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Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: October 2001
2. Country: Uruguay
3. Name of wetland: Bañados del Este and the coastal strip
4. Geographical coordinates:
34° 35" - 32° 60" South latitude
53° 17" - 54° 23" West longitude
5. Altitude: minus 5 metres to 10 metres above sea level
6. Area: 407,408 hectares
7. Overview:

The Bañados del Este Ramsar site includes wetlands located in southeastern Uruguay in the water basin of Laguna Merín and in part of the Atlantic basin. It includes a group of freshwater (Merín and Negra) and brackish (Castillos) coastal lagoons, part of the main tributaries of those lagoons and the permanent, periodical or occasional low floodplains that accompany them.

8. Wetland type:

Marine/coastal: A, E, F, J, K

Continental: L, M, N, O, P, Sp, Ss, Tp, Ts, W, Xf

Man-made: 3, 4, 6, 9

Types of wetlands by decreasing order of importance: continental, marine coastal, artificial.

9. Ramsar criteria: 1, 2, 3, 5, 6

Criteria that best characterize the site: 1

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

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

A large area of the site carries out functions related to the control and prevention of flooding. In addition, it is also an important system of natural alluvial plains.

The proposed area is the habitat for a number of species of vertebrate tetrapods of more than half of the species recognized in Uruguay. As for birds, 58 per cent of the native species have been recorded there. The number of aquatic birds is far above the figure of 20,000 established in criterion 3. A single species of bird could account for almost half this number. This is the case of the *cisne cuello negro* (*Cygnus melanocorypha*), a species for which 8,500 specimens in two lagoons included in the proposed area were reported (Arballo and Cravino, 1999). The proposed site includes the main area of distribution of this species and of the *ganso coscoroba* (*Coscoroba coscoroba*) in Uruguay. These species are charismatic and of importance as indicators of the natural quality of wetlands. The continental wetlands are the habitat of several species of long-distance migratory birds (transhemisphere), especially waders (shorebirds). Over a limited area at the site, there is a relict population of venado de campo (*Ozotecene y bezoarticus*). On several islands of the coastal strip (Islas de Lobos and Cabo Polonio), there is an important presence of sea lions (*Otavia flayecens* and *Arctocephalus australis*).

13. General location:

Administratively, it is in the departments of Cerro Largo, Treinta y Tres and Rocha. Within the coastal strip, both on the lagoon side and the ocean side, there are several beach resorts of different characteristics and importance, such as Lago Merín and La Charqueada on the coastal strip of Laguna Merín and La Coronilla, Punta del Diablo, Aguas Dulces, Valizas and Cabo Polonio on the oceanic coastal strip. The stable population in the strip of beach resorts is low and does not exceed 10,000 persons, with seasonal fluctuation and a substantial summer increase. Furthermore, in the area surrounding the site, but nearby, are two departmental capitals: Treinta y Tres and Rocha with 30,759 and 26,027 inhabitants respectively, as well as other towns: Río Branco (12,278), Vergara (3,953), Cebollatí (1,485), San Luis (581), Lascano (7,166), Chuy (9,806), San Miguel (1,125) and Castillos (7,404) inhabitants each.

14. Physical features:

A. Geology and geomorphology

The wetlands at the site form a geomorphologic unit characterized by its extremely flat topography with a minimum regional slope that makes the water level with the

surface several months a year or permanently. From the point of view of geology, the most important area of the wetlands is located in the tectonic graben of Laguna Merín and is related to variations in sea level during the Holocene, which generated an alternation of marine deposits, coastal and continental of a few metres thick, revealing the existence of a rapid cyclical variation of sea level.

From the geomorphologic study of these wetlands, it is clear that these have been generated by the following processes linked to several palaeo-environments.

Isolated tidal plains and former lagoons.

These are the most important environments identified with the scattered plains that surround Laguna Merín, located below a well-preserved terrace located at an elevation of 5 metres above sea level. These plains were formed by a marine intrusion that was greatest approximately 5000 years ago and that reached elevations of approximately 5 metres. The intruding water was seawater with a high sodium content and during their stay, infiltrated into existing sediments remaining trapped in them when the water retreated. As a result, the soils generated on these sediments have a high salt content.

Structures resulting from later transgressions on this plain are clearly preserved, in such a way that it is possible to study the early environmental dynamics of the coast. Two important geomorphologic traces can be seen that would be responsible for the resulting structures, namely, the chain of palaeo- lagoons and the paleo bars that separate them. The decrease of sea level causes the isolation of small oval bodies of water (palaeo- lagoons), which connect with the Laguna Merín through tidal canals. Among the lagoons, it is possible to identify former beach ridges (Chenier plains), which are marked coasts that respond to successive pulses of dropping.

