



## Park Profile – Brazil Lagoa do Peixe National Park

**Date of most recent on-site evaluation:** November 2002

**Date of publication:** July 2003

**Location:** Rio Grande do Sul State, Southern region of Brazil

**Year created:** 1986

**Area:** 34,400 hectares

**Ecoregion:** Uruguayan Savanna (NT0710) and Atlantic Coast Restingas (NT0102)

**Habitat:** Terrestrial habitats: restingas: arboreal, shrubby-arboreal, herbaceous (all of them may be classified as early formations with marine influence); flooded grasslands called *mata palustre* (early arboreal formations with fluvial influence); *banhados*: which are early shrubby formations with fluvial influence.

Aquatic habitats: sea; lagoons, lakes.

Inter-tidal habitats: salt water marshes called *marismas* (early formations with fluvial-marine influence).



### Summary

#### Description

Lagoa do Peixe National Park is 34,4000 hectares and is made up of the *Campos Sulinos* (Southern Fields) and *Mata Atlântica* (Atlantic Rain Forest) biomes. It includes representative samples of the ecosystems of the Rio Grande do Sul coastal zone such as saltmarsh, coastal dunes and lagoons, arboreal habitat, restingas, beach and a marine area. The beauty of the park's dunes and lagoons can be appreciated by all park visitors.

Lagoa do Peixe National Park was named after the lagoon found within the reserve with the same name. Lagoa do Peixe is the largest lagoon within the park; it is shallow and is about 35 km long, making it an important feeding ground for birds (IBAMA, 1999).

#### Biodiversity

The number of different habitats within the park has resulted in some unique environmental qualities and features. This in turn has resulted in international recognition for Lagoa do Peixe National Park: it is considered a Ramsar “Wetland of International Importance” site; it is part of Brazil's Mata Atlantica Biosphere Reserve; and has been identified by Birdlife International as an important shallow water source for birds (IBAMA, 1999).

Two of the species found within the park, the leatherback turtle (*Dermochelys coriacea*) and the Brazilian guitarfish (*Rhinibatos korkelii*) are considered critically endangered throughout the world according to the IUCN. There are 12 other species listed as threatened with extinction on Brazil's national list of endangered species and on the list maintained by Rio Grande do Sul State.

### *Threats*

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ParksWatch considers Lagoa do Peixe National Park to be **critically threatened** and urgent solutions are needed to ensure its protection and to maintain its biological diversity and natural ecological processes. The most significant threats include human presence within the conservation unit (due to the lack of land tenure system), land conversion into land for grazing and agricultural, biological contamination, and over fishing.

## **DESCRIPTION**

### *Physical Description*

Lagoa do Peixe National Park is located on the coastal region of Rio Grande do Sul State, in Brazil's southern region. The cities directly related to the park are Mostardas, Tavares and São José do Norte. The park is found within the latitudes 31°0'46"S and 31°29'27"S and longitudes 50°45'13"W and 51°11'12"W.

The climate classification of the region, according to Köppen, is "C", meaning subtropical humid. The average annual temperature is 17.5°C. January and February are the hottest months while June and July are the coldest (Tagliani *et al.*, 1992 *apud* IBAMA, 1999).

A dominant characteristic in the region of Lagoa do Peixe is its environmental variability and mobility over relatively short time periods. This occurs because of the local meteorological conditions and wind action, which contributes to the accelerated modification (Tagliani *et al.*, 1992 *apud* IBAMA, 1999).

The park is 34,400 hectares and is mostly flat, varying from 0 to 15 meters above the sea level over a few mobile dunes. In addition to the park's terrestrial area, the park boundaries extend 1 km into the sea in the southeast part of the park. Geologically, the park is considered part of São José do Norte restinga, on the coastal plain of Rio Grande do Sul. The term restinga refers to the recent sedimentary depositions either of marine or continental origin. The land within the park separates the Atlantic Ocean from Laguna dos Patos. This restinga formation is the result of at least four cycles of rising and falling sea level, caused by the alternation of glacial and interglacial periods (at the end of the Cenozoic, mostly in the Quaternary period) (IBAMA, 1999).

The park includes marine environments, lakes, lagoons, beaches, mobile and stationary dunes, arboreal restingas, shrubby restingas, and herbaceous restingas, swamps, *marismas*, and flooded forests.



*Marine portion of the park*



*Some of the lagoons found within Lagoa do Peixe National Park*



*The beach*



*Lagoa do Peixe dunes*



*Arboreal restingas*



*Shrubby restingas*



*Herbaceous restingas*



*Swamps*



*Marismas*



*Flooded forest*

Next to the sea, the park is composed of a stretch of sandy beach followed by vast dunes subject to constant alterations by the steady action of the wind.



Further inland, arboreal and shrubby restingas prevail. They are found on the elevated rise called *Barreira III*, which spreads throughout the whole extension of Lagoa do Peixe National Park and has its origins in marine and aeolian deposition (wind deposition) that occurred during the

Pleistocene period. These formations support dense groupings of relatively small, twisted trees, and a vast quantity of vines of the Bignoniaceae family (IBAMA 1999).



*The Barreira III*

Following the arboreal-shrubby restingas are the flooded forests. These forests are found in areas of low elevation where water saturation is high. Trees in the flooded forests tend to grow tall and form an open canopy.



Finally, lakes, lagoons, swamps and *marismas* are found in the central portion of the park, between the arboreal-shrubby restinga strip and the stretch of dunes along the sea.

The greater Lagoa dos Patos' restinga is marked by a series of coastal lakes and lagoons shaped like a rosary in an advanced evolutionary process. Within the national park, the predominate body of water is Lagoa do Peixe (literally translated as: Fish Lake), which is actually a lagoon because it maintains communication with the sea during most of the year. In the northern portion of the park, there are two fresh water lakes (Lagoa Veiana and Pai João). The marismas and swamps circle and connect these lakes.



*Lagoa do Peixe is not actually a lake, rather a lagoon because its connection to the sea is maintained throughout the year.*

According to Dinerstein's ecoregion classification system (Dinerstein *et al.*, 1995), approximately 74% of the park is located in the *Uruguayan Savanna* ecoregion. Another 20% is considered the *Atlantic Coast Restingas* ecoregion. The rest of the park is marine. Even though this ecoregion designation classifies most of the park as savanna, in reality, all of the terrestrial portions of the park are made up of pioneer formations influenced by marine, fluvial and/or fluvial-marine processes, and are commonly grouped under the name of restingas.

Sixteen archeological sites have been identified within the area of the park, most of them originated by natives of the *Tupiguarani* ethnic group. Most of these sites are much degraded because of anthropogenic actions (agriculture, grazing, sport beach auto racing, and treasure hunting and looting) or by natural processes such as rain and wind. Despite their advanced degradation, opportunities still exist to find evidence and information to learn about the ethnic groups that occupied the region (IBAMA, 1999).



*Map of the park*

## Biodiversity

Because Lagoa do Peixe National Park includes several different habitats in a relatively small area, the park is favored by a significant number of species, especially migratory birds. The physical-chemical and structural features of Lagoa do Peixe lagoon, such as shallowness, salinity, temperature, and connection to the sea during most of the year, allow the migration of several species like the Brazilian pink shrimp (*Farfantepenaeus paulensis*) and the mullet (*Mugil* spp.). The presence of rich invertebrate fauna in Lagoa do Peixe (especially benthic organisms) and fish, make it a preferred feeding spot for many migratory and local birds. Resende (1988 *apud* IBAMA, 1999) confirmed that Lagoa do Peixe is important feeding ground for birds that follow a migration route between the United States and Patagonia. In addition, it is an important moulting ground and reproduction site for several species.

During the elaboration of the management plan, a list of the species found in the park was compiled. The data were gathered from field surveys and from results of previous studies. They determined that there are 84 angiosperms inhabiting the marismas, dunes, and aquatic environments and 81 species in arboreal-shrubby restingas. They registered 18 zooplankton species, 44 macrozoobenthos, 52 species of fish, 6 amphibian species, 17 reptiles, 182 bird species and 39 mammal species [(Chao *et al.* 1982, Gianuca 1985, Danilevicz 1989, Borsato 1992, de Bem Jr. & Laurino 1994, Pinedo 1994, Pinedo & Barreto 1994, Cordazzo & Seeliger 1995, Maisonave *et al.* 1995, Nascimento 1995, NEMA 1995, Tagliani 1995, Bassoi *et al.* 1996, Costa *et al.* 1996, Zerbini & Secchi 1996, Calazans & Antunes 1997, Campos & Knak 1997, Glöeden 1997, das Neves 1997, Pinedo 1997, Ferrer 1998) *apud* IBAMA 1999].

Among the confirmed species of the park, the Rio Grande do Sul State's red list of endangered species includes 4 birds, 4 mammals, 2 crustaceans and 1 fish (Decreto Estadual 41.672/2002). The Brazilian National Red List (MMA *et al.*, 2003) considers that 3 reptiles, 2 mammals and 1 bird species found within the park are threatened to a certain degree. And, according to the World Conservation Union (IUCN 2002), 3 birds, 3 reptiles, 1 fish and 1 mammal are listed as threatened of extinction. The following table provides details of these lists and the species included:

Species	Taxa	Common names	Brazilian Red List (MMA <i>et al.</i> , 2003)	IUCN Red List (IUCN, 2002)	Rio Grande do Sul Red List (Decreto Estadual 41.672/02)
<i>Caretta caretta</i> L.	Reptilia, Testudinis, Cheloniidae	loggerhead (E); tortuga boba (S); cabeçauda, tartaruga-meio-pente (P)	Vulnerable	Endangered A1abd	Not listed
<i>Chasmagnathus granulata</i> Dana	Crustacea, Decapoda, Grapsidae	estuarine crab (E); caranguejo, catanhão (P)	Not listed	Not listed	Vulnerable
<i>Chelonia mydas</i> L.	Reptilia, Testudinis, Cheloniidae	green turtle (E); tortuga blanca, tortuga verde (S); tartaruga-verde, aruanã (P)	Vulnerable	Endangered A1bd	Not listed
<i>Ctenomys flamarioni</i> Travi	Mammalia, Rodentia, Octodontidae	tucu-tucu, tucu-tucu-branco (P)	Vulnerable	Not listed	Vulnerable

	(Ctenomydae)				
<i>Dermochelys coriacea</i> L.	Reptilia, Testudinis, Dermochelyidae	leatherback,turtle (E); baula, tortuga laud (S); tartaruga-de-couro (P)	Critically endangered	Critically endangered A1abd	Not listed
<i>Lontra longicaudis</i> Olfers	Mammalia, Carnivora, Mustelidae	neotropical otter (E); nutria de água (S); lontra (P)	Not listed	Data deficient	Vulnerable
<i>Macronectes giganteus</i> Gmelin	Aves, Procellariiformes, Procellariidae	Southern giant-petrel (E); pardelão-gigante (P)	Not listed	Vulnerable A1abde + 2bde	Vulnerable
<i>Oncifelis geoffroyi geoffroyi</i> d'Orbigny & Gervais	Mammalia, Carnivora, Felidae	Geoffroy's cat (E); gato de mato (S); gato-do-mato-grande (P)	Not listed	Near Threatened	Vulnerable
<i>Pontoporia blainvillei</i> Gervais & d'Orbigny	Mammalia, Cetacea, Pontoporidae	La Plata river dolphin (E); tonina, delfin de La Plata (S); toninha, cachimbo, boto-amarelo, franciscana (P)	Endangered	Data deficient	Vulnerable
<i>Procellaria aequinoctialis</i> L.	Aves, Procellariiformes, Procellariidae	white-chinned petrel (E); pardela gorgiblanca (S); pardaleta-preta, pretinha, patinha (P)	Vulnerable	Vulnerable A1bcde + 2bcde	Vulnerable
<i>Rhinobatos korkelii</i> Müller & Henle	Chondrichthyes, Rhinobatiformes, Rhinobatidae	Brazilian guitarfish (E); raia-viola, viola (P)	Not listed	Critically endangered A1bd + 2bd	Vulnerable
<i>Sporophila collaris</i> Boddaert	Aves, Passeriformes, Emberizidae	rusty-collared seedeater (E); coleira-do-brejo (P)	Not listed	Not listed	Vulnerable
<i>Tryngites subruficollis</i> Vieillot	Aves, Charadriiformes, Scolopacidae	buff-breasted sandpiper (E); correlimos canelo (S); maçarico-acanelado (P)	Not listed	Lower Risk – Near Threatened	Vulnerable
<i>Uca uruguayensis</i> Nobili	Crustacea, Decapoda, Ocypodidae	fiddler crab (E): chama-maré, caranguejo-violinista (P)	Not listed	Not listed	Vulnerable

The place is also an important reproductive and moulting area for the black-necked swan (*Cygnus melanocoryphus*) and the Coscoroba Swan (*Coscoroba coscoroba*), a formerly endangered species but no longer listed as such (IBAMA, 1999). The broad-snouted caiman (*Caiman latirostris*) is also found in the park. This species is listed on the Rio Grande do Sul State Endangered List and is listed in Appendix 1 of CITES, meaning that it is threatened with extinction and CITES generally prohibits commercial international trade in specimens of these species ([www.cites.org](http://www.cites.org)).

Some researchers consider the Hudsonian godwit (*Limosa haemastica*) as highly vulnerable. Approximately 30% of the global population of this species is found in Lagoa do Peixe from



October to April. The Hudsonian godwit has specific habitat requirements including high salinity and high pH ponds or coastal beaches with the same characteristics. Lagoa do Peixe is one of the few places in the world where they can often be spotted in great numbers during migration North, the peak month is March.

So far, no endemic species have been detected within the park. Tourists who come to the park have the chance to enjoy the natural beauty of the landscapes and to observe popular species such as flamingos, swans, Roseate spoonbills, fur seals, sea lions, and even whales.

### *Management*

Lagoa do Peixe National Park was created in 1986 by Federal Decree 93.546/86. Because it is a Federal Conservation Unit, the Brazilian Institute of the Environment and Natural Renewable Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, IBAMA) is responsible for Lagoa do Peixe National Park's administration.

The Conservation Unit (UC) does have a management plan (IBAMA, 1999). It was created the coordination of the University of Rio Grande Foundation (FURG) and with the participation of a team comprised of technicians from IBAMA, the Environmental Studies Center (NEMA) and Pelotas Federal University (UFPel). In addition, other local stakeholders took part in planning workshops during its elaboration, which lasted from 1997 to 2000.

The management plan is very broad and details issues concerning federal, state and regional issues of the park, physical, biotic and social-economic features of the park's area, and its official boundaries, human impacts, and the land planning of the UC, including zoning definitions.

In December 2000, the management plan was internally and technically approved by IBAMA's board of directors responsible for conservation units (DIREC). Now, IBAMA needs to officially approve the document and it will probably happen some time during this year (2003), after the UC's technical team elaborates the Executive Summary.

Currently, the UC's management team carries out the work according to what was established in the management plan. Such management plan was elaborated in agreement with the methodologies adopted by IBAMA to national parks category and it must be reviewed after 5 years of its publication; that is, in 2004. However, because the management plan outlined a large work plan, not everything is being handled simultaneously, and some activities take precedence to the detriment of others. The lack of financial and human resources also contribute to the management team's inability to fulfill all the objectives outlined in the management plan.

The National System of Conservation Units Law (SNUC) defines the overall objectives for the federal Conservation Units. For national parks it states, "the preservation of the natural ecosystems of great ecological importance and scenic beauty is the primary goal [of a national park]. The only activities allowed are scientific research, educational activities, and environmental interpretation activities, through nature-based recreation and eco-tourism." That is, only indirect uses of the parks' resources are allowed.

In order to fulfill this mission and achieve the primary goal, and in accordance with its unique physical features, the park was divided in the following management zones:

The **Primitive Zone** allows activities of inspection, environmental monitoring, and scientific research that cannot be performed in other zones.

The **Extensive Use Zone** allows activities such as inspection, environmental education, research, environmental monitoring and public use.

The **Intensive Use Zone** includes all services offered to the public, such as the Visitors Center, shops, snack bars, amusement parks and guide service installations. These services and infrastructure is only allowed in this zone.

The **Special Use Zone** is the zone in essential to the administration, maintenance, and services of the conservation unit, including for example residence areas for the park personnel, and workshops, among others.

The **Restoration Zone** is closed to public visitation. The access is restricted to inspection, environmental monitoring and scientific research only.

The other two zoning categories available according to the law are the Intangible Zone (this is even more remote than the US equivalent *Wilderness Zone*) and the Historical and Cultural Zone. These were not designated in Lagoa do Peixe National Park because there was a lack of pristine zones within the park, and because the archeological sites in the park have already been severely damaged and did not warrant special zoning (IBAMA, 1999).

There are 20 employees making up the team who runs the park (7 park guards, 4 administrators, 2 maintenance employees, and 7 technicians). Most of them were hired recently, using resources acquired through a mitigation/compensatory deal with a highway construction yard located near the park. While the employees have specific duties associated with their positions, they frequently share duties as needed. For example, the park guards also perform maintenance tasks and the technicians realize inspection and control activities. There are approximately 10 people working in the park at any one time from 8:00 a.m. to 6:00 p.m. and there is no night shift.

Within the park, there is only one house functioning as the base of operations for field activities. The administrative headquarters is located in the city of Mostardas.

Until 2002, IBAMA provided the majority of park's budget (for general operation and park protection). Some projects, such as publicity, environmental education, the elaboration of the management plan, have been sponsored by other institutions. Since 2002, a new source of funding was obtained through "environmental compensation," as a mitigation measure from the public highway project. The annual budget is not fixed and varies between US\$ 14,000 and US\$ 145,000 per year.



*The house that serves as the operation center for the park.*

The park does not count on a consultative council yet, which shall be constituted soon, in agreement with the law. Members of local government, NGOs, universities, local producers, civil society organizations, and other stakeholders will be part of this council. Their role will be to support the park managers and help the protected area accomplish its missions.

### *Human Influence*

Anthropogenic influence on the park is direct: people permanently reside within park boundaries. The land ownership issue should have been resolved by now as the park was created 17 years ago (in 1986). Those who legally owned land within the park should have been properly compensated and the land purchased by the state. Those who illegally resided within the park should have been relocated to other places, outside of the park limits. Nonetheless, only approximately nine percent of the area has been legally ordered and properly titled.

There are currently four distinct communities found within the park in addition to individual rural owners. According to the National System of Conservation Units Law – SNUC- (Lei Federal 9.985/2000), the private owners must be evicted and the communities and premises vacated.



The occupants of all the four communities live almost exclusively on fishing, both in Lagoa do Peixe and in the sea.



*One of the community members checking his net on the beach*

The rural owners on the other hand, mostly raise beef cattle and grow onion and other subsistence cultures.



Nearby communities also utilize the park. One common use is for recreation, mainly using the area as a bathing resort. Fishing, either amateur or professional, is also practiced by members of these communities. Aside from these mostly recreational uses, there are also some illegal commercial activities. Commercial fishing boats fish both inside and outside of the marine park limits. Some employ techniques that are damaging to the marine ecosystem, such as bottom trawling within a few meters from the beach line.



*Two boats are used to hook up the net that then trawls the bottom of the ocean, trapping everything in its path including corals, vegetation, and disturbing the ocean floor.*

Some forestry companies, which have not been evicted yet, plant *Pinus elliotti* and *Pinus taeda* in the park, and throughout the entire region. Even though the plots do not take a great portion of the national park, vast areas of *Pinus* spp. and, on a smaller scale, *Eucalyptus* spp., are planted in the immediate neighbor zone of the park, mostly in the north sector.



*Forestry plantations border the park and even extend into the park in some places.*

### *Access*

Lagoa do Peixe can be accessed from Porto Alegre by route RS040 (or alternatively by freeway BR290 out of Porto Alegre to Gravataí then up to RS040) to Capivari then continuing by route RST101 to Mostardas. The total distance is 210 km and it is completely paved. From Rio Grande in the south take a ferry through Lagoa dos Patos to São José do Norte then follow route RST101 to Mostardas. The route from Rio Grande to the park is approximately 160 km long and it is not completely paved; some parts are pure sand.

From the city of Mostardas, the access to the park is by land, through unpaved secondary roads. One of them connects Mostardas to the bathing resort of Mostardense, crossing the park from east to west. This road is the busiest road within the park and is used by more than 5,000 people (mostly during the summer season). A few vehicles, depending on the tide, use the stretch of the beach instead of the roads, negatively impacting the beach environment.

### *Tourism*

Small-size power lines are present in several sectors of the park. The largest one provides power to the Mostardense bathing resort and is installed along the trail called *Trilha das Dunas*.



*Power lines along the Trilha das Dunas trail*

Tourism in the park not well established. Although there are not accurate data, it is estimated that about 2,400 people visit the park every year. Of these, about 30% drop by the Visitors Center located in Mostardas. Tourism will most likely increase, especially with improved road system, increased publicity, and the inclusion of the coastal plain region as an ecotourism development site.

Visits to the park coincide with the summer months, from December to March (peaking in January). It is estimated that approximately 98% of the visitors are Brazilians. It is also assumed that a significant number of the tourists from other regions go to the park for birdwatching and that local tourists go to the park for the beach and amateur fishing.

Even though there is a clear upward tendency in tourism and the capacity to accommodate tourists is going up, the infrastructure for tourism is relatively small-scale. There are small hotels and bed and breakfast type accommodations offering basic services.

In Mostardas, there are a small number of tour guides for hire. The park's management plan recommends that park personnel work with tour guides in order to better control the activities and to strive for more efficient, organized tourism within the park. Only two tourism agencies operate in the park, one from Mostardas and another from Porto Alegre, the State capital.

### *Conservation and Research*

Since its creation, Lagoa do Peixe National Park has been supported by some institutions that have carried out specific projects, including research activities needed in order to properly manage the area. Below is a list of some of the organizations that have carried out projects in the park:

- CEMAVE (National Center of Research to Wild Birds Conservation): an IBAMA-linked organization responsible for birds monitoring projects, mainly the neo-artic and neo-tropical migratory species, for almost 20 years in the region of the park. The results of their studies provided scientific justification for the creation of the park. <http://www2.ibama.gov.br/cemave/>
- Fundação Zoobotânica do Rio Grande do Sul (Zoobotanic Foundation of Rio Grande do Sul State): studies of plant communities and flora of the park's restinga. [www.fzb.rs.gov.br/fzb.html](http://www.fzb.rs.gov.br/fzb.html)
- FURG (Federal University of Rio Grande Foundation): they have carried out several projects relating to ecology, biology and the dynamics of populations of some species; some which are very important to the management of the park. For example, they have studied Neotropical otter (*Lontra longicaudis*), terns (*Sterna* spp.), and two crustaceans of the order Decapoda. They have also looked into issues such as the chemical composition of Lagoa do Peixe and the remains of fishing activities. [www.furg.br](http://www.furg.br)
- GEMARS (Aquatic Mammals Studies Group of Rio Grande do Sul): For several years they have been carrying out a research project on the occurrence and natural history of sea mammals and sea turtles on the North coast of Rio Grande do Sul.
- Lagoa: is a local NGO of Mostardas municipality. It performs projects mostly in the environmental education field. Lagoa is one of the organizers of Brazilian Migratory Birds

Festival, event that normally takes place in September, attracting birdwatchers from the whole country.

- NEMA (Education and Environmental Education Center): institution that has been working for several years in the region of the park, focusing mostly on environmental education and a few initiatives of fixation and stabilization of mobile dunes. In the past, they elaborated and published material about the park. [www.octopus.furg.br/nema/](http://www.octopus.furg.br/nema/)

- PROAVES (Brazilian Association for Birds Conservation): one of the institutions that organize the Brazilian Migratory Birds Festival. [www.proaves.org.br](http://www.proaves.org.br)  
[http://www.festiaves.hpg.ig.com.br/viagens/9/index\\_pri\\_1.html](http://www.festiaves.hpg.ig.com.br/viagens/9/index_pri_1.html)

- PUCRS (Pontifical Catholic University of Rio Grande do Sul): scientific research concerning the Brazilian pink shrimp (*Farfantepenaeus paulensis*). Such projects, apart from the data about biology and ecology of the species, have as their goal to generate information to the management of the Brazilian pink shrimp, which is possible the species under the greatest exploitation pressure in Lagoa do Peixe. [www.pucrs.br](http://www.pucrs.br)

- UFRGS (Federal University of Rio Grande do Sul): specific projects aiming to characterize the arboreal-shrubby restinga vegetation. [www.ufrgs.br](http://www.ufrgs.br)

The management plan outlines the most important themes for new studies. This outline is described under the *Knowledge Acquisition Program, a Research Subprogram*. One of the objectives is to advertise the park as a site to develop scientific research and conservation programs. This subprogram is still being structured, though several themes have already been identified in the management plan.

Aside from projects of institutions that collaborate with the park, IBAMA itself develops specific conservation projects concerning themes like fishing control, human occupation and bird monitoring.

One of the principal programs, and one that may face the local opposition, is the program to decrease fishing in Lagoa do Peixe. This program is outlined in the *Environmental Management Program, Resources Management Subprogram* of the management plan. According to the plan, five years from the management plan's date of approval, fishing is to be completely eliminated from Lagoa do Peixe. This project must be developed in conjunction with a project to develop alternative income activities in the region. It is important because it attempts to actually enforce the Conservation Units law (Lei Federal 9.985/2000), which states that in reserves categorized as integral protection conservation units (such as the national park) only indirect resource use is permitted. During this period of progressive decreased fishing, only pre-listed fishermen will be authorized to fish for the Brazilian pink shrimp (*Farfantepenaeus paulensis*), the mullet (*Mugil* spp.), and the sole (*Achirus garmanii*), according to criteria and techniques already determined in the management plan.

Another planned activity as outlined in the management plan under the *Operations Program, Land Regularization Subprogram*, is the phased-in removal of bathing resorts and fishing communities from the park (IBAMA, 1999). The objective of this program is to reduce the human impacts from these communities while minimizing the social and cultural impact on the people. The overall goal is to eliminate these resorts and communities completely from the park.

## THREATS

### *Current Threats*

#### *Human occupation / Lack of legal land titling*

Humans live within the park because of the lack of land organization and titling. There are four main groups occupying the land: communities that make their livelihood from fishing, rural land tenants engaged in agricultural production, tourist companies, and forestry companies.

The fishing communities have a strong impact, mainly on the aquatic environments. The mere presence has an impact, but more importantly is their resource extraction. There is essentially competition for resources and space between the fishermen and the migratory birds. Communities are also capable of introducing exotic species that may become invasive and harm the natural environment. Existing exotic species include domesticated dogs, cats, and pigs.



The rural producers, are responsible for converting terrestrial natural systems into agricultural altered areas, which in some cases become degraded. Large areas of flooded grassland within the park have been gradually turned into pasturelands for grazing, causing a vast reduction of the flora species richness. The majority of flooded forests was converted into pastureland, while the arboreal restinga stretch (both inside and near the park) has been progressively converted into pasture and crops.



In addition, electric fences have been erected in order to detain the cattle throughout the park, even crossing some of the ponds. These fences endanger visitors as well as any species that might touch the fence.

#### *Biological contamination (Pinus spp. tree plantations)*

The forestry companies, though do not amount to a big area within the park (approximately 3 to 5 % of the park), converted rich ecosystems into monocultures. According to the management



plan of the park (IBAMA, 1999), the presence of massive blocks of *Pinus* spp. can modify the regime of prevailing winds, their directions and intensity, which can change the interaction of dunes with marshes and other bodies of water. In addition, the *Pinus* spp. needles release substances that inhibit germination of most native species' seeds (IBAMA, 1999). There is also a heightened risk of fire because of the *Pinus* spp. plantings. Even though there have been no forest fires linked to such plantings within the park, there have been in the outskirts. This shows the potential is real and indicates the necessity of regular monitoring, especially during the dry season and droughts.

The biggest threat associated with *Pinus* spp. plantings (inside or near the park) is biological contamination. These species are not native to the area and have the ability to spread and self-colonize.



*Pinus* spp. seeds are easily spread throughout this wind-dominated system and the seeds have already become part of the seed bank within the national park. With the extremely fast growth, new specimens of *Pinus* spp. quickly colonize arboreal and shrubby restingas in the region. Due to its size and colonizing capacity, they break through restinga's canopy, altering the restinga natural balance.



*A pinus spp. seedling found within the park*



*Fast growing Pinsu spp. can outgrow native restinga tree species*

With the competition for light and nutrients, native species soon undergo physiological stress and are steadily eliminated from the system to the spontaneous establishment of *Pinus* spp. The result is massive and immediate loss of biodiversity in addition to compromising the scenic beauty of the park on the account of changing landscapes and environments. There are possibly other negative consequences, but they have yet to be studied.

### *Other exotic species*

In addition to the above-mentioned *Pinus* issue, several other exotic species have been detected within the park. Domestic animals, such as pigs (raised in the fishermen communities), oxen and sheep (raised by ranchers) have been introduced to the park. Currently, the greatest impacts of such species in the park include nest trampling, soil erosion, and the predation of native species (by domesticated cats and dogs). There also are several introduced plants, such as eucalyptus, onions, and bamboo, which have the potential to spread and alter the native plant communities. These species have been detected in an area designated as environmental preservation.

### *Poaching*

In the State of Rio Grande do Sul, hunting has cultural and historical roots, even more so than in the rest of Brazil. For example, hunting is forbidden by law in most of Brazil with the exception of some places in northern Brazil, hunting is legal in Rio Grande do Sul. There are strict hunting regulations, and hunting is only allowed for certain species during certain seasons, nonetheless, there may be confusion regarding hunting in the national park. Hunting is illegal in any national park in Brazil. During our visit to the park, although we did not see direct evidence of poaching, we were told that it was a common activity. Poaching occurs in the park and throughout the whole region. The main targets are the capybara rodent (*Hydrochaeris hydrochaeris*) and the nutria (*Myocastor coypus*). Poachers are probably locals (including the park residents) and from other regions. These animals are hunted for sport and because they are a source of food. Birds are also poached for commercial sale as pets. Swan (*Cygnus melancoryphus*) and other bird species' eggs are gathered for consumption. Even though hunting and poaching in Lagoa do Peixe National Park represent a medium-degree threat due to relative low intensity, they should not occur at all within a national park.

### *Lack of access control*

IBAMA has no effective control at all over the paths, trails, and roads that provide access to the park. Practically anyone can access any sector of the conservation unit without a single control post. During times of heavier visitor flow, the park administration sets up control booths at the two main entrances, *Trilha das Dunas e Trilha do Talha Mar* (Dunes and Cutwater Trails). In addition to the ease of terrestrial access, ships, mostly fishing vessels, enter the marine portion of the park without any restrictions or permissions.

### *Fishing*

Fishing greatly impacts the species supposedly protected by the marine portion of the park. Fishing boats, mainly from the state of Santa Catarina, illegally fish within the boundaries of the park. Since the park administration does not have boats in order to conduct sea patrols, they have no way to enforce the parks boundaries. The "protected" stretch of ocean is in reality open to fishermen who practice bottom trawling less than 200m off the shore. IBAMA does has the

Coast Guard's support to limit such fishing. This cooperation is on paper only and does not function; it can take more than two days for a call to be answered—if answered at all.

### *Tourism*

Tourism, in a broad way, generates some pollution in the form of garbage. Tourists tend to leave their garbage along trails and beaches. Nevertheless, when compared to the garbage that washes up on the shore from the tide, this trash generated by tourists is insignificant.

There is no infrastructure to deal with tourism. Tourists can cause erosion on trails in the park. Motorized vehicles also cause erosion and even dune destruction because they tend to drive off the established paths, creating new routes and trails, destroying the dunes in the process.

Currently, tourism is a low-level threat. However, it must be monitored.

### *Dams*

There are small dams run by rural producers trying to control the flow of water in their fields and rice cultivation areas. Such dams, though located outside of the park boundaries to the south and north, may be causing serious alterations in the park's hydrologic system, since they affect the drainage of the existing marshes (IBAMA, 1999).

## ***Future Threats***

### *Human occupation / Lack of legal land titling*

In case no effective action takes place to title the land and to relocate current dwellers, the future generations, mainly fishermen, might come to claim land use rights and seek fishing access to the lakes, lagoons and sea. Although they are not entitled to such right, because the current dwellers do not legally own the land, there might be some sort of movement demanding the right of fishing within the park.

There is a great danger that some portions of the park, such as the flooded forest, the arboreal restinga, and the flooded grasslands, will be converted into pasture or agricultural land and will no longer be significantly represented within the park. That will cause a significant loss of the wealth of species protected by the park. These land conversions must to stop in the short or medium-term.

### *Biological contamination and environmental alteration*

Cultivated exotic plants like *Pinus* spp. may disperse and colonize whole areas, becoming invasive. Domestic animals like dogs and cats can also become feral, and increase their predation on native species. Cat and dog proliferation also raises public health safety concerns. Increase in the numbers of other domestic animals will increase the impacts previously described.

A serious risk to the integrity of the park's ecosystems is the possibility of colonization of the area by exotic wild pigs (*Sus scrofa*). That has been happening in several parts of the Rio Grande do Sul State and the hybridization with domestic grazed pigs is an imminent danger.

### *Tourism*

There is a tendency increased tourist activity. That can become a problem if no infrastructure is constructed to accommodate the visitors. Visitation needs to be monitored and stations need to be installed, as recommended in the management plan. The main impacts of the possible tourism raise would be increased solid waste, erosion, and increased perturbation of feeding and nesting birds.

### *Unstructured team and lack of financial resources*

Approximately 60% of park staff was hired using resources obtained from environmental mitigation compensation in the region. Since that resource will only be available until 2005, there is a great risk that the conservation unit's team will be significantly reduced after 2005 if no other resources are identified or made available.

This same problem goes for not only the number of staff, but for the conservation unit's activities and maintenance as outlined in the management plan. The planned budget for the next few years is about US\$ 140,000 per year. But, the resources that really are available to the park every year through IBAMA's allocation vary significantly. The average figure is US\$ 23,000 a year; a lot less than the park's planned budget.

## **RECOMMENDED SOLUTIONS**

### *Human occupation/ lack of land regularization*

Concerning fishing activities, most of all in Lagoa do Peixe, IBAMA must honor its commitment and only allow fishing in exceptional cases. Nevertheless, it should fulfill the management plan, which calls for the steady reduction of fishing until it's eliminated within 5 years at most. In this way, IBAMA must enforce the law and drive back any illicit fishing activity in the park. That is, during and after the steady decrease of fishing, inspection must be reinforced, mostly during Brazilian pink shrimp's fishing season, to prevent unauthorized extractions.

Concerning rural producers, apart from evicting current dwellers and returning the land back to its natural state, IBAMA should immediately impose restrictions on new land conversions. It ought to enforce environmental legislation since alteration of restinga areas is forbidden according to the Brazilian Forest Law. First, IBAMA must develop rules for using electrical fences based on technical standards. IBAMA must evaluate and register all fences to determine if they meet the standards or not. If the fence does not meet the standard, it should be removed or altered to meet the standards. If in certain areas fences not meeting standards may be allowed if they keep cattle out of more pristine, natural areas. In these situations, park administrators must ensure that the fences will not harm visitors or local species. Once IBAMA has purchased the land and the previous settlers and owners have been evicted from the park, all the fences must be removed.

### *Biological contamination (Pinus spp. tree plantations)*

The administration should promptly establish a plan of action to terminate all and every spontaneous regeneration of *Pinus* spp. that are not found within the established plantations. To achieve termination, basic measures could start this process of biological decontamination and awareness.

First, the whole team of the park should be urged to monitor the colonization of *Pinus* spp. aiming at the generation of data on the most important places to intervene. Besides, as part of routine, the employees should immediately terminate every new tree that could be destroyed without the use of equipment like chainsaws.

In the more critical areas, where there already is occupation of a great number of colonizing invasive species, group efforts should be realized with the goal of totally cleaning certain spots. For those, IBAMA should mobilize a task-force which would count on voluntary actions of any segment of society that would be willing to help. Good examples are local NGOs, State universities, city halls and even forestry companies themselves, that are normally responsible for contamination.

Regarding the responsibility over biological contamination, IBAMA should work with forestry companies to get their commitment to help remove the invasive trees from natural areas. That would be a demonstration of good will in solving the situation and recognizing their own environmental responsibility concerning such matter. Since such enterprises must worry about “environmental friendly” certification and good image of their products to be able to act in some markets, there are good chances of agreement between the parts. Furthermore, such companies have a group of workers used to handling field situations that, under IBAMA’s coordination, may be a great asset in the “decontamination” process.

Such very same forestry companies might be interested in exploiting the already grown *Pinus* from the plots that are inside the park. They should be removed as soon as possible minding, nonetheless, to the assistance for the regeneration of restinga in these areas. A detailed environmental restoration program in *Pinus* spp. planting areas should be established and carried out under high priority.

### *Other biological contaminations*

The administration of the park should conduct a campaign for domestic cats and dogs sterilization inside the park’s area, hence controlling their population.

In the agricultural sector, IBAMA should advise the owners who are currently within the park and also the ones next to it, not to allow them to introduce exotic grasses as grazing developing technique. The use of such species, most of all a few African ones like *Brachiaria* spp. and *Eragrostis plana* grasses, may present great spontaneous colonization threat to new areas, destroying the local vegetated communities just as what has been happening to other regions.

## *Tourism*

The management plan concerning the establishment of visitors care center infrastructure should be implemented.

## *Dams*

IBAMA should inspect the existence of environmental license to agricultural dams, mostly the ones used to control the water flow in rice crops. Besides inspecting what already exists, it should also prevent further authorizations for new undertakings that would come to interfere with the hydrologic system of the park, in a context of buffer zone control.

## **CONCLUSION**

The current conditions in the region of Lagoa do Peixe National Park, resulting from the existence of several distinct environments, allow the area to be one of the richest in South America concerning aquatic birds. Some migratory species depend on this area for resting and feeding. Preserving the bird fauna was the main impetus for the creation of the conservation unit (IBAMA, 1999).

According to the on-site evaluations, ParksWatch concluded that the park is **critically endangered**, meaning that it is not currently reaching its conservation goals. Urgent and emergency measures are necessary to reverse the negative trends and impacts within the park.

The greatest threat detected is the lack of land titling resulting in private occupation and resource use throughout most of the conservation unit. Conversion of land into pasture and agricultural areas and into homesites causes serious damage, even destruction, in the areas where it occurs. Biological contamination is evident, especially by *Pinus* spp. colonization in the restingas. The fishing activity in Lagoa do Peixe directly impacts the areas meant to be preserved for birds.

Solving such problems is not easy and implies not only the need for financial resources but also collaboration from different sectors of society, such as city halls, tourist development institutions, and forestry companies, in order to best manage the park and its resources.

Before collaboration is possible, IBAMA itself must recognize the state of Lagoa do Peixe National Park and acknowledge that it is endangered. Then, IBAMA must adopt the political and institutional will and commitment to start to solve the situation. They must start with one of the most difficult issues: land titling. IBAMA must gain title to all of the land within the conservation area before it can carry out what has already been planned in the management and implementation plan of this conservation unit.

## Bibliography

- BASSOI, M., SECCHI, E. R., DALLA-ROSA, L., ZERBINI, A. N., JANA, D. 1996. Interactions between cataceans and fisheries of the south and southeast Brazilian fleet. In: REUNIÓN DE TRABAJO DE ESPECIALISTAS EN MAMÍFEROS ACUÁTICOS DE AMÉRICA DEL SUR, 7, de 22-25 oct. 1996, Vinã del Mar, Chile. Resumos n. 101.
- BORSATO, L. J. 1992. Plano de Manejo do Parque Nacional da Lagoa do Peixe. Rio Grande: FURG/IBAMA. Relatório Final.
- CHAO, L. N., PEREIRA, L. E., VIEIRA, J. P., BEMVENUTI, M. A., CUNHA, L. P. R. 1982. Relação preliminar dos peixes estuarinos e marinhos da Lagoa dos Patos e região costeira adjacente, Rio Grande do Sul, Brasil. *Atlântica*, Rio Grande, 5 (1): 67-75.
- CORDAZZO, C. V., SEELIGER, U. 1995. Guia Ilustrado da Vegetação Costeira no Extremo Sul do Brasil. Rio Grande: FURG. 275 p.
- DANILEVICZ, E. 1989. Flora e vegetação de restinga na barra da Laguna do Peixe, Tavares, Rio Grande do Sul: levantamento preliminar. *Iheringia*, 39:69-79.
- DE BEM JR., R. T. , LAURINO, L. B. 1994. Contribuição ao conhecimento da ictiofauna da região do Parque Nacional da Lagoa do Peixe-RS, Brasil. *Rev. UCPEL*, 4(2) :61-66.
- DECRETO ESTADUAL número 41.672 de 11 de junho de 2002. Lista vermelha da fauna ameaçada de extinção no Rio Grande do Sul. Estado do Rio Grande do Sul. Brasil.
- DINERSTEIN, E. *et al.* 1995. **A Conservation Assessment of the Terrestrial Ecoregions of Latin America and the Caribbean**. The World Bank and The World Wildlife Fund.
- GIANUCA, N. M. 1985. The ecology of a sandy beach in southern Brazil. Southampton: University of Southampton. 330p. (Ph Thesis).
- IBAMA INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS 1999. Plano de manejo do Parque Nacional da Lagoa do Peixe – Fase 2. IBAMA/FNMA/FURG/NEMA/UFPEL. Brasília. 6 encartes + anexos.
- IUCN 2002. 2002 IUCN Red List of Threatened Species. Downloaded on 04 July 2003.
- LEI FEDERAL número 4.771 de 15 de setembro de 1965. Código Florestal. República Federativa do Brasil.
- LEI FEDERAL número 9.985 de 18 de julho de 2000. Sistema Nacional de Unidades de Conservação. República Federativa do Brasil.
- MAISONAVE, L., KNAK, R. B. , PAIXÃO, C. M. 1995. Variação morfológica de *Zannichellia palustris* L. nas lagunas costeiras do Rio Grande do Sul. *Atlântica*, Rio Grande, 17: 63-72.
- MMA MINISTÉRIO DO MEIO AMBIENTE *et al.* 2003. Lista vermelha da fauna brasileira ameaçada de extinção.

NASCIMENTO, I. L. S., 1995. As aves do Parque Nacional da Lagoa do Peixe. IBAMA, Brasília, 41p.

NEMA NÚCLEO DE EDUCAÇÃO E MONITORAMENTO AMBIENTAL. 1995. Planilhas de Campo do Projeto de Monitoramento Costeiro.

PINEDO, M. C. 1994. Review of small cetacean fishery interactions in southern Brazil with special reference to the Franciscana, *Pontoporia blainvillei*. Rep. Int. Whal. Commn 15: 251-259. (Special Issue)

PINEDO, M. C. , BARRETO, A. 1994. A baleia bicuda de Cuvier, *Ziphius cavirostris*, no Rio Grande do Sul, Brasil. In: REUNIÃO DE TRABALHO DE ESPECIALISTAS EM MAMÍFEROS AQUÁTICOS DA AMÉRICA DO SUL, 6, de 24-28 de outubro, Florianópolis. 88p. Resumos.

PINEDO, M. C. 1997. Marine mammals turtles: coastal and marine environment and their biota. In: SEELIGER, U. , ODEBRECHT, C. , CASTELLO, J. P. (Eds). Subtropical convergence environments: the coast and sea in the Southwestern Atlantic. Heidelberg: Springer-Verlang, p.150-154.

RESENDE , S. 1988. Nobreeding strategies of migratory birds of Lagoa do Peixe , RS , Brasil. 150 p. (Master's thesis).

TAGLIANI, C. R. et al. 1992. Geologia e geomorfologia da Porção Sul do Parque Nacional da Lagoa do Peixe, RS, Brasil. In: CONGRESSO BRASILEIRO DE GEOLOGIA, 37, SBG / SP, São Paulo. Boletim de Resumos Expandidos, 2:292-293

TAGLIANI, P. R. A. 1995. Estratégia de planificação ambiental para o sistema ecológico da Restinga da Lagoa dos Patos-Planície Costeira do Rio Grande do Sul. São Carlos: Universidade de São Carlos. (Doctorate's dissertation).

ZERBINI, A. N. , SECCHI, E. R. 1996. Occurrence of an Hector's beaked whale, *Mesoplodon hectori* (Gray, 1871), in the tropical Atlantic Ocean. In: REUNIÓ DE TRABAJO DE ESPECIALISTAS EN MAMÍFEROS ACUÁTICOS DE AMÉRICA DEL SUR, 7 ,de 22-25 Oct., 1996, Viná del Mar, Chile. Resumos n. 81.