

2.3 Existing Environment

2.3.1 Terrestrial Environment

1) General

Biologically, Northern Palawan has numerous endemic species unique only to the island such as the Palawan Tree Shrew (*Tupaia palawanensis*), Calamian Deer (*Cervus calamianensis*), Palawan Porcupine (*Thecurus pumilis*) and Palawan Peacock (*Polyplectron emphanum*) which can only be found in the island.

According to the 1874 forest map of the Philippines, Palawan was originally almost totally covered by thick primary forests from the seashore to the tallest mountains. Understandably, its flora and fauna composition is so rich and diverse that it is probably the best preserved natural ecosystem in the country.

However, with rapid development and urbanization, numerous primeval forests were cut down to give way to roads, settlements, farms, fishponds, and other infrastructure and economic activities. As a result, only a few areas remain forested in northern Palawan so much so that it is in the list of critical habitats in the Philippines at present.

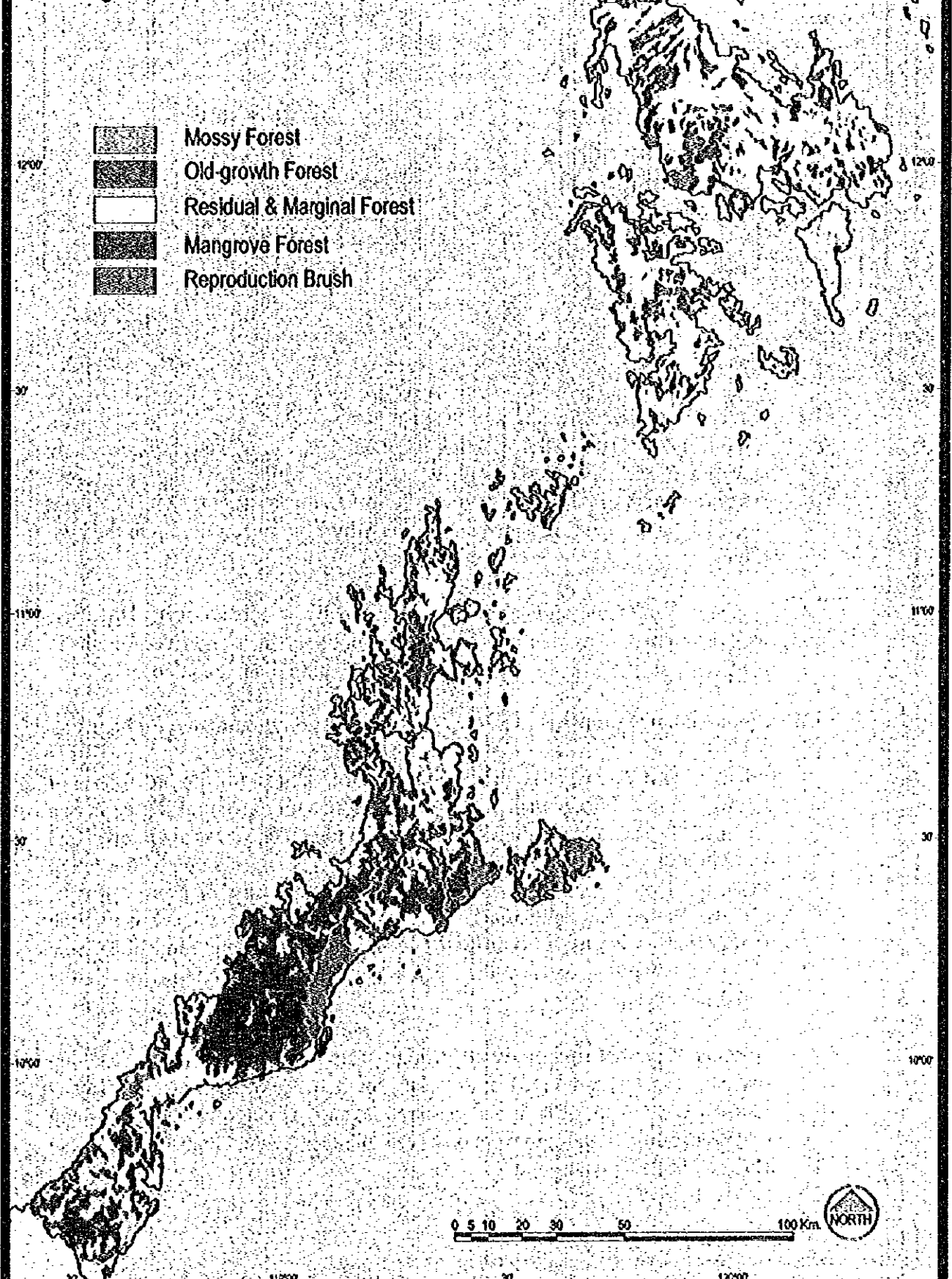
2) Vegetation

The vegetation map of the study area done by NAMRIA and JAFTA in 1992 is shown in Figure 2-3. The present vegetation has changed since then owing to activities such as kaingin, farming and land erosion. Thus, the results of the supplemental aerial survey conducted served as additional information in the analysis of the study area's vegetation.

There are six major types of natural vegetation in Northern Palawan: (1) lowland evergreen rainforest; (2) lowland semi-deciduous forest; (3) submontane forest; (4) forest over ultrabasic rocks; (5) forest over limestone; and (6) mangrove/nipa forest. The occurrence of these vegetation types in various parts of Northern Palawan is presented in Table 2-13

Vegetation in Calamian Islands: Only small patches of secondary growth and remnants of regenerating forests are found in most areas. An almost intact limestone forest is found in Coron Island whose topography makes access difficult to people. It must be noted that the forest vegetation in the islands of Busuanga, Culion and Linapacan are considered to be in critical condition at present. The mangrove forest located between the islands of Calauit and Busuanga was found to be well developed and preserved.

Figure 2-3
Vegetation Map of the Study Area



Source: 1992 satellite data, NAMRIA & JAFTA

Table 2-13 Vegetation Types in the Study Area

| Vegetation Type | Mainland Palawan | Dumaran Island | Linapacan Island | Culion Island | Coron Island | Busuanga Island |
|---|------------------|----------------|------------------|---------------|--------------|-----------------|
| Lowland Evergreen Rainforest | • | • | • | • | • | • |
| Lowland Semi-deciduos Rainforest | • | | | | | |
| Submontane Forest | • | | | | | |
| Forest Over Ultra Basic Rocks (Ultrabasic Forest) | • | | | | | |
| Forest Over Limestone (Limestone Forest) | • | | | | • | |
| Mangrove Forest | • | • | • | • | • | • |
| Nipa Plantation | • | • | | | | |

Source: Study Team

Note: • denotes the relevant vegetation type that exists.

Vegetation in Northern Mainland: A relatively well preserved vegetation was observed in Irawan, Iwahig and St. Paul National Park adjacent to Cleopatra Needle and Mt. Bloomfield. Better secondary growth on steep slopes at low elevation in Irawan Valley was likewise observed which indicates that present law enforcement is effective. Vegetation in Barbacan Range, Mt. Illian and Big Peak have been threatened significantly by kaingin activity up to the high ridge.

Vegetation in Dumaran Island: There is virtually no forest cover. However, well developed mangrove forest was noted along the bays and river mouths in contrast to the general condition of the forest within the main island.

3) Some Findings from Aerial Survey on Terrestrial Environmental Problems

Intensive and extensive landslides were seen in almost all the hill forests of the west slope of Pagdanan Range and flat range up to Central Range in San Vicente. The same situation was observed in the secondary growth forest and kaingin areas of hills along the LaOgogan River, eastern slope of the Sharp Peak and Dome Peak, Barbacan Range, the eastern hills of Central Range, Mt. Baring and Taradungan, Mt. Ynantagung, and the mountains in El Nido though not as intensive as in San Vicente. Other serious landslides were observed along the roads on the steep areas near the coastline of Mt. Baring and Taradungan.

Another important finding was that small-scale logging activities were taking place in the forest located 5 to 7 km south of Lake Manguao in Taytay municipality. A lot of fishpond preparations in the mangrove forest, Kaingin and preparation of kaingin were observed in San Vicente, Honda Bay, Ulugan Bay and Malampaya Sound.

4) Assessment of Terrestrial Ecosystem

Initial assessment of the present ecosystems has been undertaken based on secondary data and the supplemental survey conducted in the Study. Major terrestrial ecosystems have been identified and assessed as shown in Table 2-14 and explained as follows:

Calamian Islands: The Calamian Islands have evergreen rainforest, mangrove forest (brackish water swamp), limestone forest, brackish water lake, and cave ecosystems. However, the early start of resource exploitation disturbed the ecosystem except for the spectacular Coron Island. Ecosystem restoration programs are urgently needed in these islands.

Northern Mainland of Palawan: Ecosystems recorded to be fair, good or intact are found in Irawan, Iwahig and St. Paul National Park areas. Lowland evergreen or semi-deciduous rainforests are the most endangered ecosystems due to logging and man-made development. Coastal forests, which develop in estuarine condition, were found only in St. Paul National Park. Easily accessible, this ecosystem is endangered by human activities.

Very vulnerable ultrabasic forest which is probably the least commercially attractive for logging tend to be pressured by agricultural development. However, it is in better condition than any other productive soil areas due to its being less attractive for agricultural production.

Limestone forest in most of the study area is relatively well-preserved as its topography does not provide easy access .

Mangrove forest (brackish water swamp) ecosystem is now disturbed and threatened by human activities and aqua-culture development. Malampaya Sound and Ulugan Bay which used to have fully developed primary mangrove forest ecosystem are likewise being pressured significantly.

Fresh water lake/swamp ecosystem, which is only found in Lake Manguao, was quite endangered due to intensive logging in its catchment and agricultural activities in the swamp.

The least known fresh water (river) ecosystems were found to be difficult to evaluate. However, they seem to be endangered throughout the study area due to logging and kaingin activities as well as the construction of poorly planned and maintained roads.

Table 2-14 Major Terrestrial Ecosystem and Assessment Results

| Island | Location | Ecosystem | Rating ^V |
|--|--|--|---------------------|
| Busuanga | | • Lowland Evergreen Rainforest | E |
| | | • Mangrove Forest | T |
| Coron | | • Limestone (Karst) Forest | G |
| | | • (Brackish Water Lakes) | G |
| | | • Cave | F |
| Culion | | • Lowland Evergreen Rainforest | E |
| | | • Mangrove Forest | T |
| Linapacan | | • Lowland Evergreen Rainforest | E |
| | | • Mangrove Forest | T |
| Dumaran | | • Lowland Evergreen Rainforest | EX |
| | | • Mangrove Forest | F |
| Mainland | Iwahig (Mt. Stavelly, Anepahan Peak, Central Peak, Village and Triple Top Range) | • Lowland Evergreen Rainforest | F |
| | | • Lowland Semi-deciduous Rainforest | F |
| | | • Submontane Forest | G |
| | Irawan Valley, Mt Beaufort Thumb Peak, Mt. Herschel and Mt. Airy | • Lowland Evergreen Rainforest | F |
| | | • Lowland Semi-deciduous Rainforest | F |
| | | • Submontane Forest | G |
| | | • Ultrabasic Forest (forest on heavy-metal-rich soil) | T |
| | Puerto Princesa Bay | • Brackish Water Swamp | E |
| | Honda Bay | • Brackish Water Swamp | T |
| | Ulugan Bay | • Brackish Water Swamp | E |
| | St. Paul's Bay | • Lowland Evergreen Rainforest | F |
| | | • Limestone Forest (Karst Forest) | G |
| | | • Coastal Forest | T |
| | Mt. Bloomfield | • Cave | F |
| | | • Ultrabasic Forest (stunted pole forest on heavy-metal-rich soil) | F |
| Barbacan Range | • Lowland Evergreen Rainforest | E | |
| Pagdanan, Central Range and Flat Range | • Lowland Evergreen Rainforest | E | |
| Lake Manguao | • Lowland Evergreen Forest (Lake Margin, Stream Valley, High Forests) | E | |
| | • Fresh Water Lake/Swamp Ecosystem | E | |
| Mt. Copoas | • Lowland Evergreen Forest | E | |
| | • Submontane Forest | T | |
| Silanga | • Limestone Forest | E | |
| Apulit Island | • Limestone Forest (forest over limestone) | G | |
| Malampaya Sound | • Brackish Water Ecosystem | E | |

Source: Aerial Survey, 1996, Study Team

^V symbols denote the following:

I: Intact (90 - 100% of original area)

G: Good (70 - 89%)

F: Fair (50 - 69%)

T: Threatened (30 - 49%)

E: Endangered (10 - 29%)

EX: Extinct (less than 10%)

2.3.2 Marine Environment

From a macroscopic view of the study area, the following environmental characteristics are noted:

1) General

Physical aspect: Current flow pattern is regulated by wind direction during monsoon season and a distinct current direction is observed in both nearshore and offshore areas. A huge amount of land soil have been brought into the coastal waters probably by the logging road formation which generates turbid water with high concentration of soil particles during rainfall.

Chemical aspect: Sea water temperature is very stable at around 29°C throughout the year, which ensures the rapid growth of the coral reef. There is no severe water pollution at present along the coastal areas of Northern Palawan, except in Honda Bay where mercury contamination, as a result of the mine tailings used in the construction of the jetty, has been detected.

Biological aspect: Coral reefs have been degraded in most parts of the study area. The dead corals and sargassos growing on the reef cover largely the shallow reef area. It is very difficult to restore the coral reef even if some countermeasures against soil discharge are taken immediately. The northeastern part of the study area still has healthy coral reefs but dynamite fishing poses a threat to these areas. Reef-associated communities seem to be degrading due to the deterioration of coral reefs and the increase of pressure from fishing activities.

2) Condition of Shorelines by Type

There are various types of shorelines in Northern Palawan, such as coral reef, rocky shore, mangrove forest and others (refer to Figure 2-4).

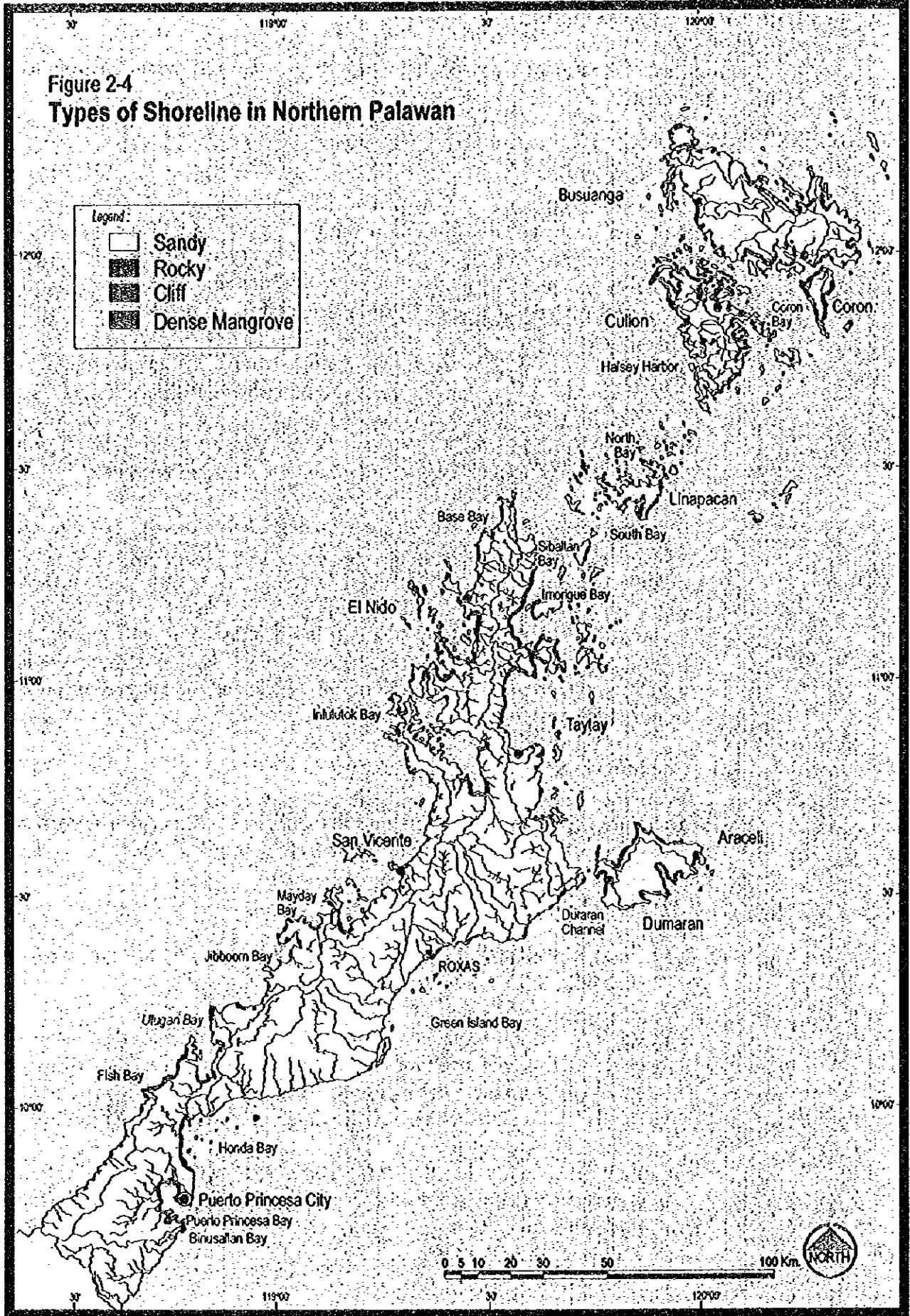
(1) Coral Reef

Coral reef communities have been ranked into five according to their state of health, as follows:

Rank A: Healthy coral community with no indication of disturbance. As observed from the air, it looks dark purplish-gray or dark grayish-brown, extending from the inner reef to the reef edge with a clear marginal line. Dead coral reef, which is grayish-white in color, is seldom recognized.

Rank B: Fairly healthy coral community with some indication of disturbance. Estimated dead coral cover of less than 25%. Color of the reef looks like Rank A. Many cracks are observed because of the whitish color of dead corals.

Figure 2-4
Types of Shoreline in Northern Palawan



Source: Study Team

Rank C: Largely disturbed. Estimated dead coral cover of 25 to 75. Coral communities are small and their distribution patchy. The marginal line of living coral is vivid and easily identified in contrast to the whitish coral or reddish seaweed beds.

Rank D: Severely disturbed. Estimated dead coral cover of more than 75%. Whitish dead corals or reddish seaweed beds predominate. Although formation of coral reef can still be recognized, detailed structure cannot be observed.

Rank E: Almost destroyed and covered with seaweeds although the shape of coral reef can still be recognized. Detailed structure cannot be observed due to the collapse of the reef's fine structure. The reef area looks flattened.

According to the definition above, an evaluation of the coral reef in the study area was undertaken and the results are presented in Figure 2-5.

Reef-associated fish was investigated through diving surveys in nine selected sites and the use of secondary data. Identified were 407 reef-associated species belonging to 44 families. The quantity of fish species seemed to be low compared to other coral reef regions, such as Great Barrier Reef and Okinawa Islands. The Crown of Thorns (*Acanthaster planci*) species was not found at any site, though an indication of its grazing on corals, which seemed to have occurred more than five years ago, was recognized at the sites in St. Paul Underground River, Northern Palawan and Culion Island.

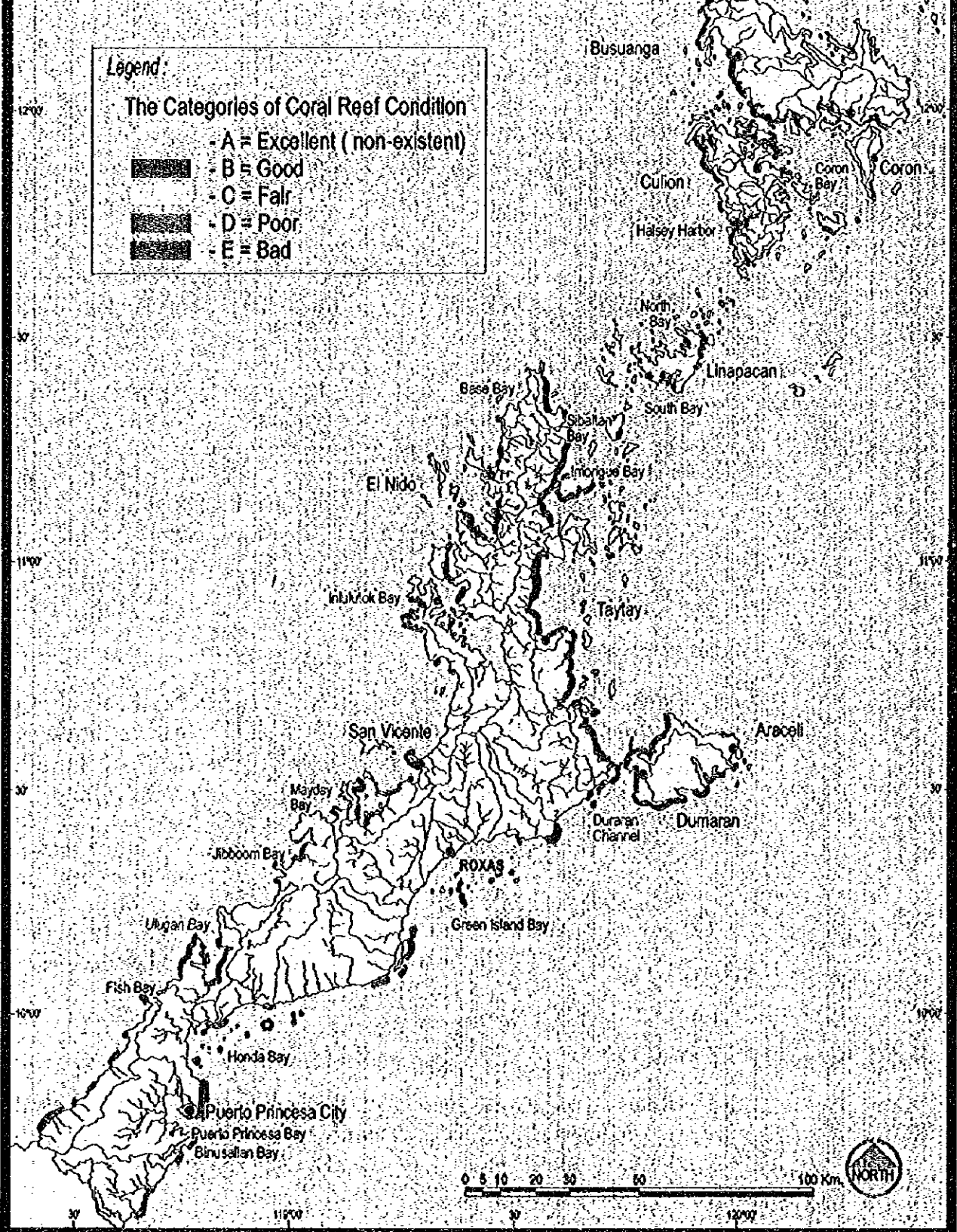
(2) Seaweed/Seagrass

Aerial observation and diving verification for seaweed/seagrass distribution were done simultaneously with the coral reef investigation. Distribution of seaweed and seagrass beds is shown in Figure 2-6. Except for beaches, almost all the coastline is the habitat of seaweeds, which attach and grow on stable substrate, such as rocks, gravel and coral reef. The sargasso is the most abundant group in the study area. Seagrass beds which develop on shallow and sandy sea bottom and which dugong feed on, were found along the coast of the Calamian group of islands, the east coast of the main island and Dumaran Island. Few seagrass beds in the western coast of the mainland were observed.

(3) Mangrove

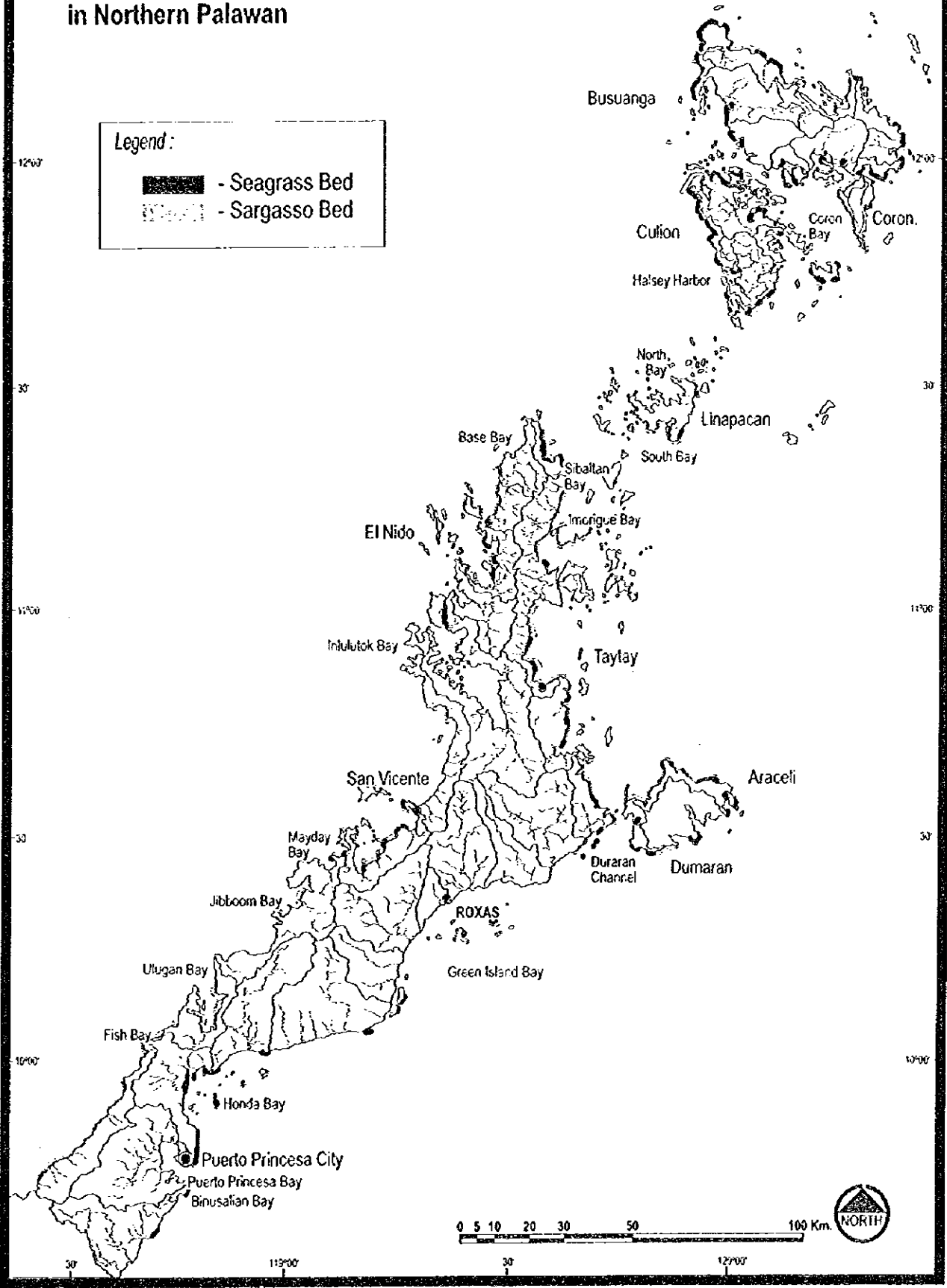
Mangrove plays an important role in the coastal marine ecosystem. Roots of mangrove consolidate the soil so as to protect the marine environment from being disturbed due to turbid water dispersion. Furthermore, mangrove forest provides many kinds of organisms with a habitat and a nursery ground.

Figure 2-5
Assessed Condition of Coral Reef
In Northern Palawan



Source: Study Team

Figure 2-6
**Distribution of Seagrass Beds and Sargasso Beds
 in Northern Palawan**



Source: Study Team

The aerial survey was undertaken for the purpose of assessing the status of the mangroves in the study area simultaneously with coral reef and seagrass/seaweed investigations. The actual aerial observation was supplemented by the analysis of the numerous photographs and video tapes taken during the survey. Secondary data was also used to chronicle the changes in the distribution of mangrove forests.

The shoreline in the northeastern part of the main island is dominated by mangrove vegetation. Major mangrove forests were observed in Puerto Princesa Bay, Honda Bay, Dumaran Passage, Shark Fin Bay, and Taytay Bay (refer to Figure 2-7). Comparison with the data of nine years ago (Swedish Space Corporation, 1988) indicates that mangrove forests have expanded in the area.

3) Assessment of Marine Ecosystems

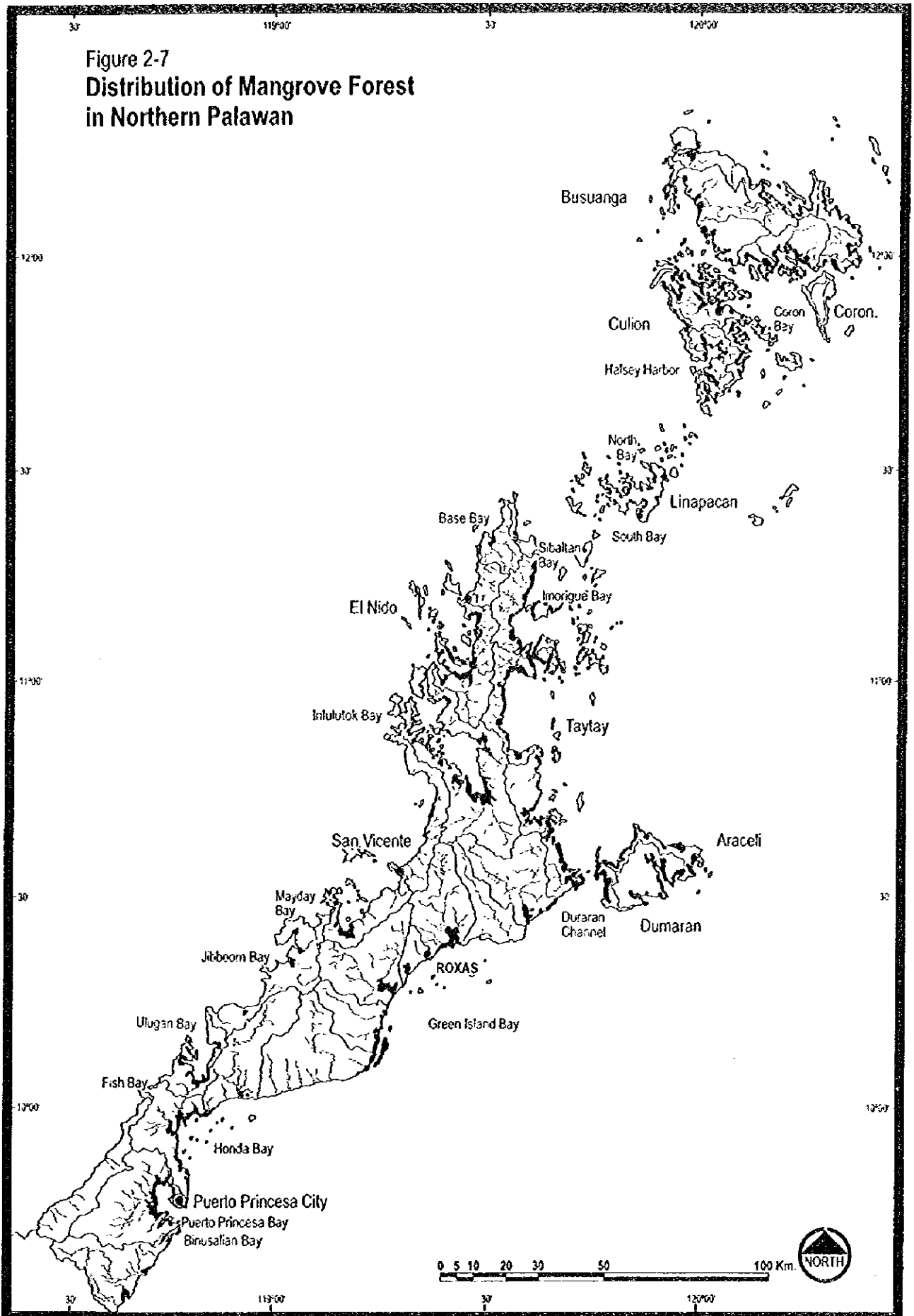
Busuanga Island: Although Busuanga Island has little forest cover, coral reef areas on the north and west coasts are well-protected from turbid water discharge due to a small catchment area divided with along-shore mountain ridges. The south coast facing Busuanga Strait receives much more influence instead from river water discharge and pearl farming activity.

Coron Island: Coron Island has outstanding natural features characterized by limestone forest and cliff. The National Museum is spearheading a campaign to declare Coron Island as a protected area. It should be promoted because the coral community of Coron Island, although still in healthy condition, is showing signs of damage caused by dynamite fishing. Tangat Island has similar natural conditions, and is also threatened by dynamite explosion.

Culion Island: The beaches in the western side of Culion and smaller islands are often uninhabited. However, small clusters of settlements were observed in some small islands. The use of beaches in the western side of the small islands and Culion Island area is limited to visits by fishermen who wait for nightfall on the island. These visits are evidenced by the presence of fire pits. Tar was found in all of the beaches (Seastems, 1995) and its occurrence is not pervasive (commonly observed above the high tide level and in the rocky portions of the beaches). The coral reef community is well preserved except for the north coast facing Busuanga Strait.

Linapacan Island: The natural condition of the marine ecosystem in this island seems to be in good condition. This is attributed to the small amount of turbid water discharge and the island's remote location which does not invite intensive human activity.

Figure 2-7
Distribution of Mangrove Forest
in Northern Palawan



Source: Study Team

Bacuit Bay: The mainland and islands in and around Bacuit Bay are a result of limestone formations, and small catchment areas with fairly little damage on the marine natural ecosystem. Oil pollution in the Bacuit Bay area can be attributed to the fishing and recreational boats in the area. The offshore area of northwestern Palawan is the site of numerous oil wells. Oil exploration is a potential source of oil pollution. Another natural process that may constitute an environmental hazard to human activities is coastal erosion and deposition. It has been reported that shore erosion in one of the islands has been accelerated by mining of beach sand. Coral reefs in Bacuit Bay had been extensively infested with the Crown-of-Thorns starfish (*Acanthaster planci*) sometime in 1987-1988. Illegal fishing was known to occur inside the El Nido Marine Reserve. The Reserve has past and pending cases filed against illegal fishers in the courts of law. The damage wreaked on the coral reef in outer Bacuit Bay as a result of recreation-related activities, e.g. dropping anchor, diving, use of small boats, and stepping on the reef, were also observed. There is no significant coral reef formation in the inner Bacuit Bay, i.e. coast of the mainland.

Taytay Bay: Taytay Bay has extensive reef flats which are dominated by the brown algae *Sargassum* and seagrass beds. Seagrass beds serve as food source for the sea cow population. The results of the diving survey indicated that the coral community in this area was destroyed several years ago due to a huge amount of turbid water discharge. It was replaced by the brown algae.

Malampaya Sound: Malampaya Sound is the most intensive fishing ground and regarded as the most significant nursery ground for marine resources. The main threat is the rapid increase in population in the area which is expected to impose pressure on the relatively undisturbed mangrove areas. Over-exploitation of the mangroves or clearing for brackish water aquaculture ponds is expected to affect coastal fishery production within and around Malampaya Sound.

Green Island Bay: Being remote from the mainland, small islands in Green Island Bay still have a small amount of living coral community. The proximity of Malad River to the built-up areas of Roxas may pose a major threat to the bay in terms of run-offs resulting from construction, development and pesticide discharge from agricultural areas. Attention should also be paid to illegal fishing (dynamite and cyanide) which has been reported in the area near Green Island and CocoLoco Resort (PDCP, 1995). Cyanide is used in the collection of live aquarium fishes in the area.

St. Paul Bay: The bay has several coves characterized by white sand beaches, limestone and rocky formation. Fringing reefs are restricted to some parts of the coastline, while extensive beds of sargasso and other seaweeds have been noted.

Ulugan Bay: Ulugan Bay is a major shallow bay with coastal mangrove forests associated with tidal flats, seaweed beds, small islands and smaller bays. There is an oil pollution threat from a nearby naval station. Oil

pollution has killed some stands of mangroves, *Rhizophora* and *Bruguiera*, in the area. Blast and cyanide fishing were rampant in the recent past. Overfishing with traditional methods coupled with the above activities resulted in the marginal economic productivity of the Bay (Walters, 1995). Pa-aling, a highly technical fishing gear, is still being used for fishing in coral reef areas.

Honda Bay: The bay embraces twelve islands together with fringing reefs, patch reefs and shoals. Coral community has been degraded on the coast of mainland, while a small scale of living corals can be seen in offshore areas. As mentioned previously, mercury contamination of a significant level has been detected, and this situation is very difficult to deal. It requires special measures to protect and improve the ecosystem of Honda Bay.

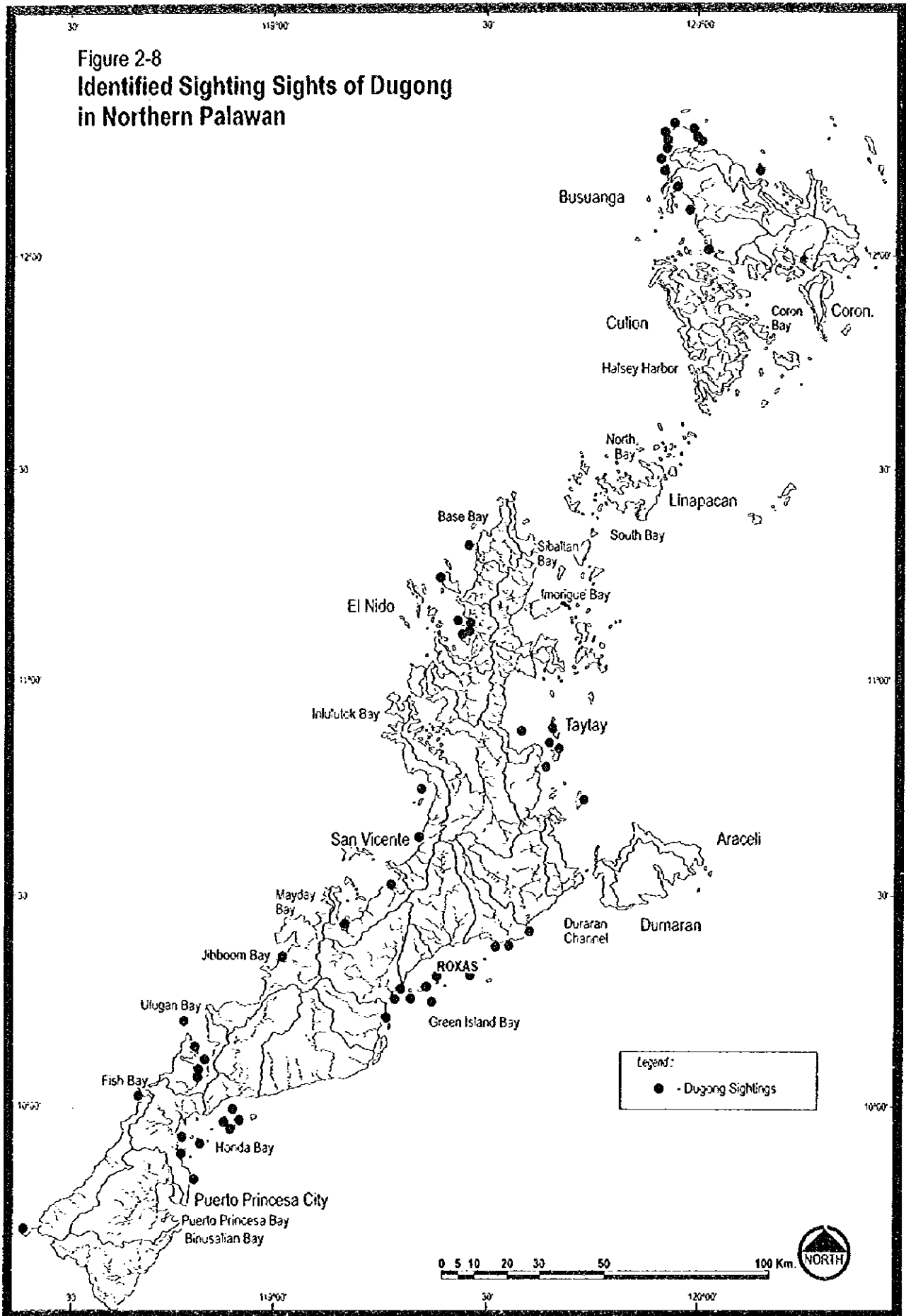
Puerto Princesa Bay: It is a shallow bay with estuaries, mangrove islands, intertidal mudflats, sandflats, mangrove forests and aquaculture ponds. Coral community is almost dead. The mangroves of Puerto Princesa Bay are threatened by pollution from Puerto Princesa City. Timber cutting and fishpond expansion has reduced the mangrove forest area. Puerto Princesa Bay is a nature and wildlife reserve. Being so, the mangrove ecosystem in the bay is thus protected against unsustainable uses that may threaten the mangrove biodiversity and mangrove resources therein.

4) Marine Endangered Species

The dugong and sea turtle are considered as endangered species in Northern Palawan.

Dugong dugon (Miller, 1776): The dugong is the only species surviving in Family Dugonidae with only one genera now. The closest relative, *Hydromalis gigas*, which is the largest of all Sirenia species, once distributed in the entire northern Pacific Coast from Japan to Mexico, became extinct in the year 1767. Thus, the closest surviving relatives are three species of *Trichechus manatus* (Manatee) in West Indies and West Africa.

Dugongs, which grow up to 3 m and weigh up to 400 kg, spread to the tropical and subtropical sea from the Gulf of Suez (Red Sea) up to New Hebrides (East of North Australia). Although their present population is not known, a declining trend is eminent due to a number of threats such as pollution and destruction of seagrass beds, aside from being hunted and being caught by accident. The species was common up to the early 1970s, but their number has greatly declined since then throughout the Philippines. A 1994 survey in Palawan revealed that dugongs could still be found throughout the province. This is the only area in the Philippines with such confirmed sightings and reports (Figure 2-8). The survey concluded that Northern Palawan was their major habitat, and thus, conservation of its habitat had



Source: Study Team

become a big issue in Northern Palawan. The surveys on dugong in Northern Palawan by the Protected Areas and Wildlife Bureau (PAWB) in collaboration with the Toba Aquarium has been well-documented and one of the proposals is providing dugong sanctuaries in Northern Palawan .

Sea Turtle: Three species of marine turtles (*Chelonia mydas*, *Eretmochelys imbricata*, *Dermochelys coriacea*) are found in the Palawan waters. The seagrass areas within the study area serve as feeding ground to the green sea turtle (*Chelonia mydas*) but they nest in the southern islands near Tawi Tawi.

The hawksbill sea turtles (*Eretmochelys imbricata*), which eat mostly sponges, utilize the small sandy beaches with some vegetation for nesting. Sponges could only grow in coral areas which are now endangered throughout Palawan waters due to severe siltation caused by intensive and extensive logging. This situation might cause further decline of the species or its moving out of Palawan waters. Recent record of nesting beaches of *E. imbricata* are summarized in Figure 2-9. This indicates that the species primarily utilizes the beach ecosystem in Northern Palawan.

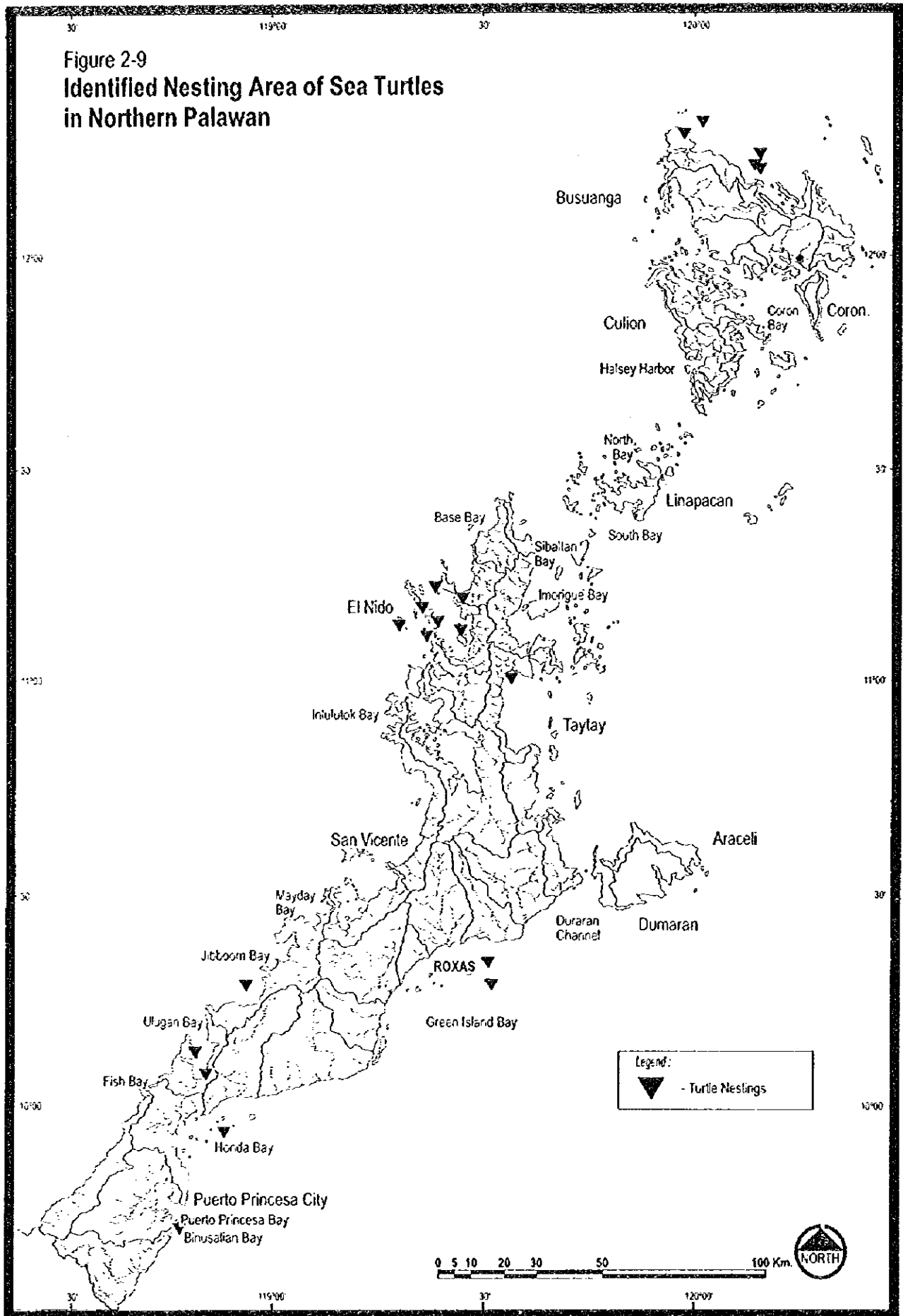
The most endangered *Dermochelys coriacea* occasionally appear in Palawan waters. But this is a highly migratory species. Their confirmed nesting beaches are in Malaysia. Therefore, the occasional appearance of the species is most probably on migrating to and from the nesting beaches.

PAWB, DENR has been undertaking the Pawikan Project for the conservation of marine turtles in the Philippines, mainly in Palawan waters. Monitoring program on nesting of marine turtles is implemented in cooperation with the fishermen of Palawan. Essential data was obtained and summarized by the PAWB project team.

5) Classification of Marine Environment in Northern Palawan

Northern Palawan can be grouped into 13 areas based on the type of shoreline, condition of coral community and the impact of soil discharge. There are two areas where coral reef communities are found to be in good condition: northeastern island and west-southeastern side of the Calamian islands, and offshore Bacuit Bay area. The remaining areas are divided into 11 areas according to the situation of seaweed bed, coastal features and human activities (navigation, fishing and mariculture) as well as possible soil particle discharge (refer to Figure 2.10).

Figure 2-9
Identified Nesting Area of Sea Turtles
in Northern Palawan

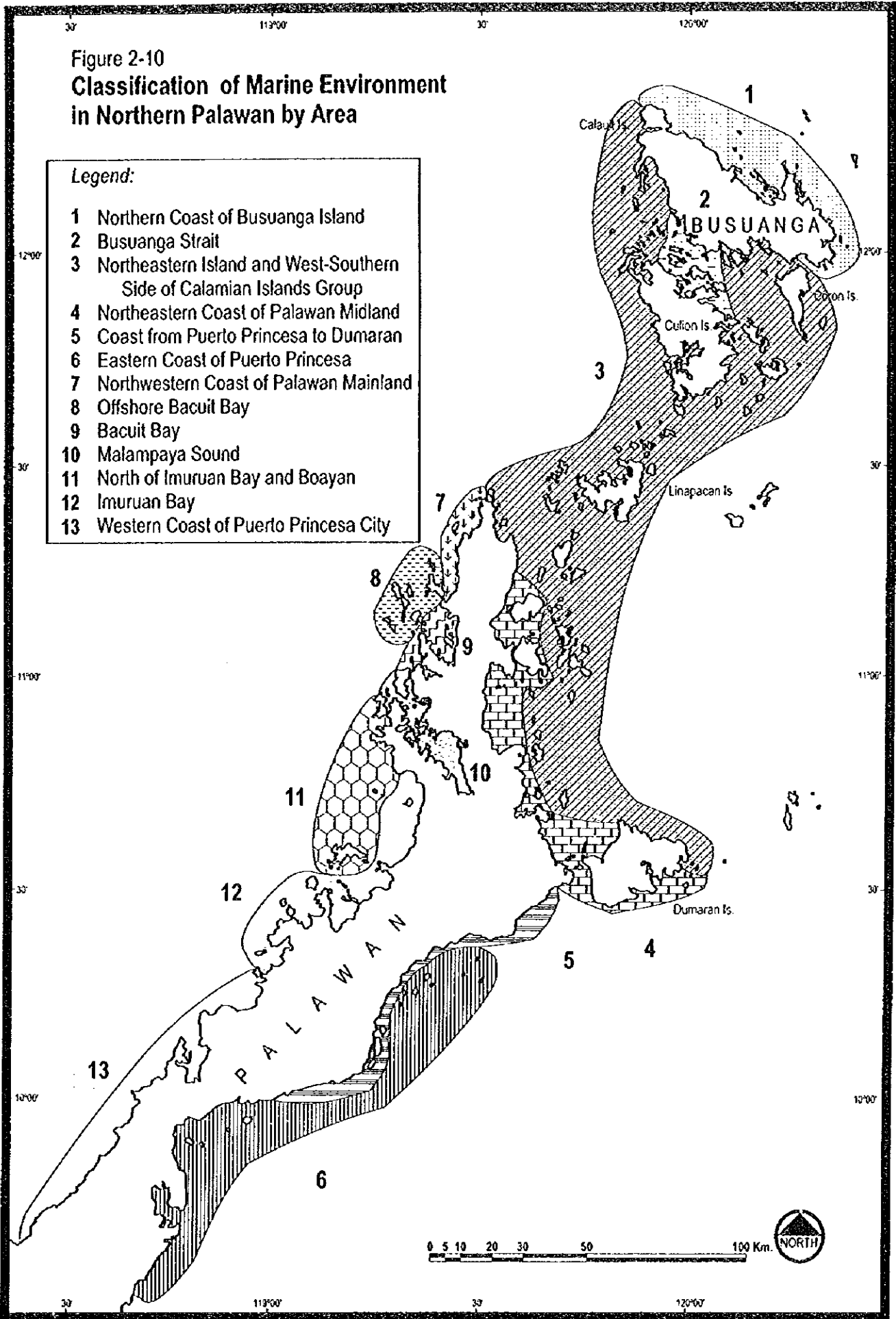


Source: Study Team

Figure 2-10
Classification of Marine Environment
in Northern Palawan by Area

Legend:

- 1 Northern Coast of Busuanga Island
- 2 Busuanga Strait
- 3 Northeastern Island and West-Southern Side of Calamian Islands Group
- 4 Northeastern Coast of Palawan Midland
- 5 Coast from Puerto Princesa to Dumarán
- 6 Eastern Coast of Puerto Princesa
- 7 Northwestern Coast of Palawan Mainland
- 8 Offshore Bacuit Bay
- 9 Bacuit Bay
- 10 Malampaya Sound
- 11 North of Imuruan Bay and Boayan
- 12 Imuruan Bay
- 13 Western Coast of Puerto Princesa City



2.3.3 Socio-cultural Environment

1) Indigenous People in the Study Area

Table 2-15 presents the population distribution of Palawan Province and the study area by mother tongue groups and by municipality in 1990. In the study area, 64 local mother-tongue groups are counted. Out of these mother-tongue groups, only nine groups are "indigenous" to Palawan, namely, Agutaynon, Batak, Cagayano (Kagayanen), Kalamianon, Cuyonan, Pinalawan, Pullon Mapun, Tagbanua and Yokad. These nine groups represent about 40% of the 1990 population in the study area and the remaining 60% are migrants from various regions of the Philippines in recent years.

Out of the nine indigenous mother-tongue groups, Agutaynon is found originally in the islands of Agutaya (in the Cuyo group of islands), Cagayano is from Cagayancillo Islands and Cuyonan is from Cuyo group of islands who are distributed in the whole province of Palawan and are regarded as already "more civilized." The Kalamianon (Calamianon) group is distributed in the whole province, but especially concentrated in Calamian group of islands, and is also regarded as the "more civilized" group. The Kalamianon group is supposed to be a sub-group of the Tagbanuas who are much more "marine-oriented." Palawanen (Pinalawan) is a large indigenous group who inhabit the southern half of the island of Palawan. But only 38 of them have been recorded in the city of Puerto Princesa. Pullon Mapun is a Muslim group found in the southern parts. Yokad, comprising only 11 persons in the Province, is considered to be a small sub-group of the Tagbanuas.

As a result of the above situation, groups of "indigenous people (or tribal minorities)" in the study area are thus limited to "Bataks" and "Tagbanuas."

2) Brief Description of Indigenous Minority Group

The Bataks: In Cuyonan term meaning "mountain people," the Bataks inhabit the rugged part of northeastern Palawan. They are one of the less acculturated ethnolinguistic groups of Palawan and are the remainders of one of the most ancient Philippine cultures. Described by ethnologists as belonging to the Negrito type (Miller, 1905), as "Veddid" by Estel (1952) and as an almost pure "Papuan" type by Beyer (1917), the Bataks were originally a nomadic people of food gatherers and hunters who migrated to the Philippine Archipelago when Palawan was connected to Borneo by means of land bridges. They are supposedly the first ethnic group to arrive in the island.

Table 2-15 Household Population by Mother Tongue in Palawan and Study Area

| Mother Tongue Group | Palawan Province (Including Islands) | | Study Area (Northern Palawan) | | |
|-------------------------|--------------------------------------|------|-------------------------------|------|--------------|
| | No. of HH | % | No. of HH | % | % to Palawan |
| Tagalog | 138,493 | 26.4 | 86,402 | 31.8 | 62.4 |
| Cebuano | 39,611 | 7.6 | 27,327 | 10.0 | 69.0 |
| Hiligaynon | 60,829 | 11.6 | 23,902 | 8.8 | 39.3 |
| Ilocano | 17,368 | 3.3 | 2,275 | 0.8 | 13.1 |
| Ibanag | 523 | 0.1 | 144 | 0.1 | 27.5 |
| Pampango | 821 | 0.2 | 382 | 0.1 | 46.5 |
| Pangasinan | 1,114 | 0.2 | 38 | 0.0 | 3.3 |
| Waray | 7,495 | 1.4 | 4,008 | 1.5 | 53.5 |
| Bicol | 7,949 | 1.5 | 5,757 | 2.1 | 76.8 |
| Maguindanao | 1,076 | 0.2 | 197 | 0.1 | 18.3 |
| Maranao | 3,567 | 0.7 | 1,403 | 0.5 | 39.3 |
| Tausug | 4,441 | 0.8 | 252 | 0.1 | 5.7 |
| Agta | 30 | 0.0 | 21 | 0.0 | 70.0 |
| Agutaynon | 9,521 | 1.8 | 3,928 | 1.4 | 41.3 |
| Aklanon | 4,756 | 0.9 | 3,975 | 1.5 | 83.6 |
| Badjao | 78 | 0.0 | - | - | - |
| Bagobo | 54 | 0.0 | 10 | 0.0 | 18.5 |
| Banuanon | 28 | 0.0 | 28 | 0.0 | 100.0 |
| Batak | 259 | 0.0 | 238 | 0.0 | 91.9 |
| Binisaya | 1,196 | 0.2 | 970 | 0.0 | 81.1 |
| Binukid | 22 | 0.0 | - | - | - |
| Bilaan | 10 | 0.0 | - | - | - |
| Bolinao | 12 | 0.0 | 12 | 0.0 | 100.0 |
| Bontoc | 12 | 0.0 | 12 | 0.0 | 100.0 |
| Botolan | 13 | 0.0 | - | - | - |
| Butuanon | 50 | 0.0 | 11 | 0.0 | 22.0 |
| Cagayano (Kagayanen) | 14,639 | 2.8 | 4,336 | 1.6 | 29.6 |
| Chavacano | 455 | 0.1 | 282 | 0.1 | 62.0 |
| Cuyano | 419 | 0.1 | 352 | 0.1 | 84.0 |
| Dayawefio | 10 | 0.0 | - | - | - |
| Dibabawon | 9 | 0.0 | - | - | - |
| Dumagat | 41 | 0.0 | 19 | 0.0 | 46.3 |
| Gaddang (Ga-dang) | 11 | 0.0 | 11 | 0.0 | 100.0 |
| Ilongot | 2,745 | 0.5 | 1,884 | 0.7 | 68.6 |
| Inibaloi | 29 | 0.0 | 21 | 0.0 | 72.4 |
| Itawis | 9 | 0.0 | 9 | 0.0 | 100.0 |
| Ibayaten | 222 | 0.0 | 32 | 0.0 | 14.4 |
| Ifugao | 29 | 0.0 | 11 | 0.0 | 37.9 |
| Ivatan | 108 | 0.0 | 9 | 0.0 | 8.3 |
| Kalamianon (Calamianen) | 2,928 | 0.6 | 2,913 | 1.1 | 99.5 |
| Kalinga | 10 | 0.0 | - | - | - |
| Kallahan | 11 | 0.0 | - | - | - |
| Kankanai | 20 | 0.0 | - | - | - |
| Kapul | 57 | 0.0 | 10 | 0.0 | 17.5 |
| Kene | 10 | 0.0 | 10 | 0.0 | 100.0 |
| Kinamigin | 10 | 0.0 | - | - | - |

Cont. Table 2-15

| Mother Tongue Group | Palawan Province (Including Islands) | | Study Area (Northern Palawan) | | |
|----------------------------------|---|---------|-------------------------------|---------|--------------|
| | No. of HH | (%) | No. of HH | (%) | % to Palawan |
| Kinaray-a (Hamtikon) | 3,829 | (0.7) | 857 | (0.3) | 22.4 |
| Cuyonan | 121,377 | (23.1) | 90,042 | (33.1) | 74.2 |
| Malaweg | 69 | (0.0) | 39 | (0.0) | 56.5 |
| Mangyan | 9 | (0.0) | - | (-) | - |
| Masbateño | 2,602 | (0.5) | 1,838 | (0.7) | 70.6 |
| Molbog | 6,493 | (1.2) | - | (-) | - |
| Obian | 187 | (0.0) | - | (-) | - |
| Pinalawan | 39,241 | (7.5) | 38 | (0.0) | 0.1 |
| Pullon-Mapun | 7,494 | (1.4) | 40 | (0.0) | 0.5 |
| Romblon | 442 | (0.1) | 67 | (0.0) | 15.2 |
| Sama (Samal) | 6,237 | (1.2) | - | (-) | - |
| Yakan | 160 | (0.0) | 122 | (0.0) | 76.3 |
| Sangil | 41 | (0.0) | - | (-) | - |
| Surigaonan | 284 | (0.0) | 284 | (0.1) | 100.0 |
| Tagakulo | 11 | (0.0) | 11 | (0.0) | 100.0 |
| Tagbanua | 11,472 | (2.2) | 6,590 | (2.4) | 57.4 |
| Yokad | 11 | (0.0) | 11 | (0.0) | 100.0 |
| Zambal (Sambal) | 460 | (0.1) | 102 | (0.0) | 22.2 |
| Other Local Dialects | 980 | (0.2) | 51 | (0.0) | 5.2 |
| Local Languages Subtotal | 522,253 | (99.6) | 271,282 | (99.7) | 51.9 |
| Belgian | 18 | (0.0) | 18 | (0.0) | 100.0 |
| Chinese | 189 | (0.0) | 169 | (0.1) | 89.4 |
| English | 144 | (0.0) | 90 | (0.0) | 62.5 |
| Spanish | 20 | (0.0) | 10 | (0.0) | 50.0 |
| Other Foreign Languages | 10 | (0.0) | 10 | (0.0) | 100.0 |
| Foreign Languages Subtotal | 381 | (0.1) | 297 | (0.1) | 78.0 |
| Not Stated | 1,859 | (0.4) | 473 | (0.2) | 25.4 |
| TOTAL | 524,493 | (100.0) | 272,052 | (100.0) | 51.9 |

Source: Various reports

Note: Figures are estimated based on a 10% sample.

As they are supposed to be a nomadic people, until recently it is believed that they do not cultivate the soil except to set out a few plants which yield edible roots. But it seemed that they have learned the shifting cultivation of dry rice. Their settlements are characterized by haphazard growth of dry (upland) rice, coconut palms, fruit trees and root crops today. Nevertheless, their main economy comprises hunting and food gathering. Small game is most common among Batak hunters. The most common method of hunting is by a group of three or four men to track the hunted animal with the aid of dogs. The hunters use their spears and arrows and the blowguns believed to be their favorite weapon; poisoned darts are rarely used today. Fishing in rivers and streams (and seldom along the seacoast) is not common to the Bataks and is

considered to be an occasional pastime. Fishers use the bow and arrow, basket traps, damming and poisoning (but not cyanide).

Trading is common among the Bataks. Forest products such as rattan, copal tree gums and wild honey are traded with the desired items such as cloth, metal implements, salt and rice offered by neighboring groups.

Social organization of the Bataks is outlined by Warren (1964) into three distinct social groups: the family unit based on kin ties, the band of subsistence folks and the settlement by geographical location. The family is the basic social unit and each nuclear family has its own shelter, both in the hunting and collecting expeditions and during seasonal occupation on the temporary coastal settlement. The Band is a transitory social grouping of related and non-related kins which have common interests in economic activities. They compose the work group whenever communal enterprise is performed. The Settlement, or temporary village, is merely a cluster of houses located near the seacoast and straddle a major path leading from the seacoast into the forest. The village is developed in response to government demands that the Bataks must have a permanent place of residence. The houses in the settlement are modeled after those of nearby Christian homesteaders, built on piles, with rectangular floor plans and nipa-palm roofs. The temporary shelters used during their nomadic activities are only lean-tos of sticks and leaves, with leaves used to cushion the ground.

The present-day leader of all the Bataks is an elder *kapitan* residing in the coastal settlement of Sumurod. The *kapitan* is chosen by the adult members of the local group from among those men considered the best hunters and fighters. The *masikampo* is the local group expert on customary law and conducts all important meetings of elders. There is only one *masikampo* for each settlement of local group, elected by the group of elders-men of demonstrated wisdom in decisions related to customary law. No decisions are legal without the presence of the *Karinpasan* or witness to all official acts.

The Tagbanua: The name of Tagbanua is derived from "tag-banua" which refers to the aborigines who retreated inland (Llamson, 1978). Originally they were coastal or near-coastal, riverine dwellers, but they retreated inland due to the pressure imposed by later settlers.

They are considered shifting cultivators in the central and northern part of Palawan Island principally engaged in upland (dry) rice production. Intercropping with plants such as cassava, sweet potatoes and taro is done in small quantities. Although their culture, social structure and lifestyle are changing quickly with the incessant contact and communication with neighboring Christian Filipinos, their economy still depend on rice production. The annual cycle of their economic, social and religious activities is greatly influenced by climatological factors (e.g., rainfall). During the driest period, they collect forest products especially resinous gum from the bark of trees (particularly) and they likewise do fishing and hunting.

Most of the material culture of the eastern coast of Tagbanua is indistinguishable today from that of their Christian neighbors. They differ in religious beliefs and practices, world view and social organization. The situation was quite different twenty five years ago during which they used tools of native make, elaborate personal ornamentation, etc. which may be related to material traits of other pagan groups in southern Philippines, notably to groups in Mindanao and the early Bisayans as described in the Spanish documents. In former days, both sexes wore long hair, inserted plugs in their ear lobes, and filed and blackened their teeth.

Description of their social structure, culture and religion may be erroneous since the report was made in the early 1980s, and the changes recorded in the recent years are enormous. Therefore, the following description may not fully represent the present Tagbanua especially those in urbanized areas.

According to the Fox's report in 1980, Tagbanua society is roughly stratified on the basis of class distinction. The "high bloods" who are actually the hereditary leaders called *gimu'u* including their kins, the shaman or the medium called *babaylan* and their kins, and remaining persons are considered to belong to the "lower blood" category. When intermarriage between different social class occurs, the inherited social position of the lower blood spouse is not altered. However, the offsprings of such marriage are considered "high blood" based on pre-eminence and the male child may become the tribal hereditary leader.

Also in the Fox's report in 1982, the Tagbanua thought of themselves as belonging to a "nation state" under a supreme leader called the *masikampu*, who is the highest in position among the hereditary leaders. The *masikampu* still uses his powers in judiciary proceedings concerning divorce, family conflicts and other social conflicts. Tagbanua society is effectively controlled by hereditary leaders whose decisions are supported by religious sanctions and beliefs. Interpersonal relationships are regulated, in addition to kinship, by a complex system of customary laws with fixed fines levied in councils by the hereditary leaders. For the most part, this judicial system is a self-enforcing order for it involves a series of interlinking obligations and rights which require paying fees and fines in order for an individual to maintain his position as a "legal being."

3) Distribution of Indigenous Minority Groups in the Study Area

The Bataks: With the information obtained from the secondary data and the supplemental field survey, the Bataks in the study area are considered to inhabit the following *barangays*. As they still live semi-nomadic lives, and their settlements are temporary in nature, it is difficult to pinpoint this settlement location. Some of them have a permanent settlement in some *barangays*, while others are wandering in the mountains in interior parts of Palawan. This may be the reason why the population of the Bataks differ

according to their location. The table below lists the barangays where they live and their distribution is shown in Figure 2-11.

Table 2-16 Locations of Batak Communities

| City/Municipality | Barangay |
|----------------------|---|
| Puerto Princesa City | Babuyan, Concepcion, Langogan, Maiyon, San Rafael, Tagabinit and Tanabag |
| Roxas | Abaroan, Magara (Arasan), Caramay, Malcampo, Tagumpay, Taradungan, Tinitian and Tumarbong |

Source: OSCC and various reports

The Tagbanuas: With 6,600 population (equivalent to around 2,000 families), the Tagbanuas are widely distributed among the municipalities within the study area except the municipalities of Araceli and Linapacan. Based on literature review and the supplemental field survey results, following are Barangays considered to be the areas they inhabit. As the Tagbanuas are considered to be coastal and semicoastal riverine dwellers, their geographical distribution is presented in Figure 2-11, with the barangays listed below.

Table 2-17 Location of Tagbanua Communities

| Municipality | Barangay |
|----------------------|---|
| Busuanga | Palaitan |
| Coron | Banuang Daan (Coron Island), Buenavista, Bulalacao, Cabugao, Calis Island, Decabobo, Lajala, Malawig, Marcilla, Tara |
| El Nido | Bagong Bayan, Barotuan, Bucana, Salogad (Cagbuli), Teneguiban |
| Puerto Princesa City | Babuyan (20 families), Bacungan (20 families), Bagong Bayan (50 families), Binduyan (10 families), Buenavista (50 families), Cabayugan (100 families), Concepcion (60 families), Irawan (50 families), Kamuning (109 persons), Langogan (20 families), Lucbuan (20 families), Manalo (80 families), Maoyon (50 families), Marufinas (60 families), Maruyogon (100 families), Napsan (100+ families), Salvacion (30 families), San Rafael (20 families), Santa Lourdes (50 families), Simpocan (100+ families), Tagabinit (6 families), Tagbueros (20 families), Tagumpay, Tanabag (15 families) |
| Roxas | Aboroan, Caramay (60 families: Batak Tagbanua), Iraan, Tinitian (20 families) |
| San Vicente | Alimanguan, Binga, Caruray (37 families: 157 persons), Kemdeng, Port Barton |
| Taytay | Abongan, Baras, Batas, Casian, Liminangcong, Meytegued, Pancol, other Barangays around Malampaya Sound |

Source: OSCC and various reports

4) Ancestral Land and Ancestral Domain

Historically, the indigenous peoples (or ethnic minorities) are placed outside the land tenure system, not only in the province of Palawan but also throughout the Philippines. During the Spanish and American periods, all the lands belonged to the state and no one could privately own land. In the Philippine Constitution, there was no mention about the land tenure rights of the indigenous people who are considered to be a political and ethnic minority group.

The first mention on the land tenure rights of the tribal people (ethnic minorities) appeared in the 1987 Constitution, which states that: "The State, subject to the provisions of this Constitution and national development policies and programs, shall protect the rights of indigenous cultural communities to their ancestral lands to ensure their economic, social and cultural well being."

It took five more years for the Department of Environment and Natural Resources (DENR) to issue the administrative order for the identification of "Ancestral Land Claims." "Ancestral Land" means "land occupied, possessed and utilized by individuals, families or clans who are members of the indigenous cultural communities since time immemorial, continuously to the present except when interrupted by war, force majeure, or displacement by force, deceit or stealth."

In this order, "Indigenous Cultural Communities (ICCs)" is likewise defined as "a homogenous society identified by self-ascription and ascription by others, who have continuously lived as community on communally bounded and defined territory, sharing common bonds of language, customs, traditions and other distinctive cultural traits, and who, through resistance to the political, social and cultural inroads of colonization, became historically differentiated from the majority of Filipinos."

Since the Ancestral Land was perceived to be for individuals, families and clans, many cases were filed claiming even public domain in their claims. In response to these cases, DENR further issued the administrative order of "Rules and Regulations for the Identification, Delineation and Recognition of Ancestral Land and Domain Claims" in 1993. Here, the "Ancestral Domain" is defined as "all lands and natural resources occupied or possessed by indigenous cultural communities, by themselves or through their ancestors, communally or individually, in accordance with their customs and traditions since time immemorial, continuously up to the present time except when interrupted by war, force majeure, or displacement by force, deceit or stealth. It includes all adjacent areas generally belonging to them and which are necessary to ensure their economic, social and cultural welfare".

The basic policy and objective of the "Ancestral Land and Domain Claims" are: to preserve and maintain the integrity of ancestral domains and to ensure the recognition of customs and traditions of the indigenous cultural

communities; to recognize the importance of promoting indigenous ways for the sustainable management of the natural resources such as the ecologically sound traditional practices of indigenous cultural communities; to protect the tenure of the indigenous cultural communities; to pursue the Constitutional mandate for equitable access to natural resources; and, to ensure sustainable development of natural resources within the ancestral lands and domains especially forest areas.

It is of course an improvement on the part of the public and the government side to recognize the rights of indigenous people and issue certificates of land tenure in their Ancestral Lands and Domains. Problems have occurred in many cases since the lands and domains claimed by indigenous people are already occupied or are utilized by outsiders, and there is not enough judicial backup system and budget to fully enforce the objectives and contents of supposed identification of ancestral domains. A coordination within the judicial system to secure rights of indigenous people from other laws, orders and administrative systems is needed and this has to be supported financially to pursue the original objectives and full identification of ancestral lands.

Ancestral Domain Claims in the Study Area: As of February 1996, there were already 18 Ancestral Domain Claims in process in Palawan of which 14 claims fall within the study area. For the approximate location of these claims, refer to Figure 2-11, while a brief status of the claims is listed as shown in Table 2-18.

According to Department Administrative Order No. 2, "once these Ancestral Domains are 'claimed', the DENR then surveys and validates the claim. Once the Certificate of Ancestral Domain Claim (CADC) is issued, the Indigenous Cultural Communities (ICCs) have preferential option to run their land and natural resources according to their customs and traditions. Once land is claimed as Ancestral Domain, future occupation and/or utilization of the land by outsiders (i.e. lease issuance or renewal) depends completely on the desires of the ICC. CADC gives indigenous people the moral and legal rights as well as the legal instrument to protect their land."

As it is, wherever indigenous people live, there may be application of Ancestral Domain anticipated within the near future as they are quickly learning this concept. Whether they would like to keep the lands or domains intact, or they would like to develop them either by themselves or with the assistance of outsiders including the public organizations, depends entirely on their own decision. In studying the Environmentally Sustainable Tourism Development Plan for Northern Palawan, due consideration must be given to the Ancestral Domain area for a harmonious co-existence of both the majority group and the minority group, as well as the natural environment.

Table 2-18 Status of Ancestral Domain Claims in the Study Area

| Place | Approximate Size of Claim | Tribal Group Claimants | Approximate No. of Families | Status |
|--|---------------------------|------------------------|-----------------------------|--|
| Sto. Cayasan, Brgy. Tagabinit, Puerto Princesa | 7,000 has. | Tagbanua and Batak | 36 | Certificates to be awarded on March 15, 1996 |
| Brgy. Cabayugan, Puerto Princesa | 5,000 has. | Tagbanua | 78 | Certificates to be awarded on March 15, 1996 |
| Brgys. Maoyon, Marayugon and Babuyan, Puerto Princesa | 7,000 has. | Tagbanua | 300 | Gathering of evidences |
| Brgys. Tinitian and Caramay, Roxas; Brgys. Tanabag, Langogan, Maoyon and Concepcion, Puerto Princesa | 31,000 has. | Batak | 116 | For validation of evidences submitted |
| Brgy. Alimanguan, San Vicente | 9,000 has. | Tagbanua | 200 | Gathering of evidences |
| Brgy. Barangonan, Culion | unknown | Tagbanua | unknown | Just applied |
| Mun. of Culion | unknown | Tagbanua | unknown | Just applied |
| Mun. of El Nido | unknown | Tagbanua | unknown | Just applied |
| Mun. of Coron | unknown | Tagbanua | unknown | Just applied |
| Brgy. Caruray, Roxas | unknown | Tagbanua | unknown | Just applied |
| Brgy. Sta. Lourdes, Puerto Princesa | 7,000 has. | Tagbanua | unknown | Gathering of evidences |
| Brgy. Irawan, Puerto Princesa | 6,000 has. | Tagbanua | 130 | Being surveyed |
| Brgys. Napsan, Simpocan, Puerto Princesa | 6,000 has. | Tagbanua | 100 | For validation |
| Brgy. San Rafael, Puerto Princesa | unknown | Tagbanua | unknown | Just applied |

Source: OSCC and municipal reports

Note: Data is as of February 1996. More claims are pending action.

Figure 2-11
Distribution of Indigenous People and
Ancestral Domain Claims

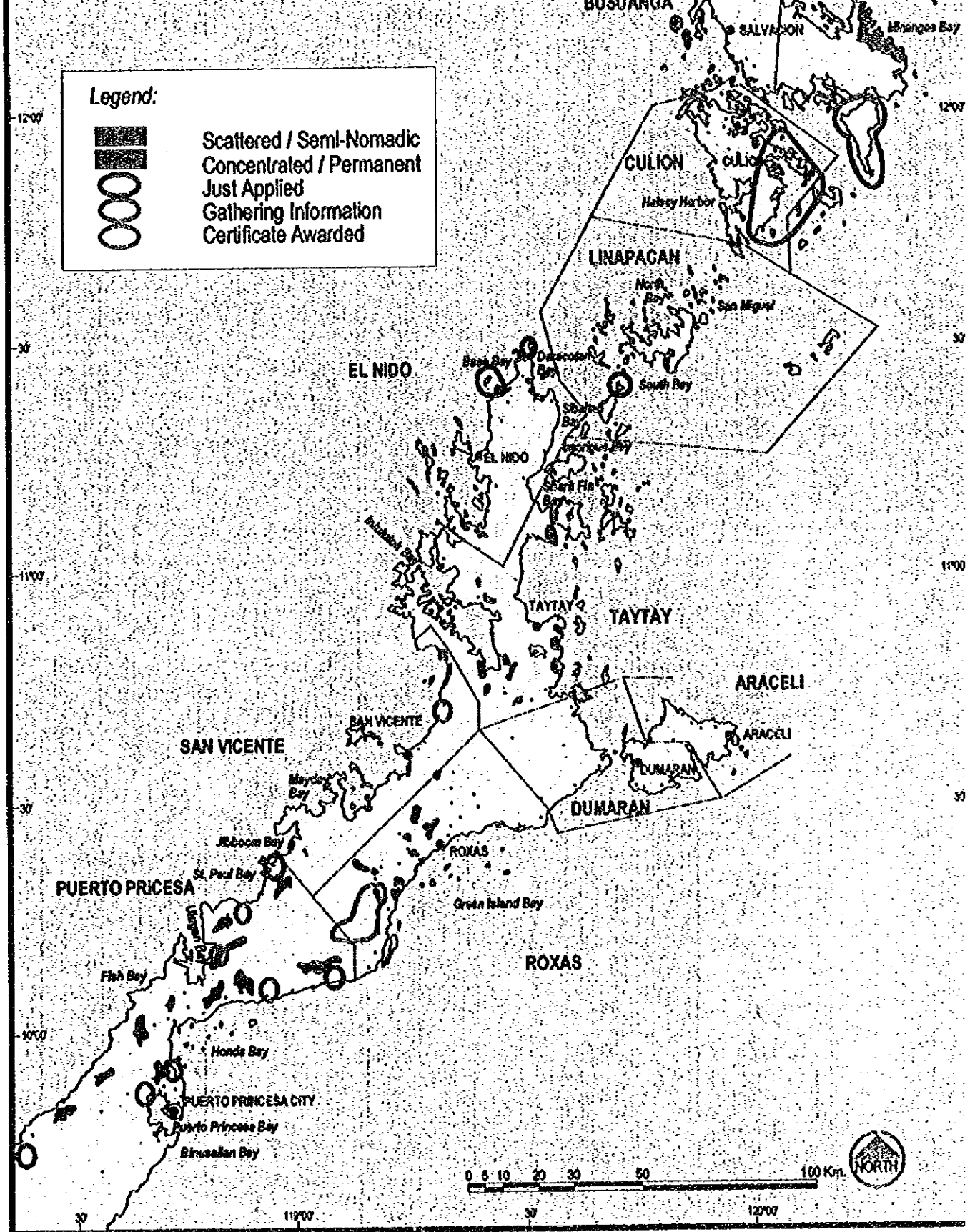
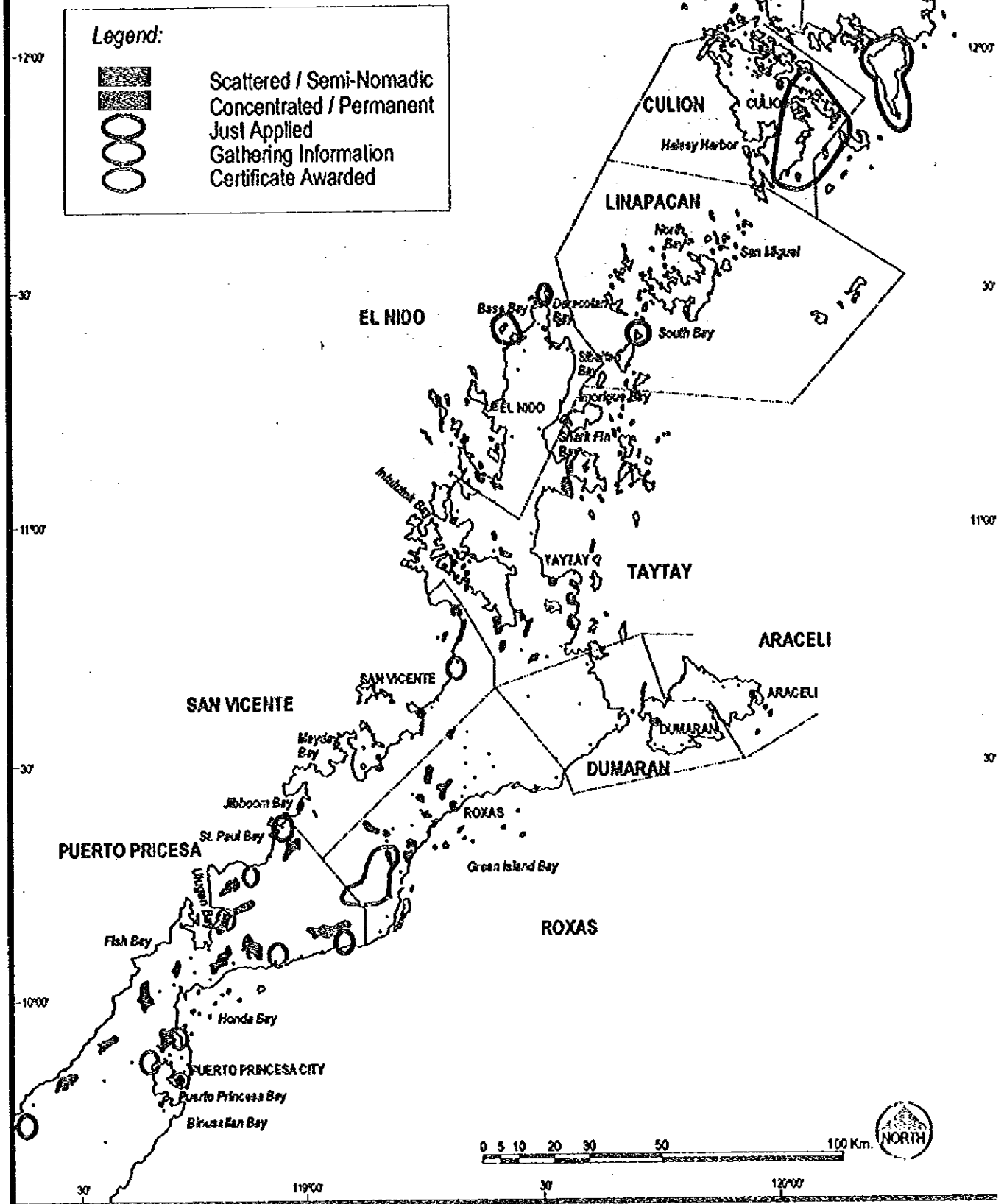


Figure 2-11
Distribution of Indigenous People and
Ancestral Domain Claims



5) Perception of Tribal Leaders on Development

A supplemental survey on the social environment was conducted in 57 barangays found to have indigenous groups. Out of these 56 barangays, 12 have both Tagbanuas and Bataks, two have Bataks only, and the remaining 43 have Tagbanuas only.

The respondents to the survey were the barangay captains and tribal leaders. Questions asked were those pertaining to development, especially tourism development, natural resources or the environment, and their views on participation or involvement in development projects and activities.

Regarding development, tribal leaders are not in favor of lands being sold to non-residents even if it is for the sake of development. Forests should not be cleared to give way to infrastructure, such as roads and bridges. Most of them are not sure if development will increase employment opportunities.

The tribal leaders want that natural resources be left alone, and should not be exploited by any means. If natural resources will be used, it should be used wisely in order to be sustainable. The tribal leaders think that limiting the entry of tourists is necessary to protect both the environment and the IPs.

About 50% of the tribal leader respondents do not know what tourism is really all about. Although they agree that it is possible to have a tourism development program that will not damage the environment, some of them do not want tourism to be developed in Northern Palawan. Those who do would like the tourism development to be studied well before implementation.

Most of the IPs participate in development activities, according to the tribal leaders. The tribal leaders themselves participate in such activities and believe that cooperation with government is necessary.

Table 2-19 Views of Tribal Leaders on Tourism

| Level of Consent | % | | | |
|------------------|------------------------------|------------------------------------|--------------------------------|--------------------------------------|
| | Will Destroy the Environment | Will Not Adversely Affect the Env. | Should be Developed in Palawan | Should be Studied Before Implemented |
| Agree | 57.6 | 88.0 | 14.0 | 96.0 |
| No Sure | 18.6 | 8.0 | 12.0 | 2.0 |
| Disagree | 23.8 | 4.0 | 74.0 | 2.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Social Survey, 1996, Study Team

Note: Figures are percentages to total answers.

2.3.4 Protected Areas and Conservation/Restoration Needs

1) Protected Areas

The protected areas in Northern Palawan were established by proclamation and DENR Administrative Order, and not by the NIPAS Act. These areas are summarized in Table 2-20 and their locations are shown in Figure 2-12.

(1) St. Paul Subterranean National Park (Proclamation No. 835, 1971)

This area has been conserved relatively well and serves as the best example of the previous forest ecosystem of Palawan. It has ultrabasic forest, which is low up to high elevation forests, coastal forest, fresh water river and the famous cave ecosystem. Plans to expand its present area of 3,901 ha to 5,753, and further to 85,766 ha (74,289 ha for the land portion and of 11,477 ha for the marine portion) have been considered and this is being coordinated for cross sector acceptance among those concerned especially the indigenous people who live in the area.

Table 2-20 National Parks and Protected Areas in the Study Area

| Protected Area | Name | Legislation | Date | Area |
|-----------------------|--|--------------------------|-------------|---------|
| National Park | St. Paul Subterranean | Proc. 835 | March 1971 | 3,901 |
| Game Refuge | Palawan | Proc. 219 Proc. 530-B | July 1967 | 763,399 |
| Sanctuaries | Calauit Island Game Preserve Wildlife Sanctuary | Proc. 1578 | August 1976 | 3,400 |
| Marine | El Nido Marine Reserve | DENR A.O. 4 | April 1991 | 95,000 |
| UNESCO: Reserve | Palawan | | | |
| IUCN: Tropical Forest | Philippines | | | |

Source: 1993 Statistics on Philippine Protected Areas and Wildlife

Note: Proc. No. 219 declared the whole of Palawan as a game refuge and bird sanctuary. Under the proclamation, islands smaller than 50,000 ha are declared National Reserve which prohibits human exploitation.

(2) Game Refuge and Bird Sanctuary Palawan (Proclamation No. 219, 1967)

Proclamation No. 219 has declared a large portion of Palawan main island as a game refuge and bird sanctuary and majority of small islands (less than 50,000 has.) as national reserve. However, many areas were excluded by amendment and other proclamations. As a result, many exploitation permits such as logging concession and aquaculture development permits were issued. Thus, even with Proc. 219, exploitation and putting up of settlements have been done intensively.

The proclamation has not been effective at all in the conservation of the ecosystem in Palawan.

(3) El Nido Marine Reserve (DENR Administrative Order No. 14, 1992)

El Nido Marine Reserve, which covers 9,500 ha, (land and marine) was declared a reserve on April 27, 1991 in order to conserve mainly the marine ecosystem of Bacuit Bay. Since then, the environmental conservation in the area has been focused and the community realized the importance of environmental conservation because a large portion of the local economy and a good number of people depend on tourism.

Although El Nido had 45% old growth forest cover in 1985, 1992 surveys revealed that only 8.7% of the area is covered by forest. This data apparently demonstrates that the intensive and extensive exploitation of the forest in the catchment area, wherein most of the siltation goes to the bay marine ecosystem, took place before this proclamation. Thus, this marine reserve declaration had only limited effects as far as the marine ecosystem is concerned.

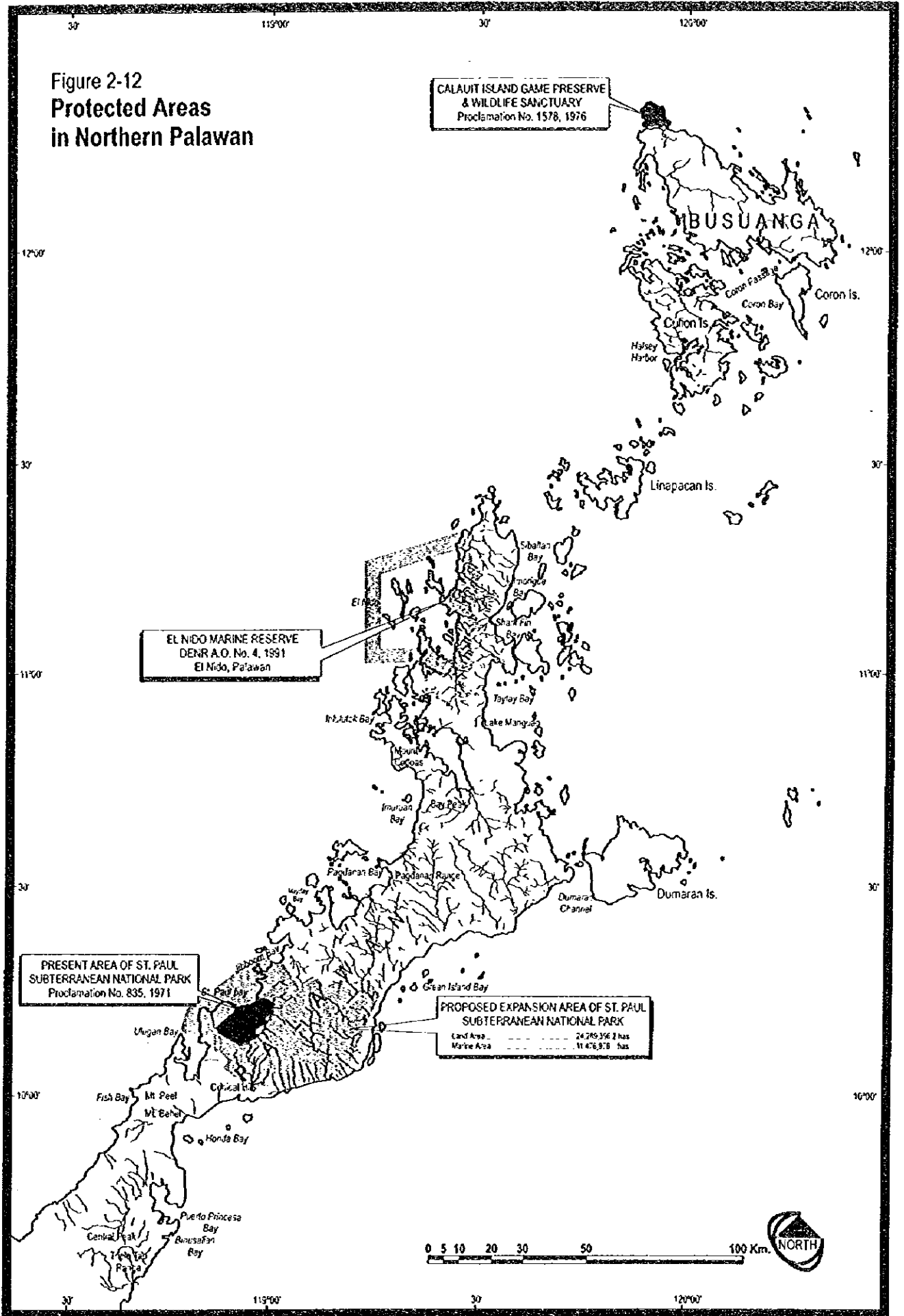
In addition to the above, the zoning of the reserve seems to conflict with its name and gives the impression of conserving just the marine ecosystem. But the reserve protects more than the marine ecosystem. Its core zone is set mainly on the island's terrestrial ecosystem. Marine ecosystem is regarded to include most of the tidal area. Marine turtles, considered to be part of marine ecosystem, use coastal ecosystem for their nesting sites, thus, marine ecosystem could be extended to include coastal beach ecosystem. Under the above context, reassigning core zone and buffer zone should be considered for the purpose of the reserve.

(4) Calauit Island Game Preserve and Wildlife Sanctuary (Proclamation No. 1578, 1976)

The very unique Calauit Game Preserve and Wildlife Sanctuary was declared in August 1996. It is haven to Philippine indigenous species and African wildlife, such as giraffes, zebras, and impalas. However, the proclamation led to the involuntary relocation of inhabitants, which became a social issue later on.

Some indigenous and African origin species adapted well to their new habitat and increased in number. Due to the peculiarity of the reserve, it caught the attention of media and soon became a tourist attraction. Calamian deer, which is indigenous to Palawan, can only be found in the reserve and they have increased in number to about 1,000.

Figure 2-12
Protected Areas
in Northern Palawan



Source: Study Team

(5) Others

In addition to the above protected areas, watershed forest reserves have been established (refer to Table 2-21). Reforestation programs have been implemented for logged-over areas in these watershed forest reserves (refer to Table 2-22). Although reforestation areas become a human-modified ecosystem, they still serve to protect the remaining old growth natural forests in the upper mountainous areas. There is also that possibility of their growth as a natural forest in the future.

Table 2-21 Watershed Forest Reserves in the Study Area

| Name | Location | Project Area | Proclamation | |
|--|----------------------|--------------|--------------|---------|
| | | | No.r | Date |
| Bacuit Watershed Forest Reserve | Bacuit | 94 | 785 | 3/28/35 |
| Palawan Flora, Fauna and Watershed Forest Reserve | Puerto Princesa City | 4,776 | 2221 | 7/14/82 |
| Palawan Flora, Fauna and Watershed Forest Reserve (Parcel 2) | Puerto Princesa City | 3,224 | 2425 | 12/3/90 |
| | Total | 8,094 | 5,431 | - |

Source: Philippine Forestry Statistics, Forest Management Bureau

Table 2-22 Reforestation in the Northern Palawan

| Project Name | Location | Area (ha) | ha | | | | | | Total up to 1991 |
|---------------------------------------|-----------------|-----------|----------------|------|------|------|------|------|------------------|
| | | | 1986 or before | 1987 | 1988 | 1989 | 1990 | 1991 | |
| Central Palawan Reforestation | Puerto Princesa | 2,791 | 5 | 32 | 28 | 26 | 29 | 25 | 145 |
| Coron Reforestation | Coron | 3,100 | 6 | 40 | 35 | 19 | 13 | 18 | 131 |
| Northern Palawan Reforestation | Roxas | 4,424 | 1,126 | 153 | 79 | 64 | 20 | 15 | 1,457 |
| Palawan Flora and Fauna Reforestation | Puerto Princesa | 4,776 | 0 | 0 | 52 | 50 | 14 | - | 116 |
| Taytay Reforestation | Taytay | - | 0 | - | - | - | - | 19 | 19 |

Source: Accomplishment Report of Regular Reforestation Projects as of December 1991

2) Environmental Conditions which Require Conservation and Restoration

Environmental conditions in Northern Palawan have deteriorated as a consequence of human activities. The damaged areas include not only the suburban towns but also the protected areas. There is also extensive logging and kaingin activities and a number of squatters occupying a large portion of these areas. The protected areas largely have not functioned for conservation purposes. But Northern Palawan requires restoration of natural environment rather than conservation. At least, protected areas and watershed reserves should be restored immediately. If environmental restoration is not immediately carried out at present, loss of natural environment is inevitable.

2.4 Current Environmental Management

1) Current Administrative Framework

Palawan's initiative to promote sustainable development led to the creation of the PCSD in 1992 through RA 7611, otherwise called SEP, for Northern Palawan and supported by PCSDS. The PCSD's main functions include the formulation of plans and policies to carry out the provisions of the SEP Law, coordination with local governments to ensure that the plans conform with those of SEP, enforcement of the provision of SEP Law, coordination with government and private agencies/organizations for cooperation and assistance in performing its functions, and so on. PCSDS is to implement "environmental monitoring and evaluation system," "environmental education extension," "environmental research," and the "ECAN," and is responsible for planning, monitoring and coordinating the activities of SPIADP. While PCSD has been institutionalized for the first time in the country to oversee and manage development and activities to enhance the environment, it still lacks more concrete regulatory framework, guidelines, organization and staffing, reliable database, technical capabilities, implementing mechanism, financial sources, and so on. Strengthening the capabilities of PCSD is considered critical to promote the sustainable development of Northern Palawan, while basic institutional framework and administration exist.

2) Major Issues Relative to Environmental Management

(1) Control of Illegal Activities by Bantay Palawan

At present, Bantay Palawan is exerting all efforts to curb illegal activities. The Bantay Palawan Program has been created by the Provincial Government through Executive Order No. 4 (s. of 1993), primarily to combat and suppress the flagrant and rampant illegal logging and illegal fishing activities as well as similar wanton destruction and degradation of the terrestrial and marine environments and natural resources of Palawan, with the exception of Puerto Princesa^{1/}.

Bantay Palawan has the following objectives:

- (a) to stop illegal activities on forestry and fisheries and other natural resource activities;**
- (b) to institute judicious management of the province's natural resources;**
- (c) to generate community participation in the enforcement of conservation and protection laws in addition to regular law enforcement;**

^{1/} Puerto Princesa City is not covered by Bantay Palawan but has a similar organization, Bantay Puerto.

- (d) to provide alternative livelihood activities for the affected rural communities;
- (e) to provide legal support on environmental cases through due process of law; and
- (f) to intensify the education campaign to heighten environmental consciousness supportive of Bantay Palawan.

In order to achieve these objectives, it has exerted efforts such as law enforcement against illegal logging, fishing, kaingin and similar illegal activities, monitoring and apprehension of violators of the law, and protection and safeguard for the terrestrial and marine environment and natural resources. However, Bantay Palawan faces the following problems:

- (a) Shortage of personnel: Only 22 staff members and committee members are responsible for the implementation of the above-mentioned objectives covering terrestrial and marine areas.
- (b) Lack of equipment: Proper equipment for patrol, including boats and vehicles, are insufficient.
- (c) Lack of budget: There is not enough budget to expend for personnel, equipment and other necessary activities, though some equipment and manpower are provided by the Navy, Army and local volunteer groups like NGOs. In 1996, the budget allocated for Bantay Palawan was only ₱4.6 million to cover all activities and areas.
- (d) Lack of public awareness on environment: Some local people still use natural resources illegally without being aware of their importance.

Table 2-23 Budget of Bantay Palawan in 1996¹⁷

| Item | P 000 |
|--|--------------|
| • Conduct of patrol surveillance, monitoring and law enforcement of PD 704, PD 705 and Ordinance No. 29 (air reconnaissance, seaborne, land mobile and foot patrol, maintenance of vehicles and seacraft | 1,654 |
| • Monitoring, prosecution and disposition of all cases filed against violators of PD 704, PD 705 and Ordinance 29 | 30 |
| • Legal and financial assistance to apprehending teams and witnesses | 49 |
| • Conduct of meetings and seminars on prosecution and adjudication | 20 |
| • Strengthening of Bantay Palawan Local Chapters and Community Fishery Boards | 100 |
| • Deputation training on forestry and fishery | 30 |
| • Procurement of seacraft and community equipment | 770 |
| • Conduct of operational assessment and conferences | n.a. |
| • Operation and maintenance of coordinating center | 142 |
| • Support staff | 1,805 |
| Total | 4,600 |

Source: 1996 Budget of Provincial Government

¹⁷ based on 20% development fund allocation

(2) Functions among Environment-related Agencies

Functions of several agencies on environmental management overlap. Unclear functions on environmental administration causes lack of administrative authority over the environment. Delineation of current environmental administrative functions and structure of environmental administration in Northern Palawan is shown in Table 2-24.

DENR is the agency responsible for evaluating EIAs conducted for projects located anywhere in the country, including Palawan (PD No. 1586, s. of 1978, Philippine Environmental Impact Assessment System). However, PCSDS has reviewed some IEE reports, especially the projects of PIADP, without regulatory basis and proper guidelines. Several agencies/offices are involved in forest management such as DENR, PCSDS, PENRO and MENRO without much coordination.

On the other hand, management of coral reef areas and other activities relative to the conservation of fishery resources belong to the Bureau of Fisheries and Aquatic Resources. However, nobody really manages coral reef from the viewpoint of ecosystem. Furthermore, although El Nido Marine Reserve is managed by DENR, it does not have authority to arrest illegal fisherman.

(3) Lack of Competent Staff

Pursuant to the Local Government Code, some of DENR's functions are devolved to local governments. In Palawan, each municipality should prepare the ECAN Zoning. However, the local government does not have enough staff to take charge of environmental management. Although each municipal government should have a Municipal Environment and Natural Resources Officer (MENRO), only San Vicente, Roxas, and Puerto Princesa have a MENRO due to lack of human resources and budgetary constraints (May 1996)

There is even no staff in charge of environmental management in Culion, Linapacan, El Nido, Dumarán and Araceli municipal governments. PCSDS is the supporting agency for PCSD that formulates plans and policies under SEP. An educational background in agriculture is predominant among PCSD staff (14 members), next is commerce/business administration (12 members.) There is only one PCSD staff member who graduated with a forestry and fishery course. Therefore, it can be said that PCSDS lacks manpower to do their work.

There is also a lack of marine environment specialists (even at DENR). For example, the Protected Areas and Wildlife Bureau has more than 300 employees but there are only few marine environment specialists so that specialists in other resource areas like forestry are requested to perform marine management tasks.

Table 2-24 Delineation of Current Environmental Administrative Functions

| Functions | Agencies | OENR Central | DENR Reg Off | DENR CENRO | PCSD PCSDS | Prov. Gov't | Mun Gov't | Other Agencies |
|--|----------|---------------------------------|-----------------------------------|---|--|----------------------|-----------------------|--|
| A. Environmental management | | | | | | | | |
| 1. General Policy Planning | | PD 1151 | | | SEP | | | |
| 2. Land Use Planning Enforcement | | | | | | consolidation | v v | |
| 3. EIA IEE Receiving Agencies Evaluation of Document Issue of Certification(ECC) Monitoring Evaluation & Enforcement | | | v v v (RED) v | PENRO/CENRO PENRO/CENRO attached endorsement PENRO/CENRO | v (no guidelines) v (no guidelines) attached endorsement DMO/EMES | | | |
| EIS Receiving Agencies Evaluation of Document Issues of Certification(ECC) Monitoring Evaluation & Enforcement | | EMB EMB-RC Secretary v | | | DMO/EMES | | | |
| B. Conservation of natural env't | | | | | | | | |
| 1. Protected area Establishment Management | | NIPAS*1 PAWB*1/PA MB | | | Calauti ² | | St. Paul ³ | |
| 2. Terrestrial wildlife Planning Management | | PAWB PAWB | v v | PENRO/CENRO PENRO/CENRO | | | | |
| 3. Marine wildlife Planning Management | | PAWB PAWB | | | | | | DA |
| 4. Forest Planning Management Permission to cut tree Rehabilitation/Reforestation Rehabilitation of eroded area | | FMB v v v | FMB v v v | PENRO/CENRO PENRO/CENRO *4 PENRO/CENRO | (PTFFP) (PTFFP) | ENRO ENRO | MENRO MENRO | |
| 5. Mangrove forest Planning Management | | FMB (ISF) | (ISF) | CENRO (ISF) CENRO | v v | ENRO/OPA ENRO/OPA | (FSP) (FSP) | DA DA |
| 6. Coral Reefs Planning Management | | | | | | OPA OPA | MAO MAO | BFAR BFAR |
| 7. Illegal tree-cutting patrol control | | | | PENRO/CENRO PENRO/CENRO | | | | Bantay Palawan, Bantay Gubat PNP, deputized military |
| 8. Illegal fishing patrol control | | | | CENRO (CEP) | | v v | v v | Bantay Dagat PNP, Navy, Coast Guard DA BFAR |
| 9. Monitoring Planning Implementation | | v | v | v | DMO/EMES | | | |
| C. Social Environment | | | | | | | | |
| | | v | SCO (LMB) (FMB) (NAMRIA) | PSTFAD CSTFAL | v | v | v | OSCC, NGOs |
| D. Pollution control for factory | | | | | | | | |
| Monitoring Control | | | | PENRO/CENRO PENRO/CENRO | | | | |
| E. Infrastructure | | | | | | | | |
| e 1. Solid Waste Planning Evaluation of Plan Construction Management | | | v v | v v | | | v v | DPWH-assistance DOH-regulatory DOH-monitoring DPWH-national roads |
| e 2. Road Planning Evaluation of Plan Construction Management | | | | CENRO- Monitoring | | prov. roads | mun. roads | DPWH-monitoring |
| e 3. Airport Planning Evaluation of plan Construction Management | | | | | | | | DOTC |
| e 4. Port/ Harbor Planning Evaluation of plan Construction Management | | | | | | v | v | DPWH |

Source: Worked out by the Study Team based on various materials

BFAR: Bureau of Fisheries & Aquatic Resources

CENRO: Community Environment & Natural Resources Office (DENR)

CEP: Coastal Environmental Plan

CSTFAL: Community Special Task Force on Ancestral Lands

DA: Department of Agriculture

DMO: District Management Office

DOH: Department of Health

EMB: Environmental Management Bureau

EMES: Environmental Management Evaluation System

FMB: Forest Management Bureau

PSTFAD: Provincial Special Task Force on Ancestral Domains

PTFFP: Palawan Tropical Forestry Protection Program

PAWB: Protected Areas and Wildlife Bureau

PD: Presidential Decree

PENRO: Provincial Environment & Natural Resources Officer (DENR)

RC: Review Committee

RED: Regional Executive Director

SCO: Special Concerns Office

SEP: Strategic Environmental Plan

FSP: Fishery Sector Program

ISF: Integrated Social Forest Program

LMB: Land Management Bureau

MAO: Municipal Agricultural Officer

NAMRIA: National Mapping and Resource Information Authority

NIPAS: National Integrated Protected Area System

OPA: Office of Provincial Agriculturist

OSCC: Office of Southern Cultural Communities

*1. There is no protected area by NIPAS at the present

*2. Calauti Island Game Preserve & Wildlife Sanctuary is managed

by District Office of PCSDS.

*3. St. Paul Subterranean National Park is managed by Puerto Princesa

*4. Authority of PENRO/CENRO had been put on hold (as of June 1999)

(4) EIA System

The current practice of EIA system involves the following problems:

Unclear EIS Procedure: While DENR is the agency responsible for evaluating environmental impact assessment in the whole nation, in Palawan, PCSDS is to be given a copy of EIS reports by implementing bodies for review of development projects, and to be issued endorsements as attachments to IEE reports. However, there are cases when only the Environmental Management Bureau of DENR Region-IV reviews the report without providing PCSD with such reports. The Sandoval airstrip project is an example. Project proponents and investors may be confused as to which agency they should submit EIS/IEE reports

The PCSD's dual role of preparing and evaluationg EIS/IEE reports: PCSD office also prepares EIS/IEE reports for Palawan Integrated Area Development Project, Phase II. There should be a clear-cut rule that PCSD should not prepare EIS/IEE reports. This should be left to the implementing agencies.

Lack of knowledgeable environmental officers on the EIA system: Several MPDCs and other officers are not familiar with the EIA system. Therefore, it may be possible that municipal governments do not require developers and investors to undertake EIAs.

Lack of human resources: PCSDS Technical Services Division is the section responsible for the evaluation of EIS/IEE reports and for monitoring. However, this division has only four members. There is also a lack of DENR officers in charge of EIA.

(5) Data and Information for Environmental Assessment

There is a lack of environmental data and information for Northern Palawan. While DENR, University of Philippines, etc. have surveyed some areas, many areas have never been surveyed. Absence of comprehensive scientific data on endangered ecosystems makes it difficult to prepare an effective management plan as well as ECAN Zoning.

(6) Management of Indigenous Cultural Communities

Not only the natural environment but also the social environment in the study area is suffering from the lack of an effective environmental management system. Other than the Ancestral Domain claims, there had been no consideration on the protection/preservation of cultural inheritance and the people in the Indigenous Cultural Communities (ICCs). They had been, both as a cultural and political minority, exempted from the development process, and no right was granted for

them to either participate in or to prevent further environmental deterioration on their land caused by non-indigenous neighbors. Even with the issuance of DAO No. 2 (1993) which identifies the Ancestral Lands/Domains of Indigenous Peoples (IPs) and ICCs, the management of ICCs remains a time-consuming, complicated process, not to mention the amount of funds and the number of staff required to do the job efficiently.

Another problem is the attitude of government and the general public on the issue of indigenous culture and its importance. In most cases, the ICCs and the IPs are left behind in policy-making and in implementation of development projects. Their natural environment, as well as their social environment, has been sacrificed by increasing population pressure of "outsiders." At present, there is no office in charge of social environmental development. In Article VI of DAO No. 2 on the preparation and implementation of Ancestral Domain management plans, assistance from the Provincial Special Task Force on Ancestral Domains (PSTFAD), local cultural community offices and other government agencies, local government units, and non-government organizations is required. However, this management plan for the Ancestral Domain is designed only for the environment within the domain. In other words, this plan is not a comprehensive social environmental management plan/program for the ICCs but is intended only for individual communities.

If the ICCs, i.e., the social environment of the study area, are to be preserved, there should be at least an office exclusively in charge of the issue on the need to formulate a Comprehensive Development/Preservation Plan for ICCs.

(7) Monitoring

There are many on-going development projects in Palawan Province which are to be monitored by PCSD. However, PCSD cannot monitor most of these projects due to lack of human resources and budgetary constraints.

3) Environmental Review of Development Projects

Inappropriate development projects, especially infrastructure projects, give rise to the deterioration of the environment. Existing development projects, including on-going and completed projects, have been reviewed from the environmental viewpoint. They are briefly as follows:

(1) Roads

a) Arterial roads

Taytay - El Nido Road: There are eroded portions along the road sides, especially around rivers, due to the existence of this road. The road becomes muddy during the rainy season.

San Jose- Port Barton Road: This road was constructed from a logging road. Severe erosion in some areas with traces of burned bushes along the sides are seen.

Sabang (St. Paul National Park) - Bahile Road: Rainwater drains in dug ditches on the roadside. In mountainous areas, most drainage ditches do not work due to sedimentation. Others have been eroded so much by heavy rains that the sides of mountains and valleys have been affected. Cracks on drainage ditches are often more than a meter deep.

San Jose - Little Caramay - Caruray Road: This road was under construction as of February 1996. A major part of this road goes through mountain areas using an old logging road which was constructed in topographically unstable areas. The construction method is considered destructive to the environment. Without slope protection, it erodes easily during the rainy season, causing damage to the ecosystem and landscape. Landslides and soil erosion occur more frequently during the rainy season.

b) Secondary roads/Barangay roads

Secondary roads are mostly earth roads. Vehicular traffic generates dust during the dry season, while roads become muddy and often impassable during rainy season. Most of the barangay roads cannot be used during the rainy season. Construction of secondary barangay roads also causes deterioration of the environment due to defective construction methods. However, roads on flat lands may be stabilized after several years.

c) Logging roads

Existence of logging roads is one of the major causes of soil erosion and landslides in the study area. These roads are mostly located on steep slopes. Loggers did not pay proper attention to road alignment.

d) Possible improvement measures

The following actions can be taken to prevent or minimize the environmental problems caused by road construction:

- (i) Undertake EIA prior to route selection and design of new roads;
- (ii) Select routes in such a way as to minimize environmental problems;
- (iii) Apply protective measures to prevent flow of soil from cut or embankment slope and rainwater drainage ditch in the road design;
- (iv) Select qualified contractors and maintain good workmanship during road construction;
- (v) Strengthen maintenance work of the existing roads and take necessary action if defects are found; and
- (vi) Promote awareness of environmental problems among government workers.

(2) Ports and Port Facilities

Although there are many small piers in Palawan, large scale ports are few. Therefore, there is no serious environmental problem related to port projects.

El Nido: The expansion of the pier of El Nido started in May 1996. The site is in an urbanized area where the land has not been adversely affected by the construction. Marine area has not been affected as well because no turbid water generated. However, it is expected that there would be more risks of oil spills from boats. The facilities are not properly managed.

Sandoval Pier/Decalachao Wharf: There are piers constructed in the forest resulting in the lost of some mangrove forest areas. Although it may be possible that the ecosystem in surrounding areas has changed, water current has not changed due to the pier type of structure.

(3) Airstrips

Sandoval Airstrip: Topographically, the area is rolling. Environmental problems relative to the airstrip development include the following:

- Filling materials of runway was obtained from a mountain several hundred meters to the west. It is predicted that 50 - 60% of the mountain may be lost if the extension work is implemented. Without proper countermeasures, landslides may occur and the landscape spoiled.
- Construction of access roads may cause deterioration of the environment such as loss of forests, landslides, obstruction of river flow, etc., if proper environmental protection measures are not undertaken.
- Drainage water has increased. Without appropriate drainage channel, the area around the airstrip suffers from flooding.

(4) Marine resort

Economy/Standard Class Resort/Tourism Facilities: There are several island resorts in Honda Bay. Garbage are disposed of by digging holes in the islands, where there is only limited space available. There is high probability that the garbage may scatter into the sea. Although there are drum tanks installed as toilets, they are not used; sewage flows into the sea or permeates into the ground. Water will be polluted more critically as more economy and standard class resorts are developed in semi-closed bays without proper facilities.

De Luxe Class Resort: De luxe class beach resorts are also located in the offshore small islands. Miniloc Island Resort has a separate waste collecting system. Garbage is collected by type, such as glass, cans, or plastic. In the case of other island resorts, recyclable wastes, such as cans and plastic bottles, are carried to Manila or mainland Palawan by boat. Most of the de luxe class resorts have a septic tank system for sewage treatment. In general, serious environmental problems are presently not found around resort islands.

4) Possible Improvement

In order to remedy the current environmental problems, possible improvement measures to be considered are as follows:

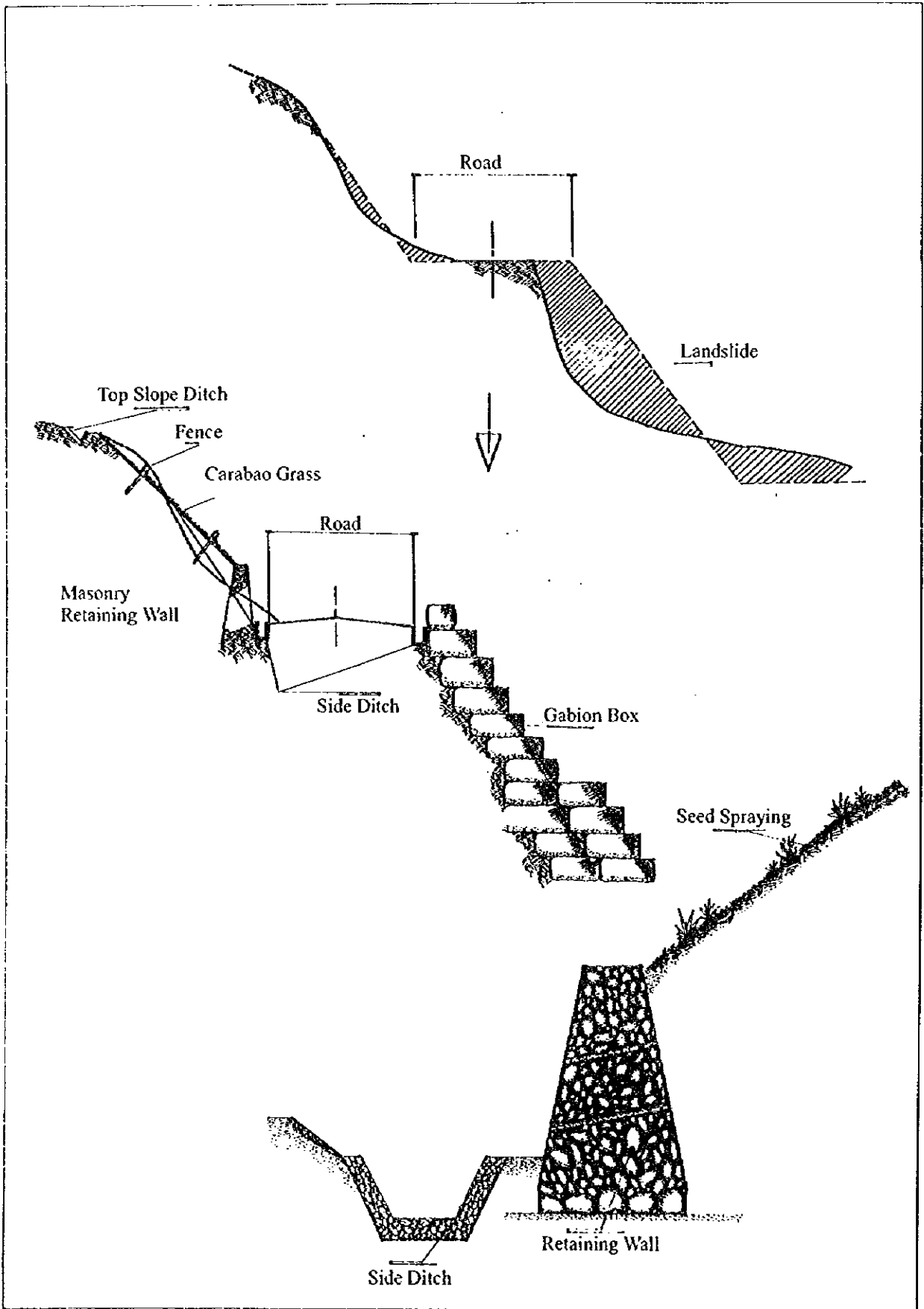
(1) For Road Construction

- (i). Undertake EIA prior to route selection and design of new roads;
- (ii). Select routes in such a way as to minimize environmental problems;
- (iii). Apply protective measures to prevent flow of soil from cut or embankment slope and rainwater drainage ditch in the road design (refer to Figure 2-13);
- (iv). Select qualified contractors and maintain good workmanship during road construction;
- (v). Strengthen maintenance work of the existing roads and take necessary action if defects are found; and
- (vi). Promote awareness of environmental problems among government workers.

(2) For Sandoval Airstrip

- (i). Do vegetation work (plant grass or seedlings) on the slope which was used as borrow pit during the construction of the Sandoval airstrip;
- (ii). Attain good soil compression all over the runway;
- (iii). Dig ditches covered with concrete or masonry around the runway; and
- (iv). Improve access roads.

Figure 2-13 Conceptual Plans for Slope Protection Measures



Source: Study Team

(3) For Economy/Standard Class Resorts

- (i) Waste management: Waste treatment facilities and disposal sites for their wastes should be provided on an area basis. Recyclable wastes such as used bottles (beer, gin, etc.), cans and plastic bottles (mineral water bottles) should be collected and brought to Manila for recycling. A proper system for recycling waste products should be worked out. Kitchen waste should be treated as compost, while other wastes that cannot be used as compost should be disposed of upon agreement with the municipal government. The municipal government should work out a proper waste management system and guideline.
- (ii) Sewage: It is difficult for all resorts and tourism facilities to install sewage treatment facilities. Priority should be given when they are located in high density resort areas, and in ecologically sensitive areas, where there is high probability of water pollution.

4) Solid Waste Management

The flow of the proposed solid waste management is shown in Figure 2-14.

(1) Collection/Transport

Waste should be separated into recyclable waste and non-recyclable waste by waste generators. Waste from households will be collected and conveyed by municipal governments or cooperatives. In case of small island groups, waste will have to be separated into recyclable and non-recyclable; these will then be collected and conveyed to the main island by boat. Collected recyclable waste will be deposited to a transfer station, and conveyed to recycling plants by a middle man. Collected non-recyclable waste should be brought to disposal sites. However, transport of garbage should be done carefully because of the possibility of scattering garbage and leachate..

(2) Disposal

A sanitary landfill is recommended. The concept shown in Figure 2-15 include the following facilities:

- embankment around sites or fence
- covering soil either daily or periodically
- lining (either artificial lining or clay lining depending on the site conditions)
- leachate collection and treatment facilities
- gas ventilation

Figure 2-14 Flow of Solid Waste

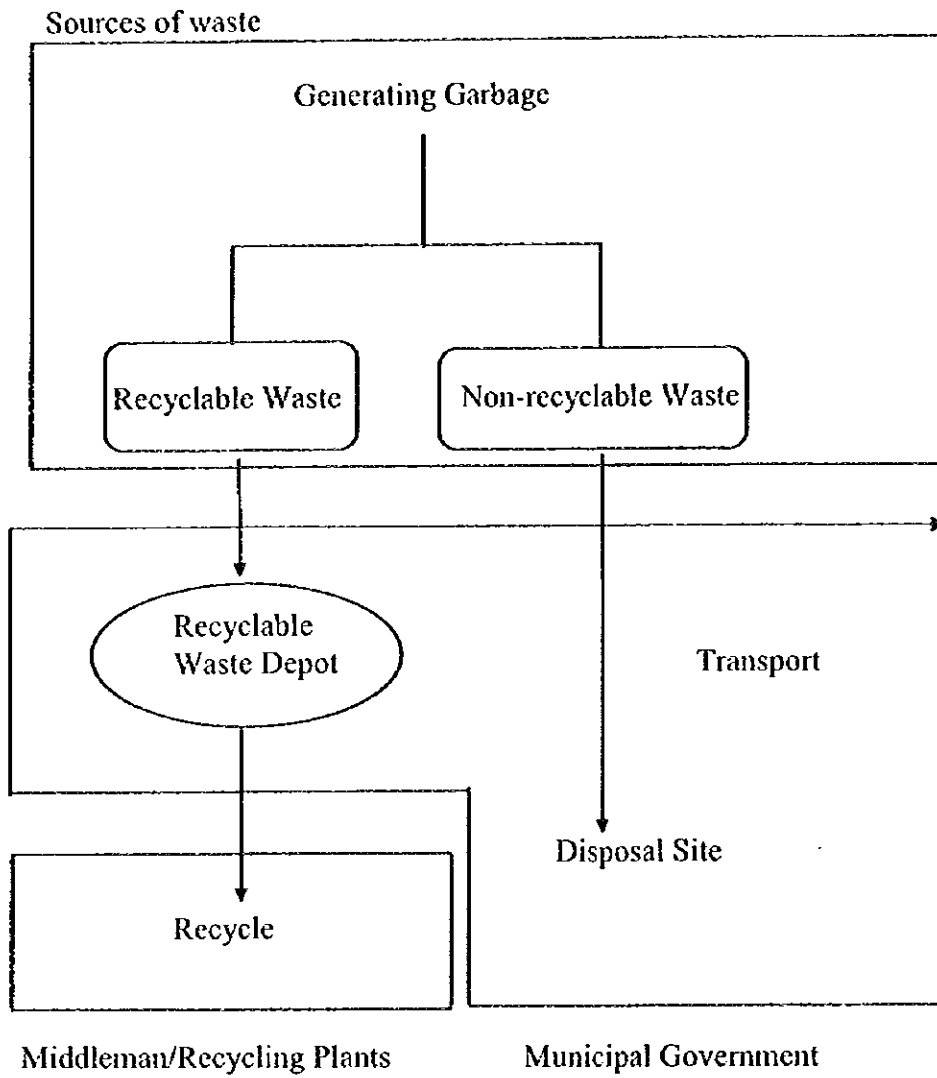
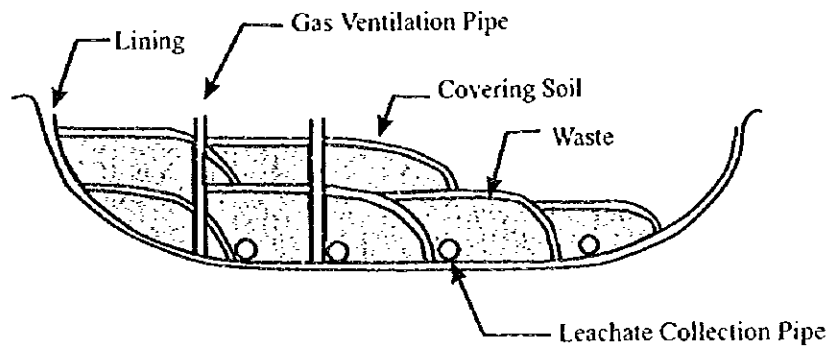


Figure 2-15 Concept of Sanitary Landfill



Source: Study Team

However, since it would be difficult to introduce a complete sanitary landfill directly to Palawan, a gradual sanitary landfill is proposed. Acceptable level for solid waste disposal depends on conditions of land use, topography, surface water, groundwater use and others. The criteria for the proposed sanitary landfill and proposed solid waste disposal level by community level are shown in Tables 2-25 and 2-26. Disposal sites should not be located in preservation and conservation areas. Domestic waste from households can be disposed of by the municipal government. In principle, however, waste from the tourism sector should be their responsibility, or waste can be disposed of at the municipal disposal site, if they pay a fee.

Table 2-25 Proposed Sanitary Landfill Criteria

| Facilities | Level - A | Level - B | Level - C |
|--------------------|-----------|-----------|-----------|
| Embankment | x | x | x |
| Covering soil | x | x | |
| Lining | x | | |
| Leachate treatment | x | | |
| Gas ventilation | x | x | |

Source: Study Team

Table 2-26 Proposed Solid Waste Disposal Level by Community Level

| Classification of Area | Collection Area | Disposal Level |
|------------------------|-----------------|----------------|
| High density poblacion | whole area | A |
| Low density poblacion | whole area | B |
| Barangay | center | B or C |

Source: Study Team