

## Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: 17 September 2002
2. Country: Cuba
3. Name of wetland: Ciénaga de Lanier and the southern part of Isla de la Juventud
4. Geographical coordinates:  
  
21° 30' – 21° 42' North latitude  
82° 36' – 83° 00' West longitude
5. Altitude: From minus six metres in the marine part to 40 metres on Cerro Caudal inland with an average altitude of 3 metres above sea level.
6. Area: A total of 126,200 hectares of which 88,160 hectares are terrestrial and 38,040 hectares marine
7. Overview:

This wetland is located south of the western region of Cuba in the Canareos Archipelago, specifically on the southern part of Isla de la Juventud. It is made up of the Ciénaga de Lanier, which crosses the centre of the island in a west–east–northeast direction. It runs from the bay of Sigüanea to the eastern mouth of the San Juan River forming a natural geographical barrier that divides the northern part of the island from the karst plain in the south, including nearby marine areas. There are several biotopes, especially the semi-deciduous forest, lagoon reefs, beds of marine grasses, mangroves and swamp grasslands, among others. They are habitat to a wide diversity of fauna and flora in good conservation status, in addition to containing traces of pre-Columbian cultures that lived here. This entire region is considered a protected area of managed resources (IUCN category VI) containing several proposed nucleus areas with the most representative elements of the marine and terrestrial fauna and flora of the wetland. There are several endemic species, listed in protected categories. Although current economic assimilation is very low, it is hoped that with the growth of tourism economic activity will increase in the future.

8. Wetland type:

Marine-coastal: B, C, D, E, G, H, I and J

Continental: N, O, R, Sp, Ss, Ts, U, Xf and Zk

Artificial: 2, 7 and 9

Types of wetlands by decreasing order of importance: C, I, J, E, H, B, D and G and O, R, Sp, Ts, Ss, U, Zk, Xf and N

9. Ramsar criteria: 1, 2, 3, 4, 7 and 8

Criteria that best characterize the site: 1

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

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

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

Criterion 1: The karst plain in the southern part of Isla de la Juventud and the surrounding sea form a mosaic of ecosystems of local, national and regional importance in the Caribbean as a consequence of its biodiversity, landscapes and economic and socio-cultural values that convert it into one of the outstanding sites in the Caribbean. The southern part of the island is a karst plain, through which underground drainage occurs that empties into the sea in the south. There are no surface currents, given that all rivers empty north of Ciénaga de Lanier, which is the point of discharge of underground and surface water from the north. Ciénaga de Lanier is the source for recharging the karst plain in the south. This is the largest natural freshwater reserve in the Canareos Archipelago. These characteristics result in its coasts being washed by transparent water that promotes development of coral formations. Semi-deciduous forest over limestone is the dominant plant formation in this area, which together with the plant associations of the beaches, rocky coasts, mangroves and swamp vegetation confirm good conservation status, forming the largest forested area in the Cuban archipelago.

Most of the bottoms of the submerged beaches are located within coral lagoons, delimited by wide and long coral barriers located between 500 and 1000 metres from the coastline. The bottoms are homogenous and smooth slopes at between two and

three metres in depth, dominated by formations of marine grasses, large sand banks and isolated coral heads.

Criterion 2: At this site, there are several species in various categories of vulnerability according to the IUCN Red List: the green turtle (*Chelonia mydas*), loggerhead (*Caguama*) (*Caretta caretta*) and the American crocodile (*Crocodylus acutus*). The American manatee (*Trichechus manatus*), a species considered vulnerable, is frequently observed along the coasts.

Criterion 3: The genetic diversity of the wetland is expressed through the composition of its fauna and flora. The flora is represented by 556 species of higher plants and 13 species of fern. Approximately 105 species are endemic, of which three are limited to this area. The fauna is also important because of its diversity and the degree of endemism of several groups, such as terrestrial molluscs of which there are at least 23 forms with two endemic forms specific to this place. Birds are well represented by 52 species of scientific, biological and aesthetic importance and for hunting. The bird species are classified as local resident, and 15 of them are considered endemic. Twenty species of reptiles have been recorded including six endemic subspecies. Mammals are represented by three forms of Rodentia and Caviomorpha: two endemic subspecies and a local species.

Surveys show that the lagoons of Ciénaga de Lanier and the swamp and semi-deciduous forested areas surrounding them regularly sustain 57 species of birds grouped in 13 orders, with the most frequent orders being Passeriformes (song birds) (41 per cent), Ciconiiformes (heron) (12 per cent) and Columbiformes (pigeons) (8 per cent). About 67.3 per cent of the species are resident, 14.6 per cent are bimodal and 18.2 per cent are migratory. In addition, there are four endemic genera (six endemic species and 14 subspecies), representing 43.6 per cent of all endemic species. In these habitats, we can find species such as the black-billed wood-duck (*yaguaza*) (*Dendrocygna arborea*), *garza azul* (*Egretta caerulea*), great white egret (*garzón*) (*Casmerodius albus*), *canario de manglar* (*Dendroica petechia*), *mayito de ciénaga* (*Agelaius assimilis*), *señorita de manglar* (*Seiurus noveboracensis*) and *coco blanco* (*Eudocimus albus*). In addition, several species of migratory ducks that visit the area during the winter (October–March) have been recorded in the coastal lagoons.

Criterion 4: This region is an important nesting site for several species of fauna, such as the *paloma cabeciblanca* (*Columba leucocephala*), which nests in the forests and mangroves. Sea turtles, namely the green turtle (*Chelonia mydas*) and the loggerhead (*Caretta caretta*), lay their eggs on the beaches and the American crocodile (*Crocodylus acutus*) is abundant here. This wetland provides habitat for the life cycles of several endemic species, such as the Cuban crocodile (*Crocodylus rhombifer*) and the *manjuarí* (*Atractosteus tristoechus*). Mangroves and marine grasses form important areas for the growth of juveniles of several species of fish and crustaceans of economic and ecological interest.

Criterion 7: The marine ecosystems are characterized by their abundance and diversity of fauna. The estimated marine fauna exceeds 1500 species of fish, corals (more than 45 species), *antipatarias*, sea fans, sponges, crustaceans, sea turtles, molluscs and sea worms (31 species just at Punta del Este). The vegetation that

dominates the sandbanks is *Thalassia testudinum*, in addition to several species of alga. Among the freshwater vertebrates, the *manjuarí* (*Atractosteus tristoechus*) (Lepidosteidae) stands out. It plays an important ecological role and is restricted to the Lanier and Zapata swamps. Other species of freshwater fish also endemic to Cuba found in this area are the *Cichlasoma tetracantha*, *Cubanichthys cubensis*, *Gambusia punctata* and *G. punctulata* (Alayón, 1973).

Criterion 8: This region is significantly important because large populations of juvenile saltwater fish develop here because of the existence of large areas of coastal lowlands, inland lagoons and mangroves, providing considerable diversity of habitat. Coral lagoons and emergent reefs all along the coast form a complex of landscapes where important communities of fish, coelenterates and other marine species carry out their life cycle or an important part, above all, in the larval phase. Crustaceans are abundant, especially the land crab (*cangrejo de tierra*) (*Cardisoma guanhumí*), which lays its eggs in the coastal mangroves.

### 13. General location:

This site is located in the southern part of the western region of Cuba in the Canareos Archipelago on Isla de la Juventud; the second largest island in the Cuban Archipelago with 2199 square kilometres. Its capital is Nueva Gerona (30,000 inhabitants). The nearby population centres are Santa Fé with 12,000 inhabitants at 18 kilometres, Mella with 800 inhabitants at 8 kilometres and La Reforma with 1000 inhabitants at 3 kilometres. The centres of population within the area are Cocodrilo with 300 inhabitants and Cayo Piedras with 20 inhabitants.

### 14. Physical features:

Geology and geomorphology: This wetland is formed by a Quaternary depression (Ciénaga de Lanier) and a Miocene karst plain in the southern part of the island. Paludal sediments and marshes accumulate in this depression, mostly bogs and clays from the Holocene (upper or recent Quaternary) with relict schist. The Jurassic metamorphic rocks in the north lie at an average depth of 24 metres, as shown by borings made in the area. Geologically, the swamp is located in a discordance between the Jurassic and Quaternary systems. Borings have identified an upper layer of sand-clay soil of variable depth, then broken limestone, karsified with cavities. At an average depth of 24 metres, we find schist of various composition, quartzite or marble, all metamorphic rocks from the north.

Geomorphologically this is a paleo-valley 1–1.5 metres in depth where marsh sediments are deposited. Its average topographic variation is 2.5 metres. In other words, the relief is completely flat, specific to these ecosystems. The karst plain (El Sur) is geologically recent (Neogene-Quaternary, between the Upper Pliocene and the Holocene), formed by the Punta del Este marine limestone formation, fossiliferous *calcarenita* marl, Cayo Piedra formation, eolitic *biocalcarenita* Cocodrilo formation, *calcarenita* and detrital limestone from the Jaimanita formation and by unconsolidated Holocene deposits, according to studies made by Franco and De la Torre (1980).

The altitude of the relief ranges between three and nine metres above sea level, highest at Punta Seboruco Alto, where there are the rests of an old terrace 10 to 16 metres in height and the only elevation, Cerro Caudal, which is 40 metres in height and a residual Mendip witness (Franco, 1988, personal communication).

Origin: In the case of Ciénaga de Lanier, its natural origin is associated with a fault and tectonic phenomena that produced this subsidence. This structure facilitates the deposit of sediments. The geomorphology of the southern coastal plain originated in young carbonate deposits from the Pleistocene and probably early Pleistocene over several generations, deposited over old metamorphic formations.

Hydrology: The hydrology of this wetland has not been completely studied. Numerous canals, dikes and ponds constructed in the northern part make further study and determination of the seasonal water balance difficult. The most important sources of surface water that discharge into Ciénaga de Lanier are the Las Jaguas, Las Tunas, San Miguel, San Pedro and Santiago rivers. In field visits, it has been established that the first three rivers do not feed the swamp during the dry season because Las Jaguas and Santiago rivers have dikes that prevent the passage of water to the swamp in that season and San Miguel River does not have runoff in that season. Also, the canals mentioned take water from the swamp for irrigation of pastures. Calculations have determined that the volume of total average runoff to the swamp for several hypothetical cases is  $Q_{25\%} = 1.77$  cubic metres/second;  $Q_{75\%} = 0.77$  cubic metres/second; and  $Q_m = 1.36$  cubic metres/second. The contribution of ground water is important because recent studies confirm that the southern part of the northern metamorphic range discharges water into this wetland.

The hydrography of the southern karst plain is characterized by the absence of surface rivers, and there is almost no surface runoff. Underground drainage is through a dense karst network formed by sinks and hollows. There are inland freshwater, brackish and almost-brackish lagoons (karst windows), which sometimes communicate with the sea through a dense karst network. The underground water table is insignificant and unstable in supply of fresh water. Also, seasonal freshwater springs are frequent in the sea emerging through underwater caverns at several places on the coast: at Carapachibey, La Siguanea and Punta del Este.

Water quality: Physical and chemical characteristics: Ground water quality is sampled at several points (borings) existing for the systematic observation of the water regimen and used by the hydrological service throughout the area. The calculation of the average values of the water-chemical relationship shows that there is no notable difference between the chemical composition of water in April (the end of the dry season) and November (the end of the rainy season). Water quality is good and is classified as bicarbonate calcium in the whole area but at specific places and on isolated occasions becoming bicarbonate sodium as reflected by the average values presented in the following table.

Month	Chemical Data		
	C <sub>e</sub>	Cl <sup>-</sup>	TSS
April	769	142	497
November	737	145	470
Average	753	144	484

Depth, fluctuations in level and permanence of water: Bathymetric studies show that this wetland has an average depth of one metre, and in sections, it was found that fluctuations in level are small and correspond to the hydrological periods already mentioned of drought and rain. There is never a large decrease in the water in this wetland. Permanence of water in this natural reservoir is a proven fact.

Watershed and runoff basin: As stated earlier, the basins that drain into the swamp are La Daguilla, Las Jaguas, La Reforma and Las Tunas hydro-geological basins. On the surface, runoff is discharged from the north towards the east.

Climate: Climate is characterized by fluctuations in temperature between 22.4° and 28.7° C. Annual precipitation is between 590 and 1056 millimetres and the prevailing wind is from the east with an average velocity of 9.4 kilometres/hour. Given its location in southern Cuba on Isla de la Juventud, this area has specific characteristics with regard to climate, namely the little influence exercised by winter cold fronts over it and the marked influence of wind from the south in the spring, creating an unstable sea and high water turbulence.

Year-round average daylight is eight hours, which is a high for Cuba. Maximum insolation is from 10 am until 4 pm, when it decreases considerably. Relative general humidity is about 80 per cent.

Tidal regime: The average duration of high tide and low tide is 9 hours, 48 minutes. Average amplitude of the tide during syzygy is 25 centimetres. Average range of the tide during quadrature is 12 centimetres and average range is 21 centimetres. Extreme oscillation is 96 centimetres, with a theoretical minimum of minus 23 centimetres below the average sea level.

#### 15. Hydrological values:

This wetland forms an important hydrological system because the swamp is the point of discharge of underground and surface water from the north. At the same time, it acts as a point of discharge of the karst plain in the south during the rainy season, flooding a large part of the karst plain which in turn filters sediments by discharging them to the coastal area, thus preventing mobilization of sediments towards the coral barriers.

#### 16. Ecological features:

The main habitats are the following:

Coastal lagoons: They are usually shallow (0.2 to 2 metres) with varying degrees of exchange with the sea depending on the range of tides. Their connexion with the sea is through channels. Most have a large supply of water, sediments and organic material from inland, which influence their large biological productivity. These are the main areas of reproduction and growth of numerous species of invertebrates, and they provide refuge and food to aquatic bird life and habitat for species of high ecological value.

**Mangroves:** Mangroves are forests of mangrove that grow on low muddy coasts in partially or completely flooded swamp soils. There are physiognomic varieties, either mono-dominant or mixed, found from high to stunted and in some cases associated with halophyte communities. They create a dense network of ecotones that makes for a very rich ecological relationship. Generally, these are formed by the association of the four species found in Cuba: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*patabán*) (*Laguncularia racemosa*) and buttonwood (*yana*) (*Conocarpus erectus*), which grow in this order from the sea inland. They form a special substratum for the habitat of numerous invertebrates and supply a large amount of energy to the aquatic ecosystem through their leaves, branches and roots, which form part of the detritus accumulated in the sediments. Their roots serve as refuge for the juvenile stages of commercial species and species of scientific interest. In recent studies, it was found that birds are the most important fauna in this biotype.

**Poorly drained forests:** These are distributed in the areas of shallow water on the seasonally flooded plains, in areas with hydromorphic soils and with underground water very close to the surface. They are associated with the area of transition between the well-drained and the flooded areas. In the arboreal stratum, *júcaros* (*Bucida* sp.), *palma cana* (*Sabal parviflora*) and buttonwood (*yana*) (*Conocarpus erectus*) dominate.

**Island lagoons:** These are more than one kilometre from the land; associated basically with karst depressions and tectonic karsts. They are deeper than the coastal, freshwater lagoons, with a permanent or seasonal regime dependent on water supply, which in turn depends on rainfall or underground water. They form sites of refuge and feeding for invertebrates, fish and birds, which make greatest use of these resources.

**Grassland bogs:** These are areas of very low plains (accumulative, paludal, marsh) and depressions of diverse origin, with peat deposits and deep marl peat, with dominance of swamp grassland over hydromorphic soils. They are sites of special interest for conservation of species of aquatic birds because of their variety and abundance.

**Bogs with shrubs:** These are areas of low accumulative paludal and marsh plains and depressions of various origins with hydromorphic peat and deep marl peat soils, usually in better-drained areas and covered with shrub and matorral plant species. In many cases, they correspond to areas of white mangrove and buttonwood.

**Semi-deciduous forest:** This is the best-represented plant formation, growing on poor schist soils of porous stone, formed by brown and black tropical rendzinas, which contain the highest indexes of biodiversity in the area. This plant formation is of great interest for conservation of bird life because of the abundance and diversity of bird species found there.

#### 17. Noteworthy flora:

Throughout this wetland, there is the following variety in types of vegetation present:

(a) Swamp forest: This area acts as a strip between the swamp grassland and the semi-deciduous forest, in which several elements of both formations appear, such as *jagüey* (*Ficus* sp.) and *palma real* (*Roystonea regia*), as well as Cyperaceae in the grassland. Dominant species are the *júcaros* (*Bucida* sp.), epiphytes such as orchids (*Encyilia* sp.) and Bromeliaceae (*Tillandsia* sp.), thorny lianas and ferns (*Nephrolepis* sp.). The soil is mostly peat in which buttonwood, *palma cana*, *bagá* (*Annona glabra*), *roble* (*Tabebuia* sp.) and *hicaco* (*Chrysobalanus icaco*) grow.

(b) Swamp grassland: This has a herbaceous stratum with *cortadera* (*Cladium jamaicense*), *macío* (*Thypha dominguensis*), *Cyperus* sp. and carnivores in the genus *Utricularia*, which vary in height from 50 centimetres to more than 1.50 metres in some places; all in muddy soil. There are small cays with inland swamp forests with dominance of *bagá*, *hicaco* and *júcaro*, and bordering the grassland *júcaro espinoso* (*Bucida angustifolia*) and abundant epiphytes appear.

(c) Mangroves: Usually made up of a stratum 10 metres in height of a mixture of black mangrove as the dominant species, white mangrove, buttonwood and red mangrove.

(d) Semi-deciduous forest: The presence of two arboreal strata is characteristic of these forests. The upper formed by deciduous trees and the lower by evergreen sclerophyllous vegetation. It is emergent, but only very occasionally. There is an abundance of shrubs and lianas. Epiphytes are very scarce in this case. There are sometimes xerophytic, thorny species and succulents. There are four types of semi-deciduous forest in the region.

(e) High semi-deciduous mesophylla forest: There are several emergent species 16–18 metres in height (sometimes greater). The dominant arboreal stratum grows to 12–14 metres, and the dominated stratum grows to 6–8 metres. The shrub stratum of 0.5–1.5 metres in height is sparse, and the herbaceous stratum grows to 0.3 metres.

(f) Medium semi-deciduous mesophylla forest: The arboreal stratum reaches 10–12 (14) metres in height. The shrub stratum is relatively dense and 1–2 (3) metres in height, and the herbaceous stratum is up to 0.5 metres in height.

(g) Semi-deciduous mesophylla forest: The arboreal stratum reaches 6–8 metres in height, the shrub stratum is dense, of 4–6 metres, and the herbaceous stratum is open, up to 0.3 metres in height.

(h) Semi-deciduous microphylla forest: The arboreal stratum reaches 8–10 metres in height. The shrub stratum is dense, between 1–2 metres high, and the herbaceous stratum is sparse, up to 0.3 (0.5) metres in height. In this type of forest, microphylla have the greatest number of species. The legumes have the greatest proportion of species.

(i) Low matorral: Formed by shrubs and small trees, mostly deciduous, sclerophyllous, microphylla and thorny elements (very few). They are found mostly on coastal limestone. The upper stratum reaches 2–3 metres in height, and the herbaceous stratum is open, less than 0.3 metres in height.



(j) Rocky coastal vegetation: This is located on the southern coast and is formed by rupicolous vegetation of low halophyte matorral, sometimes very dense.

(k) Areas of sea grape: Mono dominant forest or matorral of sandy coasts, formed by a single evergreen stratum, poor in species. This is found on narrow discontinuous strips, and the dominant species is *Coccoloba uvifera*. Next to the area of sea grape are strips of vegetation with dominance of the species *Bursera simaruba* and *Thrinax radiata*.

(l) Vegetation of the sandy beaches: This is located on the southern coast and is formed by herbaceous suffrutescent vegetation.

(m) Submerged vegetation: Submerged vegetation is located in parts of the coral lagoons on the southern coast of the island and is formed in this area basically by macro algae of which the most important are Caulerpales, Corallinales, Dictyotales and Fucales, in the areas in the north of the Carapachibey Peninsula in the Ensenada de la Siguanea, and to the east of the wetland, where the water is shallower and where Spermatophyta and macro algae dominate: the so-called *seibadales* where *Thalassia* and *Syringodium* dominate.

(n) As the result of human activity, there are invasive plants such as *marabú* (*Dicrostachi glomerata*) and *casuarina* (*Casuarina esquistifolia*), which are the most dominant.

## 18. Outstanding fauna

Among the birds, there are several species endemic to Cuba, several of which are subspecies endemic to Isla de la Juventud. The most frequent are the *cartacuba* (*Todus multicolor*), *carpintero verde* (*Xiphidiopicus percussus* ssp.), *tocororo* (*Priotelus temnurus* ssp.), *chillina* (*Teretistris fernandinae*), *cotorra* (*Amazona leucocephala leucocephala*), *candelita* (*Setophaga ruticilla*), *paloma cabeciblanca* (*Columba leucocephala*), *caretica* (*Geothlypis triches*), *coco blanco* (*Eudocimus albus*), *cagaleche* (*Butorides virescens*), *garza azul* (*Egretta caerulea*) and *garza de vientre blanco* (*Egretta tricolor*).

Among the reptiles, there are three species of crocodiles found on the island, the Cuban crocodile (*Crocodylus rhombifer*), endemic to Cuba and restricted to Ciénaga de Zapata and Ciénaga de Lanier; the (*babilla*) (*Caiman crocodilus fuscus*), an introduced species, and the American crocodile (*Crocodylus acutus*), indigenous, (all with a certain degree of threat of extinction and listed in the CITES Appendices), Cuban boa (*majá de Santamaría*) (*Epicrates angulifer*), endemic to Cuba and endangered, the ground iguana (*Cyclura nubila nubila*) and the *jicotea* (*Pseudomis decusata*), plus other species of Annelida.

Among the mammals are the *jutía conga* (*Capromys pilorides relictus* and *C. pilorides ciprianoi*), subspecies endemic to Cuba, and the *jutía carabalí* (*Mysateles meridionales*), a species endemic to Isla de la Juventud. For obvious reasons, several species have been introduced in the area long ago, such as the common cow (*Bus taurus*), the white-tailed deer (*Odocoileus virginianus*), the pig (*Sus scrofa*), cats

(*Felix catus*) among those associated with human activity.

#### 19. Social and cultural values:

This region has historically had a low level of economic assimilation. Currently, there is a town, Cocodrilo, of 300 inhabitants, which owes its origin to the migration of persons from Grand Caiman Island at the beginning of the twentieth century. This town now has basic services. The activity of the local inhabitants has always been forestry and fishing.

**Forestry:** From the point of view of forest exploitation, the forests are classified as protectors of coasts, protectors of water and soils and protectors of fauna. There are several tracts classified as productive where selective cuttings are made for obtaining logs, posts for fencing and charcoal. Several species are exploited for pharmacological purposes. Bee-keeping is very well developed.

**Fishing:** The mangroves, coastal lagoons and the area of sea grasses and reef lagoons have an enormous importance for commercial and sport fishing because these are important sites of refuge and feeding for juveniles of species of fish and crustaceans of commercial importance such as the spiny lobster (*langosta espinosa*) (*Panulirus argus*), *pargo criollo* (*Lutjanus analis*), *pargo jocú* (*Lutjanus jocu*) and *cubera* (*Lutjanus cyanopterus*). In the coastal areas, *manjúa* is captured for use as bait for bonito (*meros*) and other species such as pink conch (*cobo*) (*Strombus gigas*) and *cangrejo de tierra* (*Cardisoma guanhumi*), which have increased in the past two years. There is also a quota for capture of sea turtles for research. Among the marine resources, several species of invertebrates have been identified and studied for use in medicine.

**Tourism:** Tourism in comparison with other regions of Cuba can be classified as incipient. The number of tourists is determined by the time of year; with summer being the low season and winter the high season. Because of its isolation from the urban centres of Isla de la Juventud the greatest percentage of visitors to the area are foreigners, with domestic tourism focused on the town of Cocodrilo and several beaches.

**Water supply:** The water in the main inland lagoon serves to irrigate the surrounding rice fields and pastures. Most of the rivers that empty into these were dammed in order to use their water for irrigation.

**Mining:** Mining is characterized by the extraction of peat, for agriculture to improve the soils in the north in Ciénaga de Lanier, and of carbonate of sodium from the karst plain for construction. Also, research has been carried out in this area to exploit these rocks for preparing tiles.

**Farming and livestock raising:** This is limited to the Cooperativa de Producción Agropecuaria “Costa Sur”, responsible for providing fruits and vegetables to the town of Cocodrilo and now working to introduce goats to supply milk to that community.

**Breeding sites of species:** In Ciénaga de Lanier, specifically on Cayo Potrero, there is a breeding farm of the Cuban crocodile (*Crocodylus rhombifer*) belonging to the

Empresa para la Protección de la Flora y la Fauna, where several population studies of the species have been made with the basic objective of increasing their populations and reintroduction to the natural environment. Furthermore, specialists from that organization are carrying out a project related to a population study of the Caribbean manatee (*Trichechus manatus*).

Backed by the Centro de Investigaciones Pesquera of the Ministerio de la Industria Pesquera, the Centro Experimental de Tortugas Marinas has been functioning since more than ten years and is responsible for carrying out research related to the hawksbill turtle (*Eretmochelys imbricata*) and annual monitoring of the nesting stage of sea turtles.

Archaeological importance: Throughout the coastal region, archaeological remains have been found belonging to a pre-Columbian culture based on the activities of fishing and hunting. They also left their mark on several caves with pictographs of which the most important is cave no. 1 at Punta del Este with 213 pictographs, which has been declared a national monument. There is evidence of shipwrecks in the area from the colonial period, which have not been adequately studied.

20. Land tenure/ownership of:

All the land is government property, with the Empresa Nacional para la Protección de la Flora y la Fauna, belonging to the Ministry for Agriculture, the main landowner, while the inland bodies of water belong to the Institute for Hydraulic Resources. In the surrounding marine area, it is administered by the Ministry for Fisheries. In the surrounding areas, the land is property of the Ministry for Agriculture and Farming Cooperatives.

21. Current land use:

At the site	Surrounding area
Conservation	Agriculture (rice)
Extraction of peat	Livestock (pastures)
Extraction of sodium carbonate	Commercial fishing
Bee-keeping	
Extraction of wood	
Commercial fishing	
Sport fishing	
Recreational diving	
Sport fishing	

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

At the site	Surrounding area		
	Past	Current	Potential
Mining	x		x
Forest fires		x	

Poaching		x		Livestock		x	
Sport fishing		x		Forest fires			x
Tourism			x	Hurricanes			x
Commercial fishing		x		Climate change		x	
Forest exploitation		x					

At the site:

Mining: Mining was carried out for extraction of limestone near Cayo Piedras. Currently, although there are installations, there is no activity. Nonetheless, there is the possibility in the future that this area will be exploited.

Forest fires: There always exists the possibility of a forest fire because of lightening or through the negligence of a worker.

Poaching. There is always the possibility that poachers enter the area to hunt or fish without permits, although there is a group of forest rangers in the area.

Tourism: There is the possibility in the future that large-scale tourism will be developed in this area once accommodations are built, given the importance of beaches and coral reefs in the area.

Commercial fishing: There is a fishing cooperative in the community of Cocodrilo with small boats carrying out subsistence fishing.

Exploitation of the forest: There is small-scale exploitation of the forest, carried out on the basis of management plans and constant selective cutting. There are no sawmills or installations but a small amount of timber is cut.

Surrounding area:

Damming of rivers: In order to guarantee supply to the population of the municipio, irrigation of farming and industry, a group of dams was constructed north of the swamp that store abundant water, thus limiting the supply of freshwater to the swamp. There was a rice plantation north of the swamp, which was deactivated about four years ago. There is livestock raising north of the swamp and some cattle enter this area, but this is insignificant.

Forest fires: Around the site, there is the possibility of forest fires that can occur because there are large areas of pastures through which many persons travel.

Hurricanes: There is the possibility of this area being affected because of the high probability of the passage of hurricanes in the summer.

Climate change: This area is suffering from the effects of climate change such as a rise in sea level, droughts and other change in climatic conditions.

23. Conservation measures taken:

All the wetland has been declared a protected area of managed resources by

Agreement 534 of the Board of Directors, dated 31 December 1990, which establishes “protection measures for natural resources in areas of tourism growth in the southern part of Isla de la Juventud” and Agreement 296 of 1998 of the Board of Directors, which recognizes the southern part of the island and the eastern cays as a special region for sustainable development. Other organisms and institutions have adopted resolutions that give protection to certain regions within the wetland, such as those approved by the National Commission for Monuments which in its resolution 10/79 declared Punta del Este a national monument and resolution 560/96 of the Ministry for the Fishing Industry that declared Punta Francés and the sunken ships as an area of special use and protection. Within the wetland, there is a proposal for a national park and two ecological reserves. Currently, there is a forestry use plan being updated for management of the forests. The area of Punta Francés is carrying out its management plan.

24. Conservation measures proposed but not yet implemented:

Steps are being taken for proposal to the Council of Ministers that the entire wetland be declared a protected area for managed resources, as well as the Punta Francés National Park and the ecological reserves of Punta del Este and Ciénaga de Lanier. Policies, directives and regulations are being prepared for management of the area. Work has begun on preparation of an operational management plan for the Punta del Este Ecological Reserve. Financing is being sought for the preparation of a forestry use plan. Several parts of the wetland have been identified that should be studied for proposal to the Council of Ministers for declaration as protected areas.

<b>Management category</b>	<b>Name of the area</b>	<b>Importance</b>
Ecological reserve	Ciénaga de Lanier	National
Wildlife reserve	El Guanal	Local
Managed plant reserve	Pine forest on limestone	Local
Unclassified	Siguanea	Local
Unclassified	Guayacanal	Local

25. Current scientific research and facilities:

In the area, projects for evaluation and monitoring of species of fauna such as the manatee, crocodile, sea turtles and the functioning of the coral reefs are being carried out. There are other community development projects especially with the town of Cocodrilo. These are carried out by the Establecimiento de la Empresa para la Protección de la Flora y la Fauna of MINAGRI through a network of five microbiological stations. The Centro de Gestión y Servicios Ambientales y Tecnológicos of the Ministry for Science, Technology and the Environment has been created, which has two ecological stations located in Punta Francés and Punta del Este. The Centro Experimental de Tortugas Marinas of the Ministry for the Fishing Industry is also located here.

Two international projects are being carried out: one on priority marine areas in Cuba with financing from WWF with participation of the National Centre for Protected Areas and the other on research for preparation of an integrated management plan for the Punta Francés National Park. This project has financing from IRC and participation of the Centre for Marine Research of the University of Havana.

## 26. Current conservation education:

There are environmental education activities in the wetland, among which work with the primary school children of the communities surrounding the Punta Francés National Park stands out, with whom interest groups are organized on the life and conservation of crocodiles, protection of turtles and other local species, and work with the adult population of the communities of Cocodrilo and Cayo Piedra.

## 27. Current recreation and tourism:

(a) Excursions: There are excursions to the crocodile breeding station, the town of Cocodrilo, the caves at Punta del Este and local beaches, with occasional options. There is a visitors' centre in the Punta Francés National Park.

(b) Snorkelling: Snorkelling has been systematically organized since 1976 in the area of Punta Francés, where there is a restaurant and infrastructure for this activity.

(c) Boating: Since 1996, boating has been organized here with an annual average of 25,000 tourists that visit the area of Punta Francés. This area has an infrastructure of docks that allow an increase in the number of visits of cruise ships from one to two per week. It is hoped that in the future an average of one cruise ship per day will dock here. As part of this process of expansion, new possibilities for docking are being studied. This is the case of Punta del Este.

(d) Sport hunting: For more than five years hunting of the paloma *cabeciblanca* (*Columba leucocephala*) is held in August and September. In the winter, migrating ducks from North America are hunted. This activity is organized on the basis of studies and plans for use of hunting resources.

Future plans: Currently, this wetland is not heavily used for tourism with the exception of the area of Punta Francés. In the future, there are plans for growth of tourism, the construction of hotels with more than 2000 rooms, essentially for tourism of sun and beach at Punta del Este, Playa Blanca, El Guanabaco, Carapachibey and Cocodrilo, plus creation of a marina at Punta del Este.

## 28. Jurisdiction:

Municipal: Municipio Especial Isla de la Juventud

Administrative: Ministerio de la Agricultura  
Ministerio de la Industria Pesquera  
Ministerio de Ciencia Tecnología y Medio Ambiente

## 29. Management authority:

The following agencies are responsible for administration and management of the wetland.

Environmental management  
Ministerio de Ciencia Tecnología y Medio Ambiente  
Delegación Territorial Isla de la Juventud  
Calle 41, no. 4625, Nueva Gerona  
Isla de la Juventud  
Tel./Fax: (53 7) 612 2122  
Lic. Leonardo Cruz Cabrera, Director  
E-mail [leonardo@gerona.inf.cu](mailto:leonardo@gerona.inf.cu)

Management of forest resources  
Ministerio de la Agricultura  
Delegación de la Agricultura  
Servicio Estatal Forestal  
Tel.: (53 61) 23 368/22 995  
Ing. Lazara Cárdenas  
E-mail: Unavailable

Management of protected areas  
Ministerio de Ciencia, Tecnología y Medio Ambiente  
Delegación Territorial Isla de la Juventud, Centro de Gestión de Áreas  
Protegidas  
Calle 41, no. 4625, Nueva Gerona  
Isla de la Juventud  
Tel.: (53 7) 202 4570  
Lic. José F. Izquierdo Novelle  
E-mail: [pepe@gerona.inf.cu](mailto:pepe@gerona.inf.cu)

Ministerio de la Agricultura  
Unidad Territorial de la Empresa para la Conservación de la Flora y la Fauna  
Calle 13 final Sierra de Caballo, Nueva Gerona  
Isla de la Juventud  
Tel.: (53 7) 612 2089  
E-mail: Unavailable

Management of Fisheries  
Empresa Pesquera Industrial Pesca Isla  
Calle 28 between 31 y 33, Nueva Gerona  
Isla de la Juventud  
Tel.: (53 7) 612 2721  
Angel Pérez, Director  
E-mail: Unavailable

### 30. References: