacion	4	1994
Dauin	Apo Island Marine Reserve	Brgy. Apo Island	17	1986
	Masaplod Norte Marine Reserve	Brgy. Masaplod Norte	6	1997
Manjuyod	Campuyo Marine Reserve	Brgy. Campuyo	25	1994
	Bolisong Marine Reserve	Brgy. Bolisong	10	1995
Siaton	Tambobo Fish Sanctuary	Brgy. Siit	6.4	1993
		Brgy. Bonbonon	8	1994
Bacong	Buntis Marine Reserve	Brgy. Buntis	6	2000

Fisheries

SUML conducted fish visual censuses at 3 to 5 stations in 3 sites: Bais Bay, Dumaguete, and Apo Island. In all of the stations except 1, Family *Pomacentridae* (damsel fishes) had the most abundant number of individuals and in 8 out of 12 stations, Family *Pomacentridae*

also had the most number of species (Table 4.10). Also, in 8 out of 12 stations, Family *Labridae* had the second highest number of species. Other families prominently represented are *Chaetodontidae* and *Serranidae*. In Bais Bay, there were 99 fish species belonging to 22 families. In Dumaguete City, 112 species belonging to 23 families were counted, and on Apo Island, 146 species belonging to 27 families were identified (Calumpong *et al*. 1997).

Table 4.11 represents the mean species richness and mean density for the 3 municipalities surveyed. Overall, the sites in Dumaguete have both the highest mean species richness and the highest mean density. Of the stations surveyed on Apo Island, it is not surprising to note that mean species richness is highest in the marine sanctuary (33 ± 2 species/500 m^2). Protection from fishing and disturbance may be the cause for the high species richness (Calumpong *et al*. 1997). In Campuyo, Bais, compared to previous surveys (Luchavez and Alcala 1992; Luchavez and Divinagracia 1994), there is a reduction in the total number of species and families, as well as lower species richness and density values.

SUML conducted biomass surveys at 3 to 5 stations at each of the 3 sites. These surveys included only fish that are targeted by fishers, can be identified to the species level, and are non-juveniles. Table 4.12 presents the estimated biomass of the fish from all 3 sites. SUML identified 18 species of target fish belonging to 8 families in Bais Bay and 19 target species belonging to 9 families in Dumaguete (SUML 1997). Apo Island has the greatest diversity of species, registering 23 target species belonging to 9 families.

Total biomass for Apo Island (15,219 g/500 m^2) is high compared to other sites. These results agree with the previous study of Russ and Alcala (1993) which revealed increasing mean biomass of large predatory fishes there.

The surveys also identified the number of large predatory fish. Species density, species richness, and estimated biomass of large predatory fish are indices of fishing pressure on coral reefs (Russ and Alcala 1993). Apo Island has the greatest number of species of large predators, 6, and Dumaguete has the least number of species observed, only 1. In Bais Bay, 4 large predatory species were encountered. Based on the indices of fishing pressure, Dumaguete has the highest fishing pressure and Apo Island has the lowest fishing pressure (Calumpong *et al*. 1997).

Table 4.10. List of fish, crustaceans, and mollusk species harvested in Bais Bay, Dumaguete, and Apo Island.

Species	Local name
A. Fish	
Family Acanthuridae (surgeon fishes)	
Acanthusurs sp.	*Bagis*
Naso spp.	
Family Ambassidae (glassy fishes)	
Ambassis sp.	*Palangan*
Family Apogonidae (cardinal fishes)	
Clienlodipterus macrodon	*Ibis/Mongaw*
Apogon ssp.	*Ibis*
Sphaeramia nemetoptera	*Ibis*
Family Antherinidae (silversides)	
Atherina sp.	*Guno*
Family Balistidae (trigger fishes)	
Balistapus undulatus	*Pugot*
Balistapus sp.	*Pakol*
Stephanolepis sp.	*Bulaknita*
Pseudotriacanthus sp.	*Bulaknita*
Family Belonidae (needle fishes)	
Strongylura sp.	*Balo*
Family Blenniidae (blennies)	
Salarias fasciatus	*Palog*
Salarias sp.	*Palog*
Family Carangidae (scads and jacks)	
Megalaspis cordyla	*Bakulan*
Alepes vari	*Kabalyas*
Alectis indicus	*Samin-samin*
Alectis ciliaris	*Samin-samin*
Carangoides armantus	*Badlon*
Carangoides sp.	*Malapati*
Selar sp.	*Tamarong*
Scomberoides tol	*Lapis*
Caranx sp.	*Baha-ulo*
Decapterus sp.	*Pulag-ikog*
Atule mate	*Lambayawan*
Unidentified sp.	*Talikitok*
Family Caesionidae (fusiliers)	
Caesio erythrogaster	*Ulan-ulan*
Caesio caerulaureus	*Solid*
Pterocaesio pisang	*Lokihok*
Family Chaetodontidae (butterfly fishes)	
Chaetodon octofasciatus	*Kulampiros*
Family Chanidae (milkfish)	
Chanos chanos	*Awa*
Family Chirocentridae (wolf herring)	
Chirocentrus dorab	*Balila*
Family Cichlidae (cichlids)	
Tilapia sp.	*Tilapia*
Family Clupeidae (sardines and herrings)	
Sardinella albella	*Lilang*
Sardinella sp.	*Malangsi*
Nematalosa cone	*Kabase*
Spratelloides sp.	*Bolinabid*
Dussumieria elopsoides	*Balantiyong*

continued

Table 4.10. continued

	Unidentified sp.	*Molobgas*
	Unidentified sp.	*Hawol-hawol*
Family	Dasyatidae (stingray)	
	Dasyatis sp.	*Kiampao*
Family	Engraulidae (anchovies)	
	Stolephorus sp.	*Bolinao*
	Thrissina baelama	*Tigue*
	Unidentified sp.	*Tugnos*
Family	Elopidae (tarpons)	
	Megalops cyprinoides	*Bulan-bulan*
	Elops sp.	*Bid-bid*
Family	Ephipidae (batfishes)	
	Platax orbicularis	*Dalapugan*
Family	Fistularidae (flutemouths)	
	Fistularia petimba	*Tubo-tubo*
Family	Gerreidae (mojarras)	
	Gerres sp.	*Kasbo*
	G. abbreviatus	*Bag-angan/Samulok*
	G. filamentosus	*Bag-angan/Lawihan*
Family	Gobiidae (gobies)	
	Ptereleotris sp.	*Ananambo*
	Cryptocentrus sp.	*Balanghutin*
	Oxyurichthys sp.	*Wakli-wakli*
	Unidentified sp.	*Watlay-watlay*
	Unidentified sp.	*Bunog*
Family	Haemulidae (sweetlips and grunts)	
	Pomadasys hasta	*Ulibalay*
	Plectorhyncus pictus	*Lipte*
	P. chaetodontoides	*Lipte*
Family	Hemiramphidae (halfbeaks)	*Balanban/Salasa*
	Hemiramphus sp.	
Family	Holocentridae (squirrel fishes)	
	Adioryx ruber	*Ganting*
	Myripristis berndti	*Ganting*
Family	Kyphosidae (sea chubs)	
	Kyphosus sp.	*Ilac*
Family	Labridae (wrasses)	
	Cheilinus celebicus	*Ipos-ipos*
	C. tribatus	*Ananapan*
	Halichoeres scapularis	*Labayan*
	Choerodon sp.	*Lupit*
	Thalassoma lunare	*Tanlaron*
Family	Leiognathidae (slipmouths)	
	Leiognathus splendens	*Danglay*
	L. fasciatus	*Dagoldol*
	L. elongatus	*Tabilos*
	L. bindus	*Sap-sap*
	Gazza minuta	*Piampe*
	Gazza achlamys	*Piampe*
	Secutor ruconius	*Palotpot*
	S. insidiator	*Palotpot/Sape-sape*
Family	Lethrinidae (emperor breams)	
	Lethrinus lentjan	*Katambak*
	Lethrinus ornatus	*Katambak*
	Lethrinus sp.	*Dogso*
Family	Lobotidae (tripletails)	
	Lobotes surinamensis	*Ligad*

continued

Table 4.10. continued

Family	Lutjanidae (snappers)	
	Lutjanus argentimaculatus	*Mangagat*
	L. fulviflamma	*Lalagan*
	L. rivulatus	*Panta-an*
	L. monostigma	*Aluman*
	L. russelli	*Labungan*
	L. gibbus	*Maya-maya*
	L. caeruleovittatus	*Bangalao*
	Lutjanus sp.	*Kalambangis*
Family	Mugilidae (mullets)	
	Liza sp.1	*Gisaw*
	Liza sp. 2	*Balanak*
	Liza sp. 3	*Yakmo*
Family	Mullidae (goatfishes)	
	Upeneus sulphureus	*Hinok 1*
	U. vittatus	*Hinok 2*
	U. tragula	*Hinok 3*
	Parupeneus barberinus	*Timbungan*
	Upeneus sp.	*Salmonete*
Family	Muraenidae (moray eels)	
	Evenchelys marchuris	*Ubod*
	Gymnothorax spp.	*Bakasi*
Family	Nemipteridae (threadfin breams and spinecheeks)	
	Nemipterus spp.	*Bakay*
	Scolopsis cancellatus	*Budlat*
	Scolopsis ciliatus	*Gapas-gapas*
	Pentapodus spp.	*Sulong/Salinggukod*
Family	Platycephalidae	
	Platycephalus sp.	*Sunoga*
Family	Plotosidae (marine catfishes)	
	Plotosus lineatus	*Ito*
Family	Priacanthidae (big eyes)	
	Priacanthus sp.	*Bungo/Bulgan*
Family	Pomacentridae (damselfishes)	
	Dischistodus fasciatus	*Palata*
	Chrysiptera sp.	*Palata*
	Chromis spp.	*Kibang*
	Dascyllus spp.	*Bica-bica*
	Abudefduf	*Kapal*
	Amphiprion clarkii	*Bantay bot-bot*
Family	Rachycentridae (cobia)	
	Rachycentron canadum	*Halo-antasik*
Family	Scaridae (parrotfishes)	
	Scarus spp.	*Mol-mol/Kuyog-kuyog*
Family	Scatophagidae (scats)	
	Scatophagus argus	*Kikilo*
Family	Scombridae (mackerels and tunas)	
	Rastrelliger kanagurta	*Anduhaw*
	Scomberomorus sp.	*Tangige*
	Unidentified spp.	*Pirit-pirit/Ihalason*
Family	Scorpaenidae (scorpion fishes)	
	Pterois volitans	*Lalong*
	Sebastes sp.	*Bantol*
Family	Serridae (groupers)	
	Cromileptis altivelis	*Milo-milo*
	Epinephelus suillos	*Manalho*

continued

Table 4.10. continued

	E. macrospilus	*Lapu-lapu*
	E. caeruleopunctatus	*Manan-aw*
	E. fuscoguttatus	*Bantolon*
	E. microdon	*Bantolon*
	E. summana	*Pugapo*
	Cephalopholis	*Pugalo*
	C. pachycentron	*Tangka-an*
	Anyperodon leucogrammicus	*Lapu-lapu*
Family	Siganidae (rabbitfishes)	
	Siganus canaliculatus	*Danggit*
	S. guttatus	*Kitong*
	S. punctatus	*Lalap*
	S. virgatus	*Talagbago*
	S. vulpinus	*Talagbago*
	S. spinus	*Ngis-ngis*
Family	Sillaginidae (whitings)	
	Sillago sp.	*Aso-os*
Family	Soleidae (soles)	
	Dexillichthys sp.	*Dali-dali/Palad*
Family	Sphyraenidae (barracudas)	
	Sphyraena barracuda	*Rompe/Tabangko*
	Sphyraena sp.	*Bat-og*
Family	Synodontidae (lizardfish)	
	Synodus variegatus	*Tambod*
	Saurida ssp.	*Tambod*
Family	Teraponidae (tigerfishes)	
	Terapon jarbua	*Buga-ong*
	Pelates quadrilineatus	*Gong-gong*
Family	Tetraodontidae (pufferfishes)	
	Chelonodon patoca	*Botete*
Family	Trichiuridae (hairtails)	
	Trichiurus haumela	*Diwit*
B. Crustaceans (crabs, prawns, shrimps, and lobsters)		
Family	Portunidae (Portunid crabs)	
	Scylla serrata	*Alimango*
	Portunus pelagicus	*Lambay*
	Thalamita sp.	*Kasag*
	Charybdis cruciata	*Krusan*
	Podophthalmus vigil	*Kasway*
Family	Peraeidae (penaeid shrimps)	
	Penaeus monodon	*Pantat*
	P. japonicus	*Pantat*
	P. merguiensis	*Boktutay*
	Trachypenaeus fulvus	*Bagulan*
	Metapenaeus ensis	*Mestisa*
	M. endeavouri	*Mestisa*
Family	Sergetidae	
	Acetes sp.	*Uyap*
Family	Palinuridae (lobsters)	
	Panulirus sp.	*Banagan*
C. Mollusks		
Cephalopoda (squid, cuttlefish, octopus)		
	Sepioteuthis sp.	*Nokos*
	Loligo sp.	*Talostos*
	Sepia sp. 1	*Kulabutan*
	Sepia sp. 2	*Buko-buko*
	Octopus sp. 1	*Kugita*
	Octopus sp. 2	*Tabugok/Tamal*

continued

Table 4.10. continued

Family	Lucinidae (Lucines)	
	Phacoides philippinarium	*Embao*
Family	Mytilidae (mussels)	
	Modiolus metcalfei	*Tahong*
Family	Ostreidae (oysters)	
	Crassostrea sp.	*Talaba*
	Crassostrea cucullata	*Sisi*
	Ostrea sp.	*Kuya*
Family	Arcidae (ark shells)	
	Anadara sp.	*Litub*
Family	Corbiculidae	
	Geloina suborbicularis	*Tuway*
Family	Veneridae (Venus clams)	
	Tapes litterata	*Kandiis*
	Paphia sulcosa	
	Circle scripta	*Pisos-pisos*
	Grafrarium tumidum	*Bisala*
	Periglypta sp.	*Bug-atan*
	Pitar citrina	*Tikod-tikod*
	Unidentified sp.	*Punao*
	Unidentified sp.	*Punao*
	Unidentified sp.	*Puti-an*
	Unidentified sp.	*Punyete*
Family	Cardiidae (cockles or heart shells)	
	Vepricardium sp.	*Sulod-sulod*
Family	Mactridae (surf clams)	
	Mactra sp.	*Bulok-bulok*
Family	Anomiidae (jingle shells)	
	Placuna placenta	*Lampirong/Tipay*
Family	Pinnidae (fan mussels)	
	Atrina sp.	*Talab/Atsa-atsa*
Family	Malleidae (hummer oyster)	
	Malleus sp.	
Family	Pterridae (pearl oysters)	
Family	Aplyssidae (seahares)	
	Dolabella auricularia	*Lucot*
Family	Strombidae (true conch)	
	Strombus canarium	*Bungkawil*
	S. urceus	*Aninikad*
Family	Potamididae (mud whelks)	
	Telescopium telescopium	*Bagongon*
	Terebralia sp.	*Dalu-dalu*
Family	Volutidae (volutes)	
	Melo sp.	*Bilong*
	Voluta sp.	*Kibol*
Family	Muricidae (murex or rock shells)	
	Murex sp.	*Sangka-sanka*
Family	Haliotidae (abalones)	
	Haliotis sp.	*Kapinan*
Family	Trochidae (topshells)	
	Thocus sp.	*Tandok-tandok*

Source: Luchavez and Abrenica (1997)

Table 4.11. Mean fish species richness and mean density at Bais Bay, Dumaguete, and Apo Island.

Sites	N	Mean species richness (no. of species/500m^2)	Mean density (no. of individuals/500m^2)
Bais Bay	10	32 $\pm$ 2	9,167 $\pm$ 4,904
Dumaguete	6	44 $\pm$ 1	11,005 $\pm$ 2,097
Apo Island	14	33 $\pm$ 2	7,805 $\pm$ 2,064

Note: $\pm$2 = Standard error; N= number of replicates
Source: Calumpong et al. *(1997)*

Table 4.12. Estimated biomass of target species in Bais Bay, Dumaguete and Apo Island.

Species names	Biomass (g/500m^2)		
	Bais	Dumaguete	Apo Island
Acanthuridae	75	868	6,270
Caesionidae	9,897	2,379	5,251
Haemulidae	-	34	-
Kyphosidae	-	290	-
Labridae	150	355	-
Lethrinidae	-		45
Lutjanidae	163	700	1,900
Mullidae	189	313	961
Nemipteridae	60	630	40
Scaridae	301	-	542
Serranidae	-	-	30
Siganidae	213	168	180
TOTAL	**11,048**	**5,737**	**15,219**

Source: Calumpong et al. *(1997)*

SUMMARY

Deposits of copper, iron, limestone, dolomite, manganese, galena, gypsum, and phosphate have been reported as present in the profile area. Quarrying has been concentrated on sand and gravel for construction purposes. Meanwhile, Negros Oriental has a low forest cover due to much illegal logging although the government and other institutions are undertaking forest rehabilitation and restoration efforts.

The Negros Oriental coast is known in the Philippines for having rich coastal resources but as in most areas, they are under threat. Mangroves have been depleted and cover less than 1,000 ha but protection and reforestation efforts are now underway. Nearshore, areas are mostly seagrass and algal beds fringed by coral reefs. The best reefs are found on Apo Island, Bais Bay area and selected sites along the coast. There are more than 20 functioning marine reserves in the province covering about 200 ha of reef. Most reefs are overfished but some sanctuaries have shown documented increases in fish species diversity and abundance per 500m^2 through periodic reef monitoring.

Chapter 5
SOCIOPOLITICAL SETTING

POLITICAL AND ADMINISTRATIVE BOUNDARIES

The province of Negros Oriental belongs to Region VII, grouped together with the other Cebuano-speaking provinces of Cebu, Bohol, and Siquijor located in the Central Visayas region of the Philippine archipelago (PPDO 1992). The profile area covers the 2 cities and 7 municipalities that are along the coast stretching from the municipality of Manjuyod in the north to the municipality of Dauin in the south and contains 72 coastal *barangays* for the profile area (Table 5.1) (Figure 5.1). There are 3 islands found in the profile area: Daco and Dewey Islands, under the jurisdiction of Bais City, and Apo Island, under the jurisdiction of Dauin. Daco Island is a peninsula of Bais attached to the main land by a narrow strip of land which divides Bais Bay into North and South bays. Daco Island has 4 *barangays* and Dewey Island, located in the North Bais Bay, has only 1 *barangay*. Apo Island also has only 1 *barangay*.

DEMOGRAPHICS

The total population of Negros Oriental in 1995 was 1,025,247 (NSO 1995). A total of 205,131 households and less than 1 percent of the population in the province live outside a household. The average annual growth rate for the province was 2.07 percent from 1990 to 1995, although the average annual growth rate for the profile area was 10.1 percent. The municipality in the profile area with the highest growth rate, 18.00 percent, is Bacong, but the most populous LGU in the profile area is Dumaguete City, which has a population of 92,637 and a growth rate of 15.40 percent.

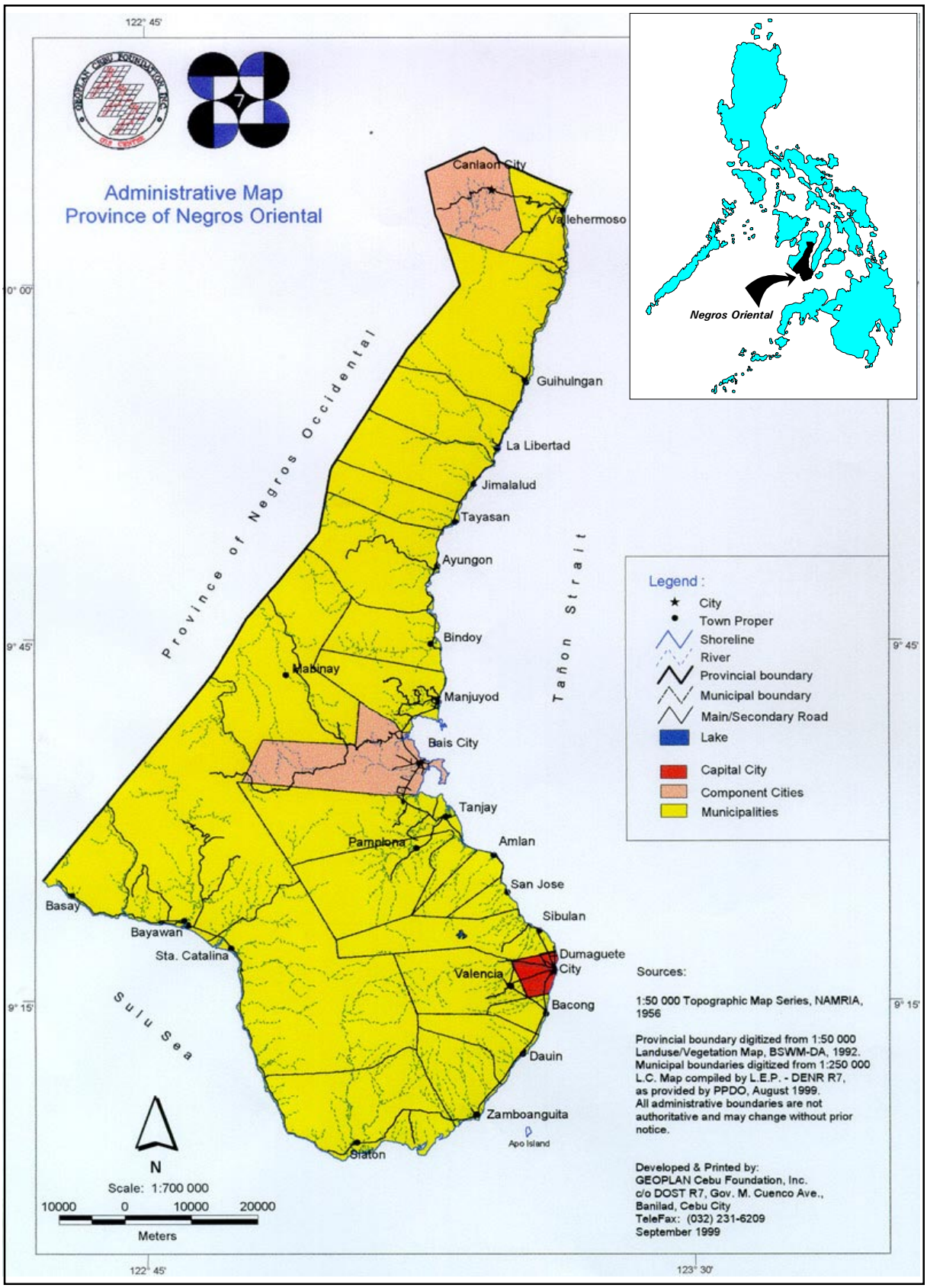


Figure 5.1. Negros Oriental administrative map.

Table 5.1. Population distribution per municipality/city.

Municipality/ City	Total population (as of 1995)	Population of coastal *barangays* (as of 1995)	Projected total population (by 2002)	Population density (person/km^2)	Projected by 2002	Number of households (as of 1995)
Manjuyod	34,545	13,212	40,098	131	152	589
Bais	63,355	15,286	70,672	200	223	11,061
Tanjay	65,634		70,455	122	131	11,747
Amlan	16,573	10,965	17,383	279	157	3,086
San Jose	14,952	6,877	18,348	275	293	2,384
Sibulan	31,206	14,348	37,577	191	231	5,307
Dumaguete	92,637	35,599	115,078	1,660	2,062	15,222
Bacong	19,177	9,076	24,029	767	961	3,460
Dauin	19,609	9,420	22,911	172	201	3,646
Siaton	57,313	39,860	70,590	201	210	9,596

The province has a density of 171.28 people/km^2. In the profile area, the average household size is 5 and over 90 percent of the population live in single unit houses (NSO 1995). The urban population in the province showed a small increase of 5 percent between 1980 and 1990, although 1 municipality in the profile area, Amlan, showed a dramatic increase of 16.50 percent.

In 1995, children 14 years old and below, comprised 39.82 percent (408,223) of the population and those 65 years old and older comprised 4.04 percent of the population. Since 1970, the number of people in the productive age group (15-64) has increased, as has the number of people over the age of 65, although the increase has been greater in the productive age group, 6.22 percent and 1.21 percent, respectively. Therefore, not only is the population getting older, but the number of people dependent on the productive age group is decreasing (PPDO 1999).

In many respects, the population of the province is rather homogeneous: 99.8 percent are Filipino citizens; 82 percent are Roman Catholic; and more than 95 percent of the population speak Cebuano (PPDO 1999). The majority of the population also understand Tagalog (Filipino) and English, the 2 national languages. Most of the local television programs and movies are in Tagalog and English has been the medium of instruction in most, if not all, of the schools, universities, and other institutions of higher learning within the profile area (PPDO 1999).

HEALTH, SANITATION, AND MEDICAL CARE

Health facilities are scattered throughout the profile area and it is estimated that about 70 percent of the people in the province are able to benefit from the health services that are available. These facilities are composed of hospitals, rural health units, *barangay* health stations, municipal health stations/centers, and private clinics (Table 5.2). Primary, secondary, and tertiary care are available in the province, although there is only 1 public tertiary

hospital, Negros Oriental Provincial Hospital. Two of the 3 private hospitals, Silliman University and Holy Child Hospital, provide tertiary care, while the third private hospital, Central Azucarera de Bais (CAB), only provides primary care (PPDO 1999). The 5 hospitals operating within the profile area have 300-400 bed-capacities.

Table 5.2. Health service facilities in the profile area.

Types of health facilities	Number	Location
Rural health unit	1	Each LGU has a a rural health unit
Maternity/family planning clinic	2	Amlan, Bais City
Municipal health station/center	16	Bais City (one per *barangay*), Manjuyod, Sibulan, Tanjay City
Barangay health unit	39	Amlan, Bacong, Manjuyod, Sibulan, Tanjay City
Private clinics	19	Bais City, Tanjay City, Dumaguete City
Hospitals	5	Bais City, Dumaguete City

Communicable diseases, such as upper respiratory tract infection, pneumonia, gastrointestinal diseases, influenza, parasitism, pulmonary tuberculosis and typhoid fever, were the leading causes of illness in the province from 1990 to 1995. Moreover, pneumonia and septicemia were the leading causes of infant mortality. Malnutrition was a problem in the province as well. In 1996, 11.0 percent of the province suffered from malnutrition and the 5-year average from 1991 to 1995 was 16.2 percent. In addition, malaria and dengue fever are endemic to the province. Malaria is declining and not present in most areas, while dengue fever is increasing (PPDO 1998).

As of 1995, an estimated 36,505 households (28 percent) in the province do not have access to potable water and 45,785 (22 percent) do not have sanitary excreta disposal facilities. There are no sewerage systems in the province, although residences are required to maintain on-lot septic tank systems. Solid waste disposal is a problem in all municipalities and cities, including Dumaguete City and Bais City, the only 2 places that have their own solid waste disposal sites (PPDO 1998).

EDUCATION AND LITERACY

Education is a high priority in the Philippines. By Presidential decree, every *barangay* is supposed to have an elementary school. Although Negros Oriental is working towards this goal and there are more elementary schools than *barangays* in the province, not all the *barangays* in the hinterlands have elementary schools. In addition, many of the elementary schools are not complete and often it is necessary to have mixed grade classes because there are not enough teachers. Elementary school participation is high; for school year 1996-97, the participation rate in the public elementary schools was 88.22 percent and the drop-out rate was 3.81 percent. The secondary schools participation rate was substantially lower and the drop-out rate was more than double that of the elementary

schools, 27.94 percent and 10.60 percent, respectively. The total enrollment, both public and private in the province for the 1996-97 school year was 170,306 students for the elementary school level and 43,065 students for the secondary level out of a school age population (ages 7-24) of 393,923 based on the 1995 census (DECS 1997).

There are a number of higher learning institutions in the province: 10 colleges, 1 state college, and 2 universities. These institutions offer a wide variety of courses across many disciplines, including graduate level courses. Vocational and technical training is also available, although these facilities are primarily located in Dumaguete (PPDO 1999).

Despite the opportunities for education within the province, nearly 78 percent of the labor force have not graduated from the secondary level of education. Out of a labor force of 501,000, only 129,601 have graduated from high school and even fewer, 39,538, hold academic degrees (Five-Year Provincial Development and Investment Plan). For the province, the literacy rate for the household population over the age of 10 is 88.77 percent (780,279), evenly split between males and females (PPDO 1999).

RELIGIOUS AND ETHNIC GROUPS

Roman Catholics are 82 percent of the population of the province. The Philippine Independent Church (Aglipay) and the United Church of Christ in the Philippines (UCCP) comprise 6 percent of the total populace. The Iglesia ni Cristo account for only 1 percent while the most of the other religions comprise 5 percent of the provincial population (PPDO 1999).

Ethnic groups are living in the hinterland of the province. In 1991-92, the local Office of the Southern Cultural Communities (OSCC) lists 460 heads of families belonging to 5 tribes in different locations within the province and the profile area (Table 5.3).

Table 5.3. Ethnic groups within the province and the profile area.

Ethnic Group	Location
Bukidnon	Mountains of Basay, Bayawan, Mabinay
Magahat	Mabinay, Bais, Tanjay, Ayungon
Carol-anon	Ayungon (Barangay Carol-an area)
Ati	Canlaon City area
Ata or Agta	Manjuyod

Source: PPDO (1999)

Dialects

Within the profile area, there are 3 dialects spoken by most of the populace. Cebuano, is the most widely spoken dialect. Hiligaynon, which is commonly known as Ilonggo is spoken only in the southernmost municipalities not covered under the profile area as well the Occidental region of the province (5.4). Tagalog is understood by a large majority of the population since most of the local programs (TV and movies) use the Tagalog (Filipino)

Table 5.4. Dialects spoken by households in the profile area.

Dialects	Percent of Households	Population
Cebuano	95.3	168,348
Hiligaynon	4.7	7,575
Filipino	no data	no data
Total	100	175,923

Source: NSO (1995)

dialect. English as influenced by communication facilities e.g. movies, radio, and publications has been the medium of instruction in most if not all of the schools and universities and other institutions of higher learning within the profile area.

Infrastructure

Electricity

Power in Negros Oriental is provided by 3 geothermal plants and 1 hydroelectric plant in Amlan (PPDO 1999). In addition to serving Negros Island, the geothermal plant at the foot of Cuernos de Negros also supplies electric power to Panay and Cebu (PPDO 1999). However, by 1997, only 339 out of the 557 *barangays* in the 25 cities and municipalities in the province have electricity, giving power to less than half (42 percent) of the households in the province.

Communications

There are many modern communication facilities, such as internet cafes, facsimile machines and cellular phone sites, available in the profile area, though these are mainly concentrated in Dumaguete City. In addition, it is possible to receive local, national, and international news and entertainment from newspapers, radio, and television. Each municipality has a government post office, radiophones, telegram stations, and a municipal telephone system and several municipalities are also serviced by private courier companies. However, many people within the profile area are without telephone service; the regional telephone density is 1.996 telephones/100 people. Therefore, radiophone communication networks are necessary to provide service to areas that could not be reached by telegraph or telephones.

Transportation

The primary means of inter-municipality transportation are passenger jeeps, buses, and tricycles. Even in Bais City and Dumaguete City, only 8 percent of the population own private vehicles. The roadways in the province cover a total of 1,490,768 km and are mainly gravel; less than a quarter are paved with asphalt or concrete. However, the road along the coast is paved and in good condition, allowing for easier transportation of passengers and goods between the profile area municipalities. Although there are a number of bridges connecting the coastal towns within the profile area, more bridges are still needed to access rural areas (PPDO 1999).

Although the Dumaguete City Airport, classified as a trunkline airport, is the alternate international airport to Cebu International Airport and has daily service to Manila and Cebu, the majority of inter-island transport occurs via the sea. Dumaguete is the major seaport in the profile area and is classified by the Philippine Ports Authority (PPA) as a primary seaport. Of the 3 government ports and the small number of privately owned ports, the Dumaguete port receives the most passengers and vessel calls per year, but combined, the private ports handle more metric tons of cargo (Table 5.5). Of the government ports, Dumaguete Port also has the most extensive infrastructure, with a roll-on roll-off ramp; a container yard and a passenger terminal. Passenger traffic has increased markedly since 1992 due to the entry of fast ferries to the Dumaguete Port and construction is currently underway to expand the port. The fast ferries offer daily service to Dipolog, Cagayan de Oro City, Tagbilaran City, Cebu City, and Siquijor province. Other passenger boats to Manila, Cebu, Iloilo, and Mindanao are also available.

Table 5.5. Total vessel, passenger, and cargo arrivals for 1996.

Ports	Vessels	Passengers	Cargo (mt)
Dumaguete Port	6,317	1,008,532	435,011
Tandayag Port, Amlan	5,053	327,011	96,569
Guihulngan Port	1,295	128,471	540
Private ports	2,554	11,579	540,356
Total	**15,219**	**1,475,593**	**1,072,476**

Source: PPDO (1999)

The 2 other government ports in the province, Tandayag Port in Amlan and Guihulngan Municipal Port, are classified as tertiary ports. Privately owned ports are mostly owned by factories and processing plants operating within the profile area. These are the Dyno-Wesfarmers Port and the Dumaguete Coconut Oil Mill Inc. in Bacong, the fuel depot ports of Petron, Shell, and Caltex oil companies in Amlan, and the Universal Robina Sugar Milling Company in Manjuyod.

The profile area still faces the need to develop its basic infrastructure. More roads and bridges need to be built; access to potable water and electricity needs to be improved; and more health and sanitation facilities are required to prevent the spread of diseases. Efforts to increase the participation in secondary level education must be taken to improve the skills of the labor force. With the need for such basic infrastructure development, local governments may believe that they cannot afford to invest in coastal resource management. The link needs to be drawn between a clean, healthy environment and an improved welfare of the community.

There are 3 major land routes connecting the province of Negros Oriental to the Occidental province. The shortest route passes through the interior town of Mabinay approximately 30 km from Bais City. This route cuts through the mountain boundary and

goes down to Kabankalan, Negros Occidental all the way to San Carlos and Bacolod City, Negros Occidental. The third route passes the southern coastal towns of Siaton and Basay then Hinoba-an, Negros Oriental. Road length inventory for the province for the year 1991 is shown in Table 5.6 (PPDO 1992).

Table 5.6. Road length inventory for Negros Oriental as of 1991.

Category of roads	Total	Types of pavement (km)			
		Concrete	Asphalt	Gravel	Earth
Total	3,231.63		334.416	1,160.46	1,673.17
National	336.305	57.576	153.054	131.02	
Provincial	293.47	52.231	33.36	180.81	79.3
City	76.45		40.182	16.765	18.045
Municipal	185.411	1.755	63.921	64.815	56.675
Barangay	1,416.88		10.512	724.62	681.744
National Aid Provincial	29.42		2.68	19.27	7.47
National Aid City	50.066	2.99	23.916	23.16	

Source: PPDO (1991)

SUMMARY

Negros Oriental has a densely populated coastal area with a growth rate of more than 2 percent, about the Philippine average. The cities are growing faster at more than 10 percent per year. Population management and health care are priority problems. The province has relatively good infrastructure because of its geothermal electricity and coastal highway system.

Chapter 6
ECONOMIC SECTOR

The economy of the profile area is heavily focused on agriculture, fisheries, and forestry, employing the majority of the labor force. Not surprisingly, this also means that much of the labor force does not earn high wages and many families are living in poverty. There is very little industry in the area outside of agriculture. Tourism has potential for growth and increased revenue.

Labor and Employment

In 1996, the total labor force was 535,000 out of a working age population of 729,000, which is defined as household population aged 15 years old and above. The unemployment rate for the province was 8.2 percent. Approximately 491,000 were employed fully or partially, with an underemployment rate of 3.1 percent (PPDO 1998). An April 1996 survey showed that 301,000 (61.3 percent) of the 491,000 fully or partially employed are engaged in agriculture, fisheries, or forestry (PPDO 1998) (Table 6.2). In addition, nearly half of the total number of families of Negros Oriental derive their main source of income from this sector. Around 41 percent of the people in the profile area work as full-time fishers earning an average annual income of less than PhP17,500 (US$438*) (Calumpong *et al*. 1999) (Table 6.3). The poverty incidence in the province of Negros Oriental was 48.3 percent for 1991 (PPDO 1998) and the average family income for the province was PhP40,603 (US$1,015*) in 1994 (PPDO 1998). Those with the highest average incomes in the profile area are engaged as middlemen in fisheries-related activities. These activities include selling fresh fish, shells or other marine organisms, or the manufacture and trade of their products and other activities. These middlemen account for less than 8 percent of labor force and earn PhP52,281 per year (US$1,307*) (Calumpong *et al*. 1997).

* US$1 = PhP40 (1999)

Table 6.1. Percent of population per age group (for profile area).

Municipality/City	Age group (in percentage)		
	< 15 years old	15 - 64 years old	> 65 years old
Manjuyod	41	55	4
Bais	39	57	4
Tanjay	37	58	5
Amlan	36	58	6
San Jose	37	59	4
Sibulan	37	59	4
Dumaguete	32	64	4
Bacong	37	57	6
Dauin	34	59	7
Siaton	40	55	5
Total	**37.0**	**58.01**	**4.9**

Table 6.2. Breakdown of the labor force by sector.

Agriculture, fisheries and forestry		301,000
Other sectors		190,000
Community, social and personal services	76,000	
Wholesale and retail trade	45,000	
Manufacturing and construction	44,000	
Other	23,000	
Employed fully or partially		491,000

Source: Five-Year Provincial Development and Investment Plan 1998-2002

Table 6.3. Average annual income by occupation.

Livelihood	Ave. Annual income (PhP)	Percentage of those employed in this sector
Fishing full-time	17,383	41.03
Fishing part-time	22,696	4.21
Fisheries-related incomes	52,381	7.17
Salary	35,829	9.83
Business	37,520	5.77
Farming	7,878	1.72
Skilled labor	26,414	9.20
Unskilled labor	14,157	16.22
Other sources of income	13,879	4.37
No income	0	0.47

Source: Calumpong et al*. (1997)*

Fisheries

The Tañon Strait, between Negros Oriental and Cebu, is one of the top 10 richest municipal fishing grounds in the country and as a result, Negros Oriental is a major exporter of fisheries products to the Visayas region and parts of Mindanao. According to the Bureau of Fisheries and Aquatic Resources (BFAR), the province produced a total of 32,360 mt of fishery products with a value of approximately PhP1.618 billion (US$40,447,500) in 1998. Municipal fishers accounted for the highest recorded yield, 25,038 mt, followed by aquaculture pond production and commercial fisheries with almost equal amounts of production.

The main marine harvests in the province include tuna, anchovies, and sardines. Other sea products which generate earnings are: *bangus* and prawn fingerlings; *Eucheuma* seaweed (*E. cottonii*); shells; oysters; mussels; crabs; octopus; flying fish; squid; and sea cucumber. In addition to the traditional salting and drying of fish that is done in the area, there is the potential to expand and upgrade processing to include smoking and canning fish. However, overexploitation is evident; several municipalities within the profile area have reported through participatory coastal resource assessments that their fish catch has declined over the last 2 decades from just over 15 kg/fisher/day to under 3 kg/fisher/day.

While most of the fish sold to areas outside the province are pelagic (deepwater), the coral reef associated fish are primarily sold for local consumption. There has been a decline in the overall live coral cover in Negros Oriental from 1981 to 1995 and a 1995 survey showed that only 5 percent of the reefs have excellent cover, which is defined as more than 75 percent living coral cover (CEMRINO 1995). Thus, with the majority of the reefs in sub-optimal condition, the level of fish catch for local consumption is well below the potential harvest that could be obtained from healthy reefs. Destructive fishing, which includes dynamite and cyanide fishing, and drive-in nets are 2 of the primary threats to coral reef habitats and therefore, to the coral reef fisheries and the families that depend on this resource as well.

Marine

In the profile area, open access to the fishery resources is practiced with a few exceptions, such as established marine reserve areas. Both commercial and municipal fisheries occur in the province of Negros Oriental; however, commercial fishing does not occur in the profile area. Data used in this section are based on the Calumpong *et al*. (1997) survey concentrating on 3 areas: Bais Bay, which comprises parts of Manjuyod, Bais City and Tanjay; Dumaguete City including part of Sibulan; and Apo Island, Dauin.

Based on the fisheries profile by Calumpong *et al*. (1997), the majority (81 percent) of the fishers were full-time fishers, and more than three-fourths of the boats were non-motorized (Table 6.4). The fishing boats, both motorized and non-motorized, are hand-made, wooden, outrigger canoes, ranging in length from 8 to 18 feet.

There are 18 gear types or methods of fishing reportedly used in Negros Oriental (Table 6.5). Fishers in Bais Bay employ 16 of these types and in Dumaguete they use 12 types, while Apo Island fishers use only 8 types of gear. Based on key person interviews, the top 3 gear types were: gill nets, fish corral, and hook and line. Most of the fishing gear in the profile area require an average of 1-8 individuals per operation (manpower). Catch per unit effort (CPUE) and income per unit effort (IPUE) in the surveyed sites vary for each type of gear from site to site. Table 6.6 lists the top 3 types of gear for CPUE in each area.

Table 6.4. Number of fishers and fishing boats in the profile sites surveyed by Calumpong *et al*. (1997).

Station	*Barangay*	Number of fishers				Number of boats					
						Motor	Non-motorized				Total
		FT	PT	OC	Total	O	O	B	R	Subtotal	
DAUIN	Apo Island	44	12	7	57	25	44		1	45	70
BAIS BAY		119	16	1	136	47	106			109	156
BAIS	Bat-ugan	2	2		4		6		1		6
	Barangay 2	3			3						1
	Canlargo	6			6	4	7			7	11
	Canibol	19	3		22	4	22			22	26
	Capinahan	16	6		22	1	20			20	21
	Lag-it	4			4	1	3			3	4
	Okiot	4	1	1	6		5	1	1	7	7
	Sanlagan	8	1		9	7	5			5	12
	Subtotal	62	13	1	76	17	68	1	2	71	88
MANJUYOD	Campuyo	42	1		43	29	18			18	47
	Dunggu-an	15	2		17	1	20			20	21
	Subtotal	57	3		60	30	38			38	68
DUMAGUETE	Agan-an	6	6	2	14		16			16	16
	Bantayan	23	4		27		27			27	27
	Lo-oc	2	1		3		4			4	4
	Piapi	14	5	1	20		29			29	30
	Subtotal	45	16	3	64	1	76			76	77
TOTAL		208	44	5	257	73	226		1	230	303
PERCENT		81	17	2	100	24				76	100

Legend: FT - Full-time, PT - Part-time, OC - Occasional, O - Owned, B - Borrowed and R - Rented.

Most species caught by fishers from Apo Island are reef or reef-associated fish, while in Bais, most of the species in the catch are demersal. In Dumaguete, a little more than half of the catch is reef or reef-associated fish and the rest are demersals. The most dominant species in the catch of Apo Island fishers was *Caranx* spp. and in Bais it was the mullet, *Liza* sp. (Calumpong *et al*. 1997).

Aquaculture

The aquaculture industry in the province is focused mainly on *bangus* (milkfish) and prawn production; there is no commercial production of freshwater fish, because the local people prefer saltwater fish and *bangus*. The total area of partially and fully developed fishponds is about 1,758.19 ha with 1,508.33 ha devoted to *bangus* production and 239.86 ha devoted to prawn production. The total annual production of *bangus* and prawn is 3,137.14 mt; *bangus* production comprises 1,735.45 mt, while prawn production comprises 1,401.69 mt (PPDO 1999).

Big fishpond areas are concentrated in the municipalities of Tanjay, Siaton, Manjuyod, Bais City, Sibulan and 2 non-profile area municipalities, Ayungon and Bayawan. Major industries, such as the Ayala Agricultural Corporation in Siaton and the Sycip Plantation, Inc. in Manjuyod, are intensifying fishpond production in these areas. Prawn farms are located in Amlan, Tanjay City, Bais City, and Manjuyod, as well as 2 municipalities outside the profile area.

Table 6.5. List of fishing gear used in the profile area.

General classification	English name	Local name
Net	Beach seine or drag net	*pahid*; *baling*
	Bottom set gill net	*taan*; *pana-an*; *pukot*; *pang-kiyampao* (specific for catching rays)
	Dip net	*sikpaw*
	Drift gill net	*pamo*; *pukot*; *panglamba* or *panganduhaw pukot* or *pang-gisaw*
	Fish net or mullet net	*pukot*; *bira-bira*; *pahubas*; *pamunuan*; *pandumog*; *pang-anduham*; *pang-ilak*; *panglamba*; *pang-lukohok*; *pataya*;
	Gill net	*pang-solid*; *sabay*, *taan*; *tapsay*
Traps	Fish corral	*bunsod*; *bunsod-pukot*
	Fish pots	*panggal*; *tayong*
	Fish traps	*bobo*; *panay-ong*; *agong-agong*
Hand Instrument	Gleaning	*panginhas*
	Jigger	*pangnukos*; *pangugita*
	Miracle hole	
	Multiple hook and line	*pasol* (for line); *taga* (for hooks); *bira-bira* (around 15 hooks); *pangare* (10-20 hooks); *palutan* or *pamalo* (around 20 hooks); *birik-birik*; *manabit*; *taktakon* (around 240 hooks); *salabay* (around 1,000 hooks); *katay* (around 1,800 hooks)
	Line without hook	*panguwat*; *birik-birik*
	Set gill net	*pukot*; *padumog*; *panaan*; *taan*; *patuloy*
	Single hook and line	*pasol*; *taga*; *birik-birik*; *pamalo*; *pangmamsa*; *pangtangigi*; *pahawin*; *pambutok*; *baolo*; *pamaulo*; *panaulo*; *pamangkulisa*
	Spear gun	*pana*; *pana-suga*
	Torching	*panulo*

Source: Calumpong et al. *(1997)*

Table 6.6. Top 3 types of gear for catch per unit effort (CPUE) in each area and their income per unit effort (IPUE).

Area and gear type	CPUE (kg/person-hour)	IPUE (PhP/person-hour)
Apo Island		
Spear gun	4.40	139.50
Single hook and line	2.20	83.50
Fish trap	1.40	41.80
Bais Bay		
Drift gill net	114.80 *	5,886.00 *
Fish corral	6.40	335.70
Multiple hook and line	4.00	124.30
Dumaguete		
Beach seine	10.00	144.00
Fish trap	2.51	76.30
Gleaning	2.30	55.10

Source: Calumpong et al. *(1997)*

* This catch is an anomaly of drift nets when a school of fish happens to enter. It also shows the potential of drift nets to cause overfishing.

Commerce and Industry

In 1992, the number of businesses increased by about 8 percent but total investments in pesos increased by 87.5 percent over that of 1991. Employment also increased to 1,530 from 1,473 in 1991. Table 6.7 shows investment and employment data from 1988 to 1992.

Table 6.7. Investments and employment data from 1988 to 1992.

	Year				
	1988	1989	1990	1991	1992
No. of businesses registered	419	517	514	536	493
Investments	103	89	49	37.7	70.7
Employment	1,899	2,214	1,803	147.3	1,530

Source: PPDO (1998)

Sugar is the leading export product, with raw sugar exports totaling US$47.7 million and molasses exports totaling US$6.4 million in 1992. Other exports include ammonium nitrate by Dyno-Wesfarmers, US$4.1 million; copra, US$1.2 million; and dehydrated fruits, US$1.4 million. Table 6.8 shows the total exports of each industrial product from 1986 to 1992.

Table 6.8. Negros Oriental exports from 1986 to 1992.

Product	Exports (US$ millions)						
	1986	1987	1988	1989	1990	1991	1992
Dried fruits	0.70	0.86	1.15	0.79	0.88	0.54	0.43
Ammonium nitrate	5.09	3.49	3.64	2.07	3.19	5.38	4.13
Raw sugar	32.82	29.25	18.56	25.24	40.52	72.49	47.74
Molasses	7.70	3.27	3.96	5.29	8.48	6.5	6.4
Copra	3.72	6.16	2.76	0.00	0.32	1.26	0.00
Total	**50.03**	**43.03**	**30.07**	**33.39**	**53.39**	**86.17**	**58.70**

Source: PPDO (1998)

Sugar is poduced by 3 sugar centrals: Central Azucarera de Bais (CAB), Universal Robina Sugar Milling Company (URSUMCO), and Herminio Teves Company Inc. (HTCI) of Santa Catalina. In 1992, the total revenues from these sugar centrals amounted to PhP4,120,760. CAB paid to Bais City PhP1,194,520; URSUMCO paid to Bais City PhP85,640 and PhP2,560,100 to Manjuyod; and HTCI paid to Santa Catalina PhP85,640. Table 6.9 shows the production data of the sugar industry as of 1992. Other industries include coconut oil mills in Bacong, Manjuyod, and Jimalalud.

Tourism

Negros Oriental, as well as the Philippines in general, realizes the growing importance and opportunities of the tourism industry to generate earnings (Figure 6.1). Within the last decade, Negros Oriental has grown in popularity as a tourist destination; tourist arrivals

Table 6.9. Production data of the sugar industry as of 1992.

Area planted	31,109 ha
Percent of total provincial area	5.6%
Average increase in area planted, 1988-1992	15.23%
Number of farms	4,881
Number of planters	4,833
Average number of farm workers/hectare	10
Average annual production (picul), 1988-1992	12.62%
Average production per hectare (picul)	78.8
Average production cost per hectare	PhP4,108

Source: PPDO (1998)

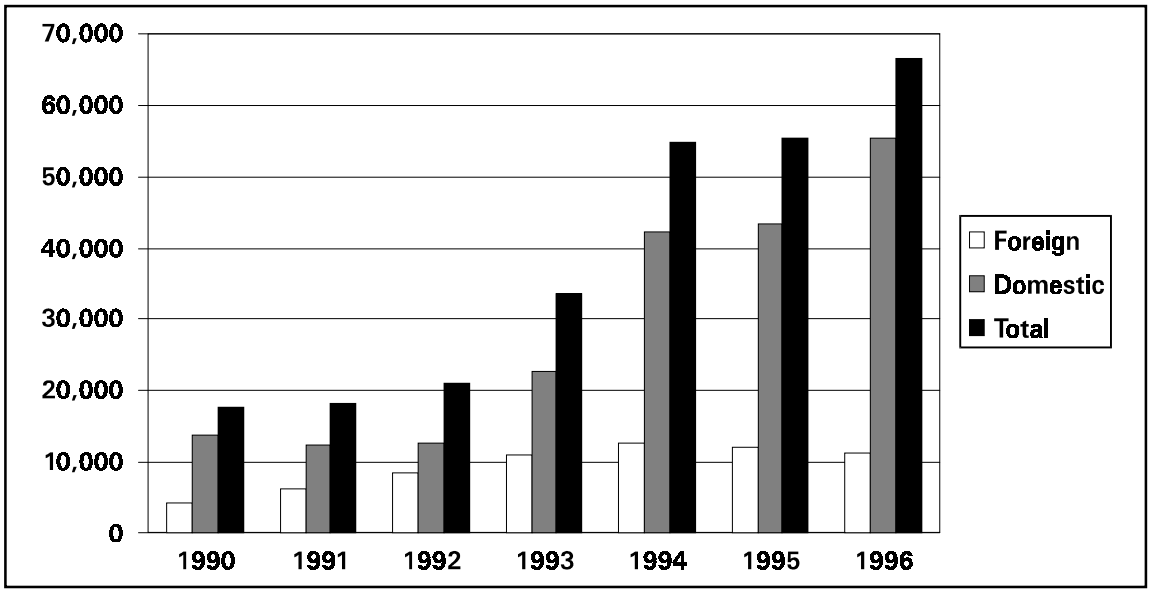


Figure 6.1. Tourist arrivals in Negros Oriental.
Source: PPDO (1999)

have nearly quadrupled between 1990 and 1996. Dumaguete receives and accommodates the bulk of these tourists, more than 80 percent of whom are domestic tourists. The province has a total of 574 rooms, most of which are located in Dumaguete City; all 7 hotels and 25 of the 28 pension tourist inns are located there. Of the 21 resorts in the province, 16 are found within the profile area (PPDO 1999).

Natural tourist attractions in the profile area consist mainly of beaches and coral reefs (Table 6.10). Beaches and beach resorts line the coasts of Sibulan, Dumaguete City, Bacong, Amlan, Bais City, Siaton, Dauin, and San Jose. SCUBA diving and snorkeling are popular, especially on Apo Island which is renowned for its diversity of coral and marine life as a result of its marine sanctuary. Other natural attractions are the resident dolphins and whales in Tañon Strait. This is a source of income for the government of Bais City which holds whale and dolphin watching excursions. Natural attractions found inland in the province include waterfalls, lakes, mountains, and caves.

Table 6.10. Types and locations of tourist attractions in the profile area.

Tourist attractions	No.	Location
Natural		
Beaches and beach resorts	13	Sibulan, Dumaguete City, Bacong, Amlan, Bais City, Siaton, Dauin and San Jose
Whale and dolphin watch	1	Tañon Strait
Man-made		
Historical landmarks	16	Dumaguete City, Sibulan, Amlan, Bacong
Museums	2	Dumaguete City
Parks and boulevard	4	Dumaguete City, Bais City, Tanjay
Showrooms and sports/cultural complexes	2	Dumaguete City
Festivals	5	Tanjay, Bais City, Dumaguete City
Restaurants/discotheques	>30	Dumaguete City, Bais City, Tanjay
Conference/convention halls	10	Dumaguete City
Sports/recreation centers	8	Dumaguete City, Sibulan

Source: PPDO (1999)

Other attractions include historical landmarks, museums, parks, a boulevard, festivals, restaurants, and discotheques. Sports and recreation centers are also available, including Olympic-standard facilities that attract national and regional games, such as basketball, volleyball and swimming. Most of these are concentrated in Dumaguete City, but some are also located in Tanjay City, Bais City, and Sibulan. Also, all showrooms, event complexes and conference facilities are located in Dumaguete City. In addition, industries, such as the Bacong Weaving Center and 2 sugar mills of Bais City, the CAB and the URSUMCO, are tourist attractions (PPDO 1999).

Agriculture

Agriculture and agriculture industries constitute the largest sector in the economy of Negros Oriental and will continue to do so into the foreseeable future. In 1995, about 245,427.6 ha of land were devoted to agriculture, an increase of almost 40,000 ha since 1992. An additional 106,182 ha were used as pasture or range lands, which is an increase of approximately 85,000 ha since 1992 (Table 6.11). Together, agricultural land and pasture/range land account for 65 percent of the total land area of the province, the vast majority of which is not irrigated. This land produces food crops, livestock, and poultry valued at nearly P2.5 billion. The most important crop in the province is sugar, followed by coconut. Rice and corn are staple crops and other important crops include legumes, vegetables, root crops, and fruits.

Agricultural products make up the bulk of the exports for the province and among total exports, sugar is by far the leading export product. For the period of 1991-96, about US$312.7 million worth of agricultural products were exported out of the total exports of US$358.1 million. Seventy-five percent of the total value was due to the exports of sugarcane and its by-products, which are produced by 3 sugar centrals: CAB, URSUMCO and HTCI of

Table 6.11. Areas devoted to agriculture (1992).

Land use	Area
Crop land	207,246.76 ha
Food crops	85,800.76 ha
Commercial crops	121,446.0
Pasture and range land	21,073.6
Water source	
Rainfed	195,484.26 ha
Irrigated	11,762.5 ha

Source: PPDO (1999)

Table 6.12. Quantity and value of production.

	Quantity (mt)	Value of production (PhP)
Food crops	219,650	1,317,899,640
Livestock and poultry		
Backyard	35,582	969,149,942
Commercial	2,639	79,309,035
Total	35,222	1,048,458,977

Santa Catalina. Coconut and its by-products accounted for 12.3 percent of the total value (PDIP). Other exports include ammonium nitrate, copra, and dehydrated fruits.

Production of food crops is greater than production of livestock and poultry. Table 6.12 shows the quantity and value of production.

SUMMARY

Except for the cities of Dumaguete and Bais, most of the municipalities in the profile area are dependent primarily on fisheries and agriculture. The majority of the municipal fishers in the profile area live below the poverty level. Although the Tañon Strait is one of the richest municipal fishing grounds in the country, the income of the municipal fishers fishing in this basin is below the minimum level. This is due to the continued depletion of the coastal resource due to overfishing and degradation of environment. To augment the income of the coastal dwellers, alternative and supplemental livelihood activities are being undertaken. Projects such as diversified farming, small-scale mariculture of finfish, invertebrates, and seaweeds and small-scale "cottage industries" are being implemented in the profile area by various national agencies, LGUs, and other NGOs. Commercial-scale aquaculture of *bangus* (milkfish), both in fishponds and in fish cages, is also undertaken in the profile area.

Tourism is also generating income for the LGUs and the people living in the profile area. Domestic tourism has doubled in the last decade. The beaches, coral reefs, sanctuaries, dolphins, and other landmarks serve as tourist attractions.

Chapter 7
INSTITUTIONAL and LEGAL FRAMEWORK

In the Philippines, CRM is built on a legal framework and state policy mandated by the Philippine Constitution which provides that the State shall protect the nation's marine wealth in its archipelagic waters, territorial seas, and exclusive economic zone, and reserve its use and enjoyment exclusively to the Filipino citizens. To effect this state policy, there are NGAs and LGUs tasked to formulate policies, implement programs and projects to manage and conserve the coastal and marine resources of the country.

This chapter presents the framework for CRM, highlighting the roles of the key organizations at the national, provincial, municipal, and *barangay* governments.

National Level Policies and Agencies

Natural resource management programs in the Philippines fall under the auspices of the Philippine Strategy for Sustainable Development (PSSD). All the national and regional policies related to ICM should conform to the general guidelines set forth in the strategy. Some of the relevant components of the strategy's agenda are as follows:

- Integration of environmental considerations in all decision-making processes;
- Proper valuation of resources used based on the cost of replenishment;
- Promotion of equitable access and tenurial security to resources;
- Rehabilitation of damaged ecosystems;
- Strengthening of pollution control in industry; and
- Promotion of environmental education, as well as citizen's participation in the planning and implementation of government programs.

The Philippines adopted in 1994 a National Marine Policy in order to develop a comprehensive program to properly manage coastal and marine resources in compliance with the United Nations Convention on the Law of the Sea (UNCLOS). This policy calls for an integrated coastal zone management system that considers the archipelagic and coastal nature of the country.

In 1991, RA No. 7160 (Local Government Code of 1991) was enacted to enhance government and corporate powers to the LGUs, particularly on political autonomy and decentralization, and resource generation and mobilization. Its salient provisions with regard to CRM are the following:

- The expansion of the scope of municipal waters to 15 km from 3 nautical miles. This gave the municipal and city governments greater jurisdiction over the municipal waters.
- Devolution of some powers and functions of the DENR, Department of Agriculture (DA) and other concerned national agencies to the LGUs.
- Repeal of anti-conservation policies of the state, as mandated by Presidential Decree 704 (Fisheries Decree of 1976) such as optimum utilization of fishery resources and exportation of fishery products.
- Assigning to the municipalities and cities the right to issue licenses, leases, or permits for the use of municipal waters.
- Preferential treatment to municipal fishers in the grant of fishery licenses.

Another major law enacted with regard to CRM is the RA No. 8550 (Philippine Fisheries Code of 1998). This law repealed Presidential Decree 704 (Fisheries Decree of 1976). This law is more consistent with the provisions of the Constitution. The overriding policies embodied this Code are the following:

- Food security as the primary goal and consideration in the utilization, management, and conservation of the coastal and fisheries resources.
- Limiting access to the fisheries resources for the exclusive use and enjoyment of Filipino citizens.
- Rational and sustainable development, management, and conservation of coastal and fishery resources.
- Protection of the rights of fishers, especially the coastal communities, with priority given to municipal fishers in the preferential use of the municipal waters. To operationalize this policy, coastal municipalities and cities are mandated to organize Fisheries and Aquatic Resources and Management Councils (FARMCs).
- Management of coastal and fisheries resources in light of the concept and principle of integrated CRM.

Another important law on environmental protection and management is RA No. 7586, otherwise known as the National Integrated Protected Areas System (NIPAS). This law governs and classification and administration of all designated protected areas. In the

profile area, there are 2 areas declared as protected areas - the Tañon Strait Protected Seascape (declared under Presidential Proclamation No. 1234) and the Apo Island Protected Landscape/Seascape (declared under Presidential Proclamation No. 856). As protected seascapes, these areas are managed to maintain essential ecological processes and life-support systems, preserve genetic diversity, ensure sustainable use of the resources found therein, and maintain their natural condition.

At the national level, the line agencies most involved with coastal management issues are the DA through the BFAR, the DENR, the Department of the Interior and Local Government (DILG), the Department of Transportation and Communications (DOTC), the Department of National Defense (DND), and the Department of Science and Technology (DOST).

Department of Agriculture - Bureau of Fisheries and Aquatic Resources (DA-BFAR)
The BFAR is a line bureau of the DA. BFAR's jurisdiction covers all fishery resources and related products from the coastal ecosystems, for example, seaweeds, fishes, squids, and shellfish. Under the Philippine Fisheries Code of 1998, BFAR is mandated to manage the fisheries resources of the country except those within the municipal waters which are under the management of the municipal or city government. As a line bureau, BFAR may establish field offices at the provincial, city, and municipal levels.

Department of Environment and Natural Resources (DENR)
The DENR's primary concern are the coastal ecosystems, i.e., coral reefs, seagrasses and mangroves. Its mandate includes the full exploration and development, as well as judicious … utilization, management, renewal and conservation of the country's forest, mineral, land, waters, fisheries, wildlife … and other natural resources (Sec. 1 of Title XIV of Executive Order (EO) 292) and the promulgation of rules, regulations, and guidelines on the issuance of licenses, permits, concessions, lease agreements, and such other privileges concerning the development, exploration, and utilization of marine, freshwater, and brackishwater, and over all aquatic resources of the country. The DENR shall also continue to oversee, supervise, and police our natural resources (Sec. 4 of Title XIV of EO 292). The DENR still holds power in policy issuances and program direction with regard to management of mangroves in the coastal area.

As part of its mandate to manage the coastal resources, the DENR started in 1993 implementing the Coastal Environment Program (CEP) which aims to uplift the socioeconomic conditions of the coastal populace through the protection of the environment and the implementation of strategic interventions on coastal management. The DENR is also implementing the NIPAS which aims to manage all protected areas, including seascapes.

Department of the Interior and Local Government (DILG)
The DILG is the agency that has the administrative control over the LGUs. It has also operation control over the Philippine National Police (PNP). Through the PNP Maritime Command (PNP-MARICOM), the DILG, in collaboration with the Philippine Coast Guard (PCG) and the DND, has the authority to perform all police functions over the Philippine territorial waters, rivers, coastal areas.

Department of Transportation and Communications (DOTC)
The DOTC is involved in CRM through its attached agencies - the Maritime Industry Development Authority (MARINA) and the PPA. It is involved in the construction of fish ports, municipal ports, and maintenance of lighthouses in the country. The MARINA is in charge of the promotion and development of maritime industry, regulation of shipping, and maritime safety. The PPA is in charge of the development of ports and supervision and maintenance of port facilities and services.

Department of Science and Technology (DOST)
The DOST is also involved in CRM through its Philippine Council for Aquatic and Marine Research and Development (PCAMRD). The PCAMRD is mandated to monitor aquatic and marine research and development projects, to formulate strategies, policies, plans, programs, and projects for aquatic and marine science technology and to generate funds.

Coastal and marine resource management in the Philippines is an interesting mix of both top-down and bottom-up approaches. On the national level, coastal resources are primarily governed by the DENR and the DA-BFAR, although other national agencies, such as the DILG, DOST, DOTC, and DND are also involved with CRM. With the enactment of the Local Government Code of 1991, however, many of the responsibilities for the management of coastal resources were devolved to the LGUs. Management of these resources fall under the provincial, city, municipal, and *barangay* governments, in collaboration with other line agencies and NGOs whose primary concern is the preservation, conservation, and management of the coastal resources.

Provincial Level Mandate and Offices
With the enactment of RA No. 7160 (Local Government Code) in 1999, the LGUs were given significant roles in the management of the coastal environment, particularly within the municipal waters. LGUs include the province, city, municipality, and *barangay*. Some of the powers and functions of national agencies were devolved to the LGUs.

Provincial Government
A province is composed of municipalities and component cities within an area. Each province is charged with developing itself into an agro-industrialized state, taking natural resources into consideration. As a result, the province is theoretically charged with preserving and utilizing resources in a sustainable fashion. In addition, nature tourism is being looked into

as an emerging and important part of the economy of the province, and therefore, the province should recognize that care must be taken with their resources in order to maximize the potential revenues in this sector. At the provincial government, the offices involved in CRM are the Office of the Governor, the *Sangguniang Panlalawigan* (SP), and the Provincial Development Council (PDC).

Office of the Governor

The Office of the Governor has the general supervision and control over all programs, projects, services, and activities of the provincial government, including formulation of plans and policies on coastal management at the provincial level. The Office is mandated to enforce all laws and ordinances relative to the governance of the province. The Office should also initiate and maximize the generation of resources and revenues, and apply the same to the implementation of development plans, program objectives, and priorities, particularly those resources and revenues programmed for agro-industrial development and country-wide growth and progress. In the Office of the Governor of the Province of Negros Oriental, CRM-related activities are being carried out by the Provincial Agriculturist's Office (PAO) and the Environment and Natural Resources Management Division (ENRMD).

The PAO is a regular office in the provincial government as mandated by the Local Government Code of 1991. In the province of Negros Oriental, under the PAO is the Fisheries Division whose tasks include formulation and implementation of programs that ensure the delivery of basic services on fisheries, development of plans and strategies, and provision of technical assistance to municipalities and *barangays* on fisheries management, both marine and inland fisheries.

The ENRMD, on the other hand, was created in 1993 through an EO issued by the then Governor Emilio C. Macias. It is directly under the Office of the Governor. The ENRMD provides assistance to municipalities on coastal law enforcement, enterprise development, marine sanctuary establishment, training, and Information, Education and Commnication (IEC) activities.

Although the PAO and ENRMD work closely with each other in some activities, the PAO is in charge of the production aspects of agriculture and fisheries while the ENRMD is responsible for the protection and rehabilitation of degraded resources. Both have their respective budget to work on (Gov. George Arnaiz, pers. comm.)

***Sangguniang Panlalawigan* (SP)**

The SP is the legislative branch of the provincial government. Its responsibilities for CRM include imposition of penalties for acts which endanger the environment, adoption of measures for conservation, and review of ordinances of the municipalities. The SP translates its responsibilities through ordinances and resolutions.

Provincial Development Council (PDC)

Another important body in the coastal management process is the PDC. The PDC is headed by the governor and composed of all mayors of component cities and municipalities, the chairman of the committee on appropriations of the SP, the congressman or his representatives, and representatives of NGOs operating in the province.

The PDC performs the following functions:

- Formulate long-term, medium-term, and annual socioeconomic development plans and policies;
- Formulate medium-term and annual public investment programs;
- Appraise and prioritize socioeconomic development programs and projects;
- Formulate local investment incentives to promote the inflows and direction of private investment plan;
- Coordinate, monitor, and evaluate the implementation of development programs and projects; and
- Perform such other functions as may be provided by law or competent authority.

The PDC has an executive committee that represents and acts in behalf of the PDC when it is not in session. The executive committee is composed of the governor, as chairman, the representative of component city, and municipal mayors to be chosen from among themselves, the chairman of the committee on appropriation of the SP, the president of the provincial league of *barangays* and a representative of NGOs that are represented in the council, as members. The executive committee ensures that the direction of the council is faithfully carried out and implemented and formulates policies, plans, and programs based on the general principles laid down by the council. The PDC may also form sectoral or functional committees, such as a committee on CRM, to assist in the performance of their functions.

All policies, programs, and projects proposed by the PDC are submitted to the SP for appropriate action. Approved development plans of the province are submitted to the Regional Development Council (RDC), a higher level of local development council, for integration to the regional development plan for submission to the National Economic and Development Authority (NEDA), in accordance with existing laws.

Municipal/City Level Mandate and Offices

With the enactment of the Local Government Code (LGC) of 1991 (RA 7160), the municipal/city government has the primary responsibility for CRM. The LGC delegated the management of the municipal waters to the municipalities and cities. In general, the municipality/city has the following CRM responsibilities:

- Legislate for the general welfare;
- Impose penalties for acts which endanger the environment;
- Grant permits for fish corrals, fish pens, aquatic beds, and taking of fish/prawn fry;

- Adopt measures for conservation;
- Enforce fishery laws in municipal waters;
- Research services and facilities related to fishery activities;
- Conserve mangroves;
- Exercise exclusive authority to grant fishery privileges in municipal waters;
- License fishing vessels of three tons or less;
- Issue permits to construct fish cages in municipal waters;
- Issue permits to gather aquarium fishes within municipal waters;
- Establish fishing seasons in municipal waters;
- Issue permits to collect mollusks;
- Issue licenses for seaweed farms within municipal boundaries; and
- Issue auxiliary invoices to transport fishery.

Fisheries and Aquatic Resources Management Council (FARMC)

To enhance community participation in the management of coastal resources, the President of the Philippines in 1996 signed Executive Order 240 regarding the establishment of FARMCs at the local government levels. With the enactment of the Fisheries Code of 1998, FARMCs are institutionalized at the municipal, city, and bay areas. The formation of the FARMC at the *barangay* level is optional.

The FARMC, as an advisory body of LGUs, exercises the following functions:

- Assist in the preparation of the Municipal Fishery Development Plan and submit such plan to the Municipal Development Councils;
- Recommend the enactment of municipal fishery ordinances to the *Sangguniang Bayan/Panlungsod* through its Committee on Fisheries;
- Assist in the enforcement of fishery laws, rules, and regulations in municipal waters;
- Advise the *Sangguniang Bayan/Panlungsod* on fishery matters through its Committee on Fisheries, if such has been organized; and
- Perform such other functions which may be assigned by the *Sangguniang Bayan/ Panglungsod*

The FARMC is composed of the

- Municipal/City Planning Development Officer;
- Chairperson, Agriculture/Fishery Committee of the *Sangguniang Bayan*/ *Panlungsod*;
- Representative of the Municipal/City Development Council;
- Representative from the accredited NGO;
- Representative from the private sector;
- Representative from the DA; and
- At least 11 fisherfolk representatives (7 municipal fisherfolk, 1 fishworker, and 3 commercial fishers) in each municipality/city which include representatives from the youth and women sectors.

The rationale for this type of council was to give local resource users a conduit to local officials and a voice in the management of coastal resources within the municipal waters. The FARMC also strengthens and supports the LGC provision that allows different LGUs to coordinate and collaborate with each other on relevant issues.

In the province of Negros Oriental, there is an advisory body called Coastal Resource Management Advisory Council which reports to the PDC and whose chair is the Provincial Planning and Development Officer (PPDO). This advisory council is comprised of the representatives of the following: ENRD, PAO-Fisheries Division, DENR; BFAR; the TMF; Silliman University and the CRMP. The CRMP-TMF Advisory Council serves as a policy-making and coordinating body at the provincial level. However, it does not report to the PDC. On the other hand, pursuant to SP Res. No. 395, Series of 1994, there is a provincial CRM committee composed of various GOs and NGOs.

Other Institutions in the Profile Area:

Silliman University Marine Laboratory (SUML)

SUML is one of the leading academic institutions in the country in the field of marine science. It was primarily established as a research facility of the university.

The thrusts of the SUML are to:

1. Conduct research in the marine sciences with emphasis on conservation management and sustainable aquaculture;
2. Develop management and conservation measures;
3. Provide laboratory space and facilities for field-oriented courses of the university;
4. Promote local and international exchange of researches and specialists in marine science;
5. Assist public and private agencies in marine development projects;
6. Provide academic linkages between the marine sciences and humanities; and
7. Serve as the environmental watchdog in the province and the Central Visayas region.

The SUML has conducted the following research projects:

1. Polyculture of giant clams and groupers with seaweeds;
2. National Products Programs, in collaboration with the United States National Cancer Institute;
3. Sarangani Bay (Mindanao) Fish Stock Assessment Project;
4. Resource and Ecological Assessment of CRMP Learning Sites;
5. Coral Reef Surveys;
6. *Crocodylus mindorensis* Breeding Project;
7. Project Evaluation of Central Visayas Regional Project;
8. Marine Mammal Program;
9. Monitoring of Coliform in Dumaguete Coastal Waters; and
10. Impacts of Fish Cages in Siit Bay.

Silliman University, with the assistance of the USAID, is now developing itself into a Center of Excellence in Coastal Resource Management (COE-CRM) in the country. As a center of excellence, it is leading in creating management initiatives through continuing researches and extension work in the field of CRM. Other organizations operating in Negros Oriental are listed in Table 7.1.

Table 7.1. Nongovernment organizations, people's organizations, and government organizations operating in the profile area.

Name of organization	Head office	Areas of concern
Rotarian Martin "Ting" Matiao Foundation	Dumaguete City	Institutional Development; Environmental and Resource Management; Livelihood Development; Infrastructure and Health
St. Joseph Fishermen's Association	Sibulan, Negros Oriental	
Punong Villareal Fishermen's Multi-Purpose Cooperative		
Bantay Dagat of Negros Oriental	Sibulan	Fishery law Enforcement
Municipal Fisheries and Aquatic Resources Management Council	Sibulan	CRM Advocacy, Plan Formulation, and Law Enforcement
St. Catherine Family Helper Project, Inc.	Dumaguete City	CRM Advocacy, Livelihood Development, Cooperative Development
Bais City Multi-Purpose Cooperative	Bais City	*Barangay*-based Health Project, Livelihood Program
Bais City Multi-Purpose Agricultural Cooperative	Bais City	Livelihood Assistance
Tamisu Small Farmers' Multi-Purpose Cooperative	Bais City	Agrarian Reform, Livelihood Program, Crop Production
HINDUNGAWAN	Bais City	Livelihood Assistance
Gabayan Foundation Inc.	Bais City	Education and Training, Community Organizing and Community Development, Livelihood Development, Coastal Management
BANIKA	Dumaguete City	Community Development
Social Economic Environmental Development Foundation, Inc.	Dumaguete City	
Negros Rural Assistance Program	Dumaguete City	Agricultural Technology
Appropriate Technology Center for Rural Development	Dumaguete City	Community Development and Organizing, Environmental Education and Training
Bantayan Sustenance Fishermen's Association	Dumaguete City	Coastal Resource Management and Livelihood Development
Bantay Dagat Federation	Dumaguete City	Fishery Law Enforcement
Bantay Dagat Association	Dumaguete City	Fishery Law Enforcement
Bantay Dagat Commission	Dumaguete City	Fishery Law Enforcement
Development Through Active Women Networking - Silliman University	Dumaguete City	Livelihood, Community Organizing and Development, Training, Networking and Advocacy
Negros Oriental Development Center (NODC)	Dumaguete City	Leadership Development, Capability Building, Skills Development, Cooperative Development
Young Men's Christian Association of Negros Oriental (YMCA)	Dumaguete City	Community Development, Education and Training, Livelihood Development, CRM Advocacy, Local Governance
Banilad, Bagacay, Junob and Bajumpandan Development Foundation, Inc. (BABAJUBA)	Dumaguete City	Community Organization, Education and Training, Skills and Training
Kapunungan Alang sa Malamboong Amlan (KASAMA)	Amlan	Health and Nutrition, Values Education, Community Organizing, Advocacy, Environment

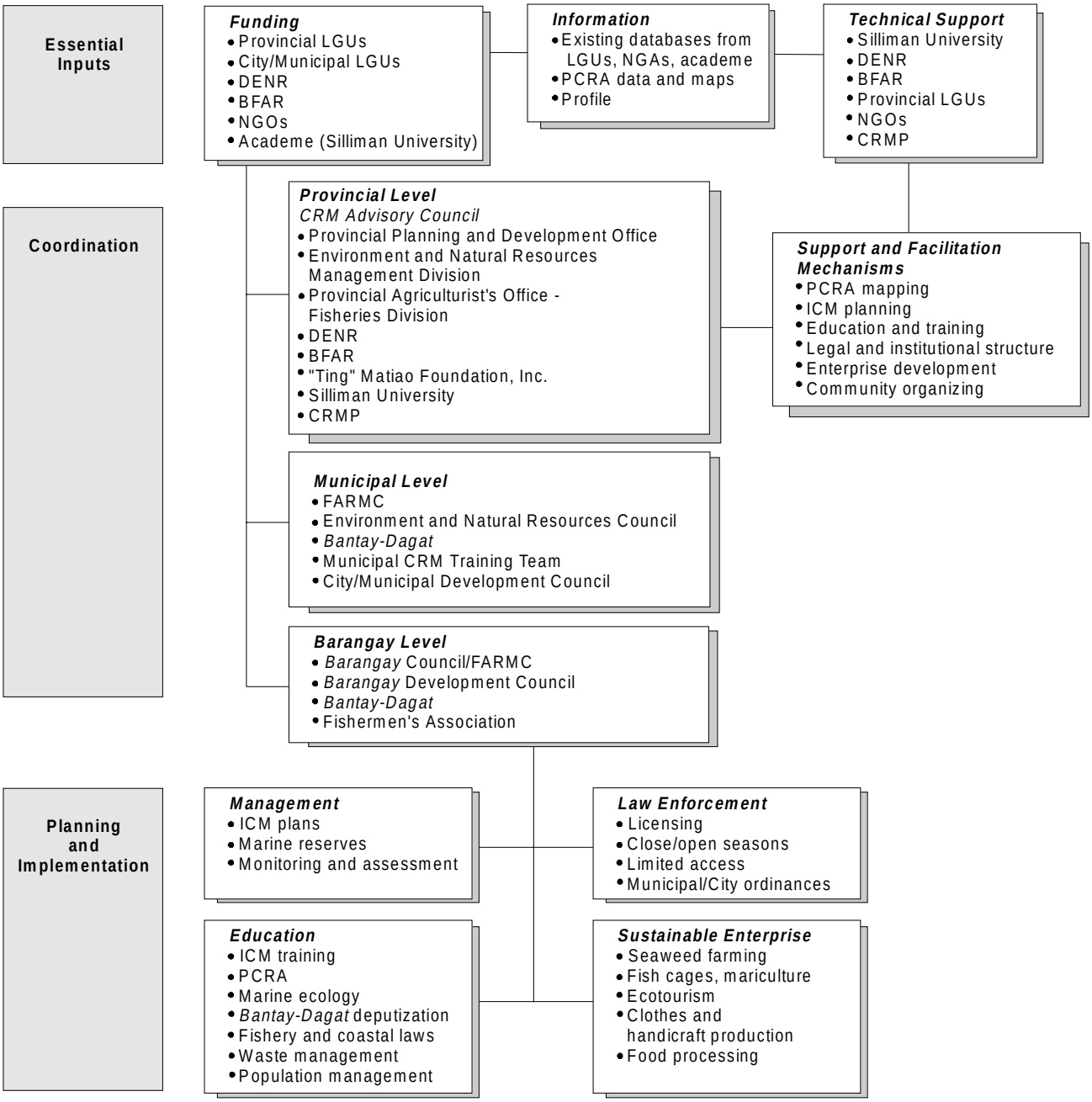
continued

Table 7.1. continued

Amlan Multi-Purpose Agricultural Cooperative, Inc.	Amlan	Agriculture, Livelihood, and Education
Tanjay Community Credit Cooperative, Inc.	Tanjay City	Livelihood, Health, Environment
Municipal Fisheries and Aquatic Resources Management Council	Tanjay City	CRM Advocacy, Plan Formulation, and Law Enforcement
Municipal Fisheries and Aquatic Resources Management Council	Manjuyod	CRM Advocacy, Plan Formulation, and Law Enforcement
Bolisong Fishermen's Association	Manjuyod	Fish Sanctuary Management, Livelihood
Manjuyod Multi-Purpose Cooperative	Manjuyod	Livelihood
SIDLAKAN	Manjuyod	Livelihood
NORDEVCO	Manjuyod	Livelihood
City Fisheries and Aquatic Resources Management Council	Bais City	CRM Advocacy, Plan Formulation, and Law Enforcement
City Fisheries and Aquatic Resources Management Council	Dumaguete City	CRM Advocacy, Plan Formulation, and Law Enforcement
Municipal Fisheries and Aquatic Resources Management Council	Amlan	CRM Advocacy, Plan Formulation, and Law Enforcement
Municipal Fisheries and Aquatic Resources Management Council	Bacong	CRM Advocacy, Plan Formulation, and Law Enforcement
Municipal Fisheries and Aquatic Resources Management Council	Dauin	CRM Advocacy, Plan Formulation, and Law Enforcement
Municipal Fisheries and Aquatic Resources Management Council	Siaton	CRM Advocacy, Plan Formulation, and Law Enforcement
Mabata Bay Ecotourism Technical Working Group	Bais City, Tanjay City and Manjuyod	Ecotourism
CRM Plan Technical Working Group	Tanjay City	CRM Planning
CRM Plan Technical Working Group	Bais City	CRM Planning
CRM Plan Technical Working Group	Manjuyod	CRM Planning
Bantay Dagat Federation	Amlan	Fishery Law Enforcement
Bantay Dagat Federation	Bais City	Fishery Law Enforcement
Bantay Dagat Federation	Manjuyod	Fishery Law Enforcement
Bantay Dagat Federation	Dauin	Fishery Law Enforcement
Jugno Fishermen's Association	Amlan	CRM, Livelihood Development
Buntis Fisherfolks' Association	Bacong	CRM, Livelihood Development
Lipayo Fishermen's Association	Dauin	CRM, Livelihood Development
Tandayag Small Fishermen's Association	Amlan	CRM, Livelihood Development
Siit Bay Fishermen's Association	Siaton	CRM, Livelihood Development
Tambobo Bay Marine Reserve Association	Siaton	CRM, Livelihood Development
Bantay Dagat Federation	Siaton	Fishery Law Enforcement

SUMMARY

ICM is being implemented in Negros Oriental through the collaboration of national agencies, the province, municipalities, NGOs, and academe (Silliman University). The mandate and votes of each level of government are being clearly defined through the experience of CRM implementation in the province. The arrangements for coordination, the essential inputs, and proposed results are summarized in Figure 7.1. It is noted that *barangay*, municipal, and provincial levels of government are all essential to ICM in the province.



Legend:

BFAR	Bureau of Fisheries and Aquatic Resources	ICM	integrated coastal management
CRM	coastal resource management	LGU	local government unit
CRMP	Coastal Resource Management Project	NGA	national government agency
DENR	Department of Environment and Natural Resources	NGO	nongovernment organization
FARMC	Fisheries and Aquatic Resources Management Council	PCRA	Participatory Coastal Resource Assessment

Figure 7.1. CRM coordination, inputs, and results for Negros Oriental.
Source: Murphy et al. *(1999)*

Chapter 8
MANAGEMENT ISSUES AND INTERVENTIONS

The management issues here are based on local consultation and from information gathered during meetings with the local communities. Issues are summarized in 3 perspectives namely: environmental, socioeconomic, and legal and institutional.

Environmental Issues

Perhaps, the most common management issue among the 3 cities and 6 municipalities is coastal habitat destruction. Coastal habitat destruction is a result of many factors one of which is anthropogenic stress on the resources. Human terrestrial activities contribute to the degradation of the coastal resources. The increased dependence on the coastal resources prompts the resource users to use destructive means of resource utilization thus increasing degradation. Other environmental issues are presented in Table 8.1.

Socioeconomic Issues

Among the socioeconomic issues in the profile are the lack of alternative livelihood to augment low income resource users and the lack of environmental education and information. Table 8.2 presents some of the issues reflecting the socioeconomic conditions of the profile area.

Legal and Institutional Issues

Legal and institutional issues in the profile area center on governance and enforcement of coastal laws. The profile area and particularly the province of Negros Oriental is practicing an open access regime in resource utilization thus creating more stress and pressure on the coastal resources. Proper governance and enforcement of coastal laws may ensure the

Table 8.1. Environmental issues and their causes.

Issues	Causes
Destruction of habitat	• Use of destructive fishing gear • Use of sodium cyanide and blast fishing and other destructive practices • Harvesting of corals • Conversion of mangroves into fishponds and human settlements • Port expansion • Lack of awareness of the people on the ecological and economic benefits from the different habitats (i.e., mangroves, corals, and seagrasses) • Poverty • Ineffective enforcement of fishery and environmental laws • Unplanned development in the coastal areas • Unregulated tourism activities • Sand extraction • Water pollution • Gathering of tropical aquarium fish for commercial purposes • Absence of coastal zoning of the municipal waters
Overfishing	• *De facto* open access regime • Unregulated use of fishing gear • Use of destructive fishing gear • Poverty • Limited livelihood activities • Lack of awareness of the people • Increase in number of resource users • Absence of regulatory mechanisms to limit access to the sea • Intrusion of commercial fishing vessels in the municipal waters • Ineffective enforcement of fishery laws • Absence of coastal zoning of the municipal waters
Siltation	• Degradation of watersheds • Slash and burn practices and improper agro-forestry practices • Construction of buildings and other infrastructure in the foreshore area • Quarrying activities

Table 8.2. Socioeconomic issues and their causes.

Issues	Causes
Poverty	• Low income of fishers • Declining fisheries • Limited livelihood options • Low education
Population pressure	• Population growth in the coastal area • Limited livelihood activities
Conflicts with tourism	• Absence of regulatory mechanisms on tourism development
Poor infrastructure	• Limited funds of the government

protection and sustainability of the coastal resources. Legal and institutional issues existing in the profile area are enumerated in Table 8.3.

MANAGEMENT INTERVENTIONS

To address the environmental, socioeconomic, and legal and institutional issues confronting the profile area, one concrete intervention is planning. Implementation of CRM at the LGUs

Table 8.3. Legal and instutional issues and their causes.

Issues	Causes
LGUs have not adjusted to their new responsibilities or do not have the capacity to address these responsibilities	• Lack of trained personnel, financial resources, equipment, and political will • Lack of awareness on CRM
Intrusion of commercial fishing vessels and continued exploitation of the seas	• Absence of CRM plans and fisheries ordinance • Ineffective enforcement of laws • Absence of clear delineation of municipal water boundaries
Illegal titling of lands within the mangrove areas	• Ineffective enforcement of laws on mangrove protection
Duplication of functions and unclear delineation of powers and tasks of DA-BFAR, DENR, PNP, DILG on program implementation and law enforcement Absence of comprehensive municipal fisheries ordinance	• Absence of a national framework on CRM • Lack of a clear set of roles for each national agency • Lower level awareness of local government officials on fisheries legislation

relies on a set of goals, objectives, and strategies. With the nature of issues and problems in the profile area, a comprehensive and multi-year CRM/ICM plan is needed.

Once CRM/ICM plans are formulated, LGUs will have a clear direction on how to manage their coastal areas. It will also facilitate resolution of conflict between resource users. Formulation of ordinances will also be easier if plans are already in placed. The plan can also be used in leveraging funds for livelihood activities. However, to ensure effective planning activity, community participation is inevitable.

Integrated Coastal Management (ICM)

ICM planning is a process of analyzing the interactions and needs of resources, economic activities, and society, including problems and opportunities in the designated planning area or zone and proposing future actions. It is a process of organizing ideas and resources to make things happen. Two questions are important to be answered in planning: (1) What do you want to happen? and (2) How do you want it to happen? The planning framework is illustrated in Figure 8.1.

An ICM plan for any area (*barangay*, municipality or city, multi-municipal wide) requires the following basic contents to be a good plan:

1. **Description of the area** provides background information. This can include geography, demography, important coastal resources and their condition, socioeconomic status of the people, institutions and laws, and other relevant information for management.
2. **Maps** of different scales are needed. Include a map of the entire area and detailed maps of the coastal area with resource locations and use patterns, existing management interventions, and other data.

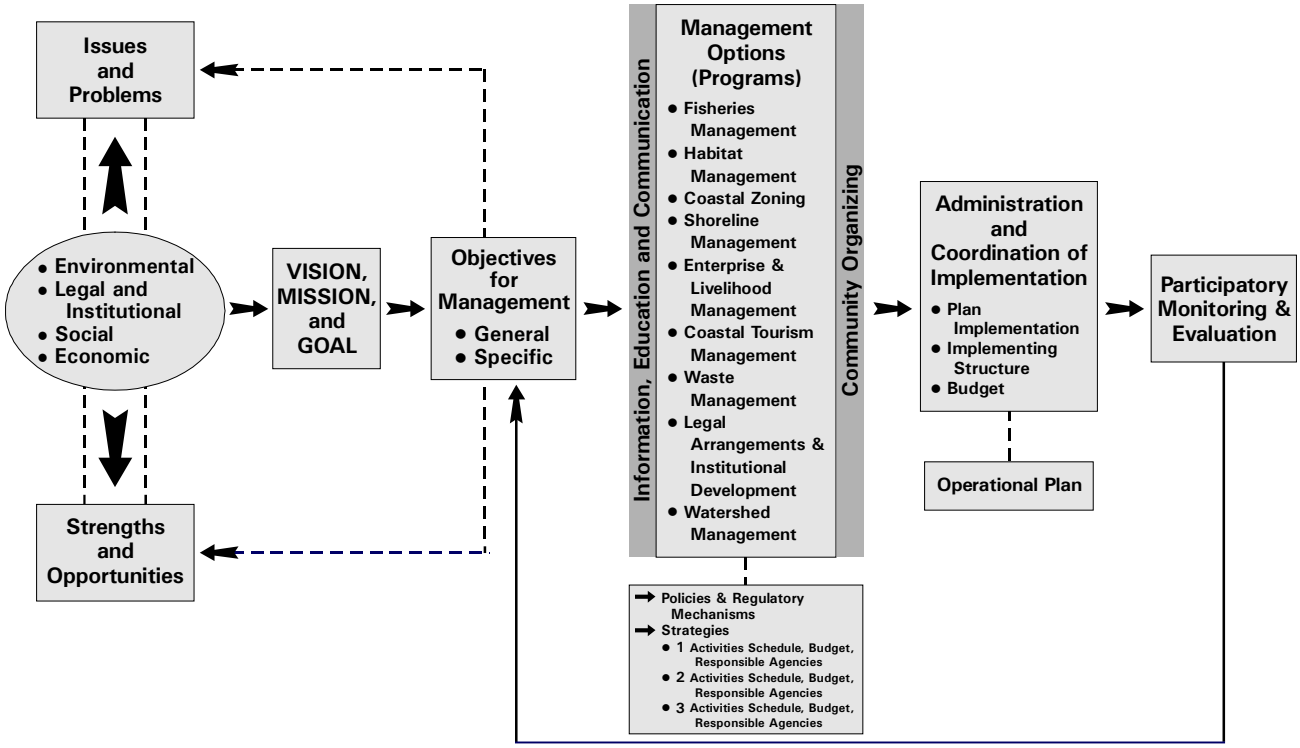


Figure 8.1. Strategic planning framework.

3. **Management issues** must be clearly stated along with their contributing causes and factors. Trends in decline of resources can be used to illustrate issues of concerns.
4. **Goals and objectives** should derive from the main issues. The goal is broad while each objective must be achievable and measurable within the 3-to-5-year life of the plan.
5. **Strategies and actions** are the heart of the plan. One strategy and several actions with assigned responsibilities should address each major issue. A strategy is a well-conceived means to solve a problem. The actions implement the strategy. Actions can be budgeted.
6. **Institutional and legal framework** is needed to support plan implementation. This section explains what institution is responsible and why as supported by law.
7. **Timeline** for implementation helps organize all responsible parties to implement the plan.
8. **Monitoring and evaluation** must be included as a set of activities to provide feedback on plan implementation and impact on environment.

Following are some of the basic programs and strategies on coastal management. A number of strategies have been proven technically feasible and are being implemented in some LGUs. However, aside from looking at the technical feasibility of each program and strategy, social acceptability is also important. Note that the success of program implementation lies in both technical feasibility and social acceptability.

Strategies are not exclusive to 1 program. There are strategies that can be used in 2 or more programs, such as the establishment of sanctuary - a strategy in fisheries management and in habitat management. There are also cross-cutting strategies, such as IEC and community organizing, that are applicable in all programs. The strategies can be operationalized through specific activities and actions.

In January 1999, the Negros Learning Area of the CRMP sponsored a 2-day Strategic Review and Planning Workshop attended by elected officials and technical personnel of CRMP-covered LGUs and representatives of national and provincial government offices. At the workshop, the participants recognized the need to integrate all their efforts and management programs into a CRM plan, and for a communal fishing ground bordered by 2 or more LGUs, a baywide CRM plan is inevitable. The participants also recognized that it will be easier to manage their municipal waters if they will delineate zones for specific uses.

In the profile area, CRM planning is now being undertaken by the LGUs in Manjuyod, Bais, Tanjay, Amlan, San Jose, and Bacong. The planning process started with the conduct of Participatory CRM Planning Workshop attended by representatives of different stakeholders in each of the LGU. During workshops, working drafts of the CRM plan in the 6 LGUs, including proposed zonation scheme of their respective municipal waters with broad regulatory mechanisms and policies, were prepared. The workshops provided the participants with a working knowledge of what strengths and opportunities they have with regard to the use and management of their resources. Multisectoral Technical Working Groups (TWGs), composed of representatives from the different coastal stakeholders were convened in each of the LGU. In Manjuyod, the TWG is headed by the *Sangguniang Bayan* Chair on Environment and Natural Resources, in Bais by the City Planning and Development Coordinator, in Tanjay by the Vice-Mayor, in Amlan by the Municipal Interior and Local Government Operations Officer (MILGOO), in San Jose by the Chair of the Association of *Barangay* Captains (ABC), and in Bacong by the Chair of the FARMC. The TWGs were tasked to conduct and facilitate community and sectoral consultations and draft their respective CRM plan.

All the LGUs, except Bais which opted to have a different process, went through the process of participatory planning by following the stages illustrated in Figure 8.2.

During the community consultation, the TWGs were guided by a set of questions to ensure smoothness of the flow and minimize unrelated discussions.

Possible Management Interventions for the Municipalities and Cities in the Profile Area

The goal of CRM is to uplift the living condition of the coastal dwellers through the rehabilitation of coastal habitats and rejuvenation of fisheries resources and the proper management of different human activities that have direct and indirect impact on the

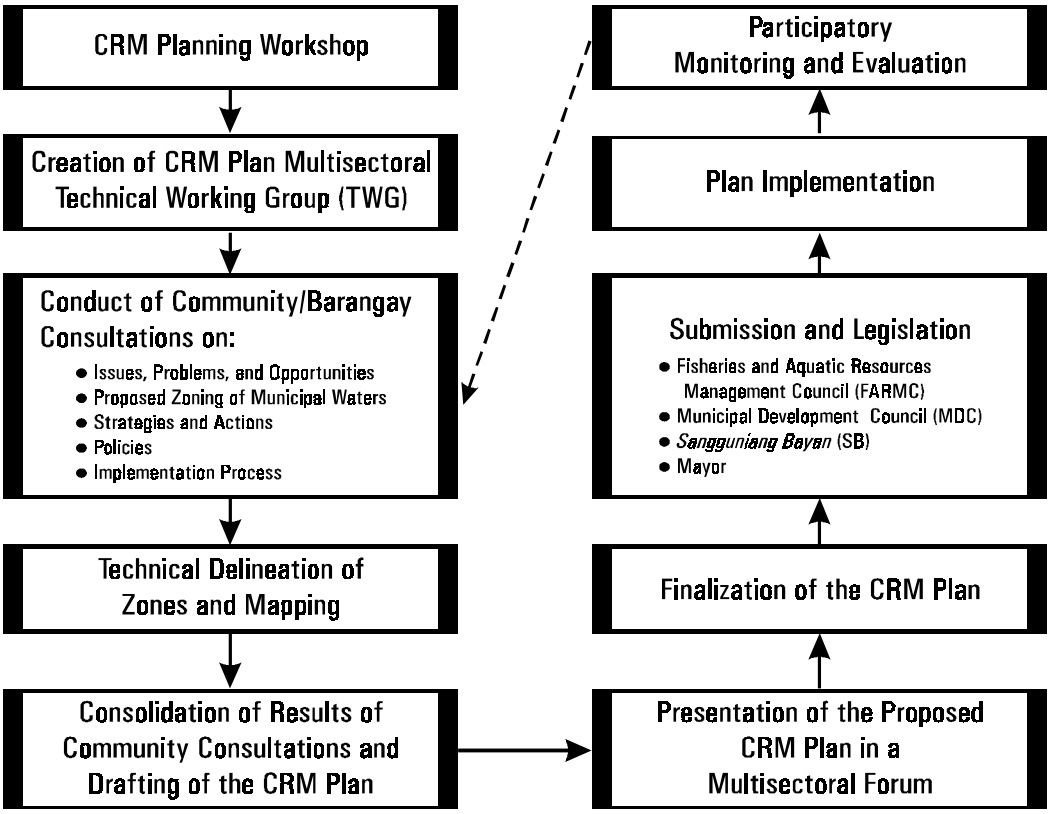


Figure 8.2. The participatory CRM planning process.

coastal area. Table 8.4 shows the common programs, objectives, and strategies, based on the draft CRM plans of the LGUs in the profile area that will be implemented to address the environmental, socioeconomic, and legal and institutional issues confronting their coastal environment.

The strategies are not exclusive to 1 program. There are strategies that are common to 2 or more programs. The establishment of a sanctuary, for example, is a strategy in both fisheries management and habitat management. There are also cross-cutting strategies, such as IEC and community organizing, that are necessary in all programs. The strategies are operationalized through specific activities and actions.

The programs and their constituent strategies make the greatest contribution to the long-term rehabilitation and development of the profile area's coastal resources. LGUs reinforce each other in addressing the issues and problems in the area, thus making management cost-effective.

Table 8.4. Common management programs, objectives, and strategies.

Program	Objectives	Strategies
Fisheries and Habitat Management	• To increase productivity of fishery resources in order to achieve food security • To protect, conserve, and rehabilitate existing habitats • To improve productivity and biodiversity of corals, seagrasses, mangroves and estuaries • To regulate access to the municipal waters and reserve its resources for the benefit of the municipal fishers • To regulate the exploitation of fisheries resources and limit fishing efforts to sustainable levels • To ensure the rational and sustainable development and management of the fishery resources • To develop monitoring, control, and surveillance mechanisms and strengthen law enforcement units • To ensure equity in fisheries exploitation	• Establishment and management of marine protected areas or fish/marine sanctuaries • Management of mangroves under the Community-Based Forest Management (CBFM) framework • Designation of closed season in harvesting siganids during their spawning season • Protection of seagrass beds by regulating fishing activities destructive to the habitat • Licensing and permitting of fishers, fishing gear, and fishing boats • Sustainable management of coastal aquaculture • Regulation on the deployment, use of, and access to artificial reefs • Regulation of the construction and operation of fish corrals • Restriction of commercial fishing vessels in the municipal waters • Enforcement of environmental and fisheries laws
Coastal Zoning	• To delineate zones for specific uses or activities in the municipal waters • To eliminate use conflict in the utilization of the municipal waters • To regulate activities in the different zones	• Delineation of municipal waters boundaries • Designation of zones for specific uses such as for strict protection, rehabilitation, sustainable capture fisheries, sustainable aquaculture, tourism, trade and navigation, etc.
Shoreline Management	• To protect the shoreline from further degradation due to destructive activities • To maintain access of the people to foreshore area • To regulate activities in the foreshore area that would affect the condition of the shore • To minimize erosion and loss of beach to natural and human induced forces	• Setting up and maintenance of coastal setbacks for all development • Construction and maintenance of seawalls • Watershed management
Coastal Tourism Management	• To provide economic incentives for the municipality and the coastal communities by optimizing the tourism potential of certain areas • To develop local capability in ecotourism projects that contribute to better coastal management and community development • To develop incentives for resource conservation	• Regulation on the number of tourism facilities and activities • Maintenance of waste disposal facilities • Ecotourism product development • Visitor education and management • User fees and appropriate business development

continued

Table 8.4. continued

Enterprise and Livelihood Management	• To develop alternative and supplement employment of fishers in order to reduce fishing effort and pressure on the sea • To diversify income source of the fishers to reduce dependence on fishing • To develop environment-friendly enterprise and livelihood projects	• Identification and implementation of environment-friendly and economically-feasible projects • Identification of beneficiaries
Waste Management	• To eliminate or minimize the potential adverse impact of wastes on human and environmental health	• Conduct of water quality monitoring • Domestic waste segregation • Sewage waste treatment, especially for tourism and industrial facilities
Legal Arrangements and Institutional Development	• To improve mechanisms and arrangements for local governance on coastal management • To enhance community participation in coastal management planning, legislation, implementation, monitoring and evaluation • To strengthen environmental and fishery law enforcement • To improve the delivery of coastal management-related services • To strengthen network and linkage with other LGUs, national government, international and local organizations, and community and people's organizations	• Legislation of comprehensive CRM ordinance • Formation and strengthening of people's organizations • Strengthening of FARMC and *Bantay Dagat*, and training of fish wardens • Monitoring, control and surveillance • Training and staff development on CRM

SUMMARY

Although much remains to be done, the Negros Oriental profile area has accomplished a great deal in its efforts to bring the natural resources of the profile area under integrated, sustainable management for the benefit of the people who rely on those resources. In essence, the successes achieved in Negros Oriental are the result of a sound management process and the participation of the stakeholders. Negros Oriental can provide a model, lessons, and encouragement to other areas of the Philippines wishing to undertake co-management of their coastal resources for their own benefit and that of future generations.

REFERENCES

Biña, R.T., B.S. Jara, B.R. de Jesus and E.U. Lorenzo. 1979. Mangrove inventory in the Philippines using LandSat data. Natural Resource Management Center, Quezon City, Philippines.

Calumpong, H.P. and E. Serrate. 1994. Carbon dynamics in Bais Bay, Central Philippines, p. 691-695. *In* S. Sudara, C.R. Wilkinson and L.M. Chou (eds.) Proceedings of the 3rd ASEAN-Australia Symposium on Living Coastal Resources. Vol. 2. Chulalongkorn University, Bangkok, Thailand.

Calumpong, H.P., J.S. Estacion, M.V. Lepiten and C.E. Acedo. 1997. Status of the Coastal Resources of the Negros Learning Site (Manjuyod to Dauin). Silliman University Marine Laboratory and the Center of Excellence on Coastal Resources Management, Silliman University, Dumaguete City, Philippines, 196 p.

DECS (Department of Education, Culture and Sports). 1997. Division of Negros Oriental Report.

De Leon, R.O.D., J.A.U. Nuique and R.J. Raymundo. 1991. Potential Levels of Primary Production and Community Structure of the Talabong Mangrove Forest, Negros Oriental, Philippines. *In*: A.C. Alcala *et al*. (eds.). Proceedings of the Regional Symposium on Living Resources in Coastal Areas. January 1989. Manila, Philippines.

Gomez, E.D., A.C. Alcala and A.C. San Diego, 1981. Status of Philippine coral reefs, p. 275-282. *In* the Proceedings of the 4th International Coral Reef Symposium, Manila. Vol. 1.

IEMP (Industrial Environment Management Project). 1997. IEMP Final Report on Rapid Assessment of Liquid Waste for the Coastal Resource Management Project Learning Area.

Luchavez, J.A. and B.T. Abrenica. 1997. Fisheries profile of Bais Bay, Negros Oriental. Silliman Journal 37 (3-4).

Luchavez, T.F. and L.C. Alcala. 1992. Reef fish community structure in Campuyo, Manjuyod, Negros Oriental, Philippines. *In* L.M. Chou and C.R. Wilkinson (eds.) Proceedings of the 3rd ASEAN Science and Technology Week Conference, 21-23 September 1992, National University of Singapore.

Luchavez, T.F. and M.F. Divinagracia. 1994. *In* C. Wilkinson, S. Sudara and L.M. Chou (eds.) Proceedings of the 3rd ASEAN-Australia Symposium on Living Coastal Resources. Chulalongkorn University, Bangkok, Thailand, May 1994. Vol. I: Status Review.

Montebon, A.R.F., 1995. Results of the manta tow survey of Negros Oriental coastline. *In* B. Schirm and H. Vogt (eds.). Technical Descriptions (Geographic Locations, Recommendations) of the fringing reefs in Negros Oriental, Philippines. Centre for the Establishment of Marine Reserves in Negros Oriental.

MPDO (Municipal Planning Development Office). 1999. Municipality of Manjuyod Annual Report.

Murphy, J.M., W.E. Ablong and A.T. White. 1999. Integrated coastal management in Negros Oriental: Building on experience. Tambuli Newsletter. No. 5, pp. 1-5. Coastal Resource Management Project, Cebu, Philippines.

NSO (National Statistics Office). 1995. Population Census of Negros Oriental. National Statistics Office, Manila.

NSO (National Statistics Office). 2000. Population Census of Negros Oriental. National Statistics Office, Manila.

OPA (Office of the Provincial Agriculturist). 1990. Office of the Provincial Agriculturist Annual Report of 1990.

PPDO (Provincial Planning Development Office). 1991. Socioeconomic profile of the Province of Negros Oriental.

PPDO (Provincial Planning Development Office). 1992. Socioeconomic profile of the Province of Negros Oriental.

PPDO (Provincial Planning Development Office). 1998. Negros Oriental Provincial Development and Investment Program 1998 - 2002.

PPDO (Provincial Planning Development Office). 1999. Socioeconomic profile of the Province of Negros Oriental.

Russ, G.R. and A.C. Alcala. 1993. Long-term effects of marine reserve protection and fishing on coral reef fishes in the Philippines (unpublished).

Schirm, B. and H. Vogt, Editors. 1997. Technical Descriptions (Geographic Locations, Recommendations) of the fringing reefs in Negros Oriental, Philippines. Centre for the Establishment of Marine Reserves in Negros Oriental.

Tiempo, F.A. 1994. Biodiversity *og ang Kalasangan*. Center for Tropical Conservation Studies (CENTROP). Silliman University, Dumaguete City.

Thayer, G.W. and R.C. Phillips. 1977. Importance of Eel grass beds in Puget Sound. Mar. Fish. Rev. November 1977.

Thayer, G.W., P.L. Parker, M.W. La Croix and B. Fry. 1978. The stable carbon isotope ratio of some components of an eelgrass, *Zostera marina* bed. Oecologia (Berl.) 3:1978.

Walters, J.S., J. Maragos, S. Siar and A.T. White. 1998. Participatory Coastal Resource Assessment. A Handbook for Community Workers and Coastal Resource Managers. Coastal Resource Management Project and Silliman Unviersity, Cebu, Philippines. 113 p.

The Coastal Resource Management Project is implemented by the Department of Environment and Natural Resources, supported by the United States Agency for International Development with management and technical support provided by Tetra Tech EM Inc. Address: 5th Floor, Cebu International Finance Towers, cor. J. Luna and J. L. Briones Streets, North Reclamation Area, Cebu City ● Telephone: (032) 232-1821 to 22, 412-0487 to 89, 412-0645 ● Fax: (032) 232-1825 ● CRM Hotline: 1-800-1-888-1823 ● E-mail: crmhot@mozcom.com and/or crmp@oneocean.org ● Website: http://www.oneocean.org