Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: 18 April 2001

2. Country: Argentina

3. Name of wetland: Jaaukanigás

4. Geographical coordinates:

28º 45' South latitude
59º 15' West longitude

5. Altitude: 43.8 metres above sea level (City of Reconquista)

6. Area: 492,000 hectares

7. Overview:

The name Jaaukanigás (water people) refers to one of the three tribes of the Abipon ethnic group from the mid-eighteenth century.

The Parana River is one of the largest and most biodiverse rivers in the world. In the Middle Parana, there is an extensive and complex floodplain with a broad heterogeneity of habitats with high productivity, promoted and shaped by the alternation of cycles of low and high water. The biotic communities have adapted to this hydrological regime. At the site, there are many lotic and lentic aquatic habitats (main branches, streams, lakes, swamps and marshes) and associated aquatic-terrestrial interface environments (emergent elevations with grasslands, scrublands, gallery woodlands, palm groves, woodlands of willows and alders and others) that form one of the most biodiverse habitats in the province of Santa Fe and all of Argentina. There are 660 species of vertebrates, several of which are threatened with extinction. Several biogeographic regions converge in the area with fauna and flora specific to each of them. This is the southern limit of populations of tropical fauna and flora (and Amazon) that use the river as a corridor. A diverse fish fauna (300 species), including many migratory species, use the area for breeding, growth and feeding. Together with other natural resources (firewood, thatching for roofs and wildlife for hunting), the fisheries are the basis of an important regional subsistence economy for many inhabitants. Sport fishing and ecotourism in the area are sustained by the many resources available in the wetland and are key to the development of the region.

8. Wetland type:

Continental: M, N, O, Tp, Ts, Xf

9. Ramsar criteria: 1, 3, 5, 8

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:

Criterion 1. The Middle Parana is a representative wetland of the Parana, Eastern Chaco and neotropical biogeographic regions. It is the second largest river in South America in terms of volume of water, after the Amazon, and like the Amazon it is characterized by a pulsating regime and a characteristic and unique biota adapted to these changes.

Criterion 3. Its floodplain and hydrological cycles are fundamental for the functioning of the system, and its high productivity creates a very special and temporal heterogeneity of habitats that sustain a complex set of aquatic, semi-aquatic and

terrestrial fauna and flora with high diversity at the global, national and regional levels.

Criterion 5. The Parana alluvial valley provides a variety of habitats for feeding, refuge and breeding for a rich resident and migratory aquatic bird life formed by 71 species belonging to 15 families, with the most representative being Anatidae (16 species), Rallidae (12 species), Ardeidae (10 species) and Scolopacidae (8 species). Many of these species are represented with high densities of populations of considerably more than 20,000 specimens. All these species are excellent indicators of the conservation status of the wetland, which forms an important part of the natural heritage.

Criterion 8. This wetland is a source of essential food for several species of fish. Among the 300 species found in the Middle Parana, there are several migratory species of economic importance, such as the *surubíes* (*Pseudoplatystoma coruscans* and *P. fasciatum*), the dorado (*Salminus maxillosus*) and the *sábalo* (*Prochilodus lineatus*). The detritivorous species, which form the largest part of the biomass, are of great importance and have adapted their life cycle to the conditions of this habitat. The early stages of the *sábalo* are food for the *surubí* larva and juveniles and the dorado, species characteristic of this system. In this complex system governed by flooding and drought, the main bed of the river is the main route for migratory fish. The floodplains offer refuge and food for the early life stages, and there are trophic migrations from the main river to the lakes.

13. General location:

The proposed area is located in the department of General Obligado in the extreme northeastern part of the province of Santa Fe, whose departmental capital, Reconquista (145,000 inhabitants), is within the wetland. Its limits are 28° 00' South in the north, to 29° 30' South in the south, and the border with the province of Corrientes to the east, with the natural limit the centre of the bed of the Parana River (58° 51' West), and highway 11 and its continuation on provincial highway 1 (59° 46' West) in the west.

14. Physical features:

Geology and geomorphology: The site is located on a stretch of the main channel of the Middle Parana River, along a series of north-south faults on the left bank of the alluvial plain. The left bank is evidence of the west-east inclination of the tectonic blocks. The edge of the mesopotamic area is the raised lip of those faults.

The middle stretch of the main bed of the Parana River forms an intertwined pattern with a meandering thalweg and widening and narrowing along a lateral floodplain on the right bank. This floodplain varies in width between 10 and 25 kilometres. There are emerged elevations, lakes, marshes and swamps that have their origin in two types of deposits: those of the banks of the river bed and those from flooding of the shores and floodplain. The general slope of the river is very slight: 6–7 centimetres/kilometre at the city of Corrientes in the north and 4–5 centimetres/kilometre at La Paz, province of Entre Rios to the south (Amsler and Drago, 1984).

Hydrology: The area of the Parana basin up to its entry into the wetland at the city of Corrientes is approximately 1,925,000 square kilometres. The volume of flow of the river in this section immediately upstream from its juncture with the Paraguay River is 16,800 cubic metres/second. Annual average flow and hydrometric levels have recorded a period of low water with lowest water in August-September, which sometimes lasts until the end of the year. There is a period of flooding with maximum high water in February–March because of intense rainfall in the upper basin followed by a drop in water level and a period of flooding of lesser importance from May–June because of flooding on the Iguazú River. It is estimated that the total annual volume of sand carried by the Parana River is close to 17 cubic hectometres/year (Amsler, 1993). The average total concentration of sediment at the city of Corrientes is 250 milligrams/litre (Drago and Amsler, 1981), with transparency at the city of Parana between 0.08 and 0.50 metres (Drago, 1984 a and b). During the past 20 years, the level of the river has risen considerably. This trend is the result of global climate changes, as described by García and Vargas (1988). Based on a study of the past 100 years, Schnack et al. (1995) found that the water level had risen one metre and there was a trend to replace drought by longer flooding.

Watershed of the smaller tributaries of the wetland: The watershed is drained by several streams whose basins gather runoff from the southeastern part of Chaco province and northeastern Santa Fe province. They are relatively small permanent streams, but during heavy rains their flow multiplies, creating shallow marshes on extensive floodplains. In all, the *himbriferas* cover 8,000 square kilometres. They begin as swamps and wet lowlands among grasslands, forming defined beds in the Cuña Boscosa formation, and then flow towards the southeast to the mouth of the Parana valley. Several, such as the Arroyo Los Amores, flow to the south through the valley without loosing their identity for many kilometres, at least during the period of low water in the Parana. From north to south, these streams are Tapenagá, El Rabón, Los Amores, Las Garzas, El Tapialito, Del Rey and Malabrigo, which marks the southern limit of the wetland. During the rainy season, the water is fresh, but during the dry season of low water the water is brackish because of the salinity of the soils through which it flows, especially in the Cuña Boscosa.

Water chemistry: The Parana River is bicarbonated with lime and sodium, with a level of water quality of 9.8 (Vassallo and Kieffer, 1984).

Climate: These are subtropical humid flatlands with mild winters, a resting period for the deciduous trees. The temperature range does not exceed 13° C. There is a constant influence of northeast winds that deposit an annual precipitation of between 1000 and 1300 mm with a high percentage of ambient humidity that reduces the daily range of temperature (Atlas Total de la República Argentina, 1982).

Summary of the main climatic variables at the meteorological station at Reconquista (National Meteorology Service):

Precipitation: average annual of 1281 millimetres;
Dry period: May-September (average 53.4 millimetres);
Minimum monthly: 26 millimetres (July);
Maximum monthly: 172 millimetres (March) with 85 days with annual average

precipitation;
Temperature: maximum absolute of 42.7° C (December); absolute minimum of minus 3.6° C (July);
Annual average: 19.6° C;
Relative humidity: annual average of 80 per cent.

15. Hydrological values:

Periodic flooding, a concept formulated by Junk et al. (1989), represents the main force that determines and controls the river's biological productivity and is a basic characteristic of this wetland. It should be pointed out that substantial changes produced upstream, especially those derived from the effect of the Itaipú dam (Bonetto and Wais, 1990b) have produced important changes. Water levels have become erratic on several occasions with peaks of minor flooding. The floodplain sometimes remains flooded and covered with vegetation for several years. At other times, there are long periods of low water. Although this phenomenon depends on climatic cycles together with water management, wide fluctuations of water level adversely affect the productivity of water and biodiversity (Canevari et al., 1998).

As for underground water, there are two areas: one located along the western limit of the wetland with three overlying aquifers: a salty aquifer on the bottom at a depth of approximately 35 metres, and two that store percolated water. The upper layer has a large volume and is only slightly brackish and poor in chlorates and sulphates, primarily calcareous bicarbonated, sometimes with high levels of nitrates. The second layer has variations in the concentration of salt from the upper layers, is low in salt (700 milligrams/litre), increasing with depth because of continuous contact with the salt water from the bottom (more chlorinated and sulphated). The second layer includes the islands in the river and those on the floodplain. The first have aquifers linked to the river water, while the others have greater salt concentrations and other chemical characteristics because of the influence of salt water on the bottom (Gollan and Lachaga, 1939).

16. Ecological features:

The Parana River is the second longest river system in South America. The river and its floodplain are dominated by the flood cycle. Regular flooding plays a key role, maintaining the complex landscape and biodiversity. (Junk et al., 1989; Neiff, 1990; Bucher et al., 1993), promoting a wide variety of biotypes with a highly complex time-space structure. Furthermore, locally they can break the processes of competitive exclusion or succession (Connel, 1978; Bridarolli and di Tada, 1994), increasing the overall diversity of the system.

This is an area of transition where several biogeographic regions, such as the Parana provinces (Amazon province), the Chaco province (represented by the Oriental district) and the Espinal province (these last two of the Chaco province), each with specific fauna and communities that increase regional biodiversity (Cabrera, 1994).

The influence of the Amazon province can be seen in the development of marginal forests in the coastal and emergent island elevations, which lose their biodiversity as latitude increases (Pensiero, personal communication). These forests are one of the

most diverse habitats with a large variety of trees distributed in three strata, including *timbó colorado* (*Enterolobium contortisiliquum*), *timbó de bañado* (*Albizia inundata*) *ambay* (*Cercropia pachystachya*), laurel (*Nectandra angustifolia*) and *ubajay* (*Hexaclamis edulis*). Mixed into these forests are dense cane fields of *Guadua paraguayana*, which are unique in the province (Prado et al., 1989; Pensiero, personal communication). The strata overlap with a wide variety of vines and climbers in the Bignoniaceae, Compositea, Malpighiaceae, Sapindaceae and Vitaceae families. These forests have a greater diversity of wildlife, and production of fruit is important for a large number of birds (toucans, *surucuás*, *tangarás*) and mammals (bats, *mono carayá*, possums and *corzuelas*, among others). They are also important for seed dispersal (Estrada, 1981) and intervene in the nutrient cycle in the canopy-soil interface (Eisenberg and Thorington, 1973) in renewing epiphytes and their reproduction (Brown, 1986; Perry, 1978). When the frugivorous birds feed on species at the edge of the river, such as the *ingá* or the *ambay*, fruit fall into the water that are eaten by the *pacúes* (*Mylossoma* and *Piaractus*) and other omnivorous fish.

The Chaco vegetation develops in the higher parts in woodlands of *Acacia praecox, Caesalpinia paraguariensis, Geoffroea decorticans, Gleditsia amorphoides, Myrsine laetevirens, Prosopis affinis, P.* spp., *Ruprechtia laxiflora, Schinopsis balansae* and *Sideroxylon obtusifolium*, among others.

In low areas on the islands and near streams, groves of *Tessaria integrifolia* and *Salix humboldtiana* are frequent, often forming pure communities. South of the area, there are forests in which species typical of the Chaco province are found, such as *Schinopsis balansae*, along with species from the Amazon province, such as *Erythrina crista-galli*. These forests, unique in the province, are usually badly degraded.

In low-lying areas throughout the region, there are mixed palm groves of *Copernicia alba*, grasslands of *Spartina argentinensis* and *Panicum prionitis*. Among these plant associations, there are a large number of hydrophilic plant communities. The most relevant are *Echinochloa helodes*, *Leersia hexandra, Luziola peruviana Polygonum* sp. and beds of *Panicum elephantipes*, *Schoenoplectus californicus*, *Solanum glaucophyllum*, *Typha dominguensis* and communities of floating hydrophilic species, such *as Eichornia azurea, E. cassipes, Pistia stratiotes, Pontederia cordata, P. rotundifolia* and *Salvinia biloba* (Pensiero, personal communication). These communities are interrelated in complex successions always determined by the hydrological and sedimentary dynamics of the river (Lewis and Franceschi, 1979). Many of these plants and communities offer refuge, food and nesting sites for a variety of birds, mammals, reptiles and amphibians, such as the *jabirú* (*Jabiru mycteria*), *aguará guazú* (*Chrysocyon brachyurus*), *carpincho* (*Hydrochoerus hydrochoerus*) and the long-tailed otter (*lobito del rio*) (*Lontra longicaudis*). The stands of *Solanum galucophylum* also produce fruit sought by fish.

The aquatic environments are as diverse as the terrestrial or semi-aquatic and are found at the site in lotic environments, such as the main river channel and branches of the Parana, used be the following fish: dorado (*Salminus maxillosus*), which is ichthyvorous in its adult stage (Rossi, 1989). It feeds chiefly on several species in open lotic environments (Del Barco, 1990). A large catfish, the *surubí pintado*

(*Pseudoplatystoma coruscans*), the *surubí atigrado* (*P. fasciatum*) and the *manguruyú* (*Paulicea lutkeni*), which can weigh more than 60 kilos, also use lotic sites for feeding and reproduction. The juvenile *surubíes* are found in vegetated habitats of high structural complexity (Reid, 1989).

Several diverse lentic environments in the alluvial valley, such as lakes, swamps, marshes, streams and their varied submerged (*Myriophyllum, Cabomba*) and emergent vegetation provide refuge and food for juvenile fish of several species. The detritivorous species in this system are of outstanding importance. This is the case of the *sábalo* (a species with a large biomass), which from its early stages (Rossi, 1992) feeds on detritus, thus shortening the trophic chain of the large commercial species that feed on it.

17. Noteworthy flora:

This area is considered as one of the areas with greatest plant diversity in Santa Fe province. There are several plant communities, among which the most important are:

(a) Palm groves of *Copernicia alba*
(b) Grasslands of *Panicum prionitis*
(c) *Carrizales* of *Panicum elephantipes*
(d) *Carrizales* of *Polygonum punctatum*
(e) *Canutillares* of *Leersia hexandra* and *Luziola peruviana*
(f) Communities of various hydrophytes
(g) Stands of *Tessaria integrifolia*
(h) Cane fields of *Guadua paraguayana*
(i) Groves of *Salix humboldtiana*
(j) Gallery forests or forest edges

The following plant species are found in Santa Fe province and are exclusive to the area.

Scientific name	**Common name**	**Family**	**Life form**
Anemopaegma flavum Morong	-	Bignoniaceae	vine
Aporosella chacoensis (Morong) Speg.	-	Euphorbiaceae	tree
Banana arguta Briq.	Francisco Alvarez	Flacourtiaceae	tree
Cecropia pachystachya Trécul	ambay	Cecropiaceae	tree
Crateva tapia L.	Paragua naranja	Capparaceae	shrub or tree
Diospyros inconstans Jacq.	granadillo	Ebenaceae	tree
Geoffroea striata (Willd.) Morong	maní de los indios	Fabaceae	tree
Guadua paraguayana Döll	picanilla	Poaceae	vine
Lonchocarpus fluvialis (Lindm.) Fortunato and Palese	yerba de bugre	Fabaceae	tree
Machaonia brasilensis (Hoffm. ex Humb.) Cham. and Schltdl.	espina blanca	Rubiaceae	shrub

Pacourina edulis Aubl.	cardo	Asteraceae	grass
Sapindus saponaria L.	palo jabón	Sapindaceae	tree

18. Outstanding fauna:

Among the many species in the wetland, there are migratory fish (*surubí, sábalo* and dorado), which carry out long migrations in the main bed of the Parana River, the secondary channels, tributaries and associated ponds. These species have adjusted to changes in the water cycle. There is close synchronization between the breeding season and periods of flooding (Junk et al., 1989; Welcomme, 1985).

The characteristics of the flooding phase, primarily intensity and duration, have a decisive influence on recruitment given the importance of the lentic environments on the first stages of growth (Bonetto et al., 1981; Rossi and Parma, 1992). The importance of these neotropical fish species in the macro system is based on economic and ecological aspects. The *sábalo* (*Prochilodus lineatus*) is one of the most abundant species in the area with a biomass of up to 1000 kilos/hectare in lentic environments of the Middle Parana (Bonetto et al., 1981). Because of its role as a detritivore, it is a key element in the trophic chains, transferring energy from the lower trophic levels to the large ichthyvorous fish (dorado*, surubíes*, etc.). The dorado (*Salminus maxillosus*) has a high sport and commercial value. This and other migratory species, which widely travel throughout the basin (Sverlij and Espinach Ros, 1986), reproduce during the period of low water in lotic stretches using as breeding areas several types of environments on the alluvial plain.

There are 360 species of four-legged vertebrates: 36 amphibians, 46 reptiles, 210 birds and 68 mammals. The amphibians and aquatic reptiles (*yacarés*, turtles and several snakes) play an important role as effective transporters of nutrients from the wetlands to terrestrial environments and vice versa. Two species of *yacarés* are found at the site (*Caiman latirostris* and *C. yacare*) and a species of boa, the *curiyú* or southern anaconda (*Eunectes notaeus*), which is more than four metres long. These reptiles are large predators at the top of the trophic chains in the region. There are two species of reptiles under controlled commercial exploitation in the province: *C. latirostris* and *Tupinambis merianae*.

As for birds, the entire Parana alluvial valley is a site for concentrations of several species of ducks (*Dendrocygna bicolor, D. viduata* and *Netta peposaca*), which are subject to hunting pressure before flying to breeding or wintering sites. Currently, *N. peposaca* is being studied because of a drop in the population that migrates to Brazil. The entire Parana River valley is a sanctuary for aquatic species during periods of severe water deficit, even for species such as the *Jabiru mycteria*, listed in CITES Appendix I. The Middle Parana is used as a migratory route for many neoarctic plovers, such as the *Calidris bairdii, C. fuscicollis, C. melanotos, Limosa haemastica, Tringa flavipes, T. melanoleuca* and *T. solitaria*, which are found there in large numbers when the river is low (Giraudo, 1992). Several bird species migrate north and south through the floodplain. The gallery forests of the Parana are still in good conservation status and are used as corridors by migratory forest birds, such as the *Pachyramphus polychopterus* and *Vireo olivaceus*.

Among the mammals, there are species valuable for their hides. The nutria (*Myocastor coypus*) is captured for its skin and meat although hunting of it is regulated. It is of economic importance for the province of Santa Fe and Argentina, and its skin is known internationally. The long-tailed otter (*lobito de rio*) (*Lontra longicaudis*), formerly captured for its skin and meat, was one of the species with the highest valued skins in Argentina but its population was reduced as a result of excessive hunting. Now a species protected by national law 22421 and provincial law 4830, it is considered endangered at the national level. The long-tailed otter is a Mustelidae adapted to a semi-aquatic environment, closely linked to unpolluted bodies of running water, making it vulnerable. Its diet consists of aquatic vertebrates and invertebrates. Its population density is protected at the site by a wide variety of available habitats and the existence of poorly accessible sites. The *carpincho* (*Hydrochaeris hydrochaeris*), currently protected under provincial law, is the largest rodent in the world and is a source of food and skin for the poor local inhabitants. In addition, in the area there is one of the most southern island populations of black howler (*carayá* or *mono aullador*) (*Alouatta caraya*).

Many tropical species of amphibians, reptiles, birds and mammals reach farther south down the Parana River along with species from the Amazon, such as the snake *Hydrops triangularis*. The site is the limit of distribution for many of tropical and subtropical species, such as the *oso melero* (*tamanduá*) (*Tamandua tetradactyla*), *tucan grande* (*Rhampastos toco*), *surucuá* (*Trogon surrucura*) and the yacare caiman (*Caiman yacare*).

There are several species of vertebrates listed on international and national conservation lists:

Reptiles: Crocodylia: *Caiman latirostris* (CITES, Appendix II/Argentina, R.315/IUCN, endangered/Dirección Nacional de Fauna y Flora, vulnerable); *Caiman yacare* (CITES, Appendix II/D.N.F.F, vulnerable)

Sauria: *Tupinambis merianae* (=*T. teguixin*) (CITES, Appendix II/D.N.F.F, vulnerable)

Serpentes: *Eunectes notaeus* (CITES, Appendix II/D.N.F.F, vulnerable); *Hydrodynastes gigas* (=*Cyclagras gigas*) (CITES, Appendix II); *Boiruna maculata* (=Clelia clelia) (CITES, Appendix II); *Hydrops triangularis* (D.N.F.F, vulnerable)

Aves: Anatideae: *Cygnus melancoryphus*, *Coscoroba coscoroba* and *Sarkidiornis melanotos* (CITES, Appendix II, endangered Fraga, 1996); Falconideae: *Falco peregrinus* (CITES, Appendix I). Ramfastideae: *Ramphastos toco* (CITES, Appendix II); Passeriformes: *Paroaria coronata* and *P. capitata* (CITES, Appendix II)

Mammalia: *Lontra longicaudis* (CITES, Appendix I, endangered at the national level) (García Fernández et al., 1996), *Tamandua tetradactyla* (vulnerable at the national level), *Chrysocyon brachyurus* (vulnerable at the national level).

19. Social and cultural values:

This area is the habitat of an important small-scale fishing activity. The population of Puerto de Reconquista is a total of 624 persons in 131 families. Approximately 150

persons, linked together in a Comisión de Pescadores, fish using rowboats or with low-powered internal engines (4 to 12 HP). Because of the existing fishing regulations in the province, namely law 10.967 which prohibits commercial fishing in the alluvial valley, they have to travel to fishing sites located on the main branch of the Parana River, which takes several, sometimes 48, hours. Out of the total active population, more than 50 per cent depend exclusively on fishing as their sole productive activity. Currently, there is a Puerto de Fiscalización de Productos de la Pesca Comercial at Puerto Reconquista through which 217,700 kilos of fish were registered in 1999. The target species of this fishing are the surubí (Pseudoplatystoma coruscans) and the rollizo (P. fasciatum). Secondary fish are the patí (Luciopimelodus pati) and the dorado (Salminus maxillosus). In addition to Reconquista, the important fishing ports are Avellaneda, El Rabón, Florencia and Tacuarendí. Human activity in the Parana River valley in general, and in particular in this area, has been important since remote time. It is an area of palaeontological importance with many finds of a variety of extinct mammals from the Quaternary, including mastodons, glyptodonts, smilodons, macrauquenias, toxodons, megaterios, milodons and giant deer (Paracero; Epiucero). There are several sites in El Rey and Los Amores arroyos (Ruggeroni, personal communication).

Before the arrival of the Spanish, the Abipones, a branch of the Guaycurúes, lived here. Until now, very few sites have been evacuated for lack of financing. Tombs, ovens, vases and arrowheads have been found at sites that have been studied, such as Arroyo El Aguilar (El Cerrito), opposite Puerto de Reconquista, Rincón de Soto, opposite Santa Lucia (Corrientes), Isla del Indio in the Parana Miní (Las Garzas), Arroyo Malabrigo and Palmar de Berna. With the arrival of the Spanish, the river became an important means of communication until roads were built. On the islands and terraces, life was very intense (animal husbandry and agriculture, hunting, gathering, trade, the sale of boats and well-remembered festive celebrations). There were also Jesuit settlements in Reconquista, whose ruins are just below the city. There are remnants from this period of groups of inhabitants typical of the site: the Isleño and the Costero. The first group lives permanently on the islands. In general, it has a fixed abode and lives off local resources, travelling to the coast from time to time to do something specific or during heavy flooding. The second group consists of fishermen or livestock raisers living in time with the river, grazing animals on the frequently flooded low-lying islands. As a result, there is real transhumance, the herding of animals from one place to another depending on the flooding. Currently, there are informal tourist guides (herders, persons familiar with the island habitat and having access to them) and the local people who take care of weekend houses.

In recent years, the Fiesta del Surubí at Puerto de Reconquista has become the most important tourist event in the region and every year attracts an increasing number of tourists.

20. Land tenure/ownership of:

At the site, there are patches of property belonging to the provincial government of a total of 12,269 hectares. The rest of the land is private property of several municipios and communes.

In addition to the protected nature area of the province, there is a private reserve created by the owner-province agreement with an area of 9897 hectares and another three areas of this type created by an agreement between the Cooperadora de Ecología de Reconquista and private owners.

21. Current land use:

In the area of the floodplain of the Parana River, cattle production on natural grasslands is the main economic activity. It is practised by inhabitants on the higher land, the Dorsal, west of the wetland. Flooding of the river makes it necessary to move the cattle and constitutes the limiting factor for continuous cattle production, as well as for the use and conservation of installations and improvements.

Fishing and hunting are common subsistence, commercial and sport activities. They are important activities, but have developed disorderly and have not been quantified.

The use of forest resources is relatively scarce, limited to native species, especially white wood and *picanillas* or *cañas*. More rational and productive use of the forest is a challenge.

The soils bordering the wetland and extending to its western border (National Highway 11 and Provincial Road 1) are mostly well drained and suitable for farming, covering more than 45,000 hectares, in which there are approximately 400 farmers, who grow species common in the surrounding area (soya, sugar cane, sunflower, cotton and wheat). They also raise livestock. These soils correspond to type III and IV use capacity, (limited farming) and have deteriorated through intensive agriculture. Water erosion of the soils on the hills, typical of the strip of higher elevations near the floodplain, is one of the more serious problems, although conservation practices and the prevention of erosion are carried out.

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

The area of this wetland has not yet suffered significant degradation. However, the following risks exist:

At the site: The unregulated use of agrochemicals is increasingly polluting streams. This wetland does not escape from this phenomenon with settlements linked to this type of activity. Also, industries located in the area only occasionally have adequate waste treatment plants. There is also commercial and sport overfishing.

In the surrounding area: The construction of dams and the channelling of rivers are two important factors contributing to degradation of the wetlands, because the river systems are separated from the wetlands with which they are associated, affecting their productivity (Neiff, 1999). At the present time, there are indications that the increase in the number of dams in the Parana-River Plate system is causing overall changes in the hydrological rhythms (Bonetto et al., 1988 and 1989 in Canevari et al.,1999). For example, regulation of flow has had a negative effect on the biota. In the upper basin of the Parana River, dams have led to the disappearance of large migratory species (Agostinho et al., 1994 in Quiros and Vidal, 2000).

Fishing: Based on the study in variation over time of the relative composition of reported captures at 42 ports on the Parana River between 1941 and 1984, Fuentes and Quirós (1989) found a trend of an increase in the frequency of *sábalo* (*Prochilodus lineatus*) in almost all the system and a decrease in the proportion of other genera, such as the *Piaractus* (*pacú*), *Paulicea* (*manguruyú*), *Brycon* (*salmón*) and *Salminus* (*dorado*). According to these authors, changes in the composition of catches could be due to natural or anthropogenetic causes (including the exploitation of fisheries) (Fuentes and Quirós in Sverlij et al., 1993). In the case of the *surubíes*, the average size of specimens caught in the area has decreased during the past few years.

23. Conservation measures taken:

Current legislation:

Provincial law 11717 (Provincial Environmental Framework Law);
Provincial law 4830 (Hunting, fishing and trade in its products);
Provincial law 9004 (Public forestation);
Provincial law 10552 (Conservation and soil management);
Provincial law 10967 (Commercial fishing seasons in the department of General
Obligado);
Provincial law 11314 (Establishing ports for inspection of commercial fishing);
Resolution 132/89 (Establishing minimum diameters for cutting of natural forest).

Protected Nature Areas

Virá Pitá provincial reserve, the first nature area created in the province in 1963 with an area of 615 hectares), is administered by the Under-secretariat for the Environment and Ecology, located in the department of General Obligado (29º 11' South and 59º 33' West). Legal framework: Decrees 0823/ 63 and 4269/76.

Campo Salas, a multipurpose provincial reserve (private property, with an area of 9897 hectares) is administered by the Under-secretariat for the Environment and Ecology and its owners. Located in the department of General Obligado (29º 11' South and 59º 33' West). Legal framework: Agreement ratified by Resolution 129/96.

24. Conservation measures proposed but not yet implemented:

Draft law for protected nature areas;
Draft unified legislation on fishing with neighbouring provinces;
Draft regulations on disposal of household solid waste.

25. Current scientific research and facilities:

Studies are being carried out by INTA aimed at solving problems of farm production on the high land and in the river valley, the most typical area of the wetland. In the field of livestock production, the classification and management of grasslands is a

relevant aspect in the work of the INTA experimental station at Reconquista. This unit works with crop production technologies, disease and weed control, fertility, complementary irrigation, etc. The Centro Operativo Experimental Tacuarendí (COET) of MAGIC of the province of Santa Fe also carries out experiments on crop adaptation, especially sugarcane.

There are other research projects on the study of wild fauna and flora in relation to biodiversity, biology, ecology and sustainable use. The main studies have been projects carried out by the Under-secretariat for the Environment and Ecology: (1) "Uso del hábitat de nutria, *Myocastor coypus* (Myocastoridae/Rodentia)", (2) "La Producción Pesquera en la Provincia de Santa Fe", (3) "Poblaciones silvestres de nutria, *Myocastor coypus* (Myocastoridae/Rodentia), especie de aprovechamiento comercial", (4) "Caza comercial iguana, *Tupinambis* spp. (Teiidae/Sauria)". Studies by institutes affiliated with CONICET: (5) "Distribución geográfica, organización social y ecología de los monos aulladores de la Argentina" (Museo de Ciencias Naturales Bernardino Rivadavia), (6) "La fauna de vertebrados tetrápodos (Anfibios, Aves, Reptiles y Mamíferos) del área del Parana Medio en Santa Fe: diversidad y conservación" (Instituto Nacional de Limnología), (7) "Mortalidad de vertebrados tetrápodos en rutas del Parana medio santafesino" (INALI), (8) "Las serpientes de los ríos Parana y Uruguay: Patrones de diversidad y rol de los ríos como corredores faunísticos" (INALI), (9) "Diversidad de serpientes (Reptilia/Serpientes) en la cuenca del Parana: taxonomía, biogeografía, biología y conservación".

26. Current conservation education:

The Secretariat for Culture and Social Communication of the city of Reconquista and the Instituto Superior del Profesorado No. 4 in the same city are preparing projects with emphasis on tourism and education, focused on the environment and biodiversity, as well as on the wetland's geology, archaeology and anthropology. In addition, there is a project to create a museum based on the alluvial valley of the Parana River, with emphasis on geography, history, fauna and flora and archaeology, which would be located in the city of Reconquista.

27. Current recreation and tourism:

Activities are based mainly on sport fishing, and there are more than 10 sport fishing firms in the area that provide services related to this activity. Many have temporary accommodations constructed among the islands. Sport fishing takes place year round. Many of the firms have temporary camps on the system of islands. Sport fishing is practiced all year round, although less intensely in winter, given the low probability of catching large fish. Since 1987, the Concurso Argentino de Pesca del Surubí has been held in Puerto de Reconquista in mid June. It is one of the most important in the world. At the tenth competition (1996), 465 boats and 1395 fishermen participated. During the three days of competition, there are a large number of tourists, approximately 5000 persons per day. In addition, there are guided ecotourism visits, mostly for primary and secondary schools that travel to the islands to observe the fauna, flora and main ecological characteristics.

28. Jurisdiction:

Department of General Obligado
Municipality of the city of Reconquista
CPN Héctor N. Ocampo
San Martín 1077
C.P. 3560
Reconquista

Subsecretaría de Medio Ambiente y Ecología of the province of Santa Fe
Subsecretario Lorenzo Domínguez
P. Cullen 6161
C.P. 3000
Santa Fe

29. Management authority:

Governor of Santa Fe province, Carlos Alberto Reutemann
Casa de Gobierno
3 de Febrero 2649 (C.P. 3000
Santa Fe

30. References: