# DIAGNOSIS

## OF AMBORO NATIONAL PARK AND INTEGRATED MANAGEMENT NATURAL AREA

PARKS WATCH BOLIVIA

OCTOBER 2005

PARK PROFILE Series


ParksWatch was created in 1999 as a program of Duke University's Center for Tropical Conservation to document the state of protected areas throughout the Tropics, many of which present a dearth of information concerning their biological riches and the problems they face.

Through partnerships with in-country NGOs and individuals, ParksWatch conducts on-the-ground evaluations of protected areas, which analyze threats to their conservation viability, identify strategies for overcoming those threats, and help government agencies, NGOs and community groups succeed at the ultimate goal of strengthening parks in their role as the world's primary instrument for the protection of biodiversity.

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PARKS WATCH BOLIVIA

ParksWatch-Bolivia is member of the ParksWatch network of NGOs, headquartered at Duke University, North Carolina, USA. ParksWatch has other active programs in Mexico, Guatemala, Venezuela, Peru, Brazil, and Argentina, and plans to initiate new programs in other countries and continents.

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CRITICAL ECOSYSTEM PARTNERSHIP FUND

PARKS WATCH

SERNAP

# Acknowledgements

This Park Profile was written by Stéphane Pauquet, Adrián Monjeau, Jorge Marquez and Victoria Fernandez Montoni. Data collection was undertaken by a team composed of Mr. Pauquet, Dimitri de Boissieu (Ecologist) and Stéphane Doizon (Geographer).

In parallel to our field observations, this report is based primarily on interviews and discussions with the staff and managers of Amboró National Park and Integrated Management Natural Area and the Bolivian park administration (SERNAP) in La Paz, as well as individuals assisting the park independently or as employees of non-governmental organizations.

The authors are extremely grateful to all the above-mentioned persons for the information, views and insights that they shared and for their comments on the draft report. Informants were speaking in their personal capacity and their views may not be the official policy of the organizations they represent. Many other individuals have kindly contributed information included in this report and the authors would like to extend their thanks to them as well. The authors have made their best effort to ensure the accuracy of the information contained in this report and apologize for any inadvertent errors.



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An interactive version of this report is available in two languages (English and Spanish) at the following URL: http://www.parkswatch.org/parkprofile.php?l=eng&country=bol&park=amnp

Designed by: Stéphane Pauquet

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October 2005

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# List of Acronyms and Abbreviations

**AOP** Annual Operational Plan

**asl** Above Seal Level

**CDF** Centro de Desarrollo Forestal

**CEPF** Critical Ecosystem Partnership Fund

**CI** Conservation International

**DNCB** Dirección Nacional de Conservación de la Biodiversidad

**D.S.** Decreto Supremo

**FAN** Fundación Amigos de la Naturaleza

**GEF** Global Environment Facility

**ha** Hectare or hectares

**IMNA** Integrated Management Natural Area

**MDSMA** Ministerio de Desarrollo Sostenible y Medio Ambiente

**MDSP** Ministerio de Desarrollo Sostenible y Planificación

**MHNNKM** Museo de Historia Natural Noel Kempff Mercado

**MP** Management Plan

**NGO** Non-governmental organization

**NP** National Park

**NTFP** Non-timber forest product

**PA** Protected Area

**PDAR** Programa de Desarrollo Alternativo Regional

**PiP** Parks in Peril

**PN-ANMI** Parque Nacional y Área Natural de Manejo Integrado

**R.M.** Resolución Ministeral

**SERNAP** Servicio Nacional de Áreas Protegidas

**SIG** Sistema de Información Geográfico

**SNAP** Sistema Nacional de Áreas Protegidas

**SPERNR** Subproyecto de Protección de Etnías y Recursos Naturales Renovables

**TNC** The Nature Conservancy

**UICN** Unión Internacional para la Conservación de la Naturaleza

**WCS** Wildlife Conservation Society

**WWF** World Wide Fund for Nature

# Objectives and Methods

ParksWatch is a non-profit organization headquartered at Duke University's Center for Tropical Conservation in Durham, North Carolina, USA. Its mission is to protect biological diversity by collecting, analyzing, and disseminating up-to-date information on the state of protected areas.

ParksWatch works through partnerships with individuals and local organizations in seven Latin American countries (Mexico, Guatemala, Venezuela, Peru, Brazil, Bolivia and Argentina) to conduct on-the-ground evaluations of protected areas, assessing their levels of implementation and identifying threats. Results of each evaluation are compiled into cross-disciplinary diagnostic reports called "Park Profiles."

Each Park profile prescribes actions to abate or remove the most serious threats and lists recommendations to improve each area's management. These reports are posted on our website (www.parkswatch.org) and printed copies provided to government agencies, conservation organizations, and other stakeholders involved in the park's management. Based on the results of our findings, our partners undertake a variety of activities to support park management and raise awareness among conservation specialists and the general public. Such activities may include the organization of forums, meetings, and workshops or involvement in media campaigns, production of video documentaries and the publication of newspaper articles.

With their journalistic style, widespread distribution, and photographic documentation, our park profiles are also meant to inform citizens of existing threats to their nation's protected areas. Our ultimate goals are to help improve political support, foster adaptive management, promote the adoption of best practices, and instigate the level of implementation needed to guarantee effective biodiversity conservation inside protected areas.

Along with other studies, our reports contribute to the baseline information available for each protected area, against which future evaluations and monitoring activities can be compared in order to measure conservation outcomes. Furthermore, the use of a standardized methodology allows us to draw comparisons between different protected areas within one country or between different countries. Alas, we intend to revisit each park every three or four years to update our database and measure changes in conservation status from a selection of key indicators.

## Description of this evaluation

This evaluation began with the compilation of all the available reference material in the libraries of the Bolivian Park Service (*Servicio Nacional de Areas Protegidas*, SERNAP), Conservation International, LIDEMA (*Liga de Defensa del Medio Ambiente*), Trópico, MHNNKM (*Museo Noel Kempff Mercado*) and FAN (*Fundación Amigos de la Naturaleza*) (databases, technical and scientific reports, journal and newspaper articles, etc.).

After this first revision, a series of interviews and field visits to the park's most relevant sites were organized with the successive park directors (Luis Fernando Terceros in 2003; Robert Salvatierra, temporary director, in 2004; and Osvaldo Aramayo in 2005), after which most of the field work

was carried out in company of park rangers, investigators and/or local residents.

The interviews (mostly semi-structured) made to these and other stakeholders were based on ParksWatch's standardized survey form, a Scorecard-based questionnaire that considers a broad range of aspects related to park management and focuses on both direct threats (such as land invasions, deforestation, and oil exploration) and indirect threats (such as budget shortfalls, lack of personnel, political interests, and macroeconomic forces). The data obtained in this way were incorporated to the ParksWatch database (available to interested parties) and were summed to the results of our literature review for the elaboration of the present report.

Below is a brief description of description of the interviews conducted and sites visited, in chronological order:

## September-October 2003

- **Santa Cruz:** Interview with the former director of the park, Luis Fernando Terceros.

- **Samaipata (Southern Zone liaison office):** Interview with the ranger on duty. Visit of the IMNA until the "la Yunga" park station and ecotouristic resort. Interview with the park rangers on duty and visit of the "Los Helechos" interpretation trail.

- **Santa Cruz:** Series of encounters with several professionals involved in the management of the area, among which: Natalia Araujo, in charge of the Conservation Science department at FAN and responsible for the design of a monitoring system for the park in 1999; Alejandra Urioste, from the MHNNKM, in charge of the development of a quantitative park evaluation methodology applied to the park; Arnildo Montero, in charge of TNC's activities in the park in the framework of its Parks in Peril program. Second interview with Luis Fernando Terceros at the park's central office and encounter with the chief ranger, Robert Salvatierra. Revision of the office's library. Participation in a workshop on the park's protection strategy, in which we met half of the ranger team.

- **Buena Vista (Northern Zone liaison office):** Interview with the ranger on duty. Participation in a meeting of the Civic Committee of Buena Vista on tourism activities inside the park.

- **Macuñucu Station:** It visits of ANMI. Encounter with the rangers on duty and assessment of facilities. Visit of the caves and other tourist attractions along the river with a group of tourists accompanied by a guide from Buena Vista. Discussions with the guide throughout the tour. At the site of the caves, we witnessed tourists fishing (with a hook), an activity prohibited in this part of the park.

- **La Chonta Station:** Visit of the IMNA. Interview with the ranger on duty and assessment of facilities. Encounter with the person in charge of the local community ecotourism project (Don Agustín), who explained us the background and described the tense climate in which it was carried out, considering the conflictive situation with the tourist agencies located in Buena Vista. Visit of the cabins and the interpretation trail. 8-hour hike to the Saguayó ranger station along the river of the same name, which forms the limit between the national park and the IMNA in this area (called the Red Line).

- **Saguayó (ranger station):** Interview with the rangers on duty and assessment of the facilities.

Visit of the oldest colonized part of the Northern Zone IMNA, until the wide sand beaches of the Surutú River due to the deforestation of its headwaters and adjacent watershed.

- **Buena Vista:** Encounter with the ranger chief and the park's coordinator for tourism. Interview with the ranger in charge of the Mataracú station, assessment of the facilities and visit of the building site of the WWF-funded interpretation center.

- **Mataracú Station:** Interview with the rangers on duty, assessment of the facilities and encounter with the person in charge of the local community ecotourism project (jungle cabins). Visit of the natural water basins and falls, one of park's main touristic attraction. Encounter with a group of visiting children from the nearby town of Santa Cruz.

- **Santa Cruz:** Last interview with the park director.

- **Comarapa Station:** Encounter with the two rangers on duty and visit of La Siberia, in the southwestern corner of the IMNA, adjacent to Carrasco NP. Visit of relict mountain pine (*Podocarpus parlatorei*) forest stands.

## March 2004

- **Buena Vista and Samaipata:** Conservation valuation and threat assessment workshop and training course for the implementation of SERNAP's newly designed park monitoring system.

## May 2005

- **Santa Cruz:** Encounter with the new park director, Osvaldo Aramayo for a data update.

# The National System of Protected Areas of Bolivia

Despite the creation of the first protected area in 1939 (Sajama National Park), Bolivia's National System of Protected Areas (SNAP) is one of the youngest in Latin America. Established in 1992 through the Law of the Environment, its fundamental objectives are the conservation of representative samples of the country's major ecosystems and it is administered by the Servicio Nacional de Áreas Protegidas (SERNAP), under the jurisdiction of the Ministry of Sustainable Development and Planning (MDSP). The SERNAP is responsible for defining and enforcing the laws and regulations pertaining to the management of the country's genetic and biological resources, as well as to administer and implement the Convention of Biological Diversity signed by Bolivia at the Rio Conference (1992) and ratified in 1994.

Although generally supportive of the creation of protected areas, the Bolivian government does not support them financially. As a matter of fact, the management of the SNAP relies almost entirely on international funding (GEF, Dutch government, KfW, IADB, etc.) and on the manpower and additional resources provided by non-governmental organizations (NGOs) (CI, WCS, GTZ, TNC, CARE, WWF, FAN, Trópico, etc).

At present the SNAP is composed of twenty nationally recognized protected areas, covering approximately 16.8 million hectares (15.3% of the national territory) and divided into National Parks, National Reserves, Biosphere Reserves (a category still not recognized by the national legislation), Wildlife Reserves and Integrated Management Natural Areas (equivalent to Multiple-Use Zones). In parallel to the SNAP, there is a growing contingent of protected areas of lesser hierarchy, such as Forest Reserves, Watershed Protection Areas, and Departmental, Regional, and Municipal Parks and Reserves. Another important zoning category is the Reserva Natural de Inmovilización, which corresponds to a temporary ordinance until a final status is defined based on the area's values and characteristics.

Each national or departmental protected area must form a Management Committee inviting spokesmen of the various cultural groups inhabiting its territory or surrounding area to participate in the decision-making process.

Since the creation of the Bolivian SNAP, significant achievements have been made in the following management areas:

(i) planning;

(ii) design and implementation of a monitoring and evaluation system;

(iii) establishment of operational protection corps;

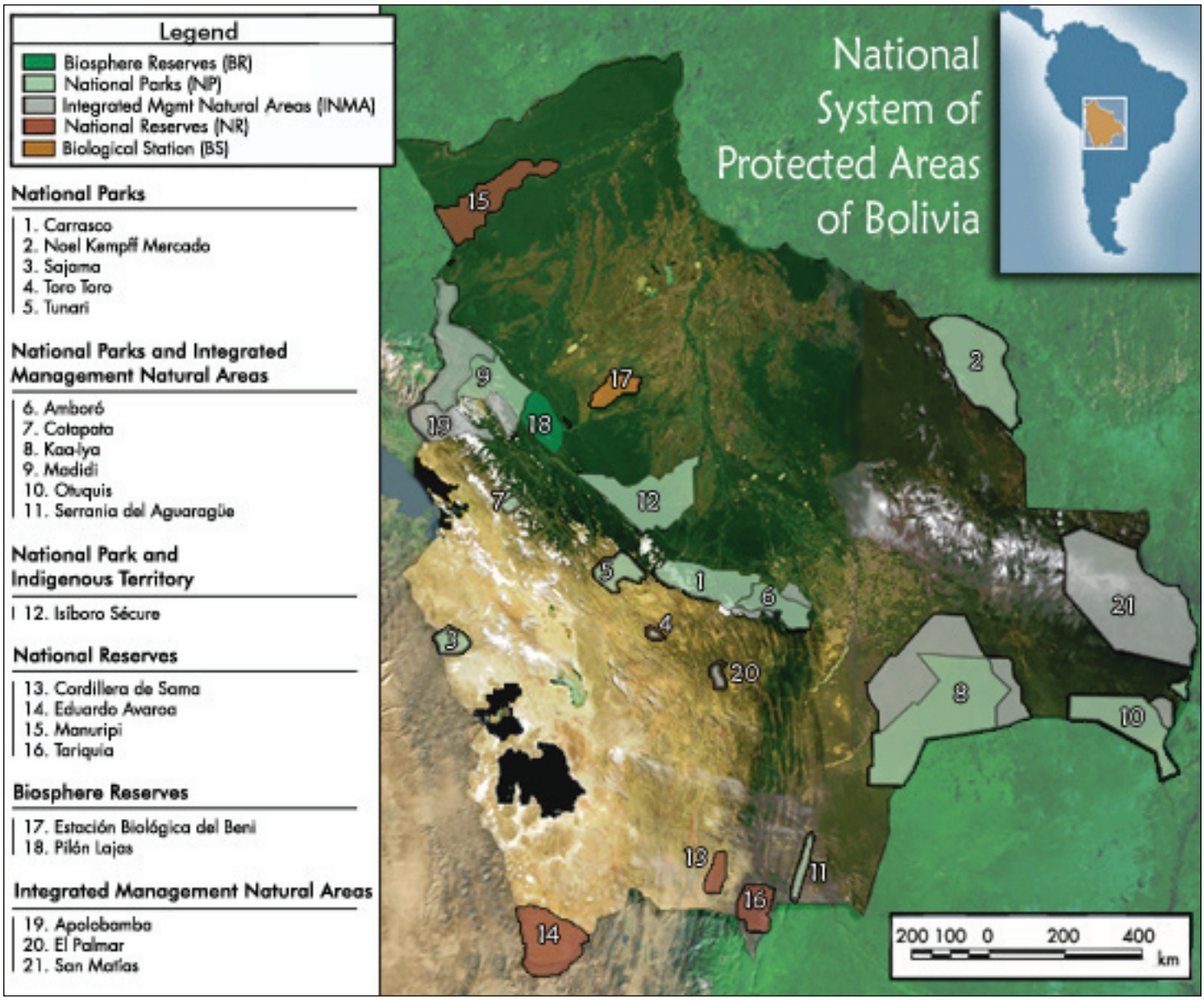
(iv) development of a training program for both park rangers and administrative staff;

(v) adoption of a set of policies for the public use of protected areas, and;

(vi) participation of local stakeholder groups in park decision-making.

## Protected Areas of Bolivia

| Management Category | Number | Area (Ha) |
|---|---|---|
| National Park | 5 | 2,592,029 |
| National Park and Integrated Management Natural Area | 6 | 7,133,336 |
| National Park and Indigenous Territory (or Communal Lands) | 1 | 1,236,296 |
| National Reserve | 4 | 1,887,332 |
| Biosphere Reserve | 2 | 535,170 |
| Integrated Management Natural Area | 3 | 3,450,217 |
| **TOTAL** | **21** | **16,834,380** |




SERNAP's policies and strategic agenda are presented in Appendix 1.

# Amboró National Park and Integrated Management Natural Area

| | |
|---|---|
| **Date of last field evaluation** | March 2004 (updated April 2005) |
| **Name** | Amboró |
| **Category** | National Park and Integrated Management Natural Area* |
| **Year created** | 1973, extended in 1991 |
| **Area** | 637,600 ha (NP: 442,500 ha and IMNA 195,100 ha) |
| **Main objectives** | - Conservation of biological diversity, in particular of the montane cloud forests;<br>- Watershed protection;<br>- Regulation of the use of natural resources and improvement of living conditions of local residents, in particular by means of ecotourism (see Appendix 2) |
| **Location** | In the western part of the Department of Santa Cruz, in the Ichilo, Manuel Maria Caballero, Florida and Andrés Ibáñez Provinces |
| **Ecoregions** | Humid montane cloud forest (Yungas), Semi-humid low montane forest, and Chaco |
| **Habitats** | Piedmont forests, humid evergreen forests, montane and submontane forests, riparian forests |

* See definition in Appendix 2.

# Summary

## Description

Amboró NP-IMNA covers 637,000 ha in the west of the department of Santa Cruz, within the denominated "Elbow of the Andes", where the Eastern Cordillera ends its temporary westward course to regain a north-south axis. It is located at the encounter of two biogeographical regions, the Chaco and the Andes, featuring both temperate and tropical climates. Its complex topography and the level of rainfall it receives over most of its range make it an important source of freshwater for the regional river system. Initially created in 1973, it was expanded to its actual size in 1991.

## Biodiversity

Although its interior remains to be inventoried, preliminary studies already place Amboró NP among the most biodiverse parks in the country, and even the world (more than 4,500 animal and plant species have already been described). The area harbors a great variety of ecosystems, among which humid to wet cloud forests, locally known as Yungas, transitions toward subhumid Bolivian-Tucuman forests, transitions toward pluvial piedmont forests and transitions toward inter-Andean dry valley forests. The subandine and piedmont forests covering the lowest reaches of the mountain range are extremely rich in biodiversity, and particularly in animal diversity.

## Pressures and threats

The area surrounding the park has undergone an intense colonization process since the 1950's, and the major part of the Integrated Management Natural Area is already under some form of agricultural exploitation, especially in the North where the conditions are more favourable. The use of slash-and-burn practices on steep and erodable slopes has considerably affected the area's hydrological regime, jeopardizing the water supply of the city of Santa Cruz, with a population superior to a million inhabitants. In many colonized areas, soil erosion is compounded by nutrient depletion and weed invasions. The logging of certain tree species and extraction of NTFPs (palm hearts, jatata and pachiuva palms, jipijapa, etc) for subsistence is a constant pressure that is nowadays under relative control of the protection corps. On the other hand, commercial hunting of agoutis (*Dasyprocta variegata*), armadillos (*Dasypus novemcinctus*) and tapirs (*Tapirus terrestris*) and fishing is rapidly depleting resources in the Northern Zone. Vegetation cover is under severe pressure by coal producers around El Torno, in the park's eastern sector. In spite of its wide acceptance, the Red Line that indicates the limits between NP and IMNA is still disregarded by some residents, whose activities encroach on the park's boundaries. There is a certain pressure for oil extraction, but past attempts have been rejected and there is currently no activity. Another permanent threat is related to the recent rise of new political leaders opposed to conservation.

Both Amboró and neighbouring Carrasco National Parks would face increased dangers of extinction shall they remain isolated from the rest of the Madidi-Amboró Conservation Corridor, a risk that seems highly probable considering the current trends in the surrounding landscape and the probale altitudinal and latitudinal changes over the next decades due to global warming. For all these reasons, Amboró NP-IMNA is considered **vulnerable**.

| Criteria | Current situation |
|---|---|
| **CONTEXT** | |
| Legal status | |
| National policies | |
| PA regulations | |
| Regulation enforcement | |
| Protected area boundaries | |
| Land tenure | |
| *Scoring scale* | Bad · Regular · Good · Excellent |
| **PLANNING** | |
| PA Objectives | |
| PA design | |
| Management Plan | |
| Zoning | |
| Operational Plan | |
| Financial Plan | |
| Biodiversity inventory | |
| Natural and cultural resource inventory | |
| *Scoring scale* | Bad · Regular · Good · Excellent |
| **INPUTS** | |
| Staff numbers | |
| Staff training | |
| Operational budget | |
| Financial security | |
| Research | |
| *Scoring scale* | Bad · Regular · Good · Excellent |
| **PROCESS** | |
| Enforcement activities | |
| Management of budget | |
| Personnel management | |
| Equipment | |
| Maintenance | |
| Controlling access and use | |
| Stakeholder engagement | |
| Environmental education and awareness | |
| Commercial tourism | |
| Acceptable change standards | |
| Monitoring and evaluation | |
| *Scoring scale* | Bad · Regular · Good · Excellent |
| **OUTPUTS** | |
| Visitor facilities | |
| Fees | |
| *Scoring scale* | Bad · Regular · Good · Excellent |

[Adaptation of the WWF Tracking Tool]

RATING: 47/96

# Description

## Geographic location

Amboró NP-IMNA is located in the center of Bolivia, in the western part of the department of Santa Cruz, between coordinates 17°43´ and 17°55´ latitude south. It occupies part of the so-called "Elbow of the Andes", where the western Andean Cordillera changes its temporary east-west course to reclaim its general north-south direction. Its western side borders on Carrasco National Park, in the Department of Cochabamba. It is the southernmost protected area of the binational Vilcabamba-Amboró Conservation Corridor, immersed in one of the country's most dynamic development axes.

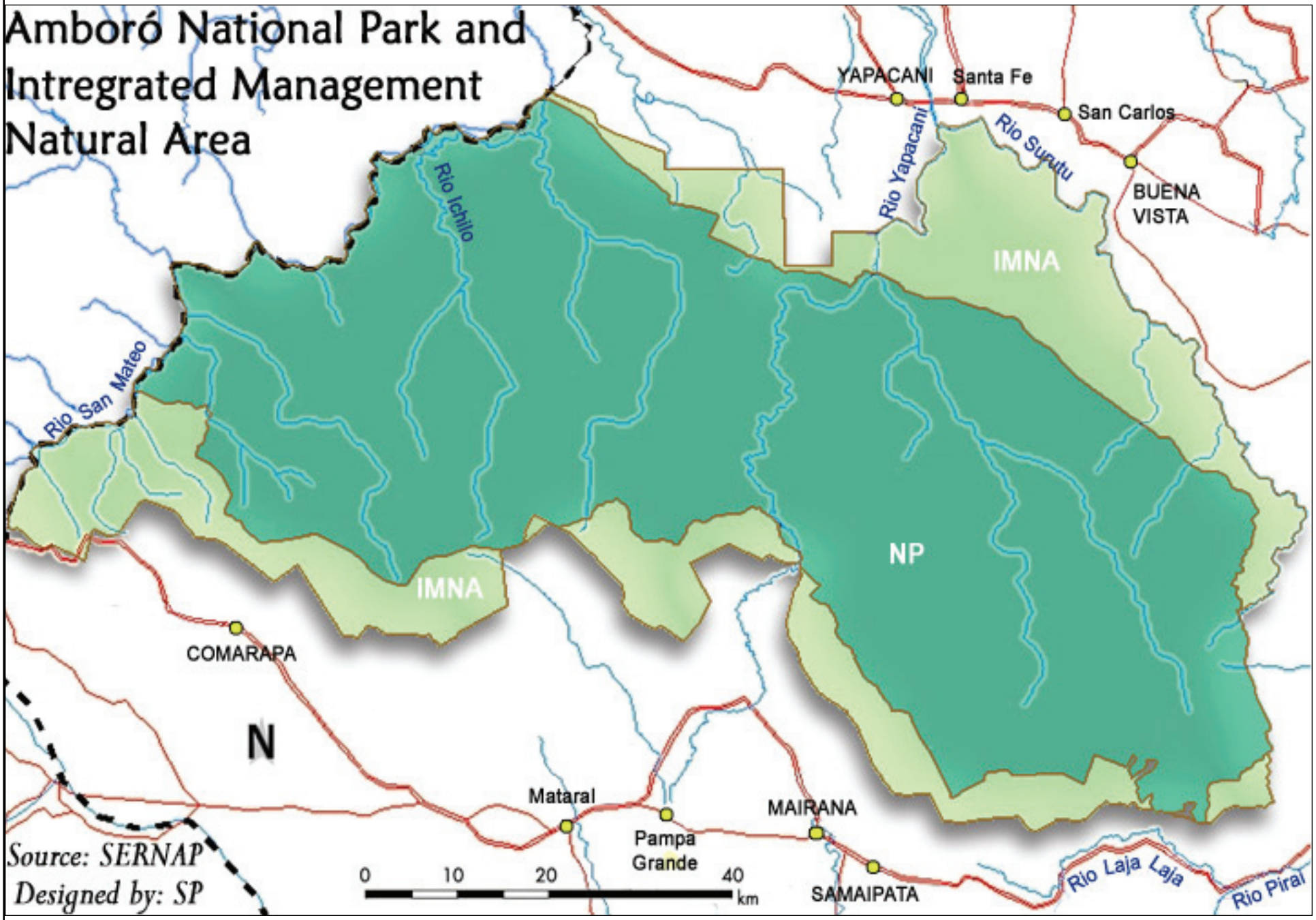
## Access

Transport on donkey's back along a riverbed in the Southern IMNA, in the environs of Los Volcanes. Photo: SP

The area is bordered north and south by the two roads uniting the cities of Cochabamba and Santa Cruz. The southern road, built in the 1950's and once asphalted, was left decaying after the opening of the northern route in the 1980's. Today it has returned to the state of gravel and dirt road limiting traffic and commercial exchange on this side of Carrasco and Amboró National Parks.

These two roads are the starting points of many secondary roads allowing easy access to most colonized parts of the Northern and Southern IMNAs. Access to the National Park is made possible by many small trails and river beds, although the rough topography only allows limited incursions.

The principal access point to the Northern Zone are the towns of Buena Vista, Santa Fe, and Yapacani, along the new Cochabamba-Santa Cruz road - from which several dirt tracks lead penetrate all across the IMNA (Espejitos, Saguayó, La Chonta, Macuñucu) - and the Yapacani river during the rainy season. In the Southern Zone, the principal access points are also secondary roads principally departing from towns located on the main highway (El Torno, Samaipata, Mairana, Pampa Grande, Mataral, and Comarapa), relayed by secondary tracks and small trails.


Amboró National Park and
Intregrated Management
Natural Area
YAPACANI
Santa Fe
San Carlos
BUENA
VISTA
Rio Yapacani
Rio Surutu
Rio Ichilo
Rio San Mateo
IMNA
NP
IMNA
COMARAPA
N
Mataral
Pampa
Grande
MAIRANA
SAMAIPATA
Rio Laja Laja
Rio Piral
0
10
20
40
km
Source: SERNAP
Designed by: SP

## Physical description

The park's rugged topography, associated with its location at the encounter between three phytogeographic regions (the Andes, the Chaco, and the Amazon), determines the existence of 20 plant associations and three ecological floors (CEBEM, 2003): montane (4,000-2,000m), low montane (2,000-1,000), and piedmont (<1,000). The relief is composed of distinct physiographic units: high and low mountains (99.36% of the national park), hills and lowland areas (0.64%), and in the IMNA valleys, recient and ancient alluvial plains and seasonally flooded plains.

The relative inaccessibility of the area under national park status has placed an important role in its relatively good conservation status, while the lower-lying areas are rapidly falling prey to the colonization pressure.

## Hydrography

The area comprises three watersheds, which are all tributaries of the Mamoré river:

- Ichilo river watershed, the main outlet for the rivers originating to the west of the park;
- Río Grande watershed, located in the southwest;
- Yapacaní river watershed, which covers more than 60% of the area, comprising the major part of the Southern, Central, and Eastern sectors as well as half of the Northern Zone, between the two roads uniting Cochabamba to Santa Cruz.

The young alluvial plains of the Yapacaní river extend northward of the area, alternating with the more ancient alluvial plains of the Yapacaní-Ichilo river.

Meandering rivers, such as this in the Southern IMNA (Volcanes sector), drain the piedmont areas on both sides of the mountain range. Photo: SP

Subordinated to topography, the area's hydrographic system has led to a heterogeneous mosaic of geomorphological formations: from imperfectly drained to completely flooded plains, natural levies, depressions, land elevations, deep gorges and abrupt cliffs, etc., composing a very varied landscape.

## Climate

The climate ranges from temperate at higher elevations to warm in the foothills. According to location,


3D satellite view of Amboró National Park and Integrated Management Natural Area (EarthSat/Google Earth)

rainfall can vary between 1,400 and 4,000 mm annually. Within those extremes, the pluviometrical distribution is very similar throughout the entire area, 75 % of the rain falling being concentrated between October and April, with a maximum in January. The dry season extends from May through August, with a minimum in July. There is a very marked decreasing rainfall gradient from north to south, ranging from 4,000 mm in the north, to somewhere between 2,000 and 600 mm in the south.

The temperature distribution follows a biseasonal cycle, reaching a maximum between December and January and a minimum between July and August. The highest amplitude is observed in the southern part of the area, characterized by a more pronounced topography. Frosts can even occur at higher elevations during the coldest months. Similar to rainfall, there is a clear diminishing north-south temperature gradient, with very significant micro-climatic variations determined by exposition to sun, wind and humidity.

The mountain pine (Prumnopitys exigua and Podocarpus parlatorei) forests in the southwest of the park are unique in the world. Photo: SP

## Biodiversity

Amboró NP-IMNA figures among the world's most biologically diverse protected areas. According to Gentry (1982), plant diversity in the Neotropics is correlated with absolute annual rainfall and temperature, increasing by nearly 50 tree species per 1,000 mm of rain. Combined with a complex physiography and hydrography, the area's strong rainfall and temperature gradients provide the abiotic reasons of its exceptional biodiversity.

The park's predominant ecological zones are humid low montane (also known as subandine) fo-rests and Yungas cloud forests. Based on the information provided by the park's Management Plan (FAN-TNC 1997), the following ecological zones can be distinguished:

a) Humid seasonal evergreen forest. Of alluvial origin, its topography is nearly flat and the soils are composed of Quaternary sediments.

b) Humid piedmont forest. Characterized by a hilly and slightly mountainous terrain with narrow valleys.

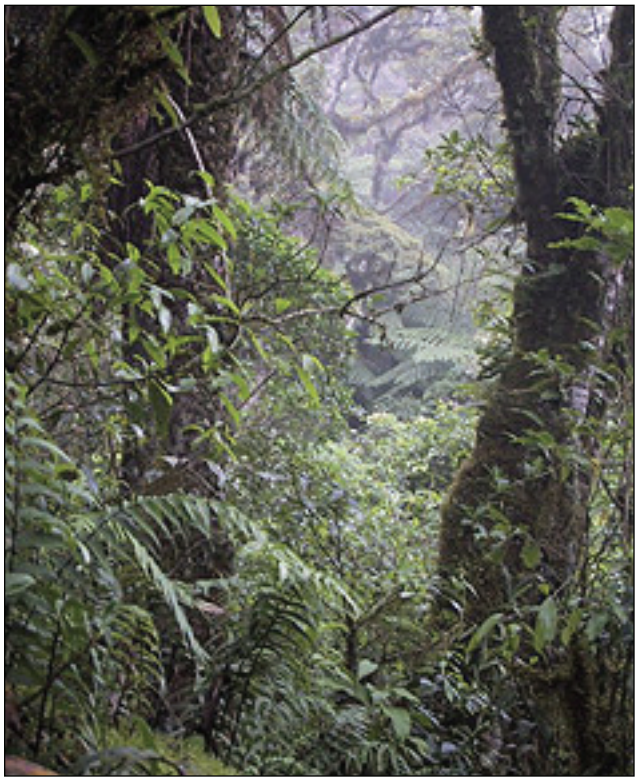
c) Very humid Andean forest. Characterized by a more abrupt topography, this zone forms the actual transition between the plains and the mountain range. The soils are all well drained.

d) Humid montane cloud forest (Yungas). Composed of steep slopes and cliffs, relatively wide

alluvial valleys and deep gorges. It is the park's predominant ecological zone.

e) Very humid cloud forest ridge. Restricted to rainfall-exposed hilltops and mountain crests between 3,000 and 3,100 asl, this ecological zone occupies only a very reduced portion of the park.

f) Dry inter-Andean valley. With a partially flat topography and Quaternary soils of colluvial and fluvio-lacustrine origin, this zone is restricted to the south of the area.



The giant-fern forest in La Yunga.
Photo: Adrian Monjeau

## a) Flora

To date, 2,659 superior plant species have been registered in Amboró NP-IMNA, but the area is believed to harbour more than 3,500 plant species. Some of the most noteworthy tree species are bigleaf mahogany (*Swietenia macrophylla*), mountain pine (*Podocarpus* sp.), *Juglans boliviana* (nogal), *Myrsine coriacea* (limachu), *Bocona frutescens* (khellu khellu), *Myrica pubescens* (cebillo), Ficus sp. (bibosi), *Pourouma* sp. (amabaiba), *Inga velutina* (pacay), *Didymopanax morototoni* (guitarrero), *Palicourea bryophila* (clavo rojo), *Aniba coto* (canelón). A particularly remarkable feature of the area is the presence of extensive patches of giant arboreal ferns (*Cyathea* sp., *Alsiphila* sp.) in the cloud forests. In addition, we note the presence of pachiuva (*Scotia exorrhiza*), asaí palms (*Euterpe precatoria*) and several species of endemic orchids.

White-fronted Capuchin (Cebus albifrons).
Photo: Loïc Devaux

The area's variety of ecological floors determines not only an exhuberant species diversity, but also an outstanding number of endemisms. For example, the inter-Andean semi-arid Chaco forests found on the southern limit are composed of many endemic species of cacti, while the saxícolous vegetation found on certain rock outcrops is dominated by endemic bromeliads such as *Cleistocactus samaipatus* and *C. aurespinus*. The pluvial hyper-humid Amazonian forests in the north also contribute many endemisms, among which *Talauma boliviana* (CEBEM, 2003).

## b) Fauna

The area also harbors a very high animal diversity, with more than 1,200 vertebrate species registered during a preliminary inventory which only concentrated on the IMNA (IMNA). The mammal community is particularly rich, with 15 marsupials, 7 primates, 19 carnivores, 44 bats, 7 edentates, 1 perissodactyle, 4 artiodactyles, 1 lagomorph, and 9 rodents). Several species figure on the country's Red List, among which: the spectacled bear (*Tremarctos ornatus*), jaguar (*Panthera onca*), puma (*Felis concolor*), ocelot (*Felis pardalis*), other felines (*Felis yagouaroundi, Felis wiedii, Felis geoffroyi, Felis tigrina*), the giant ant-eater (*Myrmecophaga tridáctila*), the giant armadillo (*Priodontes maximus*), the spider monkey (*Ateles paniscus*), other primates (*Alouatta seniculus, Alouatta caraya, Aoutus sp., Cebus apella, Calicebus moloch, Saimiri sciureus*), the bush dog (*Speothos venaticus*), otters (*Lutra longicaudis*), tapir (*Tapirus terrestris*), peccaries (*Tayassu pecari, Tayassu tajacu*), deers (*Mazama americana, Mazama gouazoubira*), and rodents (*Agouti paca, Dinomys branickii*).

The national park is believed to harbour many more species than those already inventoried, especially marsupials, rodents and quirópteros.

Cormorant (Phalacrocorax sp.). The park's bird community is composed of more than 800 species. Photo: Lisa Davenport

The number of bird species observed within the area exceeds 840, or more than 60% of the country's total. This number is superior to that of most countries. In other words, Amboró NP-IMNA boasts one of the richest bird diversity in the world, next to Manu and Madidi National Parks (in Peru and Bolivia, respectively). Among those 840 species, 209 are under some form of protection for their vulnerability: 9 are endemic to Bolivia, 7 are threatened, 43 are vulnerable, 33 are, 33 present a restricted distribution, 13 are list in Annex I and 147 in Annex II of the CITES Convention (CEBEM, 2003). Some of the most outstanding species are the Southern Horned Curassow (*Pauxi unicornis*), the Military Macaw (*Ara militaris*), the Red-Fronted Macaw (*Ara rubrogenys*) and various endemic species (*Simoxenops striatus, Grisea Myrmotherula, Aglaeactis pamela, Schizoeaca harterti, Grallaria erythrotis, Hemitriccus spodiops* and *Poospiza garleppi*). Among the most threatened species, we note the presence of *Rupícola peruviana, Myiopsitta monachus, Ciccaba albitarsus, Coeligena coeligena, Andigena cucullata*, and *Thamnophilus ruficapilus* (Moreno et al., 1989).

Represented by 105 species, the park's reptile community is more diverse than that of any other protected area in the world. Some of the endemic and most vulnerable species are *Prionodactylus eigenmanni, Bothrops jonathani, B. sanctaecrucis, Micrurus frontifasciatus, Caiman yacaré, Boa constrictor* and *Tupinambis teguixin*. As far as amphibians are concerned, in spite of a very limited sampling effort concentrated on the park's outer fringes, 76 species and 50 as yet unrecorded morphotypes

have been identified. Just these 76 species place Amboró among the three parks with the greatest amphibian diversity on the planet (along with Manu NP, with 82 registered species, and Santa Cecilia, Ecuador, with 93) (SERNAP, 2002; Ergueta and Gomez, 1997).

Finally, with respect to fish diversity, 109 species have been identified for the IMNA alone, with a clear dependence on altitude. The largest specimens, which are the principal targets of both commercial and subsistence fishing - such as sábalo (*Labeo Prochilodus*), barred surubim (*Pseudoplatystoma fasciatum*), and pacú (*Piaractus brachypomus*), next to a variety of non-edible or non-palatable characid and siluriform species - are restricted to the alluvial plains, below 700 m. Above just 1,000 m, the fish diversity diminishes dramatically (CEBEM, 2003).

# Management

## Background

Since 1973, year of its creation as the Lieutenant Colonel German Busch like Natural Reserve (D.S. N°11,254), the park's category and limits have been revised several times:

**In 1984**, the D.S. N°20,423 redefined the area as a national park and set its size to 180,000 ha. In 1989, from the town of Buena Vista and with a very limited budget, the Decentralized Unit of the Santa Cruz Forest Development Center (UDT-CDF-SC) took charge of the park's first management actions, consisting essentially in plant and animal inventories, the censing of the park's human population and a few information campaigns.

This period saw the construction of the Mataracú, Saguayo, La Chonta, and Macuñucú ranger stations, administered by the SPERNR[1] with a liaison office, 10 park rangers, material and equipment. With support from TNC's Parks in Peril (PiP) program, the NGO *Fundación Amigos de la Naturaleza* (FAN) took part in the management of the park's Southern

The Southern Zone liaison office in Samaipata. Photo: SP

1 The SPERNR (Subproyecto de Protección de Etnías y Recursos Naturales Renovables) was part of an environmental compensation scheme linked to the construction of the northern Santa Cruz-Cochabamba road.

Zone, with offices in Samaipata and Comarapa, a technician and with a technical person in charge and seven park rangers.

**In 1991**, with the first significant fund - granted by the IADB - the three above-mentioned institutions (UTD-CDF-SC, SPERNR and FAN) formed a management committee with headquarters in Buena Vista, the CDF being officially in charge of the area's management. That same year the park size was extended to 637,000 ha (by D.S. N°22.939) without prior consultation of the local population and disregarding legitimate private properties, a move which triggered serious protests and a continued resistance against the park.

With funding from the Regional Alternative Development Program (*Programa de Desarrollo Alternativo Regional* - PDAR), a consensus was finally reached with the establishment of two different management categories, indicated on the ground by a so-called "Red Line", a narrow trail that marks the boundary between the National Park and the Integrated Management Natural Zone (IMNA), effectively a Multiple Use Zone (IUCN category VI).

**In 1994**, FAN was selected by the newly created Ministry of Sustainable Development and Environment (MDSMA, today MDSP) to supervise the drafting of the area's Management Plan. The Red Line was officially approved in 1995 (D.S. N°24,137), allotting 442,500 ha to the national park and 195,100 ha to the IMNA, divided in various patches (MHNNKM, 2000). Local conflicts have since forced a constant redefinition of limits, so that the exact boundaries between the two categories are not precisely known (Moreno et al., 1989).

**In 1995**, the National Directorate for Biodiversity Conservation (*Dirección Nacional de Conservación de la Biodiversidad* - DNCB, today's SERNAP), the administration in charge of the country's protected areas decided to reclaim supervision of the area. Despite the signature of a contract between DNCB and FAN for the co-administration of the area, since this date the government has been solely in charge of the protected area.

## Administration and staff

Amboró NP-IMNA's management team is composed of a director, an administrator, a chief ranger, a legal adviser, a tourism coordinator, a natural resources specialist, a monitoring coordinator, 24 park rangers, and a driver. A minimum of 30 park rangers are considered necessary for an effective protection of the area.

In 1993 the government launched a General Protected Area Human Resources Training Program, a three-year, four-module curriculum featuring both theoretical and field courses intended to produce the country's first promotion of expert Park Rangers, 11 of which were assigned to Amboró NP-IMNA, resulting in one of the country's most highly trained protection corps.

## Infrastructure

The park administration is currently equipped with one central office (in Santa Cruz), 2 liaison offices (in Buena Vista and Samaipata), 9 rangers stations (Moilé, Mataracú, Saguayo, La Chonta,

and Macuñacú in the Northern zone; Comarapa, Santa Rosa, La Yunga, and Tigre in the Southern zone), two refuges (in San Juan and Ichilo). For transportation, it relies on a fleet of three all-terrain vehicles and twelve motorcycles.

Most stations need maintenance and restoration work and could use significant improvements to offer better living and working conditions to park rangers often confined for weeks in a row.

## Land tenure

Before the declaration of the park, the only public lands in the area were 100,000 ha pertaining to the Armed Forces, set in parts of the Cordillera inaccessible to colonization. This territory was surrounded by extensive private ranches and small to medium rural properties. In the northern part of the area, the widespread colonization of lowland areas did not take place before the mid-1970's, while in the southern part human settlements are of much more ancient origin. When the government-impulsed expansion of the agricultural frontier finally reached the area, many farmers settled with or without land titles and rapidly exposed most of the piedmont forests to unplanned slash-and-burn agricultural practices. Both the private ranches and the public lands were invaded in the process, which overall involved the settlement of approximately 3,000 families.

Today, most of the land comprised within the Red Line (i.e., under the national park category) is public property, while the IMNA is almost entirely in private hands, owned by those farmers who had settled before the protected area's creation. However, according to the Management Plan, in 1997 only half of the families had a legal title to the land they occupied.

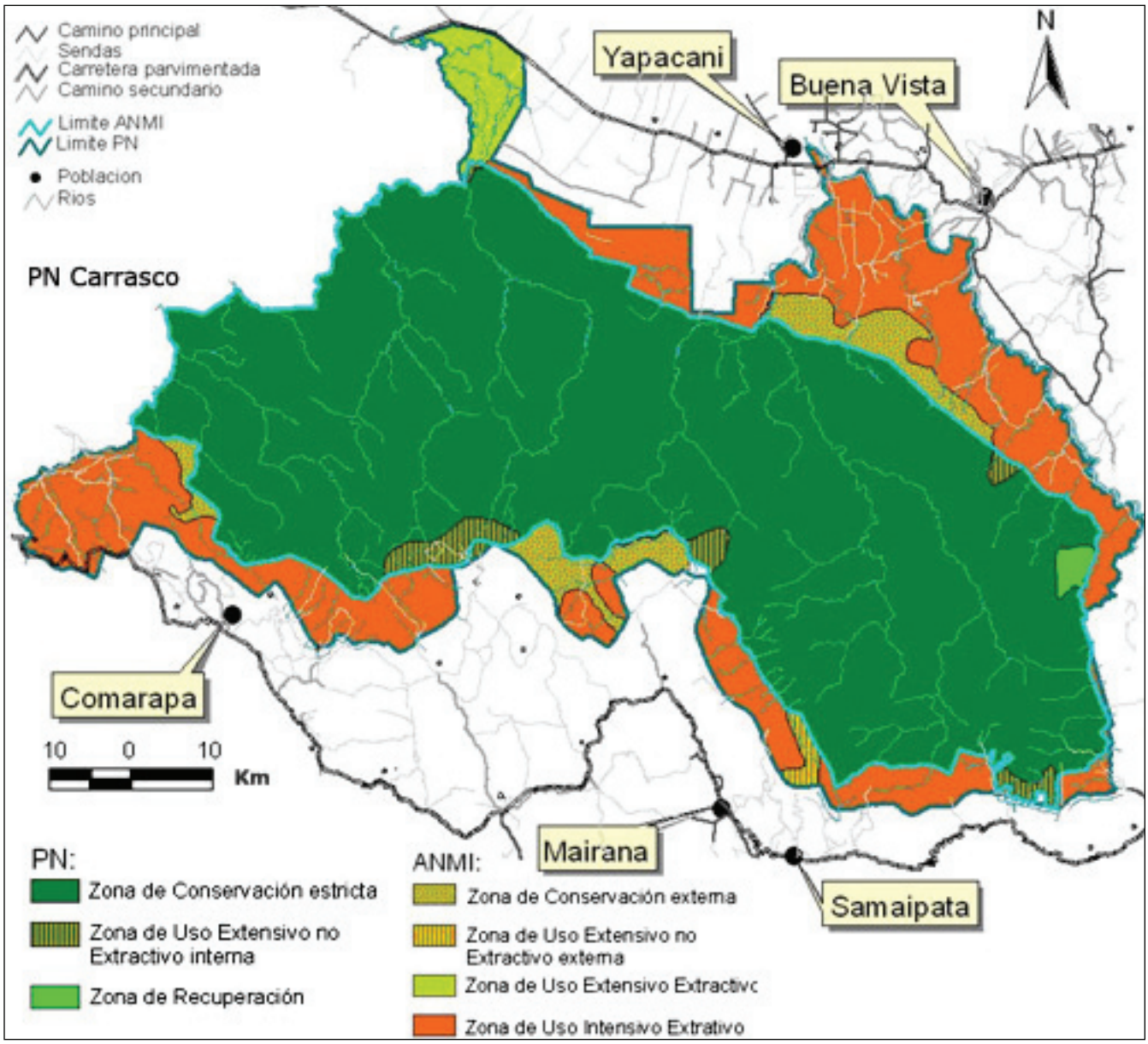
In the Northern Zone, the size of the agricultural plots tends to be greater than in the south. Most settlers come from the highlands of the Cochabamba and Potosí departments, which means that they are generally not familiar with local agricultural practices. In the Southern Zone, most of the land used to be distributed in large landholdings which were parceled out during the 1953 Agrarian Reform, to the exception of communal pasturelands, which are a source of conflict with the park administration due to the fact that they often overlap with the national park. The lands in this sector, exposed to a colder and drier climate than in the north, are only moderately adequate for farming and livestock grazing, activities which tend to concentrate on terraces in valley bottoms and along the riverbeds. However, the settlers on this side of the park have a long-standing experience of local conditions and resort to more adapted practices than in the north.

## Zoning

The Zoning plan used for the area is still the same as the one established in 1997 at the same time as the Management Plan. The criteria used in its elaboration were the ones defined by each category's conservation objectives, as follows:

- **National Park:** relevance for biodiversity conservation, ecological vulnerability, conservation status, importance for watershed protection, relevance for tourism, management needs and requirements for ecological recovery.

- **IMNA:** relevance for biodiversity conservation, importance for soil and watershed protection, current use of natural resources, human pressure, conservation status, relevance for tourism, management needs and requirements for ecological recovery.




Zoning map of Amboró NP-IMNA. Source: FAN-TNC, 1997.

## Management

The area is supposedly managed according to a comprehensive Management Plan elaborated by a consortium between FAN and TNC in 1997, and officially approved a year later by R.M. N°57/98. However, according to the park's chief ranger, this Management Plan (MP) contains structural flaws which limit its usefulness for planning, especially for the drafting of Annual Operational Plans (AOP). Considering moreover that the MP's five-year duration expired several years ago, the park administration follows independent criteria for its activiy planning, currently concentrating its

efforts in four thematic areas: natural resources management, ecotourism, redefinition of limits, and law enforcement[2].

The Zoning plan is also considered inadequate, in particular concerning the IMNA where the recommendations for the management of natural resources in the different zones are unclear and where their strict application would result in unmanageable social unrest[3].

Park rangers patrolling the Southern IMNA (Comarapa sector). Photo: SP

In spite of these serious limitations, the park's administration has made significant progress in achieving acceptance of the protected area since its creation, including that of local residents, NGOs and the public opinion in general. This is in large part due to the protection corps' enduring awareness-raising efforts and to the amicable, cooperative and participative attitude that the park rangers have adopted in recent years. Nowadays, many farmer organizations, which in the early days ferociously opposed the park's implementation, now acknowledge its existence and in certain instances even take action in its defense. Following one of the protected area's policies, many sustainable ecotourism-related projects have sprouted and are starting to record their first benefits. The inhabitants of Santa Cruz, aware of the park's importance for their water supply, feel concerned about the park and organize demonstrations against development projects likely to affect it, such as a recent attempt to conduct seismic oil exploration tests in the park's eastern sector, which was finally repelled by the popular uprising.

Among the conservation and management activities contemplated in the 2005 AOP, we find:

- strengthening of the area's PA Management and Interinstitutional Committees;
- elaboration and enforcement of regulations for timber exploitation in the IMNA;
- the physical marking of the limits between national park and IMNA and the partial land titling of the latter;
- implementation of the SERNAP's monitoring system;
- regulation of tourism activities based on ecosystem carrying capacity;
- implementation of the area's communication and environmental education strategies.

2 One of its main shortcomings is its excessive optimism with respect to funding opportunities, and as a consequence many of the programs and activities that it promotes remain to implemented nearly ten years after its elaboration.

3 CARE-Bolivia, which in the 90's operated a large-size sustainable development project in the area called "Proyecto Amboró", produced a simplified version of this land use plan, which is considered to be more practical for communicating decisions to the local population.

# Human Landscape

## Human occupation

Roofs of farmer dwellings in the Southern IMNA (Volcanes sector). Photo: SP

The oldest records of human occupation in the area date back to 3,000 BP, when nomadic hunter-gatherers of the Yuracaré ethnic group seasonally occupied the park's northern plains. The Amazonian tribes never fell under dominion of the Inca civilization when it invaded the region in the 15th century. Another invasion was that of the guaraní Indians (chiriguanos), which came from today's Paraguay and forced the Andean cultures back into the highlands for several decades. The Spanish Conquest brought the first large-scale agricultural colonization processes, along with a rapid cultural disintegration resulting from ethnic mixing and the imposition of the Spanish language. At the beginning of the 20th century, the ethnic groups inhabiting the current protected area's Northern Zone were the Churapas (chiquitanos), the Yucararé and the Yuquí. Very little is known about the latter, and there is a widespread belief - vehemently denied by academics - that some of them might still occupy or still occupied the headwaters of the Ichilo river until recently[4]. The Churapas practiced nomadic agriculture, fishing and hunting. At present the majority of the area's inhabitants are Aymara and Quechua Indians from the altiplano and colonists from the country's lowlands[5] (MHNNKM, 2000).

According to a census conducted in 2001, the IMNA is inhabited by more than 19,000 people, or aproximately 3,900 families living in 110 communities. Although the threat is permanent, there are currently no registered permanent settlements inside the national park. Nine municipal governments have jurisdiction over the protected area, the most populated being Buena Vista (821 families) and Yapacaní (703 families) in the north and Comarapa (882 families) in the South.

4 Along with this legend, the Cerro Amboró (one of the area's most outstanding mountains is considered to have surnatural powers, as a source of curses and tragedies. According to residents of Buena Vista interviewed during our visit, the legend is based on the story told by the father of a park ranger, who followed the Ichilo river until unexplored areas of the park and was suddenly hit by an arrow, which literally crossed his body. He was able to survive, escape, and give rise to this speculation.

5 Locally known as "*cambas*", these people are a result of intermixing between native indigenous groups - guarayos, chiriguanos, moxeños, and guaranís - and people of Spanish, European or Creole descent since colonial times.

### a) Northern Zone

In the park's northern area, a series of Jesuit missions were in the 17th and 18th centuries, which integrated the chiriguano Indians in 1750. The principal activities practiced by these groups were livestock grazing, cacao production and textile manufacturing. Between the end of the 18th century and the beginning of the 19th century the missions lost influence and were progressively invaded by Creole colonists from Santa Cruz, dedicated to consolidating large ranches (estancias) for cattle grazing and large-scale agriculture. After the Agrarian Reform of 1953, these usurpated lands were expropiated and handed in small plots to the former ranch workers. In the 1960's and 1970's, the expansion of the agricultural frontier was stimulated by a logging boom which rapidly exhausted most of the area's commercial timber resources.

The colonist population is predominantly of Quechua origin (75% of the population of Yapacaní and 69.7% of the population of Buena Vista) (FAN-TNC, 1997).

### b) Southern Zone

The human landscape in this sector forms a nearly linear gradient from highland to lowland cultures, as follows:

- Part of the population is truly native of the area in the sense that its earliest settlements date back to several centuries ago, composed of people originating from neighbouring valleys. In spite of high poverty rates, these communitues are completely integrated and well adapted to the landscape they occupy.

- The other part of the population settled in the area less in the last 50 years, initially attracted by the employment opportunities generated by the construction of the first Cochabamba-Santa Cruz road, and then by the closure of the state mines and a succession of draughts in the highlands in the 1970's and 1980's. The Quechua and Aymara Indians, which are the two largest migrant ethnic groups, are quite unadapted to the local climatic conditions, which has negative consequences for both their crops and the lands they occupy (Moreno et al., 1989). In general terms, altiplano farmers resort to very different agricultural practices than the lowland natives, which results in significantly per capita larger clearings and severe land degradation. In spite of the prohibition to accept to new settlements within the protected area, the migration from the Sucre, Cochabamba and Potosí departments rages on.

## Social characteristics and organizational aspects

The farmers are organized in unions, which are grouped in federations of different ranks (locally known as *Subcentrales*, *Centrales* and *Federaciones*). The northern part of the area presents an additional organizational level formed by the union of several federations with each other (called "*Cinco Federaciones*"). All these entities belong in turn to the country's largest campesino organization, called CSUTCB (*Confederación Sindical Única de Trabajadores Campesinos de Bolivia*).

The park's location between two major roads, one of them entirely paved, determine the relatively high mobility of its surrounding populations. The road network provides a good access to the urban

centers and their markets, although many of the secondary and tertiary roads tend to be blocked during the rainy season. The communities closest to the two roads all have access to power, while more isolated communities have to operate generators or forego electricity. This is the case of the communities lying closest to the national park. The provision of drinking water follows approximately the same distribution as power access. In the southern sector, 69% of residents live without a reliable source of drinking water, and there is virtually no sanitary infrastructure (CEBEM, 2003).

A diagnosis conducted by CARE at the end of the 1990's highlighted the acute poverty of the area's surrounding population, with an average of 87% of families living well below the poverty line and plagued by malnutrition and diseases such as malaria, yellow fever, tuberculosis, and leishmaniasis (GNTP, 2003).

## Local attitude towards the protected area

Some communities have already started to benefit from the presence of the protected area with assistance packages provided by both the government and private development organizations. This has contributed to improve relations between the local population and the park administration, which, as already mentioned, regularly collaborates with villagers in order to gain their acceptance regarding conservation activities.

In addition, the park is becoming an increasingly popular touristic destination, which is progressively convincing local people to invest in this activity in order to reap some of the benefits (at present most of the income generated by tourism is appropriated by a handful of agencies in Santa Cruz, Buena Vista and Samaipata). It is worth noting that CARE's Amboró Project in the 1990's had a highly beneficial impact on local attitutes towards the park in three of the nine municipalities with jurisdiction over the area.

Residents of the IMNA controlling the respect of the Red Line by a group of cattle herders (Comarapa sector). Photo: SP

Another success has been the redefinition of the national park's boundaries with the establishment of a Red Line in 1995, which resolved a large share of the social tensions ignited with the non-consultative park creation process. Certain areas remain undefined, but overall the park's limits have been endorsed and are being respected by a majority of residents, who have started to collaborate with the park administration by denouncing illegal loggers, hunters and settlers.

The popular mobilization against the entrance of the Andina oil company in 2001 is a favorable indicator of local political support for the protected area in front of future external threats.

Thanks to the environmental awareness-raising activities of the protection corps, a signification portion of the local population now measures the importance of the area - not so much for its biological diversity, which is a concept both abstract and distant from their daily preoccupations, but for the ecosystem services provided by its forests and other natural ecosystems and for the tourism potential associated with its scenic beauties.

## Political, administrative, and territorial coordination

The backbone of the park's political, administrative, and territorial coordination is the Management Committee, a board composed of 18 members representing the various local stakeholders, including municipal and departmental governments, campesino organizations, the Gabriel René Moreno University in Santa Cruz (involved in several scientific studies within the PA), the park administration and a national representative of the SERNAP.

Of the nine municipalities that have jurisdiction over the protected area, the only one that does not participate in this committee it is the municipality of Porongo. The municipality of Buena Vista actively collaborates with environmental education projects, the maintenance of communal roads and infrastructure, the protection of river shores, and is considering various tourism development projects within the park.

The Prefecture of Santa Cruz has a special unit that takes charge of the denunciations concerning violators of park regulations within its jurisdiction, and has informants alerting it of future colonization attempts inside the protected area.

Others institutions coordinate with the park administration in several aspects: credit, technical support to agriculture, natural resources management, health, education, etc. In total, approximately 20 NGOs and 13 governmental organizations are actively involved in or around Amboró NP-IMNA (GNTP, 2003).

Beyond this quite intricate coordination network, it is worth emphasizing the crucial role played by the protection corps in informing the local population on the park's objectives and on the limitations and opportunities associated with such a legal figure. In fact, this is generally what determines the park administration's success in combating daily infractions.

## Economic activities and use of natural resources

### a) Agriculture

The area's predominant economic activity is agriculture. Before the Agrarian Reform, most of the land had been destined to cattle ranching, complemented with crops of corn and sugar cane. This has been replaced by a much more varied agricultural production based essentially on citruses, bananas, corn, rice, potatoes, tomatoes, yucca roots, pepper and chili for sale on local markets and in the city of Santa Cruz, while cattle raising is limited to subsistence purposes and is conducted in domestic barns or on communal pastures, according to the location. However, the product that

Many families of the Northern and Southern raise cattle in small corrals for their personal consumption. Photo: SP

generates by far the highest economic return is the coca leaf, which on the one side is a source of poverty relief, but on the other the cause of severe repression and violence.

## b) Fishing and hunting

This activity has always been and remains an important protein complement for local residents, which frequently engage in this activity even when they rear domestic animals. Due to the area's climatic conditions, this activity is more intense in the northern sector where abundant rainfall and low altitudes determines higher animal populations than in the dry south. Studies have shown that the most ancient settlers exploited a wider range of mammal, bird, reptile, and fish species than recently arrived colonists, in large part because their more developed knowledge of hunting and fishing techniques ensures them a higher rate of success. Bushmeat and fish resources are predominantly consumed by local residents, but near the markets - as is the case in the environs of Yapacaní and other towns along the northern Cochabamba-Santa Cruz road - and in areas of high animal abundance, the activity frequently becomes commercial in purpose. Due to a progressive exhaustion of the prey populations, there is a gradual displacement of the hunting and fishing activities towards more remote areas, where they often encroach on the national park's boundaries.

## c) Collection of non-timber forest products (NTFPs)

The forest's non-timber resources are used for the production of energy, food, medicinal purposes and as construction material (CEBEM, 2003). Even at subsistence levels, the collection of certain palm species for food (palmito), wooden posts (*Scheelea princeps*), roofs (*Geonoma deversa*) and other uses (*Socratea exorrhiza* and *Carludovica palmata*) is affecting local populations beyond their natural regeneration rate (Moreno et al., 1989).

## d) Beekeeping

The keeping of bees for the production of honey wax, pollen and other materials is an important complementary activity in the area, aside from the natural pollinization service provided by these insects. In fact, beekeeping is ubiquitous throughout the IMNA (ADAPICRUZ, 1999), and more than half of the families of Buena Vista exploits the natural beehives found on their property. It is therefore not surprising that several NGOs, such as CARE, CARITAS and CEDICA, included support to this activity into their programs. This was for example the case in several communities of the municipality of El Torno, in the east, with demonstrative parcels associated with technical assistance and a microcredit scheme. CARE and CIAT also worked in communities of the municipality of Comarapa,

supporting apicultural production by means of advanced training courses. The CEBEM study frequently throughout this report noted that these initiatives showed a particularly high degree of success with respect to other sustainable development projects promoted by the same organizations.

Bee honey harvest in the Southern IMNA (Comarapa sector). Photo: SP

## Development projects

According to the MHNNKM report on Amboró NP-IMNA (2000), there is currently no sign of any significant development project threatening the protected area's integrity. However, they note that certain national road maps indicate a - nonexistent - route across the park, which might correspond to an abandoned project that could resurface in the future. As a matter of fact, road construction is a threat facing most of the country's largest protected areas.

The park's direct zone of influence has been the theater of a large number of development projects, either completed or still in progress: infraestructure (e.g., PRODECAF); agriculture (e.g., Agroplan, ASOPROF, Central Obrera Campesina, CIAT, CORDECRUZ, PROBIOMA, and PRODEPA); watershed management (e.g., SEARPI-FAO, MACUSY); microcredits (e.g., AGROCAPITAL, Cáritas, FINDESA, PROBIOMA, and SEAPAS); technical assistance in cattle production (e.g., ASOGA); integrated conservation and development (e.g., ASECAB and ASEO), irrigation (e.g., SEAPAS); municipal planning and strengthening (e.g., CEDETI, CEPAC and PRODISA); handicrafts (e.g., Sociedad de Artesanos); education (e.g., FIS); children health (e.g., AGROSALUD); professional training (e.g., PRODISA); food distribution (e.g., PCI-USAID), etc. In addition, there is a tendency within local municipal governments, such as the municipalities of Buena Vista, El Torno, and Comarapa, to create natural resources management and/or sustainable development units (CEBEM, 2003).

In spite of this apparently favorable climate, the CEBEM report observes that most of these NGOs, which act as local arms of large international aid organizations, tend to invest a significant share of their budgets in expensive offices, equipment and vehicles and actually achieve only very modest results on the ground, often compromised by the short-term scope of the majority of projects.

The institutions that are recognized as having had the greatest impact in aspects directly related with agricultural production and forestry activities activities are:

- *Fundación Amigos de la Naturaleza* (FAN), which provides assistance to the park since 1995 with support from TNC's Parks in Peril program. One of its main activities has consisted in promoting Communal Participatory Planning (PLANCOM) in the communities where disputes had arisen with the park administration concerning the position of the Red Line. Meant to

harmonize conservation and sustainable development objectives, this program successfully helped to resolve conflicts in La Yunga, San Juan Potrero, Valle Hermoso, Los Pinos, Las Lauras and Santa Rosa, benefiting a total of 221 families.

The CEBEM report notes that FAN's eminent conservationist approach has been the source of tensions with other, more development-oriented organizations in the area.

- CARE-Bolivia, which between 1996 and 2001 executed an ambitious multidisciplinary project called "Proyecto Amboró", aimed at integrating biodiversity conservation with the sustainable development of the area's surroundings.

- the Center for Tropical Agricultural Investigations (CIAT), which conducts research and promotes knowledge transfer in agriculture, cattle raising, and forestry. In Amboró NP-IMNA, this organization works in the northern piedmont areas with citrus fruits, rice, agroforestry, pasture, livestock producers and promotes the use of organic fertilizers, while in the dry inter-Andean valleys of the south it provides assistance to peach, plum, chirimoya, wheat, corn, bean, peanut, potato, and vegetable producers, among other activities.

# Tourism

Due to its proximity to the city of Santa Cruz de la Sierra (which has an international airport) and the easy access provided by the two Cochabamba-Santa Cruz roads that flank its northern and southern sides, Amboró NP is in a privileged situation to exploit its enormous touristic potential. In fact, this activity has registered a steady progress in the past decade, but in an uncontrolled manner which so far has produced more harm than good. To date, local communities remain to see the economic benefits of this activity.

The Fort of Samaipata is one of the continent's major prehispanic archeological sites. Photo: SP

However, this has not hindered several of them to start making investments with financial and/or technical support from NGOs, some of which are already operating and receiving sizeable numbers of visitors. About half a dozen of these mostly communal initiatives qualify as real ecotourism projects and many more are at the planning stage, generally within walking distance of the national park.

- In the Southern Zone, two tourism operations, La Yunga and Volcanes, receive visitors from the nearby touristic town of Samaipata (see photograph), which has one of the region's best

hotel infrastructures;

- In the Northern Zone, Villa Amboró, Mataracú and La Chonta receive tourists coming from Buena Vista or directly from Santa Cruz. Besides comfortable wooden cabins and natural foods, La Chonta offers a 2-km interpretation trail on the area's fauna and flora. Mataracú has two well-organized eco-resorts and well maintained walking trails leading to magnificent water basins and waterfalls. Finally, Villa Amboró is located near a scenic river stretch and is ideally located for excursions into the dense rainforest.

In spite of its significanly lower lodging capacity, Buena Vista is gradually replacing Samaipata as the main gateway to the park, probably due to its shorter commuting time from the city of Santa Cruz. In this town, WWF recently inaugurated a flamboyant environmental interpretation center.

Although the park's zoning Plan takes ecotourism and general recreation activities into account, the administration does not have the capacity to implement the patrols needed to exert an effective control over both visitors and tourist operators, which are known to frequently disregard regulations and perpetrate different kinds of minor infractions. As a consequence, coordination between the protection corps and the tourism agencies operating in the area is still incipient.

Most residents of the IMNA realize that the recent boom in tourism activity is linked to the presence of the protected area and depends on the preservation of its scenic beauties. In response, an increasing number of villagers is starting to look for ways to benefit from this new bounty, which tends to foster respect for the park in the communities with direct touristic potential or likely to see visitors stop by. On the other hand, the communities not concerned by this activity and which have never received any external help tend to maintain a negative view on the park and ignore its regulations (MHNNKM, 2000).

The park's scenic beauty is particularly suited for the development of ecotourism actiivities and infrastructure, such as these communitarian cabins in the community of Los Volcanes. Photo: SP

# Conservation and research programs

Below are the research projects conducted in the protected area during the past five years:

- Spatial analysis of terrestrial vertebrate diversity in the Bolivian Yungas (identification of the priority conservation areas in the Bolivian Yungas). University of Bonn, Germany. 2001-2004;
- Doctoral thesis in anthropology and ethnobotany. National Herbarium of Bolivia/Meredith Dudley/Tulane University. 2000;
- Morphological, bioacoustic and molecular analysis of the diversity of Andean amphibians with emphasis on four genuses (*Telmatobius, Phrynopus, Gastrotheca* and *Hyla*). Bolivian Collection of Fauna/Natural Sciences Museum of Madrid;
- Key areas for the conservation of biological diversity in Bolivia. Bolivian Collection of Fauna/ Smithsonian National Museum. 2002-2004;
- Biological inventory. Amazonian University of Pando/The Field Museum. 2002;
- Search of antimalarial molecules: high efficiency analysis of tropical flora. University of San Andrés and IRD. 2001-2003.

It is important to note that, similarly to many other protected areas in the country, the park administration almost never sees the results of these research projects, which it often actively supports with logistical and human resources. Some projects of regional and national scope have also involved investigations in and around the area, such as:

- Biodiversity and threat monitoring program. SERNAP-GEF II. 2003-2005;
- Country-wide gap analysis in Bolivia. SERNAP-GEF II. 2004;
- Scientific coordination of biological data sampling for the ecological zoning of the Amboró-Madidi Biological Corridor. FAN-WWF. 2001-2004.

Below is a selection of some of the area's priorities for future research:

- Monitor the status of the Southern Horned Currassow (*Pauxi unicornis*) and Red-fronted Macaw (*Ara rubrogenis*) populations and provide recommendations for their management: determine confirmed, probable, and spatial distribution and specific concentrations, habitat, feeding and breeding requirements, analyze feasibility of introduction of individuals reared in captivity, conditions for the restoration of their habitats, etc. Armonia (a bird-conservation NGO based in Santa Cruz) has recently launched a country-level population assessment and monitoring program for the former species. The latter essentially lives in steep cliffs such as those located in Tunal and the San Juan del Potrero in the IMNA.
- Monitor the status of the spectacled bear (*Tremarctos ornatus*). Determine confirmed, probable and potential spatial distribution throughout the national park, habitat, feeding and breeding requirements, management requirements to minimize conflicts with local villagers, etc.
- Use time-series of satellite images to monitor deforestation trends and patterns in the entire protected area, with a focus on the most fragile ecosystems and river headwaters.

# Pressures and Threats

Amboró NP-IMNA faces a diversity of pressures and threats, among which:

## Pressures

- Colonization and land invasions throughout the IMNA
- Agriculture and cattle raising
- Illegal logging
- Hunting and fishing
- Small-scale mining
- Uncontrolled tourism

## Threats

- Political decisions
- Social resistance
- Drug trade-related coca leaf production
- Oil exploration

One of the major threats to the park is the progressive fragmentation of the piedmont forests in the wake of a constant influx of new migrants. Photo: SP

# Pressures

## Colonization and land invasions throughout the IMNA

The park is subjected to a constant influx of new migrants, most of which are attracted by relatives who arrived with the two colonization waves that took place in the 1980s and 90s.
Photo: SP

The major threat to the park's integrity is undisputably the colonization pressure exerted by farmers on both sides of the protected area (north and south), a situation largely determined by a strategic mistake made in 1991, when the area's suface was extended from 180,000 to 637,600 ha without any prior consultation, although a significant part of this extension was on private lands. In retrospect, it is difficult to understand the motives behind this government decision, which goes against National Park regulations and which literally ensured unanimous local opposition to the park's existence[6]. An aggravating factor is that the authorities continued granting land titles inside the park for several years after its creation (Avila, 1993).

The location of the park in one of the most densely populated regions of the Department of Santa Cruz and the relatively dense road network in which it is immersed implies constant threats to its natural resources, in particular bushmeat and timber. The constant arrival of new migrants and the conversion of ever steeper lands for agriculture are the park administration's daily reality. On both sides of the park, the communities use the most accessible parts as pasturelands[7], and are simply too numerous to be effectively controlled by the protection corps.

Fortunately, the rugged topography places most of the area beyond the reach of cattle and even the most determined humans, reason for which the colonization and invasion pressure concentrates exclusively on the foothills. In those areas, however, the colonists are now starting to exploit totally unsuited lands prone to soil erosion. If no accurate statistics are available, there is a general agreement on an average deforestation rate superior to 500 ha/year, which is very significant for a single protected area. The following page presents two Landsat TM satellite images (from 1986 and 2001, respectively) indicating the extent of the agricultural frontier expansion that took place within the

6 "*We did not invade the park, the park invaded us*" - coincided residents interviewed by Moreno et al. in their 1989 survey.

7 Piedra Mesa, Barrientos y Banegas, Santa Rosa de Lima, and San Juan del Potrero.

IMNA over this period. The areas shaded in pink and related tonalities, which correspond to human land uses (deforested lands for the most part), present a dramatic increase between these two dates. Whereas the national park lost only 1,500 ha of forests during that period, the IMNA lost nearly 8,400 ha (107 ha/year and 600 ha/year, respectively). This demonstrates a very marked difference in the relative efficiency of the area's two protection categories in front of colonization pressure, although in this case the difference is probably more attributable to topography than to the success of enforcement activities.

The continuous land clearings are threatening to destroy the area's last remnants of piedmont forest. Photo: SP

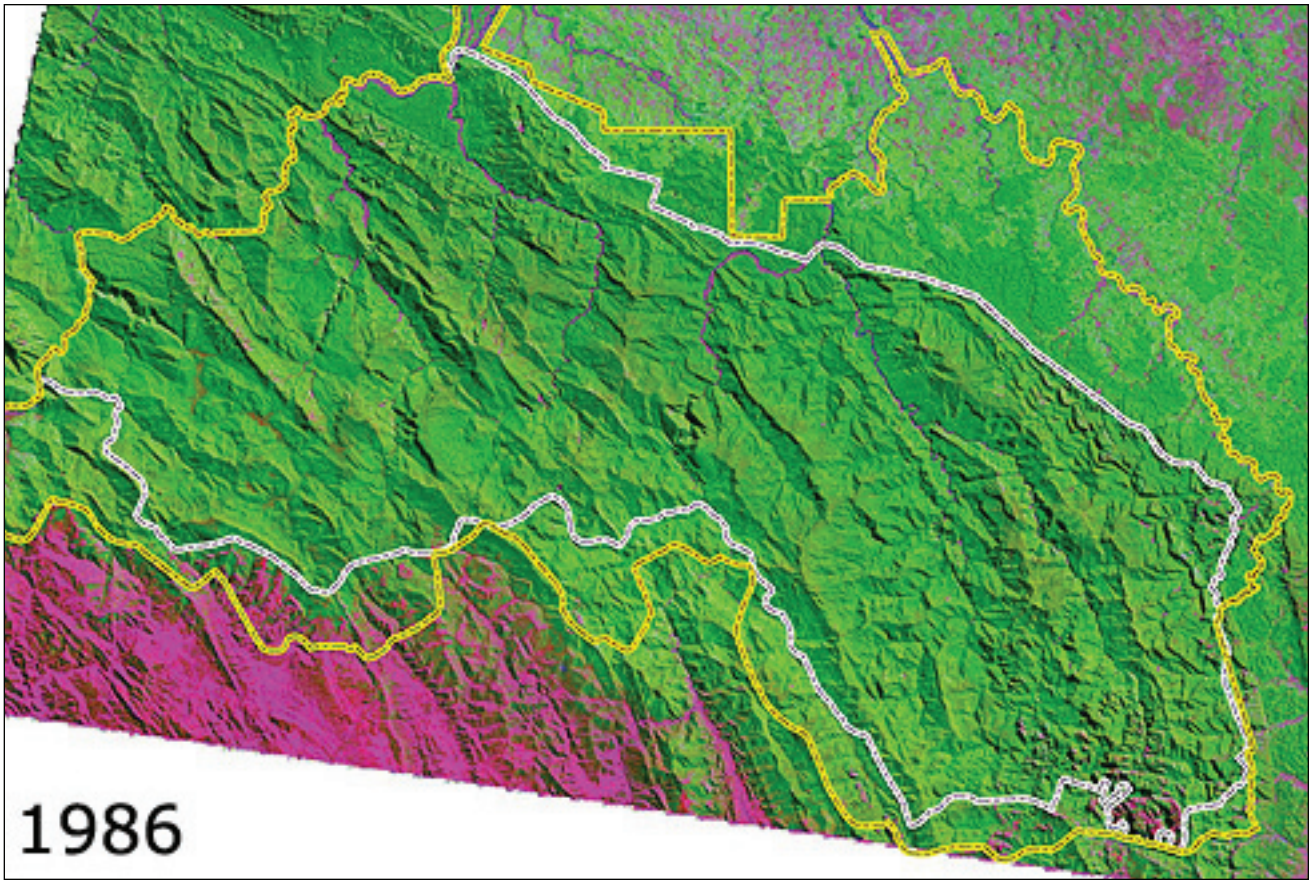
## Agriculture and cattle raising

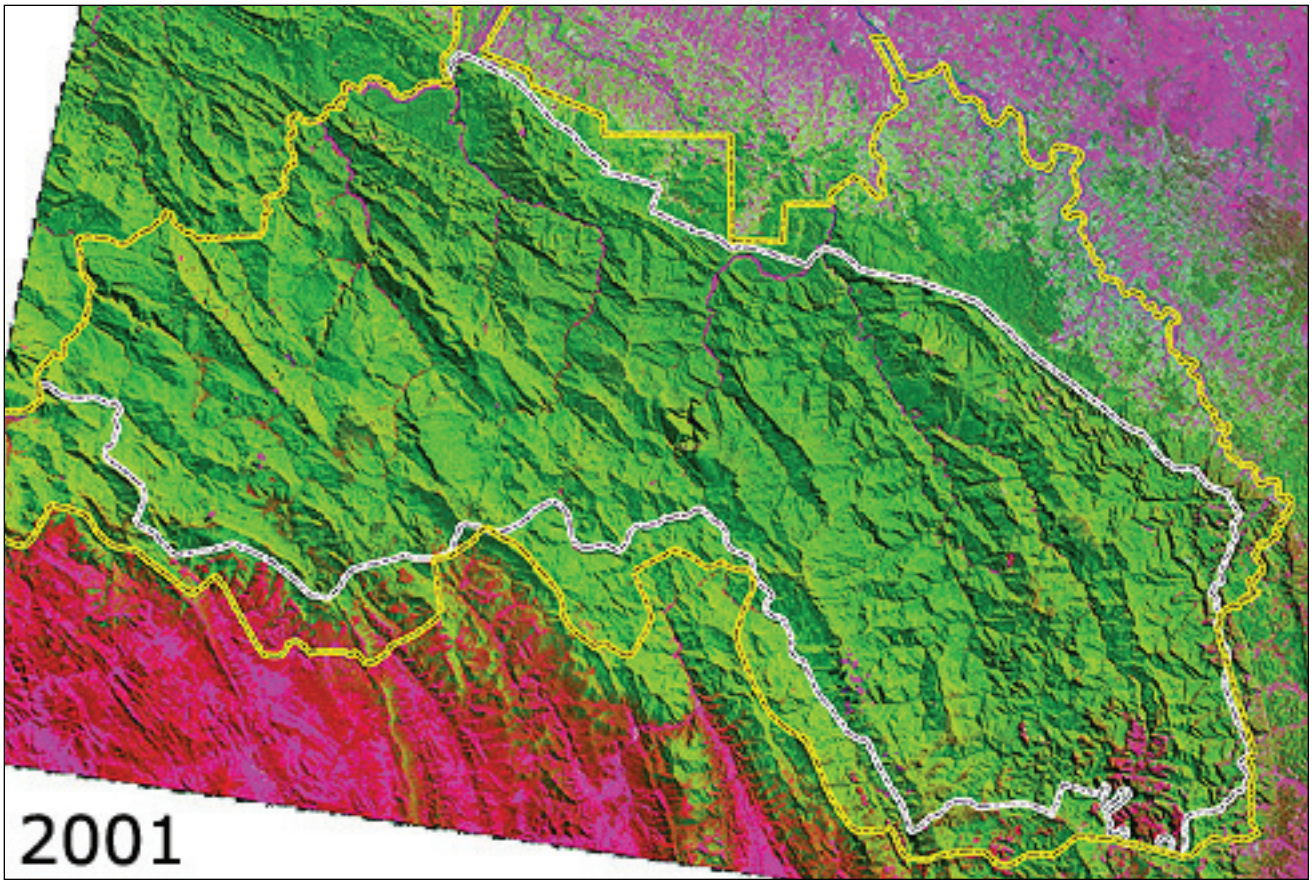
This pressure is a direct consequence of the colonization and land invasion pressure described above. As mentioned earlier, the northern part of the area IMNA is inhabited by recently arrived migrants relying on subsistence crops such as rice, corn, yucca roots, bananas, citruses and small pasturelands for small-scale cattle raising, whereas in the south the longer established communities dedicate themselves to the both domestic and commercial production of corn, potatoes, tomatoes, chili, vegetables, and temperate fruits, complemented by extensive cattle grazing on large communal pasturelands.

The use of slash-and-burn agricultural practices on steep slopes leads to rapid soil erosion, resulting in the need to constantly clear open new plots. Photo: SP

In the north, some colonists persist in taking their cattle to graze inside the boundaries of the national park, placing some areas - such as between the Yapacaní river and the meeting of the Colorado Chico and Surutú rivers - under relatively heavy grazing pressure. Others penetrate even deeper inside the park following the various streams and water courses in search of suitable land to farm.

The removal of plant cover for




Source: IARN (Instituto de Análisis de Recursos Naturales), Universidad Atlantida Argentina, based on Landsat TM satellite images provided by the CONAE (Comision Nacional de Investigaciones Espaciales), Argentina and the Global Land Cover Facility, University of Maryland.

agricultural purposes is further aggravated by the use of inappropriate practices and the absence of any soil conservation measures. The soils are often already washed away after just two or three years, forcing the farmers ever further up the hills or deeper into the forest, resulting in its gradual fragmentation. Since the most appropriate and fertile lands have already been found and converted, in recent years land clearings have started to take place on slopes inclined by more than 40%, causing widespread erosion and occasionally even dangerous landslides. In the lowlands, the width of riverbeds has more than tripled in width due to the catastrophic floodings that result from even just regular rainfall events. Little deserts are forming on the riverbanks in place of the lush riparian vegetation that used to stabilize them and shield surrounding areas from flash floods. If fertilizers are still too expensive to acquire, pesticides and herbicides have already long made their way among the park's colonists, applied indiscriminately due to their low price and therefore introducing excessive levels of chemicals in rivers and soils.

Cattle act as vectors for the dissemination of exotic species and their trampling and grazing jeopardizes the park's fragile mixed cloud forests. Photo: SP

Such an uncontrolled use of the land inevitably affects the production basis and future subsistence opportunities. Associated with population growth, it is likely to lead one day to tensions for the few remaining resources and thus increased tensions with the park administration. But an impact rarely taken into account when considering the problem of uncontrolled agriculture and grazing is the introduction of exotic species, in particular gramineous weeds transported by the cattle in their fur, hoofs and feces. This could be the reason for the almost systematic abundance of pioneering species in disturbed areas in the tropics (Quiñones Alpaca, 1999). This often irreversible phenomenon can have dramatic effects on the surrounding native vegetation and cause cascading effects leading to highly impoversished ecosystems. By opening extensive road networks later used by cattle, past and present logging operations contribute to the problem of cattle grazing and exotic species invasions inside the park.

## Illegal logging

The history of logging in the area dates back to the 70s and 80s, when large scale commercial operations exploited relatively large stands of mahogany, cedar (*Cedrela odorata*) and roble (*Amburana cearensis*) trees and other species of lesser value such as verdolago (*Terminalia* sp.) and ochoó (*Hura crepitans*). In 1992, a widely publicized corruption case involving the local timber industry signalled the imminent decline of the commercial logging era (Moreno et al., 1989), which effectively ended

with the demarcation of the national park boundaries in 1995.

Despite a total logging ban and systematic sanctions by the park administration, the financial incentives are still so high (a log of mahogany is estimated to be worth at least $US 1,000, and potentially much more depending on diameter) that the extraction of commercially valuable timber species is a permanent threat to the area, especially in the eastern sector where the complex trail network impedes any efficient control by the understaffed protection corps.


In the past, the Amboró forests have been exploited by commercial timber companies, replaced today by illegal individual chainsaw operators. Photo: SP

Some farmers and professional loggers are reported to team up in nocturnal raids towards the park's interior, where they cut several trees and turn them into coarse planks (cuartones) in order to transport on their backs to a nearby truck. Even on the rare occasion when they get caught by the park rangers, they often return after a few days or weeks to recover the wood that hasn't been seized.

During the rainy season, the Ichilo river and its tributaries become the main access ways, helping loggers to transport their loot outside of the area. It is frequent to see people load timber on trucks stationed on the bridge over this river. In the Northern Zone, illegal loggers make use of the illegal trails opened by colonists and cattle, exploiting remnant mahogany stands between the encounter of the Colorado Chico and Surutú rivers and the Salao creek. The timber is sold to local sawmills and carpentries, which don't question its origins and know how to evade the sporadic controls.

## Hunting and fishing

### a) Hunting

The NP and IMNA is frequently visited by commercial hunters in search of mammals and birds to sell on local markets and to restaurants installed on the northern Cochabamba-Santa Cruz road. This activity, which is particularly intense in the Ichilo river delta due to its proximity to this road, is known to have a significant impact on jochi on agouti (*Agouti paca*), armadillo (*Dasypus novemcinctus*), and tapir (*Tapirus terrestris*) populations, to name just a few. Felines, snakes and lizards are hunted for their skins, while primates and parrots may be captured alive to be sold as pets. In spite of its efforts, the protection corps is still far from exercising an effective control over this depredatory activity.

Subsistence hunting throughout the IMNA (north and south) also affects most of the above-

mentioned species. The pressure exerted by subsistence hunters on the largest mammals (spectacled bear and tapir) is particularly worrisome, because they occur in naturally low abundance and are already severely affected by the progressive destruction of their habitat. Because they occasionally damage the crops (especially cornfields) or sometimes kill domestic animals, they are indiscriminately killed and often hunted down by organized groups. So far little has been done by the park administration to address this severe man-animal conflict, which is becoming increasingly pervasive as the colonists move higher up the hills.

Some of the weapons seized by the protection corps in the Northern IMNA. Photo: SP

Since very little is know about the abundance and dynamics of these animal populations, it is difficult to determine the most appropriate hunting seasons, which hinders the elaboration of management plans.

## b) Fishing

Fishing is also practiced for both subsistence and commercial purposes, with a concentration of the latter in the vicinity of the markets and roads. The most affected species are: sábalo (*Labeo Prochilodus*), barred surubim (*Pseudoplatystoma fasciatum*), pacú (*Piaractus brachypomus*), doradillo, soba, and zapato, and the equipment used ranges from hooks, harpoons and nets to dynamite and barbasco, a natural toxin prepared from the leaves of the sacha bush (*Tephrosia vogelii*), or from resin of the ochoó tree (*Hura crepitans*). These last two very damaging techniques have for example been reported in the Ichilo river during the spawning season.

Commercial fishing, restricted to the largest species (sábalo, barred surubim and pacú) is more intensive every year and severely threatening these fish populations. Just like in the case of mammals, the lack of information is hindering the establishment of seasonal hunting bans.

Although the use of dynamite for fishing is largely considered to be a problem from the past, park rangers have recently noticed unusually high fish mortality rates in rivers formerly affected by this activity, which they attribute to excessively high water temperatures. A reasonable hypothesis for this phenomenon is that the vibrations caused by the dynamite explosions might have weakened the structural stability of the rocks and slopes overlooking those rivers (molded by powerful quaternary water courses), causing disproportionately high erosion rates during heavy rainfall and consequently leading to the progressive filling up of the river's deeper pools by sediment deposits, which could in turn raise the water temperature above fish tolerance levels (Robert Salvatierra, pers. comm.).

## Small-scale mining

The widespread extraction of sandy material in lowland riverbeds is a direct consequence of the progressive deforestation of the foothills, which has altered the hydrological cycle to the point of transforming once quite tightly entrenched rivers into free-roaming water courses.

Some of the exploitations are legal concessions, while others operate illegally. By further altering the "natural" river flow, this activity tends to cause increased fish mortality.

The occasional presence of gold diggers in the northen sector is an indication that the area might hold potential resources, but these have yet to be confirmed.

## Uncontrolled tourism

Given the steady and unplanned growth of tourism inside the park, only partially matched by infrastructure development, this activity could rapidly become a threat if not properly regulated and monitored by the park administration. It is, however, one of the best opportunities for the park to gain local acceptance and bring its residents long-awaited benefits.

Some of the potential negative side-effects of tourism are the disposal of solid waste, animal disturbance, vegetation trampling, and soil erosion due to badly designed trails. Other possible problems include the risk of fire outbreaks as a result of neglect, the introduction of exotic species and local extinctions due to fishing, hunting or the collection of rare plants. Although Amboró NP is still far from receiving a number of tourists that would warrant measures against such hazards, some of the tourist operators have already been reported to authorize or even promote illegal activities such as fishing and flower picking, which ParksWatch was able to corroborate during its field visits.

But beyond the usual problems brought about by the entrance of recreational visitors, the main challenge in the regulation of this activity in the park will be to achieve dialogue and collaboration between local residents and the tourist operators of Santa Cruz, Buena Vista, Samaipata and other urban centers. Some conflicts have already arisen concerning the use of the secondary roads crossing the IMNA, which the inhabitants claim to be their property since they are the ones maintaining them. Until now tourist operators had been using them as 'free-riders', i.e. without investing any money in their maintenance, while actually even damaging them quite seriously during the rainy season. Their reluctance to pay the fee requested by some communities creates tensions that will inevitably compromise the activity if not rapidly resolved.

# Threats

## Political decisions

As in many other protected areas in the country, one of the permanent threats to the park's integrity emanates from national politics and the state. The chronic instability that characterizes the country's political scene determines periodic and erratic policy shifts on the use of natural resources and biodiversity conservation, as well as on the use of the '*national interest*' principle. In the name of this principle, many operations incompatible with protected area objectives and prohibited by their regulations may be granted permission by governments pressed to produce tangible benefits for their populations or simply favourable to development and resource use. A clear symptom of these constant political swings is the frequent change in the name of the governmental entity in charge of environmental affairs (which was modified from Ministry of the Environment to Ministry of Sustainable Development and Planning).

In this context, the constitutional decree on the need and public utility of energetic, mining and hydrocarbon resources[8] does all but favour the existence and effective management of protected areas, which are still only supported by a weak Protected Areas Act (RGAP, D.S. N°24,781) instead of actual Law.

It is worth mentioning that Bolivia's newly enacted Hydrocarbon Law acknowledges the existence and importance of protected areas and requires that the approval of all projects within those areas be made contingent upon the results of environmental impact assessments and public consultations. This clause grants protected areas a higher level of protection from hydrocarbon-related projects, but unfortunately not from mining.

## Social resistance

Amboró NP-IMNA features a long history of social resistance, largely fueled by a total lack of consultation at the time of its creation in spite of an extensive overlap with private landholdings. Another reason for the park's low popularity with local communities is the coercitive attitude initially adopted by the protection corps, which were instructed to enforce all park regulations, effectively prohibiting most of the colonists' daily activities. This was met with fierce opposition and general disobedience, often organized by individuals with economic interests in the area's natural resources[9].

These tensions were partially alleviated by the creation of a multiple use zone (IMNA) and its con-

8 Declaratoria de Necesidad y Utilidad Pública de los Recursos Energéticos, Mineros e Hidrocarburíferos.

9 "*...some time later, when the colonists learned that we were going to achieve the declaration of the area as a national park, they mobilized. They brought 1,000 families and settled them incide the reserve; that was just one month before the promulgation of the decree establishing the park's boundaries, in 1984. Fortunately, many of them decided to leave because they were not ready to adapt to local living conditions, and returned to their highland communities. Only 700 families remained.*" - Robin Clarke, founder of Amboró National Park.

sensuated demarcation from the intangible zone (NP) by means of the so-called Red Line in 1995. Capitalizing on this improved situation, the park administration adopted a new management approach which consisted in transforming the park ranger from a simple law enforcer to a '*facilitator*' of sustainable development processes, meaning that more emphasis was placed on providing assistance to good practices than on sanctioning the undesirable ones. Overall, this shift of attitude is considered to have resulted in notable improvements in the relations between the park administration and the local residents, which now even collaborate in certain conservation-related issues.

However, all the diplomacy in the world remains insufficient as long as part of the residents or adjacent communities of a protected area cannot satisfy its basic needs. In the specific case of Amboró NP-IMNA, the following two underlying problems have been identified:

- Lack of basic services (electricity, drinking water, sanitary services, schools, health centers, etc.) in most of the IMNA's communities;
- Scarce agricultural and livestock production, which determines high poverty levels and the concomitant incapacity of local residents to improve their living conditions. The communities which lying closest to the park are isolated from the markets, and are frequently cut off from the outside by swelling rivers which destroy the makeshift bridges. This situation fuels the will among certain community leaders to seize control over the park's natural resources.

## Drug trade-related coca leaf production

The northern part of the IMNA harbors an increasing number of coca leaf plantations, and two cocaine-producing laboratories have already been found inside the park.

According to a report written by a former director of the park (Jose Luis Terceros), the coca fields are mainly concentrated in the jurisdictions of the Yapacaní and Buena Vista municipal governments, which already notified the Armed Forces (FELCN) of the situation. Apparently these plantations are relatively small, but many colonists also cultivate coca-leafs within their parcels. On a reconnaissance flight a few years ago, the FELCN reported the existence of 30 to 40 ha of coca plantations.

The production of coca leaves is not a new activity in the area. The park director views the current production within the IMNA as the "remnant noise of past production levels". However, most people consider this activity to be on the rise, and several anonymous informants affirmed that the forests might actually be hiding tens of small drug laboratories.

As a matter of fact, the park's western flank is surrounded by confirmed coca-leaf plantations and neighbouring Carrasco NP is nearly collapsing under coca growing pressure. A few years ago, a group of park rangers discovered a tank full of macerating coca leaves near the southern community of La Siberia, which indicates that cocaine production also takes place in the Southern Zone. The relative protection offered by the park's rugged topography from governmental control makes it a very attractive replacement site for those who lost their crops to erradication campaigns in the Chapare[10].

10 Like in Carrasco NP, police forces are often reluctant to make incursions into coca producing areas by fear of surprise attacks and reprisals.

## Oil exploration

There are confirmed oil reserves inside Amboró NP-IMNA, even exploited by some residents for domestic use. In 2001, a highly publicized confrontation between the Andina oil company (supported by the government) and a coalition of local residents and local organizations led to one of the country's first victories of the civil society over industrial interests, and unquestionably the first event of this sort inside a Bolivian protected area[11].

The categoric opposition manifested by the local residents favourable to the protected area was instrumental in expelling the company and in preventing new attempts to date. This is a remarkable example of how involving the local population can lead to the strengthening of a protected area. Without this popular activism the SERNAP would probably not have had the political clout to stand up against the oil giant.

# Recommended Solutions

## Colonization and land invasions throughout the IMNA

The park administration has reached an agreement with the local communities on a clear demarcation between the multiple use zone (IMNA) and the core zone (NP), the so-called Red Line which runs along the mountain foothills in both the Northern and Southern Zone. The SERNAP's mandate being to protect the integrity of the areas under its jurisdiction, one of its responsibilities consists in impeding the establishment of new settlements. In this respect, it is worth mentioning the protection corps' success in achieving the involvement of the local population in repealing illegal settlers. This growing local support, which was also instrumental in stopping the Andina oil exploration project in 2001, is proving to be a more efficient support than the sole specter of law enforcement.

The best way to avoid new settlements is thus to intensify relations between the administration and the IMNA's residents by procuring services that these will favourably respond to without compromising the primary function of the protection corps. Allowing villagers to use the station radio to communicate with relatives or occasionally benefit from a vehicle ride (especially in cases of emergency) is generally a very cost-efficient way to gain popular support for the protected area.

This is in line with the new participatory management model that is currently being promoted across the country and which is likely to take effect after the SERNAP's restructuring.

11 The oil companies relied on the former Hydrocarbon Law and on the absence of a Protected Areas Law. This situation has been partially resolved with the recent reform of the Hydrocarbon Law.

## Agriculture and cattle raising

The range of activities related to the production of crops and cattle raising constitute the most important pressure on the area's ecosystems, both in terms of intensity (complete modification of pre-existing natural conditions) and extension (it is by far the most extensive type of land use). Below is a list of recommendations applying to the extensive, extractive use and intensive use zones, whose implementation could help mitigate this threat in the medium-term:

- Set up model farms (or cooperatives) operating according to strict sustainable farming standards in several locations of the IMNA, at least one in the Northern and one in the Southern Zone. These farms would offer practical courses and technical assistance in soil protection, fertilization, and irrigation techniques, as well as transmitting knowledge concerning the local fauna and flora. In order to stifle the expansion of the agricultural frontier, this measure should aim at increasing productivity per land unit and rely on intensive livestock raising. However, this intensification should not be made dependent upon external subsidies or the use of agrochemicals produced by large multinationals but rely on a self-determinant and socially equitable development model.

- Before launching a large-scale technical assistance program, it is necessary to conduct a detailed analysis on the IMNA's land use potential and readjust the zoning plan according to results. Simply introducing measures that have been successfully applied to other areas without carefully assessing soil conditions and limitations can have very negative impacts and thwart the benefits of an ambitious assistance package. Zoning decisions should aim not only at optimizing production, but also at minimizing transport time and avoiding competition between neighbours by diversifying activities.

- Promote the cooperative use of resources and inputs such as machinery, fertilizers and animal labour. This will not only reduce investment and production costs, but also reestablish the production model used by most of the colonists before migrating to the area.

- Promote the adoption of agroforestry systems and the planting of nitrogen-fixating tree species on pastureland, such as *Alnus acuminata* (as proposed by FAN-TNC in the 1997 Management Plan), and the incorporation of other tree species as alternative sources of fodder, such as *Eritrina poeppigiana* (whose leaves contain 25% of proteins), *Enterolobium contortisiliquum* and *Gochnatia* spp.

## Illegal logging

Illegal logging in Amboró NP-IMNA is practiced for two different reasons and by two different groups: on the one side there is commercial logging by external and organized groups of chainsaw operators and on the other subsistence logging and firewood collection by local villagers.

The first is a clear offence to park regulations and as such should be repelled with the use of public force. Given the protection corps' severe limitations, it is necessary to design and implement an "environmental intelligence system" capable of alerting the park rangers in advance. This calls for the involvement of local communities, which are often eager to participate since they generally don't benefit from these illegal operations. However, fear of reprisals is a strong limiting factor and in

certain occasions this problem may only be solved by seeking participation of the police.

The second is a rather legitimate use of natural resources in an Integrated Management Natural Area (IMNA), and as such should be dealt with using incentives and providing alternatives rather than sanctions and systematic prohibition. This involves training local residents in the integral and sustainable use of forest resources as well as providing technical and financial assistance to increase agricultural output, as mentioned in the section above. Specifically (FAN-TNC, 1997):

- Establish a social contract between the local population and the park administration. On the one hand, this requires the acceptance by the park authority of some levels of timber harvest according to specific management plans. On the other hand, this implies a commitment by the beneficiaries to endorse and implement such practices as setting aside certain patches of forest for regeneration and reforesting with native species. In other words, users of timber would become producers at the same time. This would naturally include the collection of NTFPs (wild fruits, medicinal and ornamental plants, etc.), considering that the available resources need to be quantified before being able to establish sustainable harvest rates.

- Promote the replacement of firewood by gas, mainly in the local brick-making factories (in the eastern sector).

- Foster the introduction of pricing schemes in surrounding communities reflecting the value of the services provided by the park's natural ecosystems, - in particular the provision of clean water - with the purpose of maintaining the level of protection necessary to guarantee the continuity of the water supply. In case of the private forests contained within the IMNA, this could be done either by compensating the owners for their opportunity cost or by purchasing the land and donating it to the national park. All the headwaters of the national park and IMNA should be placed under strict protection, and those forests that have already been deteriorated by human activities, such as the headwaters of the Comarapa, Quirusillas, Moile and Bajo Surutú rivers, should be identified and placed under restoration schemes. In this respect, it is worth mentioning the work of Fundación Natura, which is currently implementing a pilot project in the Southern ANMI (Comarapa sector).

For the restoration of hydrological functions lost to human activities, FAN-TNC recommend:

a) the identification of the high-priority sites and their clear delimitation;

b) the use of native species to reforest the margins and borders of pathways, gorges, rivers, water sources and other critical features, protecting them from cattle grazing and other pressures;

c) the adoption of soil conservation practices such as the use of hedgerows, terraces, and ditches;

d) the use of fences to prohibit the access of cattle to sites left aside for recovery;

e) the construction of drainage systems and the sowing of herbaceous species to minimize soil erosion in places where the vegetation cover has been permanently removed.

f) the application of specific soil regeneration techniques in flat but unproductive terrains.

- Ecological restoration is one of the most effective ways of mitigating environmental impacts. One priority site identified by FAN (1997) lies in the semi-deciduous dry forest of the southwestern part of the protected area, in the headwaters of the San Mateo river ubicado between 1,500 and 1,700m asl (Karahuasi, Diampampa, San Mateo), on the border with Carrasco NP.

## Hunting and fishing

Similarly to the case of logging, it is important to distinguish between commercial and subistence hunting and fishing. In this respect, specific regulations should be established in order to exert control over the latter while sanctioning and totally prohibiting the former.

If authorized, subsistence hunting and fishing need to be restricted to the IMNA and conducted under strict rules (complemented by monitoring schemes), destined to avoid the depletion of the most vulnerable species while ensuring a sustained yield of protein resources for the local population[12], such as the establishment of species-specific hunting/fishing seasons, the prohibition of hunting pregnant animals or with young offspring, and the definition of minimum size limits for fish. This will require serious investigations in the biology of these species and their local environmental requirements. To reduce the effects of hunting pressure, users also need to be made aware about the need to manage and protect wildlife habitats.

The rearing and reproduction of certain wildlife species in captivity should be encouraged. This would not only guarantee a stable source of proteins, leather, milk and eggs but could also help restore natural abundance levels by reintroducing individuals into the wild. The 1997 Management Plan[13] mentions certain species susceptible to be raised in captivity or semi-captivity, such as iguanas (*Tupinambis teguixin*), boas (*Boa constrictor* and *Epicrates cenchria*), amphibians (*Hyla leucophyllata*, *Osteocephalus taurinus, Phyllomedusa boliviana, Elachistocleis and Hamtophrynes, Leptodactylus chaquensis*), and birds (*Guttata Ortalis, Odontophorus, Ara, Pionus, Amazona, Paroaria gularis, Pheucticus auroventris, Piranga* sp.). In the case of mammals, which are much more difficult to domesticate, the agouti (*Agouti paca*) seems to be the only candidate, and its low reproductive potential (one young a year) does not make it economically attractive. Concerning fish farming, sábalo (*Prochilodus labeo*) along with fresh water clams and shrimps could lend themselves to captive breeding.

In the case of properties sufficiently large to allow the creation of semi-captive conditions (in which animals are kept in fenced enclosures containing or reproducing their natural habitat), the Management Plan mentions various species suited for "wildlife ranching": iguanas (*Tupinambis teguixin*), amphibians (*Leptodactylidae*), caiman (*Caiman yacare*), ducks (*Dendrocygna bicolor* and *D.*

12 Humans have practiced sustainable hunting and fishing during millenia, but factors such as population growth, the market economy logics, and the dramatic reduction of the land available for these activities has resulted in dwindling animal populations and the consequent use of forest areas that had been left untouched due to their poor accessibility.

13 Available online at http://www.fan-bo.org/siicva/catalogo/pdf/PlanAmboro/

*autumnalis*), guans (*Penelope* sp.), deer (*Mazama* sp.), agoutis (*Dasyprocta* sp., *Agouti paca*), *Sylvilagus brasiliensis*, and *Myocastor coypus*.

## Small-scale mining

Given than Amboró NP-IMNA is not a mining area and that mining activities - such as gold mining - have direct and indirect detrimental environmental impacts (ranging from river pollution from mercury to increased hunting pressure), it is the duty of the SERNAP to repel this activity from the park in collaboration with the local communities.

## Uncontrolled tourism

The carrying capacity of the park's touristically attractive sites needs to be assessed in order to establish acceptable visitor numbers and the maximum time they are allowed to stay. The construction of infrastructure inside the national park should be limited to the strict minimum and their environmental impact be previously analyzed.

The distribution of pamphlets and the installation of signs and/or posters in strategic places can help diminish the problem of solid waste disposal, excessive noise, and vandalism. The application of severe fines to tourist operators and guides taking their clients to prohibited sites or letting or encouraging them to engage in illegal activities (such as fishing and collecting rare plants) is a measure proven to be efficient in regulating this activity.

Another recommendation is to minimize the presence of tourists along or inside riverbeds, which are a primary animal habitat and the breeding grounds of many species. It is therefore important to avoid building long walking trails in those areas, although river crossings and short distances on river banks are fully acceptable. It may be necessary, however, to restrict access to these trails during the breeding season(s).

As far as existing infrastructure is concerned, it is recommended to consolidate the La Chonta lookout in order to avoid accidents and to avoid the erosion of steep footpaths with the installation of wooden stairs and/or other soil stabilization measures.

## Social resistance

Although Amboró NP-IMNA's social situation is not nearly as complex or critical as in other protected areas, an important task of the park administration is to manage to dissociate the SERNAP from the persisting image of a government driving people out of their lands, and replace it for that of an ally working to achieve better living conditions for protected area residents.

The resistance exerted by certain sectors of the local population is due to a large extent to a lack of communication concerning the potential benefits of living near a national park and to the fact that many of those people who did receive information still haven't seen any of the direct or indirect

benefits that they were encouraged to expect (which is the case in almost all the municipalities and towns left aside from tourism development).

The protection corps' awareness-raising efforts have significantly reduced the level of opposition to the park generated by its flawed creation process and the first years of its implementation. However, in order to achieve a viable relationship between the park administration and the local population, it is necessary to achieve a real social pact with the communities, starting with a comprehensive community outreach strategy, characterized by the following components:

- regular provision of information;
- a negotiation platform aimed at achieving participative management;
- educational activities for the youngest generations;
- a set of good neighbour policies (independently from alternative development), translated into investments and direct support from the protected area in social and economic issues.

## Oil exploration

Considering that the oil industry has eyes on the park's potential reserves and that two oil concessions partially overlap with the protected area, it is crucial that the park acquire a solid legal protection and consolidate its popular support to offer a strong negotiating power against oil exploitation interests.

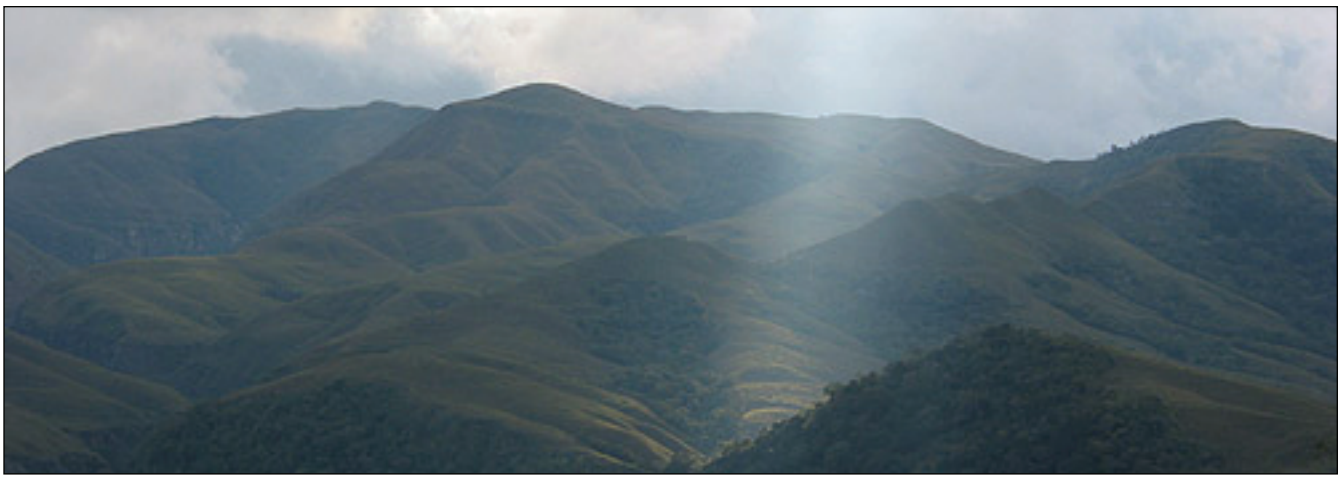
# Conclusion

Amboró NP-IMNA is arguably one of the country's most scenic and attractive protected areas, conferring it a very high ecotourism potential. Although formal species inventories were never conducted inside the national park, the list of species reported for the IMNA and surrounding areas already places it among the most biologically diverse areas in the world, as well as a center for endemic species.

The greatest threat to the integrity of this natural jewel, like so many others in the world, is the complex and unstable social context in which it is immersed, characterized in this precise case by unplanned colonization, the continuous expansion of the agricultural frontier and the area's increasing attractiveness for coca growers chased from their lands by military eradication campaigns. A profound concern is the general opposition by the local peasantry to nature conservation initiatives, which are viewed as undesirable governmental control and, yet worse, the intromission of foreign interests into domestic affairs.

Amboró NP-IMNA is part of the Amboró - Carrasco conservation complex, which protects a significant part of the so-called "Elbow of the Andes" but which to the south is isolated from other protected areas. Considering that only highly-connected protected area systems are likely to help maintain large-scale ecological processes and minimum viable populations of the most vulnerable vertebrate species, the success of Amboró NP heavily depends on the conservation of neighbouring Carrasco NP.

Finally, concerning the future of Amboró NP, it is important to consider the raging international debate on the relationship between parks and people (in particular local populations), which was the central tenet of the Vth World Park Congress (Durban, 2003) and is constantly widening the divide between conservationists and socio-environmentalists (*socioambientalistas*). The SERNAP is running its own internal debate, fed by defenders of both factions, but characterized by a gradual trend towards the socially-oriented approach to conservation, as formalized in its new policy statement. In this context, the future of Amboró NP and many of the country's other protected areas largely depends on the type of social pact that will need be made between the needs of nature conservation and the aspirations of the local populations to improve their living conditions.



# References

ADAPICRUZ. 1999. Primeras Jornadas Apícolas Departamentales. Memoria ADAPICRUZ (Asociación Departamental de Apicultores de Santa Cruz). Santa Cruz de la Sierra, Bolivia. 82 pp.

Avila, R. 1993. El Amboró y la problemática de los asentamientos campesinos. Final report. CORDECRUZ-KFW-Consorcio IP-CES-KWC. 32 pp.

Bibby, C. et al. 1992. Putting biodiversity on the map: priority areas for global conservation. ICBP, Cambridge, UK.

Cajías de la Vega, M. 1995. La coca en la historia de Bolivia. Su uso en las épocas prehispánicas y colonial. Encuentro. Revista Boliviana de Cultura. Año V. Editorial Fundación BHN.

CARE-BOLIVIA. 1997. Taller de planificación comunitaria Cabra Cancha. CARE. Santa Cruz de la Sierra, Bolivia.; CIAT (Centro de Investigación Agrícola Tropical). 1998.; CIAT-CARE. 1999. Informe final de prestación de servicios a FAN-Comarapa. CIAT-CARE Partnership.

CARE-WCS. 2003. Plan de Manejo del Parque Nacional y Área Natural de Manejo Integrado Madidi. With support from the European Union.

CEBEM. 2003. Parque Nacional Amboró: Aproximación Multidisciplinaria a su Zona de Amortiguamiento.

Eagels, P. 2002. Sustainable tourism in protected areas: guidelines for planning and management. IUCN. Gland, Switzerland.

Ergueta P. and H. Gomez C. 1997. Directorio de áreas protegidas de Bolivia. Centro de Datos para la Conservación. La Paz, Bolivia. 186 pp.

FAN-TNC. 1997. Plan de Manejo del Parque Nacional Amboró y Area Natural de Manejo Integrado, Santa Cruz de la Sierra, Bolivia. Con apoyo de CARE-BOLIVIA.

FTD. 2003. Plan de Uso Turístico del Área Protegida Amboró (APA), Santa Cruz de la Sierra, Bolivia.

Gentry, A. 1982. Phytogeographic Patterns in Northwest South America and southern Central America as Evidence of Chocó Refugium. En: G.T. Prance. Biological Diversification in the Tropics. Columbia University Press. New York.

GNTP. 2003. Espacio político y empoderamiento. Grupo Nacional de Trabajo para la Participación. 70 pp.

Ibisch, P. and G. Mérida. 2003. Biodiversidad: La riqueza de Bolivia. Estado de conocimiento y conservación. Editorial FAN. Santa Cruz. 400 pp.

Leung, Y. and J.L. Marion. 2000. Spatial Strategies for Managing Visitor Impacting National Parks. In: Journal of Park and Recreation Administration, Volume 17, Number 4, pp. 20-30.

MHNNKM. 2000. Análisis de la situación social e institucional y sistema de información geográfico de las áreas protegidas de la Amazonia Boliviana. Museo de Historia Natural Noel Kempff Mercado. 180 pp.

Mogrovejo, T. 1996. Informe de Consultoría. Caracterización Física, Geología, Geomorfología e

Hidrología para el Plan de Manejo del Parque Nacional Amboró. Santa Cruz, Bolivia, 53 pp.

Moreno, A., P. Margoulis, and K. Brandon. 1989. Bolivia. Amboró National Park. En Parks In Peril (Brandon, Redford and Sanderson) Island Press and The Nature Conservancy.

Quiñones Paco, F. 1999. Evaluación del efecto del ganado sobre la vegetación de un bosque nublado del Parque Nacional Amboró, en Comarapa, Santa Cruz, Bolivia. 43 pp.

Ribera, M. 1999. Aspectos generales sobre la conservación de la biodiversidad y áreas protegidas en Bolivia. 100 pp.

SERNAP. 1999. Sistema Nacional de Areas Protegidas. Proyecto MAPZA, SERNAP, GTZ. La Paz, Bolivia. 79 pp.

SERNAP. 2001. Información Técnica del Sistema Nacional de Áreas Protegidas.

SERNAP. 2002. Base Nacional de Datos de Biodiversidad en Áreas Protegidas (BANDA). La Paz, Bolivia.

SERNAP-MAPZA-GTZ. La Paz, Bolivia.

SERNAP. 2003. Medición de la Efectividad de Manejo (MEMS). La Paz, Bolivia.

SERNAP. 2004. Sistematización de la investigación en el SNAP. La Paz, Bolivia.

Urioste, A. 1996. Sistema de control y vigilancia en el Parque Nacional Amboró. FAN-TNC Consortium. Santa Cruz, Bolivia. 69 pp.

# APPENDIX 1

# Institutional Framework of the SERNAP

## 1/ Policies

The following outlines SERNAP's political framework, which forms the basis for establishing its objectives and selecting and implementing actions directed at meeting those objectives:

- o Consolidate the SERNAP as an institution.
- o Achieve financial sustainability for protected area management.
- o Conserve biological and cultural diversity in the protected areas.
- o Strengthen public participation in protected area management.
- o Promote protected area management integration in national economic and social policies.
- o Contribute to improving the living conditions of local residents.
- o Guide personal and collective values, attitudes and practices towards protected area conservation.
- o Promote protected area integration at the international level.

## 2/ Strategic agenda

The 2003-2004 Activity Report lists the following advancements in relation to the actions outlined in the 2004-2007 strategic agenda:

- o Strengthening of public participation via co-administration agreements with associations of municipalities (*mancomunidades*) and farmer organizations.
- o Joint establishment, among all SNAP stakeholders, of an effective, efficient, and transparent management model focusing on "Parks with People".
- o Promotion and implementation of tourism strategies, policies, and activities in protected areas, with tangible benefits for local people and communities.
- o Development of a conflict management and resolution system for preventive action against emerging conflicts within the SNAP.
- o Launching of a national gap analysis to guarantee representation of the country's ecosystems within the SNAP and as a principal input for the design of its Master Plan.

o Laying the foundations for the achievement of financial sustainability and adoption of financial management policies for donor funds or internal revenues.

o Strengthening SERNAP's interinstitutional and intersectorial relations through establishment of crosscutting principles, policies, and strategic management plan.

o Implementing productive uses (sustainable use of natural resources, tourism, etc.) and land titling in protected areas.

**Future work includes:**

o Continue the prevention, management, and resolution of social conflicts related to protected areas.

o Implement the agenda of the Constitution of the National Consultative Council as a starting point for a social pact with grassroots organizations.

o Ensure the continuity of technical and financial support provided by such organizations as MAPZA-GTZ, GEF-World Bank, BIAP-KfW and other technical/financial aid agencies, in accordance with the SERNAP policies and strategic agenda and based on the harmonization and complementation of processes.

o Propose and approve a Supreme Decree for the institutional reorganization of the SERNAP in accordance with the reality and conditions determining the institution's current restructuring.

o Start the elaboration of a Master Plan for the SNAP.

o Conclude, adjust and initiate the elaboration of Management Plans in at least eight protected areas.

o Adjust and improve public and institutional participation mechanisms in protected area management.

# APPENDIX 2

# Objectives of Amboró National Park and Integrated Management Natural Area

## Legal basis:

## D.S. N°24,137 of October 3, 1995

Art° 4.- The main objectives of the National Park are:

1.- the protection of the pristine areas of high biological diversity, in particular the montane cloud forests (yungas), ecosystems, genetic resources, threatened and endemic species.

2.- the protection of geomorphological and singular landscape features.

3.- the protection of watersheds and their headwaters.

4.- to contribute to local and regional development through ecotourism, natural interpretation activities, and environmental education.

5.- the promotion of scientific research.

6.- the promotion of the monitoring of ecological processes.

Art° 5.- The main objectives of the Integrated Management Natural Area are:

1.- the promotion of sustainable development.

2.- the restoration of natural vegetation in degraded areas.

3.- the recognition of indigenous and farmer rights and the promotion of their participation in the management of the IMNA through a Management Comittee.

# What is a National Park and Integrated Management Natural Area?

## D.S. N° 24,781, 07.31.1997

Art° 20.- The National Park (NP) category is aimed at the strict and permanent protection of representative samples of ecosystems or biogeographic provinces and the plant and animal species, as well as the geomorphological, scenic or landscape values that they harbor. A national park is a relatively large area which ensures the continuity of ecological and evolutionary processes of its ecosystems.

Art° 23.- Extractive or consumptive use of renewable or non-renewable natural resources is strictly forbidden, just as the construction of infrastructure - to the exception of scientific research, ecotourism, and environmental education purposes as well as the susbistence activities of native people, once expressly defined and authorized, so as to provide the population with tourism, recreational, environmental monitoring, nature interpretation, environmental education, and ecological awareness opportunities, in accordance with the park's zoning, management plan, and regulations.

Art° 25.- The Integrated Management Natural Area (IMNA) category is meant to harmonize the conservation of biological diversity with the sustainable development of the local population. It constitutes a mosaic of land uses, including representative samples of ecoregions, biogeographic provinces, natural communities or plant and animal species of special importance, traditional land use systems, multiple-use zones, and strict protection zones (Art. 25) (CARE-WCS, 2003).