

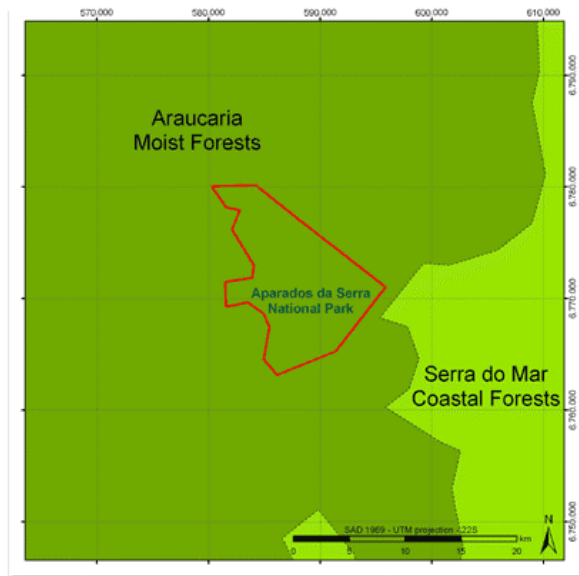


PARKS WATCH

Strengthening Parks to Safeguard Biodiversity

Park Profile – Brazil Aparados da Serra National Park

Date of most recent on-site evaluation: May 2003
Date posted: March 2004
Location: Rio Grande do Sul and Santa Catarina states, southern region of Brazil
Year created: 1959
Area: 10,250 hectares
Ecoregion: *Araucaria Moist Forests*
Habitat: Atlantic dense rain forest, grasslands, Araucaria forest, and cliff vegetation



Figures 1 and 2: Location of Aparados da Serra National Park and the Ecoregions.. Fundação O Boticário, 2003.

Summary

Description

Aparados da Serra National Park (PNAS) is located in south of Brazil, on the eastern boundary between Rio Grande do Sul and Santa Catarina States. The name “Aparados da Serra” means the rugged transition between the high plateau region and the littoral plain region in which grasslands form. The main goal is to conserve the grasslands, forests, and cliff vegetation refuge and all of the natural elements associated with those ecosystems. Furthermore, the national park protects the impressive scenery formed by geological and geomorphologic processes. The main attraction of the park is the famous Itaimbezinho Canyon.



The Itaimbezinho Canyon is breathtaking.



Biodiversity

Despite its small size (10,250 ha), the park shelters a wide variety of environments and, consequently, rich biodiversity. This is due to two prevailing factors. First, there are two distinct geomorphologic units: the plateau and the sharp slopes on its edge. Second, the park is found in a region of ecological convergence, where contact between coastal forests of Atlantic influence, grasslands and Araucaria forests occurs. Endangered species of the plateau, such as the red-spectacled parrot (*Amazona pretrei*), the maned wolf (*Chrysocyon brachyurus*), and the puma (*Puma concolor*), are protected in the park. Other endangered species like the neotropical otter (*Lontra longicaudis*), the ocelot (*Leopardus pardalis*) and the brown howler monkey (*Alouatta fusca*) live on the slopes.

Threats

ParksWatch-Brazil considers Aparados da Serra National Park to be **threatened** and there is a great risk that in the near future the conservation unit will fail to protect its biological diversity and natural ecological processes. Immediate remedial actions are necessary to ensure the park fulfills its management goals. The greatest threat to the park is permanent human presence within its borders and the related activities that are not compatible with its management objectives. The human presence is a direct result of the park's incomplete land titling process.

Description

Physical Description

Aparados da Serra National Park is located in the northeast region of Rio Grande do Sul State, on the border with the extreme southeast of Santa Catarina State and shelters a portion of the beautiful Serra Geral. It covers parts of the municipalities of Cambará do Sul (60%), on the plateau of Rio Grande do Sul and Praia Grande (40%), on Santa Catarina's plain. Outside of the park but within its area of influence are the municipalities of São João do Sul, in Santa Catarina, and Mampituba, Morrinhos do Sul, Três Forquilhas, Terra de Areia, São Francisco de Paula and Jaquirana, in Rio Grande do Sul.

The Park shelters geomorphologic formations of the Serra Geral, which are exceptionally beautiful and attract approximately 5,000 visitors a month. The creation of the park in 1959 signified an early concern regarding the future of such formations in Brazil's south region. In 1992, Serra Geral National Park was created, with the goal of expanding protection of the region. Serra Geral National Park's 17,300 ha adjoins Aparados da Serra National Park. The two parks are managed together.

Aparados da Serra was originally created by Decree no. 47446 in 1959, with approximately 13,000 ha. It was reduced to 10,250 ha in 1972 through a new decree (no 70296). The reduction can be contested since, for the alteration to be legally valid, it should have been done through law passed at the congressional level not merely another presidential decree.

After the 1972 reduction, the park was managed excluding the northern section, according to its new size. Thus, the limits of the park are within the projected coordinates UTM 581426 and 595840 for longitudes and 6777840 and 6763175 for latitudes, the zone 22 south constituting the reference zone (calculated by ParksWatch—Brazil using a shape file provided by the Brazilian Institute of the Environment and Natural Resources (IBAMA)).

There is some discrepancy between the approximate area mentioned in the decrees and the areas indicated by the shape files available on IBAMA's website. ParksWatch - Brazil's calculations show that the current area of the park is 15% bigger than the park's area estimated through the alteration decree. However, the accuracy of the file should be confirmed before considering the true area as larger. Ground truthing may be necessary.

Considering the shape of the conservation unit, we determined that the park's perimeter to area ratio is "medium-favorable". That is, for each hectare of protected area, the conservation unit presents 4.8 m of perimeter. Nevertheless, when taken into account the adjoining Serra Geral National Park, the outer perimeter (park's interface with private unprotected areas) and the area of Aparados da Serra National Park, a theoretical ideal value of 3.1 m of perimeter per hectare of protected area is reached. This relation is extremely favorable for the park.

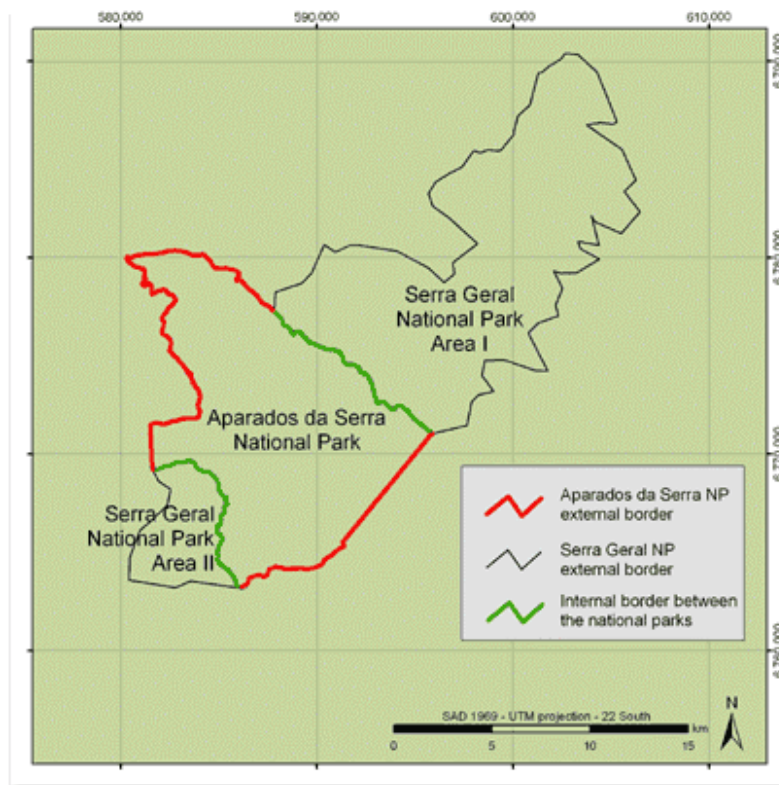


Figure 3: Aparados da Serra and Serra Geral National Parks. Fundação O Boticário, 2003

There are three ways to reach Aparados da Serra National Park. The first is from Porto Alegre (capital of Rio Grande do Sul) through highway RS-020, passing by Taquara and São Francisco de Paula and reaching Cambará do Sul. This route totals 182 km of paved roads. From this point on, there are still 17 km of unpaved road until the main entrance gate and visitors' center. The second option is a variation of the first, via the tourist cities of Gramado and Canela. This option adds 58 km to the trip. The third option is the most adequate for those coming from either the shore or the north, from highway BR-101. From BR-101 near Torres municipality, it is an additional 19 km on an unpaved road that goes up Faxinal ridge, until it reaches the front entrance of the visitors' center (IBDF, 1984; IBAMA, 1995). There is no regular public transportation to the park.

The park is located in the temperate zone, with mild temperatures and well-defined seasons. However, due to the proximity to the sea and relief formations, the climate is more subtropical. Rainfall is abundant and well distributed throughout the year, reaching 1500-1750 mm a year on the plains, and 1750-2250 mm a year on the plateau. January is the hottest month, when the average temperature varies around 20 to 22°C. A very important feature concerning climate is the occurrence of several frosts during the year and at least one occurrence of snow in the region of the plateau (IBDF, 1984).

The park is found completely within the Atlantic Forest biome and, according to Dinerstein et al. (1995), it is part of the Araucaria Moist Forests ecoregion. The park shelters stretches of low montane Atlantic rain forest, montane Atlantic rain forest, high montane Araucaria moist forest, cloud forest, grasslands without trees or shrubs, grass vegetation on thin soil with rock formations, peat swamps, and cliff vegetation



Grasslands with rock formations



Peat swamps



High montane Araucaria moist forest



Grasslands



Cliff vegetation

Biodiversity

The environmental diversity found within Aparados da Serra National Park favors the existence of different natural communities associated with these environments. Significant species richness results, even considering the degree of continued anthropogenic alteration.

The region of the plateau is covered by huge extensions of grasslands and bushes interspersed with *Floresta Ombrófila Mista* (Araucaria Moist Forest). The park is one of the last refuges of well-conserved Araucaria Forests, which shelter endangered species such as the red-spectacled parrot (*Amazona pretrei*), the maned wolf (*Chrysocyon brachyurus*) and the puma (*Puma concolor*).

The Atlantic Rainforest grows on the escarpment slopes and canyon valleys. It occurs in a wide altitudinal gradient, which renders a great diversity of fauna and flora, including species such as the neotropical otter (*Lontra longicaudis*), the ocelot (*Leopardus pardalis*) and the brown howler monkey (*Alouatta fusca*).

Rambo carried out the first studies on the flora and the vegetation of Aparados da Serra (1956 *apud* IBDF, 1984). Later, Klein (1978 *apud* IBDF, 1984) published data on the vegetation of Santa Catarina. In 1979, Baptista and collaborators performed a specific study about Aparados da Serra National Park's vegetation (Batista *et al.* in IBDF, 1984), and listed approximately 635 species within the park.

The great environmental variation also favors the presence of a rich fauna in terms of number of species, with evidence suggesting the possibility of preserving remnant communities, which present a high degree of endemism. Though big mammals are no longer abundant due to historical anthropogenic pressure, species like the maned wolf, the puma and the Pampas deer (*Ozotocerus bezoarticus*) were still found in the Park, mainly in the regions of difficult access, during the elaboration of the Management Plan in 1984. Among the vertebrates, fish seem to be poorly represented, mostly on the plateau. That is due to both the constant presence of barriers (waterfalls) and nutrient poor waterways (IBDF, 1984; IBAMA, 1995).

Several studies were used to elaborate the management plan and they documented at least 143 bird, 48 mammal, and 39 amphibian species (Belton, 1975, Breyer, 1978 e Braun *et al.*, 1980 *apud* IBDF, 1984).

The *pinhão* (seed of the Paraná pine, *Araucaria angustifolia*) is an important component of several species' diet, so important that it influences the patterns of fauna distribution and the seasonal occurrence of some species within the park (IBDF, 1984).

Among the species found in the national park, at least 18 are part of lists of endangered species, the so called "red lists." From those, 9 are animals and 9 are plants. The listing follows.

Species	Taxa	Common name	Brazilian Red List (MMA <i>et al.</i> , 2003)	IUCN Red List (IUCN, 2003)
<i>Amazona pretrei</i> Temminck	Aves, Psittaciformes, Psittacidae	red-spectacled amazon parrot (E); amazona cabecirroja (S)	vulnerable	vulnerable A1cd + 2cd
<i>Amazona vinacea</i> Kuhl	Aves, Psittaciformes, Psittacidae	vinaceous amazon (E); loro pecho vinoso (S)	vulnerable	threatened C2a
<i>Araucaria angustifolia</i> (Bertol.) Kuntze	Coniferopsida, Coniferales, Araucariaceae	Brazilian pine (E); pino de Misiones (S)	vulnerable	vulnerable A1cd
<i>Cedrela fissilis</i> Vell.	Magnoliopsida, Sapindales, Meliaceae	cedro (S)	not listed	threatened A1acd+2cd
<i>Chrysocyon brachyurus</i> Illiger	Mammalia, Carnivora, Canidae	maned wolf (E); aguara guazu (S)	vulnerable	low risk / near threatened
<i>Dicksonia sellowiana</i> (Presl) Hook	Polypodiopsida, Cyatheales, Cyatheaceae	(fern)	endangered	not listed
<i>Harpyhaliaetus coronatus</i> Vieillot	Aves, Falconiformes, Accipitridae	crowned eagle (E); águila coronada (S)	vulnerable	vulnerable C1+2a
<i>Ilex paraguariensis</i> A. St. Hil.	Magnoliopsida, Celastrales, Aquifoliaceae		not listed	low risk / near threatened
<i>Inga lentiscifolia</i> Benth.	Magnoliopsida, Fabales, Leguminosae		not listed	vulnerable A1c
<i>Leopardus tigrinus</i> Schreber	Mammalia, Carnivora, Felidae	little spotted cat (E); gato atigrado (S)	vulnerable	near threatened
<i>Leopardus wiedii</i> Schinz	Mammalia, Carnivora, Felidae		vulnerable	not listed
<i>Limnocittes rectirostris</i> Gould	Aves, Passeriformes, Furnariidae	straight-billed reedhaunter (E)	vulnerable	low risk / near threatened
<i>Mazama nana</i> Hensel	Mammalia, Artiodactyla, Cervidae	Brazilian dwarf brocket (E)	vulnerable	data deficient

<i>Ocotea catharinensis</i> Mez	Magnoliopsida, Lurales, Lauraceae		vulnerable	vulnerable A1cd
<i>Ocotea pretiosa</i> (Nees) Mez (= <i>O. odorifera</i>)	Magnoliopsida, Lurales, Lauraceae		endangered	vulnerable A1cd
<i>Podocarpus lambertii</i> Klotzsch	Coniferopsida, Coniferales, Podocarpaceae		not listed	data deficient
<i>Puma concolor</i> Nelson & Goldman	Mammalia, Carnivora, Felidae	cougar, mountain lion (E); león bayo (S)	vulnerable	near threatened
<i>Solanum inaequale</i> Vell (= <i>S. pseudoquina</i>)	Magnoliopsida, Solanales, Solanaceae		not listed	low risk / conservation dependent

Endangered species found in the park

Management

Aparados da Serra National Park was created in 1959 by federal decree no 47446/59.

The park has a management plan, officially adopted in 1984, which defines the zoning, the management programs, and a program of integrated development. The primary management goals are integral nature protection, to provide open-air recreation, scientific research, and environmental education. Currently, the management plan is in final revision phase.

In 1995, an emergency action plan was devised (IBAMA, 1995) to control the fires that affected the grasslands and to improve the park's management deficiencies. This plan was partially carried out and resulted in action proposals for the park, supplying the national park with the minimum amount of infrastructure needed.

In 2002, complying with one of the requirements stipulated in the laws regulating the Brazilian System of Protected Areas, a consultative committee for this national park was created. Its primary function is to support the administration of the protected area in many different areas. It also aims to involve the local society, the business sector, non-governmental organizations and government institutions in discussions of mutual interest concerning the national park. At the time of this assessment, the consultative committee was composed of 76 institutions, 33 of which are entitled to vote.

IBAMA is responsible for park administration. At the time of ParksWatch's evaluation, the park team was composed of 23 employees: 2 administrators, 3 technicians, 6 for visitors' care, 2 people for the maintenance, 2 drivers, and 8 guards. However, inevitably, personnel often share functions to meet the demands and carry out the work.

Of the entire team, only 4 people are employed by IBAMA. The other are hired from other institutions such as Camará do Sul city-hall and *Universidade do Extremo Sul Catarinense*, and lent to the park. Nearly all the members of the surveillance team (which is responsible only for the security of the buildings and the physical patrimony and do not perform the activities of a park guard), with the exception of those in charge of the entrance, are contract workers rather than staff.

Each year, a prevention and fire-fighting team is hired temporarily. In 2002, 21 people were hired for the team. This period normally extends from July to January, when the risk of fires is greatest. The brigade's work is part of IBAMA's program, *Centro Nacional de Prevenção e Combate aos Incêndios Florestais* (PREVFOGO) that provides financial resources and technical support and training to the fire fighters. To aid inspection and control activities in the park, there are information and control booths that also function as guard outposts (Figure 4 shows the location of these outposts).

The park is now open to the public and, for that, it counts on a visitor's center, trails and lookouts. Two trails, Vértice and Cotovelo, are located next to the visitors' center and allow the visitor to observe Itaimbezinho Canyon from the edge of the plateau. The third trail, Rio do Boi, goes through a stretch of grassland and enters, to a certain point, Itaimbezinho Canyon itself.



Figure 4: Location of the control posts along the Park's borders, Fundação O Boticário, 2003



Aparados da Serra's visitor's center



One of the lookout points in the Park

Visitation has been significantly increasing within the last years, as shown in Figure 5. In 2002, the park received about 38,000 visitors. When fees are collected (they are not always collected), it costs R\$6/person (about US\$2) and there is a parking fee (R\$3 for motorcycle, R\$5 for car, R\$10 for bus). These revenues go into the general national park coffers and then are redistributed among parks; thus, Aparados da Serra is not able to use the money collected from its visitors directly.

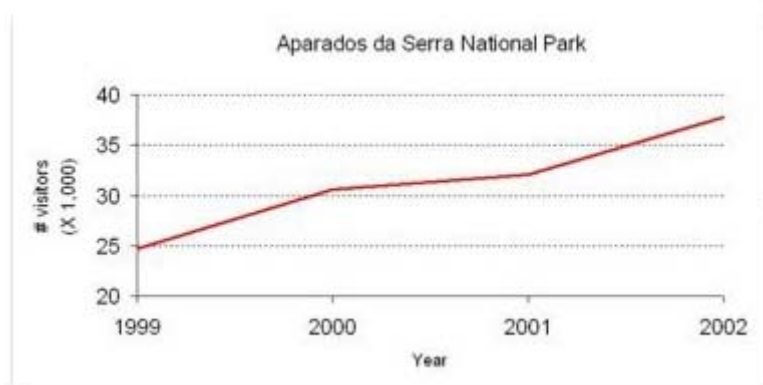


Figure 5: Visitation to Aparados da Serra National Park between 1999 and 2002

Like most Brazilian conservation units, Aparados da Serra National Park has a budget that varies significantly from one year to another. In 2002, the park was given R\$ 51,400 (approximately US\$ 18,000) to carry out its annual plan. This is actual money for use in park management; the salaries are not paid with money.

Since the elaboration of the management plan in 1984, the need to consider areas adjoining the Park as protected has been considered, in order to shelter other exquisite geological formations, increasing significantly the size of the protected area, and improving possibilities of species maintenance in the long term. As a result, in 1992 Serra Geral National Park was created, consisting of two areas neighboring Aparados da Serra.

Even though they are legally two distinct conservation units, Aparados da Serra and Serra Geral National Parks are managed as one. The administrative and operational team is divided between the two parks. However, Serra Geral is in a much earlier stage of implementation and totally lacks infrastructure. Aparados da Serra management plan is being revised and most likely this shared administrative will remain, resulting in a protected area of 27,550 hectares.

Human Influence

Almost the entire park has already suffered anthropogenic disturbance. The Araucaria forest has suffered from logging, the grassland areas bear a long history of cattle ranching use, and the cliff sides and canyon valleys have been subject to selective harvesting flora and fauna.

It should be noted that in 32.5% of the park the issue of land tenure has not been resolved and people still live there. A few remaining inholders who have not had their lands expropriated and indemnified, were able to get, in court, the right to continue to develop their productive activities within the park. Their main economic activity on the plateau is cattle ranching, which causes impacts both in the plains and in the forests. In the fields, there are problems like soil compaction, selective pressure upon vegetable species, and burning for the renewal of grazing areas. In the forests, the cattle cause damage mainly in the undergrowth by eating and trampling young plants and hindering the natural regeneration of the forests. On the slopes of the cliffs, the main damage forest conversion to banana (*Musa paradisiaca*) cultivation and the collection of firewood.



Ranching and banana cultivation are the primary activities in the region, both of which damage the natural vegetation.

Other activities developed in the surrounding areas have a direct influence on the park. The cultivation of Pine trees (*Pinus* sp.), on the plateau, and Japanese raisin tree (*Hovenia dulcis*) on the plains, result in biological contamination problems. Fire, used to renew the grazing areas, often enters the park.

Conservation and Research

One of the management goals of Aparados da Serra National Park, and all of Brazil's national parks, is to facilitate and promote scientific research. Within the management plan, research fits in an investigation sub-program, which is included in the *Environment Management Program*. At the time the management plan was elaborated, it highlighted the need for joint efforts to conduct research. Specific areas of interest included biodiversity inventories - mainly on unknown groups, research regarding the management needs after securing all land titles and dwellers left, breeding and domestic animals and exotic plants, survey and study of endemic or special needs species, and geological studies in the canyons, among others. The management plan includes a monitoring sub-program, which regulates activities in systematic data collecting such as weather information, the progress of degraded environments regeneration, and tourist visitation data.

In 1995, eleven years after the completion of the management plan, the Emergence Action Plan pointed out that the research activities stated in the management plan were not being carried out. It was observed that the research conducted was not included among the priorities of the plan. Furthermore, it found that the results of the studies conducted in the park were not available. As a result, the Emergency Action Plan outlined activities to fulfill the research goals included in the management plan. Included among these activities was the development of a database of research conducted in the park and the prioritization of future research.

According to the 2002 Activity Report (IBAMA, 2003), the administration carried out a campaign for attracting new research in the Park. Research institutions were contacted to inform them about the legal matters concerning research activities within the national park. However, the administration failed to assemble and furnish a lab, and they failed to establish contacts with several key governmental agencies including the National Council of Scientific Research (CNP) and FINEP, which provides financial support for research. Plus, the document pointed out that the activities proposed by the Emergency Action Plan had been executed, except for the definition and promotion of priority research themes, which awaited the review of the management plan. In an interview, those responsible for the protected areas stated that even though studies were being carried out, the tendency is for an increase of research.

According to information gathered from the park's management at the time of ParksWatch's evaluation, 47 research projects were being conducted in the national park. From these, 29 focused specifically on the park and its surroundings, and the other 18 counted on the park as an area to develop research activities, studying processes in a greater scale.

Twenty-six studies (55% of the total) investigated biophysical features of the park, nine were linked to ecology, six to botany, five to zoology, two to palynology, two to pedology, one to microbiology and one to genetics. Ten projects focused on the management of the unit, seven on public use, two the administration, one the environmental education and one focused the relation between the park and its surroundings.

Among the institutions that have been conducting research within the Park, the *Universidade Federal do Rio Grande do Sul*, the *Universidade do Vale do Rio dos Sinos* and the *Universidade do Extremo Sul de Santa Catarina* have numerous projects.

Research conducted by the park team itself should be noted. These include studies that aim to monitor and control exotic species in the park, primarily of *Pinus* spp. and *Ulex* sp.

At the time of this evaluation, there were several ongoing research projects including research about the flora of Aparados da Serra region, a survey on rodents, a study on serpent ecology, one focusing the pampas fox and one concerning birds.

The research carried out in the park, as well as research conducted in any conservation unit in Brazil, is required to receive authorizations from the head of the unit and from IBAMA. IBAMA's authorization is necessary in case the research involves gathering biological material.

The park has lodging for researchers, but currently it needs improvements. Staying in the lodge requires a fee defined by an IBAMA's standard table (about US\$2 per day), which according

to the Park's team is not feasible for most researchers. The collection of research fees is used to maintain the structures for the same activity.

Threats

Current Threats

Land tenure

The lack of land tenure and, consequently, people living inside the park is undoubtedly the main obstacle for the park to fulfill its goals. Currently, the federal government has title to 67.5% of the park. Despite that fact, farmers still occupy part of this 67.5% even though they were expropriated and paid. Nonetheless, the activities developed by the remaining dwellers cause great impact not only on non-tenured areas but frequently affect already tenured areas as well.

On the plateau region, raising cattle is the main economic activity carried out by residents and it creates significant impacts on natural grasslands. The pressure of pasturing alters the floristic composition and the structure of the fields, for it puts at risk a few species through selective pasturing. The consequences of cattle trampling are significant: it compacts the soil, making it prone to erosion and it can even change the characteristics of the hydrologic cycle. Cattle also graze in forested areas. The cattle use forest fragments, feed on young plants and alter the medium and long-term dynamics of the floral community.

Another threat linked to raising cattle on the plateau is the use of fire to 'renew' the grasslands used as pasture. This practice, very common in the whole region, uses fire to eliminate dried biomass accumulated on the surface of the soil during the driest seasons, and to stimulate new sprouts upon which cattle feed. However, the fires often reach beyond the limits of targeted areas, entering other areas of the park.

On the plains and slopes, the most alarming activity is the establishment of banana plantations (*Musa paradisiaca*), which requires a drastic land conversion and intense use of pesticides. Since they are generally planted on the slopes, banana plantations cause erosion problems that make restoration of the areas after the land is properly titled difficult. In addition, such plants grow underground stalks and stems, which are difficult to access and eradicate.

On the slopes, vegetation is cut for use as firewood, although on a small scale.

Still, the presence of people living in the unit also causes problems like biological contamination, because exotic crops, trees and ornamental plants are grown and can escape home garden plots.

The presence of domestic animals such as dogs and cats is critical, for they are potential predators to local fauna, and also act as carriers of several diseases that can infect the wildlife.

Lastly, there are conflicts with visitors, for example, who often come upon domestic animals such as horses and oxen on the trails or even next to the visitors' center. Undoubtedly, running into farm animals during a tourist's visit to a national park undermines the experience and minimizes the visitor's ability to completely connect with unspoiled nature.

Activities in the park's surroundings

Even though Aparados da Serra National Park has part of its limits adjacent to Serra Geral National Park, ensuring greater protection in such stretches, the other limits border private lands, which generates threats depending on the activities developed within.

In the properties that focus on raising cattle as their main economic activity, there is the risk that the annual fires will invade the park. Cattle frequently enter the park to graze as well.

On the plateau, big stands of *Pinus* sp. in the surroundings of the park have been causing serious problems of biological contamination as their seeds are dispersed by the wind, easily germinating in the grasslands. (There is a specific study about invasive alien species in the park, but it has not been publicized yet). The same is occurring on the plains and slopes with plantings of Japanese raisin tree (*Hovenia dulcis* Thunb.), whose seeds are dispersed by birds. The problem with *Hovenia dulcis* invasion is smaller than the one with *Pinus*, at least for now; however, it is a tremendous potential threat.

On a smaller scale, the cultivation and processing of tobacco carried out in properties on the plains, in Santa Catarina, requires firewood to dry the leaves. The extraction of wood from the park comprises a constant threat that needs monitoring.

Biological contamination

As previously mentioned, problems of biological contamination by *Pinus* spp. and *Hovenia dulcis* are observed. Both species are very aggressive, reaching the point of completely altering the vegetative composition and, consequently, the functioning of the invaded environments.

Another powerful contaminant, already posing a serious problem for the park, is the gorse (*Ulex europaeus*), which has an alarming population size even occurring predominantly along the sides of the roads. Gorse is an alien species, with enormous potential for colonizing new areas. It competes with the native species and in more degraded areas it always prevails. In spite of research and attempts to eliminate these invasions, it was reported that the specimens have a rather deep root system and sprout again easily after cutting. This makes its eradication extremely complicated.

ParksWatch - Brazil observed *Impatiens balsamina* in stretches along the trail that leads to the Rio do Boi sector, and stretches of underbrush in the plain's forests, which is very disconcerting due to its great invasive capacity. It is not yet displacing native vegetation within the park, but it is very common in the Atlantic Forest region and it should be monitored closely in order to keep it from getting out of control within the park.

Other biological contamination cases are linked to cattle from species introduced as forage, such as the *Trifolium repens*.

Size of the protected area

The park's area is insufficient for the conservation of species that need large areas to survive, like top food chain predators such as the puma and the crowned eagle (*Harpyhaliaetus coronatus*). This issue was already addressed in the Management Plan, back in 1984. The document recommended the inclusion of two adjacent areas to enlarge the park, which did occur in 1992 with the creation of Serra Geral National Park, 17,300 ha which shelters areas contiguous to Aparados da Serra National Park. Since the units are managed together, the protected area adds up to 27,550 ha.

However, considering that the parks lie in an area where the Araucaria Forest meet the Atlantic Rain Forest and grasslands, the conservation of representative samples of all environments demands a bigger area, as the management plan has pointed out.

Poaching

Illegal hunting, the capture of fauna, and the gathering of plants affect the conservation unit and are motivated by different reasons, thus demanding strong repressive actions. According to the unit's staff, on the plains and slopes medium and large size birds, such as the dusky-legged guan (*Penelope obscura*), are hunted for food. Such practice is common among park residents and locals living near the park, though it not a necessity. They do not need to rely on subsistence hunting in order to survive; rather, they hunt for cultural reasons.

On the plateau, the hunting of capybaras, partridges and spotted nothuras, among others, occurs for subsistence or even for fun, and puma is hunted because locals consider it a threat to domestic animals.

Another critical factor is the capture of birds in order to sell them as pets. This kind of action is more frequent in the region of the plains and slopes in the State of Santa Catarina.

In the plateau forests, the massive gathering of Araucaria seeds, the *pinhão*, jeopardizes its regeneration. The species is considered the most important of all flora, and overharvest endangers likelihood of regeneration and subsequently, without Araucaria trees, the dynamic of the whole ecosystem would change.

In the forests of the slopes and plains, locals collect firewood thereby causing alterations to the ecosystems. On a smaller scale, the gathering of bromeliads and orchids for illegal commercialization occurs.

Management Team

Even though the National Park relies on a relatively large number of workers (23) compared to other conservation units, only four of them are IBAMA employees. The others are either hired by IBAMA for a pre-determined period of time, by outsourcing companies, or they work in the park through partnerships (for example, Cambará do Sul City Hall and UNESC – The university of Santa Catarina State). The park suffers from this inadequate staffing model; the management team lacks stability, medium and long-term planning suffers (since there are problems with continuity), and staff training is not feasible, since there is no guarantee that they will remain in the group.

The partnerships that bring staff to the park are very positive and undoubtedly they have been helpful. However, they depend on several factors that do not lend to proper park management. For example, the partnership is between the park and local institutions, which are usually very political. When the mayor of the city changes, usually entire public projects and partner institutions' priorities also change and that causes instability within the management team.

In addition, the lack of employees' training may endanger the performance of some activities. The functions that should be carried out by park rangers are partially fulfilled by watchmen hired on a contractual basis. They go through a watchmen's course but not through a ranger's course, which would be ideal so that they could be able to deal with the situations intrinsic to a conservation unit. Plus, the number of employees for the visitors' care is insufficient and no one is bilingual, which would be desirable in order to attend to foreign visitors, who make up about 5% of the visitors nowadays.

Delay on the execution of actions

When the management plan was elaborated, attention was drawn to several threats to the conservation unit highlighted by studies. Unfortunately, the delay in implementing the plan allowed the potential threats to occur.

For instance, the document highlighted the pressing need to enlarge the park, noting that the forest companies had been expanding the plantings of *Pinus* sp. in the Fortaleza and Malacara regions, encroaching on the areas selected for the enlargement. The actual enlargement of the area, occurring with the creation of Serra Geral National Park, did not take place until 1992, eight years after the proposal. During this period of time the *Pinus* plantings were established just as had been warned.

In this sense, if technical studies point an urgent necessity to solve problems or lessen future impacts, the delay in the implementation of such actions contributes towards the non-fulfillment of the conservation unit's management goals.

Future Threats

Land tenure

According to information from the team of Aparados da Serra National Park, most landowners are only waiting for indemnity to leave the interior of the protected area. Planning for securing final land tenure has already begun using resources from the environmental impact mitigation compensation from the construction of highway BR-101.

However, the sluggishness of the process has left many of those residents dissatisfied with IBAMA. If the process does not take place quickly, such dissatisfaction might hurt the relationships between the residents and park employees. This in turn could reflect negatively on the management of the conservation unit, for the residents might, for instance, make access difficult to areas within their properties, or even start forest and grasslands fires deliberately.

Visitation and adventure sports practice

There has been a steady increase in the search for natural environments for recreation. As a result, the park has been experiencing a significant rise in visitation every year. It has been able to keep up with this rise, despite the lack of services such as snack bars and restrooms along longer trails. Nonetheless, if the visitation rate continues to increase, the park's infrastructure will not be enough to render a quality experience to visitors without environmental deterioration.

Another fact linked to the increasing search for natural environments is the rise in popularity of adventure sports. The amount of people practicing such sports has been increasing every day throughout the country and accidents, many of which very serious, are becoming more common.

Currently, there is a high expectation on the part of tourism operators and the Association of Guides concerning rock climbing and canyoning possibilities inside the park. Yet, from discussions with local guides and tourism operators, a lack concern over the environmental objectives of the park was evident.

Asphalting of Cambará do Sul – Praia Grande road

There is a plan to pave the Cambará do Sul – Praia Grande road, which is also the boundary between Aparados da Serra National Park and the north area of Serra Geral National Park. Such work will incur damages to the parks during both its construction and its operation. The state highway departments of both Santa Catarina and Rio Grande do Sul are spearheading this road-paving plan. It appears as though the plan will be carried out eventually. Before it is, there will be an environmental impact study required and that will be an opportunity for the park's administrators to voice their opinions and make management suggestions regarding the road.

During the asphalting, embankments and ditches will be constructed on the ground to mold the roadbed; this will also result in permanent impacts. After the work is done, an increase in car traffic and the possibility of hazardous cargos transportation can be expected. The greater velocity of the traffic may also bring about road-kill problems.

Tobacco production

There is also an expectancy concerning the rise in the tobacco production within the next few years on the coastal plains of Santa Catarina. That will cause an increase in the demand for wood to dry the tobacco leaves. Since this may happen before it is possible to develop forest plantations for wood production (considering time needed for planting and growth), there might be a strong pressure upon native forests within the park.

Biological contamination

The occurrence of white ginger (*Hedychium coronarium* J. Konig) was reported in the vicinity of the park, in stretches of the road that leads to the Mampituba information and control booth. Since the species is worldwide known as invasive bearing a high dispersal capacity, it can be considered a threat to the park. It is possible that it has already entered its borders (see: http://www.hear.org/pier/species/hedychium_coronarium.htm regarding white ginger impacts).

Contaminating species linked to raising cattle will always pose a threat to natural grasslands, especially when the animals invade the limits of the park.

Contamination by *Pinus* spp. will continue to be a threat in the future since new stands have been planted, many near the borders.

Recommended solutions

The land titles to non-indemnified or expropriated properties must be secured and the families living inside the park relocated. After the evictions are completed, it will be necessary to restore altered and degraded areas and remove exotic invasive species.

In the meantime, while the remaining titles for the park are secured, residents and others must obey and follow the forestry laws and regulations, mainly in regards to Permanent Preservation Areas. In this way, slopes and the edge of cliffs and areas surrounding headwaters and water sources would be protected from anthropogenic activities.

Concerning contaminant species, control measures must be promptly taken due to their aggressiveness and ability to colonize new areas and the subsequent altering of natural ecosystems. The first step, regarding all species, is to diagnose the most important areas for intervention. To control *Pinus* sp. invasion, the responsibility of the company that owns the stands must be considered in the process, seeking to involve it in the formulation and application of the control strategy. Whenever possible, IBAMA's edict that forbids *Pinus* plantings within the park must be enforced, in order to avoid natural areas to be converted into homogeneous stands. To control both *Pinus* and the Japanese raisin tree, every specimen should be eradicated eventually. The strategy for such must involve not only the companies responsible for the disseminator plantings, in *Pinus* and Japanese raisin tree cases, but also other sectors of the society like universities and research institutions, which might combine strategies with scientific research. Currently, there is an invasive species study for Aparados da Serra awaiting publication. It is essential that the information from that study be used to prioritize critical areas to begin the invasive species removal.

In addition, it is urgent and important to adopt law enforcement and education measures aimed at ending problems such as poaching and the gathering of orchids and bromeliads, since people who practice these activities do not depend on them to survive. Sometimes these people have great knowledge of the region and might actually become allies to the park and the management should develop strategies to encourage that.

Adventure sports involve risks and demand training of the practitioners and instructors. Those involved with these activities must observe what is laid out in the management plan, especially regarding zoning and respective rules. If adventure sports are practiced in the park, it is important to take into account the discussions brought forward by the Ministry of Environment, through *Grupo de Trabalho sobre Escalada em Unidades de Conservação* – a working group on climbing within conservation units –, together with organizations linked to the practice of such sports and NGOs promoting nature conservation. If, after those discussions, adventure sports are approved in the park, we have several recommendations. Since many of the adventure sport companies do not know or care about the ecological value of the park, they should be educated and later certified if they are able to show a certain level of understanding. Only certified guides/agencies should be allowed to work in the park. They

should attend training sessions explaining the rules and regulations of the park so that they fully understand what is prohibited and what is permitted. And, they should be required to pay heavy fines if they damage any park resources.

Conclusion

Solving the matters concerning activities on the park's outskirts will take more than monitoring from the administration, because it requires changes in the customs and deeply rooted tradition of using natural resources.

According to our evaluation, the Aparados da Serra National Park is **threatened**, which means that there is a high risk that it will fail to protect and maintain biological diversity in the near future if the current situation persists. Remedial action is needed.

Presently, the largest hindrance to a better management effectiveness is that the federal government does not have land title to about 32.5% of the park. And, subsequently, problems such as continued human presence within its boundaries, and residents carrying out activities incompatible with the objectives of nature conservation contribute to its threatened status.

Furthermore, even when considering the size of the neighboring Serra Geral National Park, the small area of Aparados da Serra cannot guarantee the existence of several species in long term. Therefore, we also recommend that Aparados de Serra National Park be increased in size. In addition, the activities in the buffer zone must be determined to be of a minimum impact and enforcement taken seriously.

Due to intense human occupation of the region, biological contamination stands out as a serious threat to the park, demanding organized and intensive control actions.

The park's small team, despite being very hard working and well intentioned, is not sufficient to accomplish the activities that will enable the park fulfill its objectives. The partnerships with other institutions in order to provide the park with more staff is positive, but is not a substitute for a fully trained IBAMA team.

Aparados da Serra National Park will function properly only if IBAMA takes a strong position and the government itself has the political will to become involved to solve the conservation unit's problems. They should start by securing 100% of the park's land titles and relocating any remaining residents outside of the park.

Bibliography

DECRETO FEDERAL número 47.446 de 17 de dezembro de 1959. Cria o Parque Nacional de Aparados da Serra. República Federativa do Brasil.

DECRETO FEDERAL número 70.296 de 17 de março de 1972. Altera os limites do Parque Nacional de Aparados da Serra. República Federativa do Brasil.

DECRETO FEDERAL número 84.017 de 21 de setembro de 1979. Regulamento dos parques nacionais brasileiros. República Federativa do 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.

http://www.hear.org/pier/species/hedychium_coronarium.htm downloaded on Apr 13 2004

IBAMA INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS 1995. **Plano de ação emergencial - Parque Nacional de Aparados da Serra, RS**. Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal/IBAMA. Brasília. 168p.

IBAMA INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS 2003. **Relatório de atividades. Janeiro de 2002 a Março de 2003**. Not published.

IBDF INSTITUTO BRASILEIRO DE DESENVOLVIMENTO FLORESTAL 1984. **Plano de manejo do Parque Nacional de Aparados da Serra**. Ministério da Agricultura/IBDF. Brasília. 245p. + anexos.

IUCN 2003. **2003 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 9.605 de 12 de fevereiro de 1998. Lei de Crimes Ambientais. 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.

MMA MINISTÉRIO DO MEIO AMBIENTE *et al.* 2003. **Lista vermelha da fauna brasileira ameaçada de extinção**.