Information Sheet on Ramsar Wetlands

1. **Date this sheet was completed/updated:** 2 December 1996

2. **Country:** Peru

3. **Name of wetland:** Los Manglares de Tumbes

4. **Geographical coordinates:**

3°25'S
80°17'W

5. **Altitude:** sea level 6. **Area:** 2,972 hectares

7. **Overview:**

The Peruvian mangroves form one of the smallest and most fragile ecosystems and are found only in the extreme northwestern corner of the country, except for a small relic of mangrove at the mouth of the Rio Piura, some 358 kilometres south of the city of Tumbes. It is a vegetative community in which *Rhizophora mangle* and *Rhizophora harrisoni* dominate. These two species are characterized by their adaptation to variable salinity and flooding.

The Peruvian area of mangroves has been used for some time for a series of economic activities, namely, the exploitation of aquatic biological resources (shrimp, molluscs and fish), usually without planning for sustainable use. This has led to changes in the environment and a gradual decline of these resources. This mangrove covered approximately 6,000 hectares in 1982; it is now estimated that there are about 4,500 hectares.

In 1988, the Peruvian government declared 2,972 hectares of this area as a national sanctuary in order to protect the mangroves, the aquatic invertebrates of economic importance and the American crocodile, as well as to promote recreation and tourism. The current legal status of this area must be supported by strong measures for this area by the government and the community.

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:**

Dirección General de Areas Naturales Protegidas y Fauna Silvestre
Instituto Nacional de Recursos Naturales (INRENA)
Ministerio de Agricultura

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

The criteria of the Ramsar Convention for designation as a Ramsar site are (Davis, 1994):

1. Criterion of a representative or unique wetland

a) *is a particularly representative example of a natural or almost natural wetland characteristic of a specific biogeographical region*

Mangroves are found in Peru only in the section of the coast in the biogeographical province of equatorial dry forest (Udvardy system, 1975). The southern limit of the distribution of this ecosystem in the eastern Pacific Ocean is 3°30' to 3°40' latitude south; with the exception of a small mangrove of *Avicennia germinans*, 350 km farther south at the mouth of the Río Piura.

The reserve is an example of what was a more extensive mangrove of at least 10,500 hectares in the 1940s. At the present time there are approximately 6000 hectares of mangrove in Peru. It is a refuge for five species of mangrove: *Avicennia germinans, Conocarpus recta* (a small population), *Laguncularia racemosa, Rhizophora harrisonnii* and *Rhizophora mangle*.

b) *is a particularly representative example of a wetland that plays a biological or ecological role in the natural functioning of a coastal system*

A variety of invertebrates live in the reserve that depend on the mangrove to complete their life cycle (at least 60 per cent of the aquatic biological species in the department of Tumbes; one of the main source of income in the region). The trophic networks in the reserve are among the most complex of the whole Peruvian coast.

2. Criteria based on plants or animals

a) *sustains a community of rare, vulnerable or threatened species or subspecies of plants and animals*

The reserve is home to a large variety of molluscs, the most important species is the black conch (*Arca tuberosa*), because of its popularity in the diet of the local population.

13. **General location**:

This wetland is located in the extreme northwestern corner of Peru. For administrative purposes, it is in the region of Grau, department of Tumbes, province of Zarumilla, district of Zarumilla.

The cities and towns closest to the reserve are Tumbes (74,601 inhabitants) at a distance of 29 km; Zarumilla (13,430 inhabitants) at a distance of 6.7 km; Aguas Verdes (7,977 inhabitants) at 6 km (on the border with Ecuador); Puerto Pizarro (1,469 inhabitants) at 17 km and El Bendito (1,278 inhabitants) at 5.8 km from the reserve.

14. **Physical features**:

Geology and geomorphology: The area of the mangroves is located on continental deposits of the Quaternary (Pleistocene and Holocene) formed by poorly consolidated sand, clay, gravels, mud and fine sediments. There are the following stratigraphic formations:

Zarumilla formation: formed by a layer of sand, clay and gravel of marine origin, more than 100 metres deep that breaks the surface along the Rio Zarumilla.

Punta Malpelo formation: sediments of epicontinental origin formed by sand from the shore and muds from the swamps with interspaced layers of sand

and gravel deposited as the result of wind erosion. These deposits extend approximately 30 km under the sea and reach between 2 and 8 km inland.

The geomorphological development of the delta of the Río Tumbes, which influences the mangroves, is linked to three independent processes: tides, coastal currents and the transport of sediments by the river. The result increases or decreases depending on the conditions of each of the components.

Other relevant geomorphological activities in the reserve or the surrounding area:

Apparition and disappearance of islands in Puerto Pizarro bay and in the area between Punta Malpelo and Bocana del Alamo.

Continual formation of coastal spits such as the Isla del Amor, Isla Hueso de la Ballena, Playa Jelí and Los Tómbolos de Punta Malpelo.

Accelerated sedimentation of fine particles, clays and mud in the bay of Puerto Pizarro, making it less and less deep. The delta tends to advance, being the final stage of the disappearance of the bay.

Constant formation of swamps and mangroves on the landward edges of new coastal beaches.

Soils: Sand-mud profiles predominate in the mangrove soils. Although most of the soils have a neutral pH, depending on the presence of salts and organic material in decomposition, it is possible to find samples that are moderately or heavily alkaline or highly acidic.

Hydrology: The reserve is in the hydrographic basin of the Río Zarumilla on the Pacific watershed. This river begins in Ecuador. Its slope is moderate, and its flow is intermittent. Its average annual discharge is now about 21 million m^3, after having been about 74 million m^3 several years ago. The Río Zarumilla plays an important role in the water level of the swamps, and its action is determined in large part by rainfall.

Water quality: The ecological conditions of the tidal channels in the reserve are characterized by instability and frequent changes in chemical parameters, especially the water with variable salinity, which is classified as mixed saline. Concentration of chlorine and salinity increases toward the mouth of the river. Changing salinity gives rise to phenomena of stratification with a deeper layer of greater salinity underlying another less saline and of double circulation in superimposed layers or with vertical circulation called "cellular circulation." The water in the channels of the mangroves is usually alkaline, with a high concentration of phosphate, which is inversely proportional to the concentration of salinity. Another important characteristic of the channel is the abundance of organic material creating highly productive environments.

Physiography and topography: The reserve is uniform, almost flat, floodable, with a very gentle slope (between 1 and 5 per cent) between the ocean and the PanAmerican Highway. In the higher parts, there are slight undulations. Because of the effect of tides and the sediments carried by the Río Tumbes and to less extent by the Río Zarumilla land is gained from the sea by alluvial settling. This is crossed by branches of the rivers, which are considered to be swamps when they are subject to the action of the tide. These swamps do not follow a fixed pattern of orientation. Seaward of the mangroves, islands form, which were originally mud and sand banks. They can be colonized by mangrove vegetation, and over time they join with the continent or with larger islands or remain separate.

Climate: The extreme northern coast of Peru, where this reserve is found, is a semitropical climate with a rainfall of between 100 and 300 mm per year. The average annual temperature in the area is about 25°C, ranging between 18° and 32°C between winter and summer. Precipitation in this area is greatest along the coast, reaching between 1200 and 1800 mm at the head of the Río Zarumilla and, as already mentioned, between 150 and 300 mm on the coast between Tumbes and Zarumilla. The winds in this part of the coast are different from those on the rest of the Peruvian coast. The prevailing winds are from the north and northwest.

15. **Hydrological values**:

Apart from their importance for completing the biological cycle of more than 60 per cent of the aquatic biological resources on the Tumbes coast, mangroves fulfil an important function as a buffer for coastal erosion.

16. **Ecological features**:

Taking into consideration several studies, the area in the reserve can be placed in the following classifications:

Its latitude places it in the tropical region. Using the Ramsar Convention's classification system for wetlands, this is a type 9 coastal wetland of intertidal wooded wetlands. Using the criteria of the Conservation Data Centre (CDC-UNALM), this wetland is a tropical mangrove, also referred to as a Rhizophoretum. According to Udvardy's classification of biographical provinces (1975), the reserve is in the biographical province of equatorial dry forest, of which there are 2,535,000 hectares in Peru. In the National System of Government Protected Nature Areas, the equatorial dry forest biogeographical province occurs at five sites: Cerros de Amotape National Park, Laquipampa Reserve, Tumbes Reserve, El Angolo Hunting Reserve and the Manglares de Tumbes National Sanctuary for a total of 253,207 hectares. About ten per cent of the area in the province is protected.

According to Holdridge's classification of life zones, the tropical scrub forest (mte-T) covers all of Los Manglares de Tumbes National Sanctuary. This life zone is also represented in the Cerros de Amotape National Park, the Tumbes Reserve and the El Angolo Hunting Reserve.

This ecosystem is a halophilic formation with distinct layers (Ferreyra, 1979): a dense forest, closed with interlaced buttress roots formed by *Rhizophora mangle*, as the dominant species, associated with secondary elements such as *Avicennia germinans, Conocarpus erectus, Laguncularia racemosa* and *Rhizophora harrisoni.* Other species forming small communities in the mangrove are *Acacia macracantha, Prosopis chilensis* and *Scutia spicata*. Another layer is the short-lived grass that covers the ground, both around and inside the forest, formed by a holophytic grass mixed with creeping plants.

17. **Noteworthy flora**:

The community of mangroves in the reserve has perennial foliage with limited diversity, where species of mangrove dominate. Among these are *Rhizophora mangle*, commonly called *mangle,* is the species of greatest population. Other species of mangrove present in the reserve are *Conocarpus erectus*, *Laguncularia racemosa* and *Rhizophora harrisonnii* commonly called *jelí* and *Avicennia germinans*, called *mangle salado* or *jelí*.

The greatest diversity of species of flora is found in the associated vegetation of the grasslands, where it is possible to find up to 29 species of Gramineae and 8 species of Cyperaceae.

According to CDC-UNALM (1992), the reserve has 26 families of flora, 63 genera and 85 species. The most abundant families are Poaceae (14 genera, 29 species), Cyperaceae (4 genera, 8 species), Solanaceae (4 genera, 5 species) and Leguminosae and Boraginaceae (3 genera, 4 species each).

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Significant species of flora in the
National Sanctuary Los Manglares de Tumbes

Family	Scientific name	Common name

18. **Noteworthy fauna:**

The Tumbes mangroves have been the habitat of the American crocodile (*Crocodylus acutus*), whose distribution is limited to the extreme northern

Scientific name	Common name	Official	CDC category	CITES	IUCN	
Birds						
Pelecanus occidentalis	Pelican		VL2L3	-	-	
Larus dominicanus	*Gaviota dominicana*	V	L2L3	-	-	
Mammals						
Procyon cancrivorus	*Cabeza de mate*		R	L2L3	-	-
Lontra longicaudis	Long-tailed otter	E	L1L2	1	V	
Reptiles						
Crocodylus acutus	American crocodile	E	L1	1	E	
Chelonia mydas	Green turtle		V	L2L3	1	-

Figure 0 Wildlife threatened in Los Manglares de Tumbes National Sanctuary

part of the Peruvian coast in the department of Tumbes. This species is listed in Appendix I of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) and is considered to be a threatened species in the *IUCN Red List of Threatened Animals*. The government of Peru recognizes it as a species becoming extinct (Ministerial resolution 082-90-AG) and CDC-UNALM classifies it in Jerarquía N1 as a critical species because of its rarity.

Although the Tumbes crocodile has not been recorded in the past few years within the reserve, it has been observed in other swamps of the mangrove such as La Chepa (Sector Barranco Blanco), included in the proposal for the

expansion of the reserve and in Corrales, where it is still possible to find it, although rarely and in small numbers. Some of the shrimp workers have hunted this species, because it feeds in the shrimp ponds; although it is hunted only occasionally. It is quite possible that within a few years, given adequate protection measures, this species will again be found in the reserve.

Another important species in the reserve is the long-tailed otter (*Lontra longicaudis*), officially considered a species threatened with extinction. It is rarely found in this area. It is sometimes possible to find *perro conchero* or *cabeza de mate* (*Procyon cancrivorus*), a species officially considered rare in this area. The reserve is the host for a high number of migratory and resident birds, which rest on the islands or continent. Species such as wild ducks and *cushuri* feed on shrimp, forcing the shrimp extractors to drive them off.

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Official category

Ministerial resolution 1082-90-AG, passed in 1990, assigns official categories to conservation status, in accordance with the regulation entitled Conservation of Wild Flora and Fauna (D.S. 158-77-AG) of the Forestry and Wildlife Law. The following definition has been given to the categories.

E: Endangered species subject to immediate extinction and whose survival is impossible if present factors continue.

V: Vulnerable species, which because of excessive hunting, destruction of habitat and other factors are in danger of becoming an endangered species.

R: Rare species whose natural populations are scare, because of their endemic nature or other reasons and could become vulnerable.

I: Species with an unknown status, but thought to be in one of the previous categories, for which insufficient information is available.

The hunting, capture, transportation, sale and export is indefinitely prohibited for all species listed in the ministerial resolution, with the exception of cases related to scientific or cultural purposes and in agreement with the provisions of Decreto Supremo 158-77-AG.

Species of fauna found in the reserve

Birds

Habitat: Swamps and mangroves

Family Scientific name
Common name

Habitat:

Other species observed in the surrounding area, especially during the rainy season

Mammals

Reptiles

Crustaceans

Bivalve molluscs

19. **Social and cultural values**:

The reserve is extremely important for the local population, primarily because of its role in providing aquatic biological resources (shrimp larvae, black conchs, mangrove conchs and crabs). These resources sustain a large number of local inhabitants and related economic activities.

20. **Land tenure/ownership of**:

As part of the National System of Government-Protected Nature Areas, all of the reserve is the property of the government by law.

The neighbouring areas belong to

the Peruvian navy (500 hectares, granted by decree) and to several private companies raising and selling shrimp in fattening ponds with surfaces of between 5 and 10 hectares. Some of these ponds were previously covered with mangroves.

21. **Current land use:**

Around the reserve there are only shrimp ponds.

The principal human activities are trade and harvesting of aquatic biological resources (shrimp larvae, crabs, conchs, snails and fish).

Survey

a) Shrimp (area in hectares, 1992)

Area of active shrimp ponds		4331
Area of inactive shrimp ponds		2697
	Total	7028 hectares
Allocated area		10000 approximately
Area cleared		5000 approximately
Area in use		2000 approximately

b) Agriculture

Wooded scrub		1167
Scrub area in cultivation		1711
Cultivated fields		7148
	Total	10026 hectares

The inhabitants of these settlements live from the exploitation of aquatic biological resources.

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

There are plans to increase the reserve to include a sector at Puerto Pizarro (with the Isla de los Pájaros) and La Chepa swamp (thought to be a breeding area for the Tumbes crocodile). This addition would increase the reserve to an area of 4,025 hectares.

In 1982, a private company began to cut down the mangrove for the construction of shrimp ponds. Before then, mangroves were cut down only for opening channels. Cutting increased until 1987 and continued until 1989, in spite of the area having been declared a reserve.

It is agreed that the most serious current and potential threats are the following:

1. Harvesting of aquatic biological resources. The exploitation of molluscs and crustaceans in the mangrove, plus the extraction of shrimp larvae, uses a method for selecting shrimp larvae that leaves all other larvae in the sand. This is harmful to the reproduction of other species, breaking their natural cycle. This problem is of great concern because this activity extends along practically the whole coast of the department of Tumbes and the swamps.

2. Contamination from mining activities using mercury carried out upstream in the Río Zarumilla and from the accumulation of agrochemicals from nearby farms and from upstream in the same river.

3. Cutting of mangrove branches for use as supports for shrimp feeders. In addition, these poles are used for hanging nets for catching shrimp larva. The mangrove poles have the advantage of resisting salt water, which is not the case of poles made from other species.

23. **Conservation measures taken:**

Legal status: Los Manglares de Tumbes National Sanctuary was declared by decree 019-88-AG of 7 March 1988 with an area of 2,972 hectares. In the classification of the World Conservation Union (IUCN), this reserve is a Category IV Wildlife sanctuary.

Management category: Peruvian legislation provides that national sanctuaries like this reserve are areas for the protection in its natural state of specific species or communities of wild fauna and flora, as well as being areas of scientific or scenic interest.

Management practices: Before declaration as a national sanctuary, the surface of the mangrove decreased constantly owing to the cutting of the forest for the construction of ponds for breeding and raising shrimp.

In light of the importance of this ecosystem for the local population and in the search of alternatives for its conservation, the Conservation Data Centre of the Universidad Nacional Agraria La Molina presented in 1986 a proposal to the World Wildlife Fund for Nature (WWF) to draft a conservation strategy for the mangroves in northwestern Peru. This document was the basis two years later for establishing the national sanctuary. In 1988, WWF, in an agreement with the Ministry of Agriculture and the NGO Pro Naturaleza (Peruvian Foundation for the Conservation of Nature), supported several projects to consolidate the reserve, paying salaries of the area co-ordinator and purchasing equipment. After 1991, WWF's support increased to an annual assistance between 1991 and 1993 of $US 60,000.

In the first few years, the physical presence of control in the mangrove was limited to a co-ordinator and a park ranger, working in contact with the navy and police monitoring this part of the Peruvian border. Until the end of 1995, the staff of the reserve was a director, two park rangers and a secretary. At the beginning of 1996, through a bilateral programme sponsored by the Netherlands (see topic 24), the number of park rangers increased to four. The equipment and infrastructure of the reserve is now two boats, only one of which is operative, an administrative centre in El Algarrobo, a radio, a generator and three motorcycles. Most of the equipment was purchased with the support of WWF.

The following activities have been carried out in the reserve.

In 1989, Pro Naturaleza, then called FPCN, began working with the Cooperativa Agraria Los Maderos in order to introduce management techniques for dry forests to ensure their sustainability. This co-operative, located near the reserve, was chosen because of its strategic location and because the forests form a buffer for the reserve.

The administration of the reserve has also carried out activities with the users of local aquatic biological resources, seeking recognition from the

local authorities and their support. They have carried out a survey of the businesses.

Forestation trials using *Rhizophora mangle* has been carried out in parts of the reserve and nearby. The trials are usually held in ponds formerly used for shrimp.

Increasing, there are measures to make the local public aware of the importance of the reserve. For example, a campaign is being carried out to discourage exploitation of larvae in the reserve. There are currently several NGOs working in the Tumbes reserve: Pro Naturaleza (regional office), Asociación Conservación Ecológica Tumbes Silvestre (ACETUS), Pronaturaleza, Asociación de Alberguistas, Perú Joven and Grupo Ecológico-Cultural "Tumpis." Through their efforts and the work of the Región Agraria, it was possible to avoid human settlement ("Puerto Peru" in the Zarumilla swamp) in Aguas Verdes on the edge of the reserve.

24. **Conservation measures proposed but not yet implemented:**

At the beginning of 1996, an important project began for strengthening the management of the reserve under the project "Manejo y Uso Integral de los Manglares de la Costa Noroeste del Perú." This project is financed from assistance provided by the Netherlands through an agreement with the Instituto Nacional de Recursos Naturales (INRENA) and Pro Naturaleza (Fundación Peruana para la Conservación de la Naturaleza). This project, scheduled initially for five years, will provide approximately $US 900,000 annually to the reserve for the development of measures such as:

Division of the reserve into sectors, providing strict protection for the core area. Improvements will be made to the infrastructure of the El Algarrobo guard station, and another station will be constructed above flood level, as close as possible to the mangroves.

Political negotiations for expanding the reserve. Once this is done, the reserve's attractions will be improved.

Construction of a dock for boats in the reserve near the El Agarrobo control station.

Additional forestation with *Avicennia germinans* and *Rhizophora mangle*.

Transformation of the control station into an interpretation centre.

Drafting of biannual operational plans.

Continuation of the physical and legal improvement of the reserve.

Hiring of new staff.

In addition, FONDEPEZ (Fondo Nacional de Desarrollo Pesquero) is organizing a project for the conservation of crocodiles near Tumbes. The office of the president together with the department for the environment of the Ministry for Fisheries intends to forest 500 hectares of mangrove with the support of the Swedish government.

According to the management of the reserve, the following urgent measure should be taken:

Cessation of the cutting down of the mangroves.

Constant monitoring to avoid additional ponds.

Education and environmental awareness programmes with local officials and the shrimp companies.

Promotion of studies by the businesses in order to ensure efficient management of existing shrimp ponds.

Monitoring of artificial drains.

Study and proposal of measures for reducing sedimentation in the Zarumilla swamp.

Rehabilitation of mangroves in adjoining areas. (It is estimated that reforestation of 6000 hectares is required.)

25. **Current scientific research and facilities**:

Some of the research completed or under way by the Universidad Nacional de Tumbes in the mangrove area are:

Pilot trials of planting of mangrove propagules (1983-1984)

Promotion of the planting of mangrove cuttings with phyto growth regulators

Study of the distribution of black conch and crab (*Ucides* spp.)

Reforestation of mangroves to recover invertebrate fauna

Reintroduction of the alga Gracillaria (macrophyte alga)

Study of the Texas (or Taura) syndrome, which causes a viral infection in shrimp

Identification and trials of the edibility of the sea urchin

Study of the distribution of gastropods in the mangrove

Studies of insects in the mangrove, financed by the Netherlands

Study of the efficiency of the "protecting cone" for the extraction of larvae. This is a screen, which separates the larger marine fauna, used in trials in Ecuador. This cone avoids manipulation of the larvae.

Studies of the post-larval stage of shrimp near the mangrove

Study of species other than shrimp taken when harvesting shrimp, to learn which commercial species are being lost as a consequence of the selection of larvae along the shore

The Fisheries Department of the University of Tumbes has a small laboratory and breeding facility to raise fish, shrimp (indigenous and introduced) and algae in ponds 2-3 m^3. One of the limiting factors for continued research is financing. The Fisheries Department is currently attempting to obtain financing for research.

Other universities have carried out studies in the mangrove. This is the case of the Universidad Nacional Agraria La Molina, where Dr Mario Peña studied gastropods at Puerto Pizarro.

26. **Current conservation education:**

The city of Tumbes has a plan for reaching the local population with conservation education. The NGO Asociación de Conservación Ecológica Tumbes Silvestre (ACETUS) and Perú Joven are active in environmental education with professors in Tumbes and Conservacion y Desarrollo with PROFONANPE.

27. **Current recreation and tourism:**

The best season for tourism in the mangroves is between July and December, although visits are possible throughout the year. Between December and March, rains make visits difficult. In Puerto Pizarro, near the reserve, there is a small hotel. There are pans to construct a breakwater in front of the area of mangroves. There is no organized service for visiting the reserve in boats. Some fishermen offer their boats for visits to the neighbouring mangroves to Puerto Pizarro, without entering the reserve. There is an informal group in Puerto Pizarro that offers transportation to tourists, but they have no training. They are haphazard and give poor service to the tourists.

The prospects of efficient service for tourists visiting the reserve are limited by the following factors:

the area of the reserve is small, with a limited capacity for receiving a large number of tourists

the reserve is on the border with the permanent presence of armed troops to control and monitor the border

the reserve is very close to a naval base, requiring the identification of visitors

28. **Jurisdiction:**

Politically, the reserve is situated in the Grau region, subregion of Tumbes, province of Zarumilla, district of Zarumilla. For the Ministry for Agriculture, the reserve is located in the Subregión Agraria Tumbes, in the Agencia Agraria Zarumilla.

The reserve is part of the National System of Government-Protected Nature Areas (SINANPE), under the administration of the Dirección General de Areas Protegidas y Fauna Silvestre (DGAPFS), of the Instituto Nacional de Recursos Naturales (INRENA), an agency of the Ministry for Agriculture.

29. **Management authority:**

Dirección General de Areas Naturales Protegidas y Fauna Silvestre
Instituto Nacional de Recursos Naturales - INRENA
Ministry of Agriculture
Lima

30. **Bibliographical references:**