Floodplains and former streams

The wetlands linked to these floodplains and former streams were created on an alluvial plain located between 10 and 20 metres above sea level, which was probably created when the water level was about 10 metres above the current level (35,000-40,000 years ago), associated with an increase in rainfall that was channelled into several systems of alluvial fans, of which the most important is the Río San Luis. The centre of this is in Paso Averías delimited to the northwest by the Río Cebollatí and to the south by the Río San Luis. Surface drainage of this fan was moved towards the north at a stage whose age has not been determined, with the current bed of the Río Cebollatí taking its place.

As a result, a series of meandering former beds and diversions exist on this plain, with frequent changes of new beds. This dynamics has made possible the formation of many small crescent-shaped lagoons, which have been filling in with fine materials that have made possible the growth of tall hydrophytic vegetation. Except for these lagoons, plains develop that are frequently flooded by high water. The outstanding example of this type of wetland is the Estero de Pelotas.

Alluvial plain with impeded drainage

Wetlands linked to this type of plain develop especially in the Bañado de India Muerta. Topographically, they are the highest wetlands with elevations between 16 and 17 metres above sea level, which correspond to an alluvial plain that sank in a bay linked to a former ocean terrace located approximately 20 metres above sea level. The same phenomenon was produced by preventing the exit of the water, through development of the alluvial fan referred to as paleo Cebollatí–San Luis, mentioned earlier.

As for Laguna de Castillos, its origin is similar to that of other lagoons of the Atlantic coast and is related to a drop in ocean level and the creation of bars that enclose the mouth of several streams, cutting off communication with the ocean. In this case, the phenomenon affects the two most important tributaries of the lagoon: the arroyos Chafalote and Don Carlos, which empty directly into it and create important swamps. The Laguna de Castillos connects with the ocean through Arroyo Valizas, which acts as a tidal arroyo. Its exit opens at certain times, when the water level in the lagoon is high. This process is promoted by the erosive action of the waves on the sand barrier during sea storms.

Sedimentation is still active in the swamps of the costal lagoon. The geologic substratum of the area, of sedimentary origin and from the recent (Holocene), is formed by deposits of variable size, with layers of sand, mud and clays, as well as clams and molluscs. The water table is usually brackish because of frequent penetration of seawater. Deposits of coastal sand consist of loose sand, from medium grain to fine grain, stratified, quartz sometimes with feldspar, accumulated by the southeast winds. As for the rock outcroppings, for example Cabo Polonio, Punta del Diablo or Santa Teresa, are formed almost exclusively by outcroppings of crystalline bedrock in the form of large blocks and piles of rocks and to a lesser extent, shell and sand beaches.

B. Soils

The dominant soils within the Ramsar site are deep, poor to very poorly drained, of variable size and chemical properties in function of the origin, age, sedimentation conditions and quality of the water (fresh or brackish) of the water environment at the time of transportation and deposition (gleysols, fluvisols, arenosols and histosols). They occupy the low lagoonal and fluvial flatlands associated with the lagoons and main rivers and streams, which flood for variable periods of time because of an increase in level of the lagoons and the overflowing of the rivers and streams. Plains or internal flatlands also are part of the site, which is land located at an elevation of 10 to 25 metres above the level of Laguna Merín with slight slope towards Laguna Merín. They flood primarily as a result of runoff of surface water from their catchment basins. The dominant soils are deep, poorly drained and fine textured (gleysols). During the 1980s, in order to incorporate this land for growing rice, important drainage works substantially changed their water regime and the natural vegetation associated with them.

Finally, the Atlantic coast is a physiographic unit, which includes accumulations of Aeolian sand in the form of shifting dunes, dunes fixed by vegetation and beaches subject to the dynamics of the waves and the wind. Included in this landscape are rocky outcroppings such as Punta del Diablo and Cabo Polonio.

C. Climate

The site is located in the temperate area, equidistance from the tropics and circumpolar, as a transition zone with greater influence from the subtropical region. The oceans in the Southern Hemisphere occupy 80 per cent of the total surface, making the climate maritime. This leads to moderation of thermal swings, both annual and monthly, and is especially noticeable on the coastal strip, determining that the climate is considered as subtropical humid with hot summers. Climate variation is an important characteristic and includes both the frequency, the values (daily and monthly) and its intensities. There are long periods of intense drought and years with excessive precipitation leading to flooding. These extremes are usually accompanied by the phenomena known as La Niña and El Niño. The following data of the annual averages of the main parameters for three representative areas of the site.

Area	Average temp. (°C)	Average maximum temp. (°C)	Average minimum temp. (°C)	Relative humidity (%)	Insolation (hours)	Precipitation (mm)	Days of rain
Melo	17.0	23.4	11.8	74	2,461.4	1,237	65
Trenta y Tres	16.8	22.9	11.2	75	2,330.1	1,293	72
Rocha	16.0	21.5	10.8	81	2,378.1	1,123	79

15. Hydrological values:

Given that the most relevant area of the wetlands is concentrated in the basin of Laguna Merín, the data to be taken into account will be that corresponding to the same. Annual precipitation varies considerably from year to year, but averages are between 1123 and 1237 mm. Potential evapotranspiration is approximately 1150 mm per year. Of this, approximately 800 mm occurs from October to March and the rest (350 mm) from April to September. This seasonal difference has a strong effect on runoff of the rivers and streams, while from October to March, an important part of precipitation is used in the watershed to compensate potential evapotranspiration and only a small part runs off toward the rivers and lagoons. The opposite occurs from March to September. This annual runoff varies considerably from year to year. According to information available, expressing the values in millimetres in relation to the watershed and with the years considered, annual runoff in 90 per cent of the years is 190 mm and in 10 per cent of the years (very wet) it is 800 mm.

Laguna Merín is fed by a series of rivers and streams, the most important of which are in Uruguay. Seasonal variations in their flow cause important fluctuations in their levels. At low levels, the water surface is approximately 4000 square kilometres and its maximum is 8700 square kilometres. At the present time, the natural exit of Laguna Merín to the Atlantic Ocean is regulated by the San Gonzalo dike, constructed in the 1970s by Brazil, which connects with Laguna de los Patos, preventing entry of salt water.

The watersheds of the main tributaries of Laguna Merín have the following areas (square kilometres) Río Cebollatí (16,919), Río Tacuarí (3540) and Río Yaguarón (4700).

The contribution of Río San Luis and Arroyo San Miguel to the lagoon have decreased considerably, because runoff from their basins has been diverted towards the Atlantic Ocean through important drainage works. The Laguna de Castillos belongs to the Atlantic watershed and has a basin of 180 square kilometres, receiving freshwater through the Castillos, Chafalote and Don Carlos streams.

It has an average depth of one metre and water area of 8,000 hectares, connecting with the ocean by Arroyo Valizas, which is a tidal creek.

16. Ecological features:

From the point of view of biogeography, Uruguay presents a transitional position, being represented in the Pampa, del Espinal, Parana and Atlantic phytogeographic provinces. They were described by Cabrera and Willink (1980), who, nonetheless, assigned the territory only to the first two (Arballo and Cravino, 1999).

The characterization of vegetation at the Ramsar site has been carried out on the basis of the geomorphologic units that integrate this site, given the intimate relation existing between the distribution of these units with the hydrographical regime and soils. The abundant information available has been reviewed and summarized in order to complete this information sheet and relate it to the maps.

At the site, the following types of wetlands have been identified:

A. Marine and coastal wetlands

1. Brackish-salt coastal lagoons (J)

The conservation created includes the body of water of the Laguna de Castillos in the department of Rocha. Variations in the physical structure and chemical composition of the water of the lagoon generate a clear differentiation of three bodies of water: (a) in the northern part, there are predominantly freshwater because of the contribution of the streams that empty into it; (b) in the centre, north and east, there is a transition between freshwater and salt water, with an increase in transparency; (c) the southern part the transparency and salinity are greater because of the connection of the lagoon with the Atlantic Ocean through Arroyo Valizas. This variation in degree of salinity is important for the life cycle of shrimp (*Pennaeus paulensis*).

Where there is water, there are *cisne cuello negro* (*Cygnus melanocorypha*), *cisne coscoroba* (*C. coscoroba*), which nest in the marshes and reeds on the edge of the lake. There are characteristic flocks of flamingos (*Phoenicopterus chilensis*). The coastal lagoons provide a habitat for several species of shore birds, both sedentary and long-distant migrating species (Charadriidae and Scolopacidae).

2. Freshwater coastal lagoons (K)

3. Sandy beaches/rocky seacoasts (E/D)

The alternation of sandy beaches and rocky outcroppings gives sites for resting or feeding birds such as various species of *gaviotines* (Laridae, Sterninae), *gaviotas* (*Larus* spp.), *rayador* (*Rynchops niger*). There are several species of Neartic migrating *chorlos*, such as the *chorlo rojizo* (*Calidris canutus*) and the *vuelvepedras* (*Arenaria interpres*).

Among the reptiles, mention should be made of the *lagartija de la arena* (*Liolaemus weigmanni*). There are also amphibians such as the *sapo grande* (*Bufo arenarum*) and the *sapito de Darwin* (*Melanophryniscus montevidensis*).

B. Continental wetlands

1. Swamps/marshes/seasonal freshwater ponds (Ts)

Included in this category are several types of wetlands along with low plains with small lakes and streams, sandy points and beaches near scattered bodies of water, bodies of water isolated by sandy bars and islands located in the mouths of the main rivers.

In the lagoon areas, mangrove formations predominate and are known locally as *gramales* and are formed mainly by *Luziola peruviana* and to a lesser extent by *Echinochloa helodes*, *Paspallidium palidavigum* and *Paspalum modestum*. In addition, the following species are frequently found: *Echinochloa longiscapus*, *Hidrocleis nymphoides*, *Pratia herbacea*. During dry periods, the grasses recede and Gramineae appear such as *Paspalum paspaloides*. To a lesser extent, there are the *caraguatales*, an association where *caraguatá* (*Eryngium pandanifolium*) dominates and the grasslands of *paja brava* (*Panicum prionitis*) and *paja estrelladora* (*Erianthus angustifolius*). In the poorly drained depressions, there is marsh vegetation, especially *cucharón* (*Echinodorus longiscapus*), *junco* (*Juncus microcephalus*) and *duraznilares* in which *duraznillo blanco* (*Solanum glaucophyllum*) is dominant. Many species of trees are associated with the foregoing, including *sarandí blanco* (*Phyllanthus sellowianus*), *sarandí negro* (*Sebastiania schottiana*), *curupí* (*Sapium montevidensis*) and *ceibo* (*Erythrina cristagalli*).

In the Laguna de Castillos, there are wet pastures over saline soils (Ss), where halophyte grasses dominate, including *Distichlis spicata* and *Paspalum vaginatum* to a greater extent and *Salicornia ambigua* and *Heliotropium curvicum* to a lesser extent.

The *gramales* provide sources of food for numerous bird species. Among the migrating Neartics are the *chorlito rabadilla blanca* (*Calidris fuscicollis*), the *chorlos patas amarillas* (*Tringa flavipes* and *T. melanoleuca*) and the *chorlo dorado* (*Pluvialis dominica*). There are also sedentary species, such as the *jacana* (*Jacana jacana*), the *becasina pintada* (*Rostratula semicollaris*) and the *tero real* (*Himantopus melanurus*). In addition, birds in the Anatidae family feed there, such as the *pato picazo* (*Netta peposaca*), the *cisne coscoroba* (*C. coscoroba*) and the *cisne cuello negro* (*Cygnus melanocorypha*).

In the *duraznilares*, nest colonies of *gavilán caracolero* (*Rostrhamus sociabilis*), a migratory predator. The *caraguatales* constitute the characteristic environment of

ranita enana de Sanborn (*Hyla sanborni*), the *rana motor* (*Argenteola siemersi*) and the *pajonera pico recto* (*Limnoctites rectirostris*), species of birds included in lists of endangered birds by IUCN (Collar et al., 1992 and 1994). There are also reptiles such as the *culebra verde vientre rojo* (*Liophis jaegeri*).

In *pajonales* and nearby wet *pastizales* appear the *rana saltadora* (*Leptodactylus gracilis*), the *rana común* (*L. ocellatus*) and the *macaquito* (*Pseudopaludicola falcipes*). Among the reptiles, can be mentioned the *culebra de líneas amarillas* (*Liophis anomalus*). In the marshes that border the Laguna de Castillos, there is a community of *ceibal* (*Erythrina cristagalli*) and the forest of *ombú* (*Phytolaca dioica*).

2. Swamps/marshes/ permanent freshwater ponds (Tp)

This includes the middle course of the Arroyo Pelotas, which empties into Laguna Merín and the lower parts of the arroyos Chafalote and Los Indios that empty into Laguna Negra and Laguna Castillos, respectively. They are meandering streams with blocked flow that hinders natural runoff. These areas remain flooded permanently and are covered with continuous and permanent vegetation with a dominance of mangrove species, such as *Cyperus giganteus*, *Scirpus californicus*, *Typha latifolia* and *Zizaniopsis* sp., among others. This is the environment most frequented by the nutria (*Myocastor coypus*), a species of rodent subject to an annual season of commercial hunting. There is also the *carpincho* (*Hydrochoerus hydrochaeris*). There are multi-species nesting colonies of birds, such as *cuervillo de cañada* (*Plegadis chihi*), *espátula rosada* (*Ajaia ajaja*) and up to five species of *garzas* (Ardeidae). Colonies of *gaviota capucho café* (*Larus maculipennis*) also nest there.

C. Permanent rivers/streams (M)

Included in this category are the most important freshwater streams at the site, such as the Cebollatí, Olimar, Tacuarí and Yaguarón, which begin in the crystalline mountains of the Cuchilla Grande. The most important is the first whose water basin is 10,085 square kilometres. While they are considered permanent streams, they show a marked irregularity in their annual flow and from year to year. In general terms, the Río Cebollatí, for example, has shown fluctuations of flow between 1.71 cubic metres/second and 319 cubic metres/second. The most important are the river plains and the riparian woodlands, which occupy the edges of the rivers.

These environments on the edges of streams or the water are inhabited by mammals such as the *lobito de río* (*Lutra longicaudis*) and *carpincho* (*Hydrochoerus hydrochaeris*) and by birds, such as three species of kingfisher (Cerylidae) and the *garcita azulada* (*Butorides striatus*). Among the reptiles, can be mentioned the *tortuga morrocoyo* (*Trachemys dorbignyi*), the *tortuga campanita* (*Phrynops hilarii*) and the *tortuga cabeza de víbora* (*Hydromedusa tectifera*) and the *culebra parda de agua* (*Liophis miliaris*). The riparian woodlands are the habitat for a rich fauna of vertebrates, among which, in certain places, the presence of the *carpinterito enano* (*Picumnus nebulosus*). The *gato montés* (*Felis geoffroyi*) and the *zorro de monte* (*Cerdocyon thous*) occur here.

3) Artificial wetlands.

1. Irrigation areas and water storage areas

A good number of species of birds have adjusted their reproductive cycle to rice. The outstanding example is the *garibaldino* (*Agelaius ruficapillus*), known locally as the *pájaro negro del arroz*, a member of the Icteridae family, whose populations have increased explosively until reaching levels of conflict because of damage to crops. Arballo and Cravino (1999) mention other species that have adapted to the dynamics of this man-made environment, such as two species of *cuervillos* (Threskiornithidae), the common stork (*Ciconia maguari*), the *cigüeña cabeza pelada* (*Mycteria americana*) and several species of *garzas* (Ardeidae). The *nutria* (*Myocastor coypus*), a rodent that is hunted commercially, has moved into the canals linked to farming.

17. Noteworthy flora:

The most conspicuous single species communities in the marsh are the following:

Espadaña (*Zizianopsis bonariensis*)

This is found in deep water and roots in the soil. It grows to a height of approximately two metres. The communities are dense, but interspersed with several other species: *Bohemeria cylindrical*, *Carex pseudocyperus*, *Cyperus giganteus*, *Dryopteris gongyloides* and *Dryopteris rivularioides*. The permanence of these communities depends on the maintenance of the water level.

Tiririca (*Scirpus giganteus*)

This is found in shallower water than *espadaña*, forming dense single-species communities approximately two metres in height. It colonizes modified places, which gives it a greater area of distribution. It is a characteristic component of peat bogs.

Carrizo (*Panicum grumosum*)

This is found in places of semi permanent water. It grows to a height of 1.5 metres and is found in marshes or on the shores of streams, especially on saturated soils.

Paja brava (*Panicum prionitis*)

This is found in fields with sporadic flooding. It grows to a height of two metres and is very frequent in the area. It is considered a good indicator for growing rice. On old farms, it is found sporadically because it is believed to be of slow regeneration.

Scirpus giganteus

This is found in places of permanent water, forming more or less dense communities of up to two metres in height. It appears mixed with *Thalia multiflora*, *Typha dominguensis* and *Zizianopsis bonariensis*.

Junco (*Scirpus californicus*)

This grows in water of up to one metre deep, on permanently or seasonally flooded soils. It is a characteristic species of marsh environments. Because of its strong roots and the depth of the water that it invades, it is one of the most important species in the processes of plant succession and the filling-in of lentic environments. Its stalks do not permit total cover of the ground or water (although its is dominant),

which facilitates development protected from other hydrophytes more delicate, smaller, floating or emergent plants.

Totora (Typha domingensis)

This is common in permanently flooded soils, temporal or saturated with a maximum elevation of 30 centimetres. It is a common component on the edges of lagoons, streams and marshes and can grow to 2.5 metres in height. During the summer, it is found along roads (*cunetas*) together with *Canna glauca*, *Cyperus prolixus* and *Eryngium pandanifolium*.

Caraguatá (Eryngium pandanifolium)

This is a frequent component of saturated or seasonally flooded soils on the edges of marshes, lagoons or streams. It forms communities called *caraguatales*.

Camalote (Pontederia lanceolata)

An emergent perennial plant. Rooted in the soil, it is found on the edges of deep-water marshes.

Camalote (Eichornia azurea)

A perennial rooted plant with floating stalks and leaves. It is very common in quiet water such as ponds, lagoons or canals. In canals, dense associations form basically with *Pontederia cordata* and *Potamogeton gayii*.

Camalote (Eichornia crassipes)

Perennial free-floating plant. Uruguay is the southern limit of its geographical distribution.

Palms

In soils that remain flooded or saturated most of the year, communities of palms are found. The palm groves of *Butia capitata* grow on middle-elevation plains. Depending on the degree of saturation and flooding of the soil, the palm grove can be associated with pastures (*pajonales*) of *Erianthus angustifolia* and *Panicum prionitis*.

At the site, are particularly extensive on the western edge of the Laguna Negra where there is a special association because of the type of soil that remains flooded most of the year: *Pradera uliginosa* plus palm groves. The grassland is made up of *Cynodon dactylon* and *Stenotaphrum secundatum*, accompanied by *Axonopus affinis*, *Centella asiática*, *Cyperus obtusatus*, *Juncus imbricatus*, *Panicum gounii* and *Sporobolus indicus*. The palm groves are located on the highest grounds.

Ceibal

This plant formation of *ceibos (Erythrina cristagalli)* is found occasionally mixed with *curupíes (Sapium montevidensis)*. The *ceibales* of the Laguna de Castillos are the most picturesque and extensive in the department of Rocha. Although it is an environment submitted to frequent flooding, in the *ceibales* of Barra Grande (mouth of Arroyo Castillos), various mesophile and mesoxerophile trees of less than one metre in height have been found along with *chal-chal (Allophylus edulis)*, *envira (Daphnopsis racemosa)*, *coronilla (Scutia buxifolia)* and *canelón (Rapanea laetervirens)*, which grow near the base of the trunks of the *ceibos*. In the open spaces between the trees, in a herbaceous stratum, grow *caraguatales* of *cardo*

(*Eryngium eburneum* and *E. pandanifolium*). In the flooded parts, there are various small emergent aquatic plants, such as *yerba del bicho* (*Polygonum punctatum*), *ranunculo* (*Ranunculus apiifolius*) and the *trébol de cuatro hojas* (*Marsilea ancylopoda*). There is a gradual transition from the *ceibal*, to the *caraguatal* and the *pajonal de paja estrelladora* (*Erianthus angustifolius*).

Ombú forests

The ombú (*Phytolacca dioica*) forests surround Laguna de Castillos and seem to be unique in the world because of the number of ombus that make it up. Here, there are approximately 3,000 mature specimens.

18. Noteworthy fauna:

Altogether, in its current dimension the Ramsar site Bañados del Este is the habitat for a wealth of species, including 51 per cent of the species of vertebrates tetrapodes recognized as national fauna. The total number of mammals represents 50 per cent of the terrestrial species recorded for Uruguay. Of importance is one of the only two remaining populations in the country of *venado de campo* (*Ozotoceros bezoarticus*), a deer that is endangered at the world level. The region is the habitat of a very high proportion of the national population of nutria (*coipo*) (*Myocastor coypus*), which has historically provided an estimated 90 per cent of the product of the annual commercial hunting of the species in Uruguay. The *carpincho* (*Hydrochoerus hydrochaeris*) is relatively abundant in the region. In the riparian forests along the Yaguarón and Tacuarí rivers the presence of the *margay* (*Leopardus wiedii*), a feline considered vulnerable in Uruguay, has been recorded. E. González and A. Soutullo (Libro Rojo de los Mamíferos Terrestres de Uruguay, in preparation) identified 18 key areas for the conservation of terrestrial mammals in Uruguay, six of which are found (three of them partially) at the proposed site.

As for birds, 252 species have been recorded, representing 58 per cent of the birds found in Uruguay. Some 21 species of amphibians and 18 species of reptiles (51 per cent and 29 per cent, respectively of the national fauna) have been recorded.

19. Social and cultural values:

The main social values are tourism, grazing, agriculture and fishing. Among the cultural values, archaeology and historic tradition are important. Both agriculture and tourism have affected the ecological characteristics of the wetland.

20. Land tenure/ownership of:

Land ownership within the wetland and in the surrounding areas is almost all private.

Within the national resources for public use are the bodies of water of Laguna Merín (approximately 1,100 square kilometres in maximum area), Laguna Negra (approximately 175 square kilometres) and Laguna de Castillos (approximately 80 square kilometres). At the same time, there is strip of costal protection 250 metres wide established in the Water Code (Código de Aguas).

21. Current land use:

a) At the site

Land use on the lagoons and fluvial flood plains is for traditional livestock raising, based on extensive grazing of cattle and sheep on unimproved natural pastures. Nonetheless and especially on the plains that border Laguna Merín, they have begun to use the land with less risk of flooding for growing rice during very dry years. Both Laguna Merín its main tributaries and Laguna Negra are the main source for irrigation for growing rice, with production reaching 60,000 hectares annually of crops irrigated with water from these sources.

Melo, Treinta y Tres, Rocha and José Pedro Várela, the cities with the largest population within the basin, use as a source of potable water the surface streams, while cities with smaller populations (Cebollatí, Castillos, San Luis) are supplied with underground water.

Also within the wetland, *nutria (Myocastor coypus)* is captured for sale and shrimp (*Pennaeus paulensis*) in the Laguna de Castillos. There is small-scale fishing in Laguna Merín and Laguna de Castillos. Activities such as hunting are now expanding.

b) In the surrounding area

In the areas surrounding the Ramsar site, the main activities are the growing of rice, while on the higher hilly land, more or less extensive livestock predominates. In the departments of Treinta y Tres and Rocha, forest exploitation is being expanded on the land with greatest relief.

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

At the site:

Drainage works and recovery of marshes and swamps

From this point of view, the most important changes have occurred on the internal wetlands within the department of Rocha, known as the Bañados de India Muerta, San Miguel and Santiagueño, where regional drainage works carried out primarily by the government in the 1980s produced substantial changes in the hydrology and vegetation. Nonetheless, these works were already under way or completed in most cases, when the government approved the Ramsar Convention in 1982, and when on 22 May 1984, Uruguay acceded to the UNESCO Convention and simultaneously presented the map of the area where they will be created. The owners have continued to construct, taking advantage of the regional works, in order to incorporate this land into agriculture and more intensive livestock raising. Until now, some 96,000 hectares have been modified, leaving only several patches of swamp unaltered.

Tourism

The development of unmanaged tourism, the chaotic and erratic growth of coastal settlements at several points on the ocean coast owing to a lack of appropriate planning, damaging the natural beauty of the coastal strip. This happens in places such as Aguas Dulces, Cabo Polonio, Punta del Diablo and Valizas.

Hunting and fishing beyond established controls

Destruction of archaeological sites

Although the archaeological cultural heritage is legally protected, the productive activities related to the drainage works mentioned earlier have led to widespread destruction of structures known locally as *cerritos de indios*, also called *túmulos* in other South American countries. Also and primarily at the exposed sites, the gathering of archaeological material by amateurs has caused considerable disturbances.

In surrounding areas

On the high plains immediately surrounding the site, the growing of irrigated rice, together with the raising of livestock are the most important productive activities. From the point of view of agriculture, the most intensive use occurs in the north of the basin of Laguna de Merín, in the departments of Cerro Largo and Treinta y Tres. It is in this area where the demand for growing rice is greatest, primarily due to the closeness of the Uruguay-Brazil border.

It is difficult to quantify the environmental impact of the growing of rice on the fauna and flora, as well as the contribution of water that runs off towards the lowlands at the Ramsar site. At the same time, it is difficult to quantify the impact of the use of agrochemicals on the streams in Laguna Merín for more than 30 years.

23. Conservation measures taken:

At the Ramsar site, no specific conservation measures have been taken. Nonetheless, there is national legislation that covers the Bañados del Este and the Coastal Strip.

Decree 183/991 of 2 April 1991 by which the executive power prohibited any construction at the site without previous authorization of the Ministerio de Vivienda, Ordenamiento Territorial and Medio Ambiente (MVOTMA) and other competent organisms;

Decree 527/992 of 28 October 1992 definitively delimiting the protected areas within the eastern wetlands. A large part of the area of the site has been incorporated into it;

Law 15939 of 28 December 1987 establishing protection of the native forest at the national level, allowing its use only with prior authorization of the Dirección Forestal del Ministerio de Ganadería, Agricultura and Pesca (MGAP) before presentation of a management plan and after prior justification of the proposal;

Decree 16.466 of 1994 (evaluation of environmental impact) declaring of general and national interest protection of the environment against any type of degradation, pollution or destruction, as well as the prevention of any negative or harmful environmental impact;

Law 17.234 of 22 February 2000 declaring of public interest the creation of a National System of Protected Nature Areas;

Law 9.481 of 4 July 1935 and regulations of 28 July 1947 and decree 164/996 regulating the protection and hunting of indigenous and introduced species.

In general, as was stated, no concrete conservation measures have been taken at the site, except for those established in protected nature areas on public land, administered by various agencies. Several of these measures are the following:

Regulation of the access of tourists to the Monumento Natural de Dunas de Cabo Polonio and Costa Atlántica;

Regulation of the traffic of boats on the Arroyo Valizas;

Management of the ombu forests at Laguna de Castillos;

Reintroduction of the *Rhea americana* in the protected area of Laguna de Castillos;

Reintroduction of the *Ozotoceros bezoarticus* into the protected area Potrerillo de Santa Teresa;

Management of the Reserva Forestal de Cabo Polonio and Aguas Dulces;

Restoration of the Monumento de Dunas de Cabo Polonio.

There are the following protected areas at the site:

Potrerillo de Santa Teresa: An area of 715 hectares of public land administered by the Programa de la Biodiversidad and Desarrollo Sustentable en los Humedales del Este (PROBIDES) and by the Dirección Nacional de Medio Ambiente (DINAMA).

Bañados de San Miguel, government property and belongs to the Ministerio de Vivienda Ordenamiento Territorial y Medio Ambiente, has an area of 864.5 hectares.

Bañado de los Indios was transferred to the Intendencia Municipal de Rocha by the Instituto Nacional de Colonización, which is located near Laguna Negra.

Monumento Natural de Dunas y Costa Atlántica

The Monumento Natural de Dunas y Costa Atlántica is composed of 1000 hectares of shifting coastal dunes and 26 kilometres of coast that extends from Punta del

Diablo to Cabo Polonio. Part of this area is public land (Ministerio de Ganadería Agricultura and Pesca) and part is in private hands, but is being expropriated.

Reserva Forestal de Cabo Polonio y Aguas Dulces

The Reserva Forestal de Cabo Polonio y Aguas Dulces covers an area of 3000 hectares, which is forested with exotic species (*Pinus elliotti*, *P. pinaster*, *P. taeda*, *Eucalyptus globulus*, etc.), managed for the production of timber. It is also owned by the government (Ministerio de Ganadería Agricultura and Pesca) and private land is being expropriated.

Laguna de Castillos Wildlife Refuge

It is composed of the water surface of the lake, and its area is approximately 8000 hectares plus 185 hectares of land. This area is government property (Ministerio de Ganadería Agricultura and Pesca).

24. Conservation measures proposed but not yet implemented:

Creation of a larger protected area at the site (Parque Nacional Laguna de Castillos), formed by the Refugio de Fauna, Monumento Natural de Dunas y Costa Atlántica and the Reserva Forestal de Cabo Polonio y Aguas Dulces, together with surrounding private land and oceanic islands (51,000 hectares).

Creation of other protected areas: Paisaje Protegido de las Lagunas Costeras, Parque Nacional Bañado de San Miguel y Laguna Negra, Area Protegida con Recursos Manejados in Laguna Merín.

Recognition of the Estero de Pelotas as a protected area.

25. Current scientific research and facilities:

Research activities of the Ministerio de Ganadería Agricultura and Pesca (M.G.A.P.) in the Laguna de Castillos Wildlife Reserve:

- Carrying capacity of the ombu forests (*Phytolaca dioica*);
- Studies on the replanting of ombu;
- Survey of tetrapode vertebrates;
- Monitoring of reintroduced species of ñandú (*Rhea americana*);
- Project (submitted for approval) on training of the local community for ecotourism activities and nature interpretation.

b) Forest reserve

Native forest

- Description of the bush
- Study of the distribution of *mantillo*
- Study of species that attack wood

Exotic forest

Important species of fungi as potential biological agents for controlling disease
Trials of the introduction of species and studies of the behaviour in dunes and sandy soils.

Pilot project for the breeding of *Apereae* (*Cavia* sp.), Universidad de la República

Cabo Polonio (rocky outcroppings)

Seals and sea lions

Population dynamics: abundance, patterns of life history, assistance patterns

Interaction with small-scale traditional fishing

Impact of tourism and behaviour

Whales

Stranding

Patterns of life history

Interactions with fisheries

d) Laguna de Castillos and Arroyo Valizas

Evaluation and management of fisheries resources (shrimp, *corvina blanca*, *lenguado*);

Limnology studies.

Research activities of PROBIDES (Programa de Conservación de la Biodiversidad y

Desarrollo Sustentable en los Humedales del Este)

Conservation of palm groves and grazing ecology. Grazing trials in pastures with palm groves with various combinations of management of cattle.

Productive systems for wildlife. Breeding in captivity and semi-captivity on private farms of native species of animals: *ñandú* and *carpincho*.

Rapid ecological evaluations. Estimates of the current conservation status, values and threats to little-known sites in the reserve.

Population studies of endangered birds and their ecosystems. Population studies of *dragón* (*Xanthopsar flavus*) and *viudita* (*Heteroxolmis dominica*).

Environmental monitoring. Monitoring of water quality and the use of bioindicators at selected sites in the reserve.

Factors that influence the dynamics of growth of several species of freshwater fish.

26. Current conservation education:

Refugio de Fauna de Laguna de Castillos (MGAP)

Bird-watching observatory

Training of local guides for sport fishermen

Training of park wardens

Potrillo (PROBIDES)

Visitors' centre

The main activities in environmental education carried out by PROBIDES are the following:

Training of local communities, technicians and managers for the reserve. Training for nature guides, coastal management, environmental management, agro ecology and production of handicrafts.

Support for the formal education system: courses, seminars, talks with teachers and students.

Environmental distant learning through modules.

Documentation centre. Specific documentation and access services on biodiversity, wetlands and sustainable development.

The most important pamphlets published by PROBIDES are the following:

Tourist guide to the Reserva de Biosfera Bañados del Este
Catalogue of handicrafts in the reserve
Aquatic plants in the reserve

27. Current recreation and tourism:

Visits to Cabo Polonio in four-wheel-drive vehicles, including the Monumento Natural de Dunas. In the summer, this type of visit is organized several times a day depending on the number of visitors. Sometimes as many as 1200 persons take part. Boat trips to the Arroyo Valizas and the Bosque de Ombúes (Refugio de Fauna de Laguna de Castillos). Most of this activity is in the summer, with an average of 200 visitors per day.

Boat trips on the Laguna Negra.

28. Jurisdiction:

Almost all the wetland is in private hands, except areas administered or the property of MVOTMA, del MGAP, SE.PA.E (Servicio de Parques del Ejército, Ministerio de Defensa Nacional) or the Intendencia Municipal de Rocha. In addition, there are several private establishments used for ecotourism, with assistance from PROBIDES for their management.

29. Management authority:

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30. References: