

Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated:

2. Country: HONDURAS

3. Name of wetland: Punta Sal National Park

4. Geographical coordinates:

15°42'N - 16°00'N  
87°29'E - 87°52'E

5. Altitude:

6. Area: 78,150 hectares

7. Overview:

This national park influences to the west, Río Chamelecón and Puerto Cortés; to the south, the Cordillera Nombre de Dios and the Tela-El Progreso highway; to the east, the city of Tela; and to the north, the Caribbean Sea. It is delimited in the north by the Caribbean Sea, in the south by the Tela-Puerto Cortés railway; to the east by the town of San Juan; and to the west by the Río Chamelecón.

8. Wetland type:

9. Ramsar criteria:

10. Map of site included? Please tick yes -or- no

11. Name and address of the compiler of this form:

12. Justification of the criteria selected under point 9, on previous page:

13. General location:

This reserve is northeast of the town of Tela, which is located in northern Honduras, 107 kilometres northeast of the industrial centre of San Pedro Sula and 98 kilometres west of the town of La Ceiba. The study site is 5 kilometres from the buffer zone and 15 kilometres from the centre of the Punta Sal National Park.

The 17 communities included in the study are in the buffer zone of the reserve. Most of the towns are on flat land, except for small hills between Los Cerritos and Agua Chiquita (the highest elevation is 252 metres above sea level), west of San Alejo and Laguna de Los Micos. The rocky mass of the Punta Sal peninsula (176 metres) and the Cerros de Agua Caliente (105 metres) and Berlín (143 metres) to the south of Punta Sal.

14. Physical features:

Geology

The mountains, hills, rocks, lakes and beaches are apparently stable, however, in many circumstances slopes and soils are almost instable. For example, the exposed rock on the Punta Sal peninsula is metamorphic rock from the Palaeozoic of schists and quartz, while the hills to the south of Toloa mountain are characterized by exposed diorite and granite from the Tertiary and the Cretaceous periods. The metamorphic rocks is fragmented, especially near the

entrance to Bahja Tela, where it forms low hills and mountains, frequently reddish in colour. The bedrock provides high stability to the coastal area.

#### Pedology

The following information was taken from the study entitled, "Estudio de Biodiversidad y Desarrollo Sostenible en el Parque Nacional Punta Sal y Jardín Botánico Lancetilla, Bahja Tela." There are two general soil types in this area: Choloma and Toyos, plus beach sand and fine-textured, poorly drained alluvial soils. The Toyos soils are shallow (15 to 25 cm), red in colour and apt for the African palm in the sections that have already been modified. Castellanos (1993) identified seven types of soils in the Punta Sal area, as part of the baseline studies sponsored by UNDP/IHT in 1993.

Soil types in the Punta Sal National Park	Soil type	Symbol	Area
Alluvial	113		3,630
	117		18,775
Forest	130		15,797
	F1		1,862
	F2		1,899
Beach sand 1	AP1		2,167
Beach sand 2	AP2		3,835

47,965 hectares

The soils in the lowlands, the vegas of the Ufa and Chamelecón rivers and in the Valle de Sula are alluvial in origin, formed by the deposition of sediments during seasonal flooding of both rivers. Their fertile soils are used for the production of banana (*Musa spp.*), plantain (*Musa paradisiaca*), sugar cane (*Saccharum officinarum*), maize (*Zea mays*) and rice (*Oryza sativa*); although a large area is used for extensive cattle raising.

#### Climate

The northeasterly, prevailing sea breezes reinforce the trade winds coming from the same direction, producing a year-round moderating influence. The climate is characterized by sunshine in the mornings during almost the whole year, with cloud cover in the afternoons and light showers at dusk. Approximately 60 per cent of annual precipitation falls in June, October and November. In June, the mornings are usually clear with strong rains at night. In October and November, there is a period of two or three days of intermittent light rain followed by two or three days without rain.

The climate is especially good from mid-December until mid-February and in July and August. During the winter months, masses of cold air move in from North America, exerting a moderating influence on the climate and causing a decrease in the precipitation that occasionally falls at night.

The two months of summer that are considered part of the dry season have showers twice a week during the afternoon or at night. Precipitation during the summer contributes to the status of the flora and stimulates the sensation of a virgin tropical paradise. Nonetheless, during the past few years, there has been a trend of less precipitation and higher temperatures.

#### Meteorology

Average annual precipitation (mm)	3,300
Average annual cloud cover	5.0
Number of days of rainfall	190.5

Number of average monthly hours of sunshine	198.5
Temperatures (°C)	
maximum	30.1
average	26.4
minimum	23.8
Average relative humidity	81.8%
Prevailing winds	east and north by northeast
Force of prevailing winds	6 knots

#### 15. Hydrological values:

Basin and drainage basin: In the Río Ulfa drainage basin, there are six sub-basins that drain into the Laguna de los Micos. The largest is the Río San Alejo with a basin of 120 km<sup>2</sup>, forming 30 per cent of the total area of drainage of 390 km<sup>2</sup>. This drainage area includes the 40 km<sup>2</sup> of the surface of the Laguna de Los Micos. The smaller Laguna Quemada has an area of 3 km<sup>2</sup>.

Also located in the reserve are Laguna El Diamante, Puerto Caribe, Puerto Escondido, Río Tinto (Canal Martínez) and the Río Ulfa which flows into the Caribbean. The Río San Alejo apparently has the greatest potential for supplying water, being a well-defined drainage sub-basin. It will be necessary to identify the productive sites within the basin. The storage capacity of the Laguna de Los Micos is more than 121 million cubic metres. Tests of the water confirm that the water of Laguna de Los Micos can be used for human consumption, if it is adequately treated. Sedimentation in the Río Tinto probably have a negative impact on the Punta Sal coral reefs.

#### 16. Ecological features:

The park's current ecosystems are only a small part of those that originally existed in this area. Changes began at the beginning of this century, in the 1910s, and range from destruction of the original vegetative cover to the dredging of vast areas of former coastal wetlands. The changes have produced fragmentation and a reduction of habitat. This fragmentation has reduced the population and composition of wildlife throughout the study area.

The forests that originally formed the natural vegetative cover of the Punta Sal National Park and the Cordillera de Mico Quemado had a wide diversity of trees, plants and wild animals. These ecosystems have been reduced or affected by the activities carried out by the Ferrocarril de las Empresas Bananeras, the expansion of ranching and agriculture of low output, canalization or damming of water by the banana companies and the hunting of local species. Among the species hunted to near extinction are the jaguar (*Panthera onca*), white-tailed deer (*Odocoileus virginianus*), chancho de monte (*Tayassu tajacu*), American manatee (*Trichechus manatus*), American crocodile (*Crocodylus acutus*), the great curassow (*Crax rubra*), the crested guan (*Penelope purpurascens*) and many other species. There are fourteen identified ecosystems in the park: five wetlands, five land ecosystems and four marine ecosystems.

#### 17. Noteworthy flora:

The surveys carried out under the Proyecto Bahía de Tela recorded 499 species of plants in the national park, 10 of which were observed for the first time in Honduras. There are 112 families, 342 genera and 499 species of flora.

#### 18. Noteworthy fauna:

The following numbers of species have been recorded: 70 freshwater fish, 12 amphibians, 68 reptiles, 345 birds, 49 mammals, 151 molluscs, 142 insects and 51 marine corals. Previously, only 300 species of wild animals had been recorded in the study area. It is now established that there are 544 species of vertebrates and 384 species of terrestrial and marine invertebrates. A total of 70 species

of freshwater fish have been observed in 30 families and 49 genera. Two of these are threatened with extinction in Honduras: tepemechin (*Agospomus monticolor*) and cuyamel (*Joturus pilchard*). A total of 25 species are caught for subsistence and commercial fishing. Four species are of interest to tourists: s balo (*Tarpon atlanticus*), robalo (*Centropomus* spp.), chunte (*Arius assimilis*) and vaca (*Bagre marinus*). There are 80 species of amphibians and reptiles of which 31 per cent are reptiles. The following species are threatened: American crocodile (*Crocodylus acutus*), loggerhead (*Caretta caretta*), common iguana (*Iguana iguana*), garrobo gris (*Ctenosaura similis*), boa constrictor (*Boa constrictor*) and the ground python (*Loxocemus bicolor*).

A total of 273 species of birds have been recorded in the park. Birds are most important group of vertebrates for tourists. At least 80 local species are of interest to tourists, especially the resident and migratory aquatic birdlife such as the jaribu (*Jaribu mycteria*), which is highly threatened with extinction, esp tula rosada (*Ajaia ajaja*), white ibis (*Eudocimus albus*), stork (*Mycteria americana*), garza nocturna bujaja (*Cochlearius cochlearius*), black-bellied whistling-duck (*Dendrocygna autumnalis*), Muscovy duck (*Cairina moschata*), rayador negro (*Rhyncops niger*) and keel-billed toucan (*Ramphastos sulfuratus*), as well as several species of hummingbirds, parrots and parakeets.

There are birds of prey such as the osprey (*Pandion haliaetus*), black hawk-eagle (*Spizaetus tyrannus*), common black-hawk (*Buteogallus anthracinus*), slender-billed kite (*Rostrhamus sociabilis*), bat falcon (*Falco rufigularis*), king vulture (*Sarcoramphus papa*), spectacled owl (*Pulsatrix perspicillata*), barn owl (*Tyto alba*) and ferruginous pygmy-owl (*Glaucidium brasilianum*).

A total of 32 species of mammals have been recorded in the park, 13 of which are threatened including the American manatee (*Trichechus manatus*), jaguar (*Panthera onca*), puma (*Puma concolor*), ocelot (*Leopardus wiedii*), white-tailed deer (*Odocoileus virginianus*), Guatemalan red brocket (*Mazama americana*), black-handed spider monkey (*Ateles geoffroyi*), white-faced capuchin (*Cebus capucinus*), mono olingo (*Alouatta coibensis*), chancho de monte (*Tayassu tajacu*), long-tailed otter (*Lontra longicaudis*) and spotted paca (*Agouti paca*). Three species are considered to have become extinct locally because of human pressure on their habitat or of hunting: Baird's tapir (*Tapirus bairdii*), pecari de labios blancos or quequeo (*Tayassu tajacu*) and the giant anteater (*Myrmecophaga tridactyla*).

#### Marine resources

It is estimated that more than 80 per cent of the coral reef in the park is deteriorated in the section west of the Punta Sal peninsula and partially destroyed (50 to 80 per cent) in the area east of the peninsula. There is less than 30 percent deterioration in the sections on the banks between 2.4 and 9.2 kilometres off the coast. The reasons for this deterioration are the transportation of sediments produced by deforestation and subsequent erosion of the higher parts of the drainage basins and the transport of garbage and chemical contaminants to this marine area.

A total of 374 species of marine plants and animals have been recorded in the Punta Sal National Park. Of the marine plants, 35 species are algae and 2 species are phanerogams or flowers. The coral reef in the park is situated along parts of the peninsula and around rocks off Punta Sal. They are especially important for maintaining biodiversity and the development of Bahía de Tela for tourism.

A total of 51 species of coral are recorded, of which 37 are hard and 14 are smooth. There are also 12 sponges, lobsters and at least 76 species of colourful fish.

Biodiversity in the Punta Sal National Park (source: Estudio de Biodiversidad del Parque Nacional Punta Sal y Bahía de Tela) Group Order Family Genus Species In danger Useful Valuable

Fish	-	30	49	70	2	4	25
Amphibians	3	6	9	12	0	1	0
Reptiles	4	16	5	68	9	8	8
Birds	18	56	232	345	20	80	12
Mammals	13	24	44	49	13	13	11
Insects	8	43	ND	142	0	4	0
Corals	3	13	27	51	2	21	1
Molluscs	16	57	81	151	19	40	13
Plants	-	112	342	499	1	ND	1
Total	-	357	789	1387	66	171	71

In the 17 towns in the park, there is a population of 11,687 persons.

#### 19. Social and cultural values:

##### Colonization

Colonization of this region began with the opening of the railroad and roads by the Tela Railroad Company in 1910 to carry out agriculture activities. Some of the inhabitants in the southern part of the park settled at the railroad stations or warehouse points that the company used to collect fruit. A total of 57 per cent of the inhabitants of the park are immigrants. Of these, 30 per cent came from Tela and 27 per cent from other departments (Cortés, Intibuc, Lempira, Valle, Yoro). A total of 43 per cent were born in the study area.

Inhabitants living in the Punta Sal National Park Community

	families	persons	children	total	
					per family
					inhabitants
Barra de Ulua	16	7	5	115	
Río Tinto	59	8	5	473	
Miami	22	6	4	136	
Tornab,	173	9	6	1556	
San Juan	227	8	6	1820	
Puerto Arturo	13	7	5	88	
Buena Vista	79	7	5	550	
Kilometro	21	7	5	150	
San Alejo	145	7	5	1016	
Patos	107	7	5	752	
Marión	35	7	5	249	
Cerritos	26	7	5	180	
La Unión	62	8	6	503	
La Fortuna	114	8	5	1153	
Agua Chiquita	91	7	5	639	
Villa Franca	40	8	5	327	
Ramal del Tigre	282	7	5	1980	

Total 1614 x = 7 x = 5 11687

In the 17 towns studied, a total population of 11,687 persons was surveyed, and the total number of houses recorded was 1614. The average number of children

per family is 5, and the average number of persons living in each house is 7. The number of houses per town varies between 13 and 282.

#### Residence in the community

About 73 per cent of the community has lived for more than ten years inside the the park, and 26 per cent have lived between one and ten years. Only one percent of the population has lived for less than one year in the park. The persons surveyed stated their reason for moving to the park were: 34 per cent for work, 24 per cent because of a greater availability of agricultural land, 18 per cent for family reasons, 7 per cent because land was much less expensive at the time they immigrated and those who always lived there 17 per cent.

#### Profession

Thirty per cent of the persons surveyed are employed in the subsistence production of maize, rice and plantain. Another 21 per cent are occupied in ranching, primarily for the production of milk. The average size of a farm is 30 manzanas and has an average of 25 head of livestock. Most of the milk production is sold to milk processing enterprises and producers of cheese.

About 23 per cent of the population is occupied in fishing for commercial or local consumption. A majority use nets for fishing and others use hooks. Most of the catch is sold to intermediaries in El Progreso and San Pedro Sula. About 19 per cent of the population work as day labourers in the Palma San Alejo plantations or for independent producers of palm and cattle.

#### Health

The persons surveyed agreed that the major health problems are bronchial/lung diseases (54 per cent), gastrointestinal troubles (36 per cent) and malaria and miscellaneous (10 per cent).

The primary source of health problems is the swamps surrounding places of habitation. The swamps are damp and provide a favourable environment for the proliferation of vectors. There is also no sewage system, aggravating already poor sanitary conditions. In addition, there is no monthly health care service available to local inhabitants, especially those living in the western part of the park.

#### Water supply

Fifty per cent of local inhabitants declared wells as their source of water; another 47 per cent take water from a reservoir or a water supply system; and 3 per cent take water from a river or stream.

#### Sewage systems

Among the inhabitants interviewed, 57 per cent have latrines, but some do not use the latrines because of a lack of information about the importance of their use. A total of 24 per cent use a septic tank and 19 per cent use a garden or forest.

#### Energy

Of those interviewed, 82 per cent use firewood obtained in the forest or grazing areas; 17 per cent use commercial fuels and only 1 per cent use electricity.

#### Communication and transportation

Local inhabitants purchase supplies in the towns of Tela and Puerto Cortes. The roads to these towns are in poor condition; both the highway and the railroad. A total of 35 per cent use vehicles, 30 per cent use boats, 28 per cent use bicycles and 7 per cent use animals.

#### Communal organizations

Most of the communities have some form of organization based on a patron saint, religious organization, association of parents or a football club.

#### Land tenure

Most of those interviewed stated that they have no title to their land (dominio pleno) and that all they have is a certificate of occupation issued by INA. There are problems of improper title and adjudication of land within the park to small-farmer organizations (HONDUPALMA, UNC and COAPUL).

The following visits were received from development agencies: 29 percent PROLANSATE, 20 per cent INA and FHS, 12 per cent RRNN, 2 per cent FOSIVI and 4 per cent declared having received no visits.

#### Environmental awareness

A total of two-thirds of those interviewed had received no environmental information, but were aware of the importance of caring for the forest and for animals. One-third declared having received information through the PROLANSATE foundation, radio, a publication or the Bahía de Tela project. Most of those interviewed considered that natural resources (fauna and flora) had decreased because of hunting for commercial purposes, the cutting down of forests for the planting of subsistence crops and extensive ranching for the purpose of gaining ownership of the forested areas. They are aware that there is overfishing in the lakes, rivers and even the ocean, with the inappropriate use of small-mesh nets in unsuitable areas, the use of harpoons and a lack of respect for closed seasons. As a result, there has been a decrease in fishery resources in all areas.

#### Ecotourism

Eighty per cent of those interviewed do not know what ecotourism is, while 20 per cent know what it is and would like to be employed as guard, guide, driver or service employee.

#### Community problems

- poor communications (road and railroad)
- education, in many localities there are no schools and in others no teacher
- few latrines are constructed
- there is no potable water in many communities
- there are health problems of malnutrition, gastrointestinal and bronchial-pulmonary diseases, malaria and dengue fever
- in most communities there is no electricity
- there is flooding in winter

Most of these problems are concentrated in the western part of the park.

#### Land use

The banana companies began to develop this area in 1920 by constructing the railroad, drainage canals, dikes and banana and palm plantations. Taking advantage of the railroad along the southern edge of the park and canals running

from north to south, ranching and agriculture began, as well as the cutting of forests, hunting and fishing. At the same time, indigenous populations (garifunas) moved in along the beach in the northern part of the park to fish and harvest coconuts and yucca.

The area has been divided into the following two areas based on the factors mentioned above and the ecological damage caused by human settlement.

#### A. Occupied area where the following activities were developed

Monoculture is the use of large areas of traditional crops such as bananas, African palm and plantains. This system was established by the banana company and is used in the southern part of the park.

Polyculture is the use of small gardens, usually around a house, to produce a large variety of fruits. This type of exploitation is practised throughout the buffer area around the park.

Annual crops are usually small areas planted with basic cereals on approximately one hectare. These are found throughout the buffer zone. This practice presents serious ecological problems because of the practice of slash and burn with the resulting destruction of organic material and increase in erosion.

Livestock raising is usually extensive and practised over areas of different sizes, producing serious problems of compaction and erosion especially in the basins that drain into the Laguna de Los Micos. This activity is common throughout the buffer zone.

The activities of polyculture, annual crops and livestock raising cover an area of approximately 7,467 hectares, including the matorrales.

#### B. Nature area

All of the ecosystems in the park are part of the nature area, including lakes, swamps, marshes and flooded mangroves. This area is located in the lower part of the park, serving as drainage for all of the tributaries to the middle and upper basin of the park. It covers approximately 44,000 hectares.

#### Potential and recommended land use

Certain types of soil use can cause damage depending on the physical and chemical capacity of the soil. The following established soil use categories are used.

##### Unit Ap1 and Ap2 group

These are rapidly draining soils with little organic material that have been damaged by slash and burn, leading to accelerated wind erosion, leaving them inapt for farming. It is necessary to avoid all types of burning and to promote the use of natural fertilizer and cover crops, especially in the area of Agua Chiquita, La Fortuna and Los Cerritos in the southwest and Cerrito Berlín in the northwest.

##### Unit 130

Burning is prohibited because any change in vegetation can destroy the habitat, affect wildlife, promote migration and destroy the scenic beauty and the panoramic view of the core area of the park.

##### Unit 113

Only visitors or park wardens are permitted along the edges.



## Unit 117

Burning and certain uses will be prohibited in the core area of the park. In the buffer zone, all activities will be monitored.

### Units F1 and F2

These are units of soils subject to erosion that require broad protection, although they are found in the buffer zone, because all of the tributaries flow into the centre of the park. It is imperative that a programme of basin management be carried out. This will bring direct and long-term benefits to the park and the ecotourism project.

### Study of critical areas and re-defining of boundaries

#### A. critical areas

In the central part of the park, there is a high degree of sedimentation, specifically in the Laguna de Los Micos because of deforestation in the mountains of Nombre de Dios, caused by extensive ranching activities and subsistence agricultural on soils with slopes of more than 40 per cent. In addition, the lake is overfished by local inhabitants and visitors, because of the abusive use of capture methods and a lack of respect for closed seasons.

In the area of the Punta Sal peninsula and within the core area, there is a serious problem of sedimentation and destruction of coral reefs caused by sedimentation in the R;jo Tinto and the Barra de Miami. Fishing and shrimp boats cause considerable damage to the reef with their anchors and fishing equipment, tearing off pieces of the reef.

In the southeastern part of the park in the buffer zone around the settlement of Puerto Arturo, R;jo de la Esperanza flows over its natural banks because of sedimentation. In the rainy season, this river floods and causes damage in Tela. This happens because in the upper part of the river there is environmental destruction caused by farming and livestock raising.

In the southern part of the park, in the buffer area near the settlement of Los Patos, there is heavy damage to the lake because of contamination from the channel of the R;jo San Alejo. This contamination comes from the waste of a palm oil extraction plant. In addition, sedimentation is increased in the lake by the dredging of canals and rivers within the plantation by the company.

In the southwestern section of the park in the buffer area on both sides of the Mart;nez canal, 5000 members of small-farmer organizations (UNC and HONDUPALMA) colonized the area in order to work in the plantations. An area of approximately 500 manzanas has been cleared, but the inhabitants have left the area because of flooding or storms.

The current western limit of the core area of the park coincides with the R;jo Ulfa, leaving outside of the park a large area of pristine wetland which is among the better conserved but is outside of the core area and, therefore, vulnerable to use by humans. As a result, this will lead to the destruction of its fauna and flora.

There are ecosystems of mangroves and lakes where the following species can be found: long-tailed otter (*Lontra longicaudis*), American manatee (*Trichechus manatus*), American crocodile (*Crocodylus acutus*), egret (*Egretta thula*), osprey (*Pandion haliaetus*), pelican (*Pelecanus occidentalis*) and royal tern. The mangroves of the lagoon are the best preserved of those along the Atlantic coast and grow to good heights. Birds are perhaps the most attractive group of

vertebrates and of greatest importance in the area. There are three species of trees in the mangrove: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*) and the white mangrove (*Laguncularia racemosa*).

In the area of the Punta Sal peninsula, the coral reef is between 1.5 and 5 miles offshore. It is the largest on the continental coast of Honduras. There are 51 recorded species of corals, of which 37 are stone corals and 14 are soft. There are 12 sponges, lobsters and at least 36 species of multicoloured fish, echinoderms (starfish and sea urchins) and annelids such as marine worms. All of this area is in the marine ecosystem. The reef is a subsystem that together with the marine depths has a high biodiversity of fauna. Some of these are currently endangered, such as several species of sea turtles, the mero and dolphins. Species such as the lobster (*Panulirus argus*), queen conch (*Strombus gigas*) and shrimp (*Penaeus* spp.) have been devastated by humans in the past few years. The intertidal zone in this same sector is also important because of its high productivity. In addition to a high diversity of aquatic animals, there are species of reptiles (lizards) and sea turtles, which visit the beaches to lay their eggs, including the hawksbill turtle (*Eretmochelys imbricata*).

In the southeastern part of the park, there is the mouth of the Río La Esperanza in the Laguna de Los Micos. In this area there are at least four ecosystems: herbaceous marsh, mangroves, lagoon and flooded woodland with a large number of species of fauna and flora such as crab (*Cardisoma* spp.), mapache (*Procyon lotor*), common black-hawk (*Buteogallus anthracinus*), Guatemalan howler (*Alouatta pigra*), tortuga jicotea (*Chrysemis ornata*), tortuga sambunango (*Chelidra sermpentina*), American stork (*Mycteria americana*) and the Muscovy duck (*Cairina moschata*). Among the flora are sangre (*Virola koschnyi*), María (*Calophyllum brasiliense*), varillo (*Symphonia globulifera*), zapatón (*Pachira aquatica*) and grape (*Coccoloba belizensis*).

In the southwestern part of the park, along the Martínez canal, there are four ecosystems: floodable woodlands, herbaceous marsh, primary forest and low ombrophile forest with a large number of species of fauna and flora: camaloe, cangrejo, cola de zorro, gavilan cangrejero, guamas, mapache, maria, pito, sangre, varillo, zapatón and tall vegetation (20 to 30 metres).

#### Recommendations

In the critical areas "a," "b," "c" and "d", management actions must be identified in the upper and middle parts of the basins that flow into the park in order to study and mitigate any negative impact on existing ecosystems, especially sedimentation and contamination by the use of chemicals and residues of oils from the processing plant at San Alejo. For area "a," there is a need to regulate fishing, in order to manage all related activities.

To delimit the boundaries of the park, especially the south "d," southwest "e" and west "f," markers should be installed at key points indicating the park limits and clearly showing the limits of the buffer area and the core park area. Area "b" should be marked with buoys. At the present, there are no limits marked for the park.

For the critical areas "d" and "e" it is recommended that management provide for classification as a use area. The following objectives and norms should be established.

Objectives: to permit the continued use of agroindustrial crops. It should be possible through environmental education to make the local population aware of the importance of protecting the ecosystems of these areas.

Norms: All activities will be permitted that contribute to the management of the plantations, except the extraction of forest products. No hunting will be

permitted in this area. It will be prohibited to discharge waste from harvesting or processing. In the case of the San Alejo palm oil processing plant, a plant for treating waste water should be installed. Agriculture will be permitted in areas already under cultivation, but will be prohibited in areas never cultivated or abandoned and with natural vegetation. No domestic animals or introduced species will be allowed. The use of fertilizers and pesticides should be submitted for approval by the government after study.

The current western border of the core area of Punta Sal borders on the Rıo Ulfa. It is proposed that the limit of the core area be extended up to the Rıo Chamelecın in the northwestern sector.

#### Justification

The proposed zone is a pristine wetland that, like Punta Sal, is the best conserved on the Atlantic coast. With the incorporation of this area, there will be communication with the wetland from Lake Alvarado at Puerto Cortes through a biological corridor.

Location of guard stations, justification for location and recommended development

a - Northeast, at the entrance to Tornab, (At the entrance to Tornab,, there is a movement of persons who sell products for sport fishing, commercial fishing, visits by tourists and shipment of wood.) Recommended development: development of ecotourism in the park's buffer zone; identification of sites suitable for low-impact ecology in the areas of intensive and special use in the core area.

b - North central, in the settlement of Miami (This is where fishing in the Laguna de Los Micos can be controlled at the point of a narrow and long canal and the mangrove and nesting of many birds and mammals.) Recommended development: promotion of interpretation and environmental education activities for visitors; extension of these activities to local inhabitants in the reserve, including teachers, school children, fishermen, farmers, housewives and others.

c - Northwest, at Rıo Chamelecın (This station can control fishing with illegal equipment, hunting and slash and burn of the forest.) Recommended development: construction of reception centres in the form of raised platforms, visitor centres, trails, observation towers, rest areas, trash collection, camping areas and latrines in order to avoid harming wildlife and the ecosystems. It is recommended that at least one cafeteria and a guesthouse be constructed. These installations could be managed by inhabitants living in the buffer area.

d - Northwest of the Punta Sal peninsula, at the bar of Rıo Tinto (This station can control fishing with traps or illegal equipment, hunting and slash and burn of the forest.) Recommended development: regulations for visitors to the park and sanctions for violation of the rules.

e - Northwest, at the bar of the Rıo Ulfa (This station can control fishing with traps at the mouth of the bar, hunting and slash and burn of the forest.) Recommended development: prohibition in the lakes, canals and rivers of the park of the use of boats running on petrol; encouragement of the use of electric motors that do not contaminate the water and that do not disturb the environment with noise.

f - East, at kilometre 4 of the El Progreso-Tela highway at the intersection of the highway to Proyecto Bahıa de Tela (This station can control the fishermen from Puerto Arturo and hunters from Puerto Arturo and Tela.) Recommended development: limitation of the velocity of boats to a maximum of 30 km/h in the coastal lagoons and canals in the park. Jet skis should be prohibited.

g - South, at the settlement of Mariçn (This station can control fishing, hunting and the cutting of the forest.) Recommended development: avoidance of the disturbance of threatened species, especially of aquatic birds reproducing, resting and nesting in the mangroves. A distance of at least 100 metres should be maintained for the boats with visitors.

h - Southwest, at the settlement of Meroa R;jo (This station can control hunting and the sale of wildlife, the most common activities in the area, and the cutting of the forest.) Recommended development: assignment of special places for the anchoring and boarding of boats in order to avoid a negative impact on wildlife and the local habitat, such as the spilling of petrol. In the Laguna de Los Micos, the settlement of Miami is recommended for this purpose.

i - Southwest, in the Crique Mart;nez canal (This station can control the slash and burn of the forest, hunting and the settlement of small farmers in the area.) Recommended development: installation of buoys for mooring tourist boats visiting parts of the reef in order to avoid the use of anchors.

#### Ecotourism studies

In the northwestern area of the Punta Sal peninsula within the core area is the Barra R;jo Tinto and, in the adjacent area, there are other ecosystems such as humid tropical forest, floodable plains, flooded woodlands, sandy beaches, sea and coral reefs.

North of the reserve inside the core area, there is Laguna del Diamante with an ecosystem of mangroves with mangle rojo (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), zapatçn (*Pachira aquatica*) and camalote (*Echinochloa polystachya*). Among the fauna are the manatee (*Trichechus manatus*), otter (*Lutra annectens*), white egret (*Egretta thula*), osprey (*Pandion haliaetus*), kingfisher (*Ceryle torquata*), white-faced capuchin (*Cebus capucinus*) and hawksbill turtle (*Eretmochelys imbricata*). The lagoon is especially important for the production of shrimp larvae.

In the northern section, there is the Punta Sal peninsula within the core area where it is possible to visit sites such as Bah;a Lefebre, Cocalito, El Bancçn and Jachinchin. This is the area where the coral reef is found; the largest on the coast of continental Honduras where there are several species of corals (hard and soft), sponges, lobsters, multicoloured fish, starfish, sea urchins and marine worms. The peninsula also serves as a sanctuary and nesting area for many species of birds, mammals and sea turtles.

In the southeastern part of the core area of the park is the Laguna de Los Micos where there are mangroves and woodlands with a large variety of species of birds and mammals that find a sanctuary and breeding area here.

The area of R;jo Tinto is of great ecological importance because of a series of adjoining ecosystems of humid forest, flooded savannas and riverine and intertidal areas. This area has great potential for ecotourism, given its wide range of habitat with characteristic species of fauna and flora. Many of the species are endangered such as the American manatee (*Trichechus manatus*), American crocodile (*Crocodylus acutus*), mantled howler (*Alouatta palliata*), jaguar (*Panthera onca*), tortuga jicotea (*Trachemys scripta*), loggerhead turtle (*Caretta caretta*) and hawksbill turtle (*Eretmochelys imbricata*) among others.

The Laguna del Diamante has a mangrove with three species of mangrove of ecological importance. It serves as a nesting area for migratory and resident birds, as well as mammals threatened with extinction: white-faced capuchin (*Cebus capucinus*) and Guatemalan howler (*Alouatta pigra*). This area is considered an important producer of shrimp larva of the genus *Paeneus*.

On the Punta Sal peninsula, there is a large number of ecosystems such as coral reefs, marine grasses, sandy beaches and rocks with a vast fauna and flora including corals, sponges, crustaceans such as the lobster (*Panulirus argus*), crabs (*Callinectes* spp.), shrimp (*Panaeus* spp.), molluscs, fish, hawksbill turtle (*Eretmochelys imbricata*), grey shark (*Caracharhinus* spp.), hammerhead shark (*Sphyrna* spp.), marine algae, dolphins (*Turciops truncatus* and *Stenella* spp.), manatee (*Trichechus manatus*), garrobo gris (*Ctenosaura similis*) and the common iguana (*Iguana iguana*).

In the Laguna de Los Micos there are several types of ecosystems such as mangrove, herbaceous marsh, lake and sandy beach that serve as a refuge and breeding area for many types of wildlife including *Egretta caerulea*, kingfisher (*Ceryle torquata*), Guatemalan howler (*Alouatta pigra*), white-faced capuchin (*Cebus capucinus*), tortuga jicotea (*Chrysemys ornata*), otter (*Lutra annectens*), osprey (*Pandion haliaetus*) and the Muscovy duck (*Cairina moschata*).

Tourist capacity of the trail around the Laguna de Los Micos

Physical capacity

length of the trail = 32,000 metres  
time required for a complete circuit = 6 hours  
size of the group that uses the trail = 10 persons  
length of group = 10 metres  
distance between groups = 2000 metres  
number of visits/day/visitor = 2

12 hours/day = 2 visits/day/visitor  
6 hours/day

Number of groups that use the trail at the same time =

$$\frac{32000 \text{ m} + 2000 \text{ m}}{2010 \text{ m}} = 17 \text{ groups}$$

number of metres required for 17 groups

$17 \text{ groups} \times 10 \text{ persons} \times 1 \text{ m/person} = 170 \text{ m}$

$CCF = 1 \text{ visitor/m} \times 170 \text{ m} \times 2 \text{ visits/day/visitor}$

$CCF = 340/\text{visits/day}$

Real capacity (CCR):

$$CCR = CCF \times \frac{100 - Fc1}{100} \times \frac{100 - Fc2}{100} \times \frac{100 - Fcn}{100}$$

Fc of precipitation: usually 190 of rain/year

6 hours of limiting rain/day

ML = hours of limiting rain per year

$ML = 190 \text{ days rain/year} \times 6 \text{ hours limiting rain/day} =$

$1140 \text{ hours limiting rain/year}$

MT = number of hours of limiting rain per year =

$190 \text{ days/rain/year} \times 24 \text{ hours} = 4560 \text{ hours/rain/year}$

Fc = Correction factor

ML = Limiting magnitude of the variable

MT = Total magnitude of the variable

Fcl = 1140 hours limiting rain/year x 100 = 25%

Fc = sunshine: 190 days of rain/year; 175 days without rain/year

ML1 = 175 days sunshine/year x 4 hours sunshine limiting/days = 700 hours  
sunshine limiting/year

ML2 = 190 days rain/year x 1 hour sunshine limiting/day = 190 hours sunshine  
limiting/year

ML = ML1 + ML2 = 890 hours sunshine/year

MT = hours of sunshine available

MT1 = 175 days dry season/year x 12 hours sunshine/day = 2100 hours  
sunshine/year

MT2 = 190 days rainy season/year x 6 hours sunshine/day = 1140 hours  
sunshine/year

MT = MT1 + MT2 = 3240 hours sunshine/year

Fcs = 890 hours sunshine limiting/year x 100  
3240 hours sunshine/year

Fcs = 27%

Fct = Temporary closure for maintenance

for 2 weeks every 3 months for 7 boats  
52 weeks/year

Fct = 8 weeks limiting/year x 100  
52 weeks/year

Fct = 15%

FCf = Correction factor for disturbance of fauna:

Fcf = 3 months limiting/year x 100 = 25%  
12 months/year

CCR = 340 x 100-25 x 100-27 x 100-15 x 100-25 =  
100 100 100 100

CCR = 340 x 0.75 x 0.73 x 0.85 x 0.75

CCR = 119 visits/day

CCE = Effective or permissible carrying capacity

CCE = CCR x CM =  
100

CCE = 119 x 15  
100

CCE = 17.85 visits/day

#### Identification of ethnic groups

The coastal area of the reserve has a special ethnic diversity. Negroes from the Caribbean, known in Honduras as garifunas, arrived from the islands of Guadalupe and Saint Vincent in 1792, expanding their settlements to Bajamar, Corozal, Miami, Río Tinto, San Juan, Tornab,, Travesia and Triunfo de la Cruz. Miami, Río Tinto, San Juan and Tornab, are north of the buffer zone. The communities of garifunas live by fishing and agriculture, primarily yucca (*Manihot esculenta*), sugar cane (*Saccharum officinarum*) and rice (*Oryza sativa*). These crops do not harm the natural resources of wildlife and flora.

The main ethnic-cultural group is the Spanish-speaking ladino located in the southern part of the buffer area, working in trade, subsistence agriculture, ranching and fishing. They represent about 85 per cent of the population in this area. The main ladino communities in the area influenced by the park are: Agua Chiquita, Barra de Ulfa, Buena Vista, El Ramal, El Tigre, Kilómetro 13, La Fortuna, Los Cerritos, Los Patos, Puerto Arturo and San Alejo.

#### Status of ecotourism and services

Tela: Located on the Atlantic coast, with a tropical climate, accessible by air, land and sea, Tela is visited by a large number of tourists, both domestic and international. Tela has approximately 20 km of beach where 5 communities of garifunas live; 3 of which are in the buffer area (Miami, San Juan and Tornab,). In these towns, there are restaurants, cafeterias and guest houses. The food offered to tourists is based on seafood and coconut (tapado, raysambeen, machuca). There is good access to these communities: a dirt road and a paved highway are being constructed under the Bahía de Tela project. Transportation is available in the form of buses, taxis or boats for hire.

During 1992, Tela received approximately 95,000 tourists and 100,000 in 1993. Twenty-five per cent of the tourists are foreigners. Tourists bath in the sea and the rivers, visit the lakes, the Punta Sal peninsula and the garifuna communities to take photographs and videos. A small number of groups come to study the wildlife and flora in the park. Tela has about 15 hotels with from 10 to 15 rooms, restaurants, telephone service and local transportation.

20. Land tenure/ownership of:

21. Current land use:

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

Slash and burn agriculture directly harms the environment in the upper and middle slopes of the cordillera and even in the forests on the lower slopes. Slash and burn is used to exploit forest products, extensive ranching, agroindustrial crops and subsistence agriculture. As a result, it produces bare soils, erosion and impoverishment of the soil, sedimentation, deterioration of water quality, a decrease and emigration of aquatic and terrestrial species as well as to loss of habitat and several species.

Another significant environmental impact is caused by illegal or commercial hunting by people living in the buffer zone and others from outside the area. As a result, there has been a decrease and extinction of several species of fauna such as the white-tailed deer (*Odocoileus virginianus*), white-hooded

capuchin (*Cebus capucinus*), manatee (*Trichechus manatus*), peccary (*Tayassu tajacu*), crested guan (*Penelope purpurascens*) and parrots (*Amazona* spp.).

Another significant environmental impact is caused by the use of chemicals, prohibited in some cases by the government but used in agricultural activities by independent producers and agroindustrial companies. These chemicals are washed away and deposited in the water, causing damage to the environment.

23. Conservation measures taken:

24. Conservation measures proposed but not yet implemented:

The three environmental impact studies found that no mitigation steps are being taken by the government. Nonetheless, the PROLANSATE Foundation and UNDP have been trying to protect the Punta Sal National Park through training programmes, awareness building, monitoring and small development projects for local communities.

In the garífuna communities of Río Tinto, San Juan and Tornab, there has been significant environmental impact owing to a lack of education programmes in their dialect and the use of customs incompatible with their traditions, causing them to lose some cultural traits. A significant impact in the garífuna communities is the occupation of land, through purchases, by ladinos with capital who have fenced the land, changing the traditional system of life for the community.

No mitigation steps have been proposed in the previous studies to solve the cultural problems caused by a gradual and steady loss of culture. Through the UNDP-sponsored project of cultural recovery, efforts are being made to make the garífuna community aware of not only the environment but also the importance of maintaining their cultural traditions.

25. Current scientific research and facilities:

26. Current conservation education:

27. Current recreation and tourism:

28. Jurisdiction:

29. Management authority:

30. Bibliographical references: