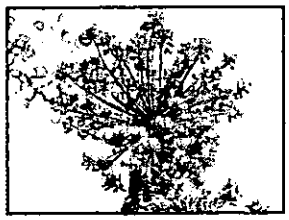
FINAL REPORT 2003

Conservación Argentina



Project

Urugua-í Green Corridor

Conserving a biodiversity corridor between Urugua-í and G. H. Foerster provincial parks, Misiones, Argentina

BirdLife INTERNATIONAL

bp

FAUNA & FLORA International
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CONSERVACION ARGENTINA

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Universidad Maimónides

In agreement with the Ministry of Ecology, Renewable Natural Resources and Tourism of Misiones Province

Conservación Argentina is a non-governmental organization. Our mission is to develop integreted conservation programmes choosing solutions that are simple and sustainable, based on sound science, community education and institutional management; taking into account the social needs and cultural background of the surrounding community.

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Contents

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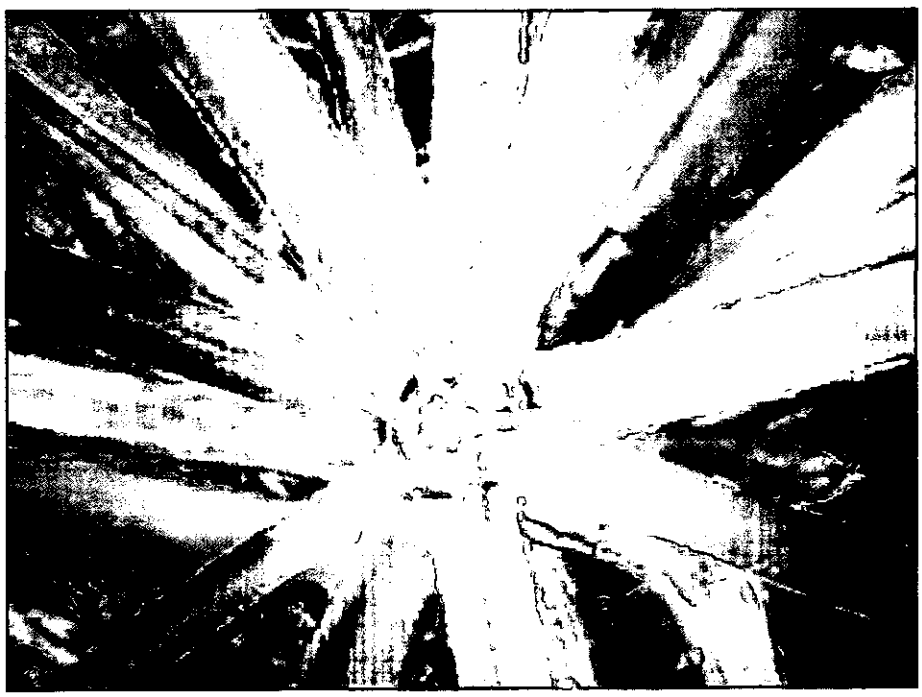
chapter 1

Introduction and background



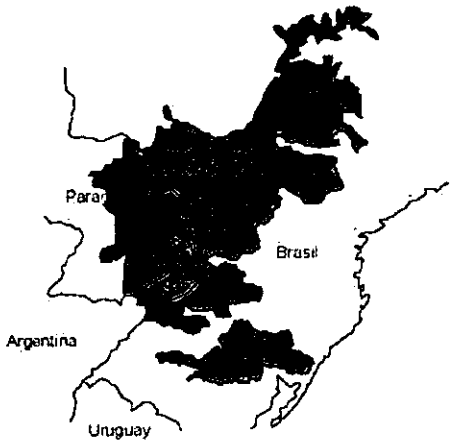
Introduction

Forest landscape in the Urugua-í Green Corridor.

Interior Atlantic Forest Conservation

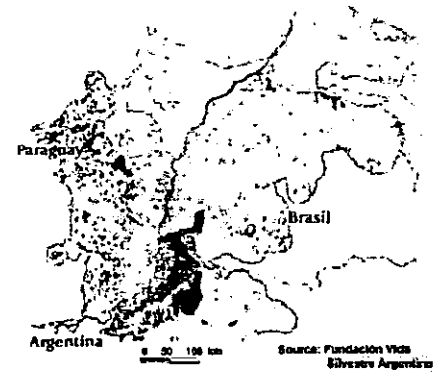
Atlantic Forest eco-region or Mata Atlántica extends from the Atlantic coast of Brazil towards the centre of the southern cone, reaching the east of Paraguay and the north of Argentina. Historically, it occupied 1 million square kilometres, but today it exists only as isolated patches scattered throughout a landscape dominated by agricultural uses and covering less than 5% of its former size. Forest depletion and degradation has caused the loss of 93% of the Atlantic Forest in Brazil, 80% in Paraguay and 56% in Argentina (Galindo-Leal & Camara 2003).

This eco-region rank among the top five of the "hottest" Hotspots of the world (Myers 1988, Mittermeier *et al.* 1998, Myers *et al.* 2000) and it is also considered one of the most threatened tropical ecosystems of South America. Its levels of taxa diversity are comparable to other tropical forests such as the west arc of the Amazonia and the Chocó-Darién region, containing several important centres of endemism (Statterfield *et al.* 1998, Long 1996). Because of its outstanding biological value and its critical state of conservation (ICBP 1992, BSP *et al.* 1995, Dinerstein *et al.* 1995, Olson & Dinerstein 1997, Mittermeier *et al.* 1999), the Atlantic forest is considered of high conservation priority at a regional and global level.



Interior Atlantic Forest original area

This ecosystem presents a high forest heterogeneity resulting from its wide elevation gradient, which determines diverse climatic conditions and soil types. Although there are a great variety of vegetation formations, three basic types can be identified: coastal rainforest (along the Brazilian coast), Araucaria forest (in higher zones of southern Brazil and northern Argentina) and interior seasonal subtropical forest, also called Interior Atlantic Forest, *Paraná* Forest or Misiones´ Forest (located at the confluence of the Brazilian, Paraguayan and Argentinean frontiers).



Interior Atlantic Forest actual area

Misiones´ Forest

The best preserved tracts of Interior Atlantic Forest are in Misiones region, Argentina, where more than 1 million hectares of continuous forest remain; these contrast neatly with adjacent deforested areas in Brazil and Paraguay. They conform one of the major remnants of Atlantic Forest in South America and are home for threatened animal species such as Red Howler Monkey, Brazilian Dwarf Brocket Deer, Bush Dog and Merganser Duck. Because of its high biological diversity and the large forest remnants inside and outside protected areas, this region presents itself as one of the major opportunities for the long term conservation of Interior Atlantic Forest.

Protected Areas and the Green Corridor Law

During the last decade, Misiones province has established an important system of natural protected areas, totalling more than 400.000 ha (48 parks and reserves under national, provincial, municipal and private jurisdiction).

Aspidosperma polyneuron endangered and endemic Atlantic Forest tree species

In the year 2000, Misiones sanctioned the Green Corridor law, declaring conservation and multiple use zone most of the provincial territory. Its main goal is to ensure connectivity between protected natural areas and to encourage sustainable development practices in the area. This law constitutes an important step towards a conservation and sustainable development policy, yet it currently presents several implementation difficulties principally due to economic limitations and instrumentation problems.

WWF is working on a tri-national Interior Atlantic Forest conservation project with the aim of integrating protected areas of Argentina, Brazil and Paraguay.

Most of protected areas in Misiones are threatened because of their isolation and the absence of buffer zones that could soften the shock of anthropic activities near their edges. Besides, there is an absence of involvement and integration of neighbouring countries with forest conservation and wildlife problems. This situation threatens forest preservation in the long-time, particularly outside protected areas.

Atlantic Forest butterfly

Biodiversity

Misiones eco-region contains the greatest biodiversity of Argentina (Rabinovich & Rapoport 1975, Bertonatti & Corcuera 2000). Up to date, 420 birds (Chebez 1996, Saibene *et al.* 1996, Chebez *et al.* 1998, Bertolini & Gil 1999) and 70 mammals (Chebez 1996, Heinonen Fortabat & Chebez 1997, Bertolini & Gil 1999) have been registered, mostly in Iguazú National Park and Urugua-í Provincial Park.

The scarcity of surveys and the rapid forest fragmentation and habitat loss in the eco-region difficult the status assessment for most of the species. Endemic species have one of their last viable habitat remnants in Misiones forest, yet the status and ecology of many of them still remain unknown (e.g. *Mazama nana*) (Chébez & Varela 2001).

The Corridor Approach to Conservation

The corridor approach to biodiversity conservation seeks to provide a practical and effective solution to the difficulty of maintaining biodiversity and large-scale ecological processes. Existing protected areas are often too small and isolated to maintain viable ecosystems and processes. In such circumstances, conservation efforts must focus on linking major sites across wide geographic areas. Such networks of protected areas and landscape management systems are the so-called biodiversity corridors (Newmark 1993, Meffe & Carroll 1997).

The main function of corridors is to connect biodiversity areas through a patchwork of sustainable land uses, increasing mobility and genetic exchange among individuals of fauna and flora even in the absence of large extensions of continuous natural habitat (Forman 1995). In this context, small habitat fragments within corridors perform several related functions, connecting or reconnecting larger areas, maintaining heterogeneity in the habitat matrix, and providing refuge for species that require the unique environments present in these fragments.

Large scale intervention through biodiversity corridors, regional planning and landscape conservation is therefore one of the highest conservation priorities at a regional level in many of the world's hotspots and wilderness areas.

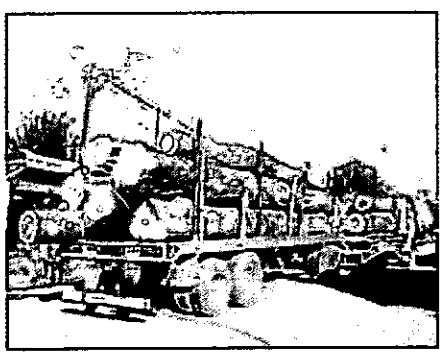
Project Study Area

The study area is located in Andresito municipality, Misiones province (Lat. 25º 51´ S; Long. 54º 10´ W), 1500 kilometres north from Buenos Aires city. It is limited by Urugua-í Provincial Park (UPP) and Guardaparque Horacio Foerster Provincial Park (GHFPP), two protected areas situated in the north of the province.

UPP and GHFPP protect important extensions of nearly untouched forest, including important areas for conservation of endemic regional birds (EBA's) (Sttatersfield *et al.* 1998). Moreover, it is considered a key area for conservation of neotropical birds (Wege & Long 1995).

A gradient of natural habitats are present, ranging from lowland forests with abundance of canes -Uruzú stream-, relict stands of Paraná pine(*Araucaria angustifolia*) in the south-eastern region, and palmetto palms (*Euterpe edulis*) and Rosewood tree(*Aspidosperma polyneurum*) associations at Sierra de la Victoria hills (Bertolini & Gil 1999). This environmental diversity explains the high vertebrate richness in the area, including several Atlantic Forest endemisms. Nine avian and eight mammalian species are considered globally threatened (Collar *et al.* 1992, IUCN 2003), as well as 15 bird species are considered threatened at a national level.

Palmetto forest in Foerster P.P.



Logging companies in Andresito

Urugua-í Green Corridor

Urugua-í Provincial Park (84,000 ha) is one of the most important forest fragments in the region. A few kilometres to the east there is another fragment of protected forest, GHFPP (4,309 ha). Between these two parks lays a mosaic of forest fragments, crops, cattle pastures and Maria Soledad settlement. The forest fragments in this area function as an ecological corridor linking the larger UPP to the minor "palmetto rich" GHFPP.

Palmetto associations constitute an attractive food source for local migrating fauna, such as *Turdus* spp., parrots, toucans and White-lipped Peccary. Therefore, palmettos could be considered as "keystone species" within this ecosystem, thus being synchronized producers of edible fruits during a period when other fruits are scarce (Placci *et al.* 1992, Keuroghlian *et al.* 2001).

Socio-economic context

Maria Soledad community is formed mainly by European descendants and recent immigrants from Brazil (Bertolini & Gil 1999) scattered in small country houses. Economic activity is based on subsistence plantations and cash crops (maize, tobacco, cassava, rice, beans and yerba mate), and extensive livestock within native forest fragments. The production is extremely low and the majority of families are struggling to meet their basic needs (Laclau 1994, Placci & Holz 2003).

Identified problems

Changes towards agro-development, exotic forest plantations, non-rotating crops, hydroelectric projects and extensive livestock are pressing on long term viable forest remnants of the eco-region. Ecosystem integrity is currently concerned by the problems occurring **in Urugua-í river watershed, involving several key protected areas** the Green Corridor of Misiones.

Additionally, several species are probably extinct (Brazilian Merganser) and remaining populations are being fragmented or reduced (Chebez 1994). Forecasts coming from population genetics, metapopulation dynamics and Island Biogeography Theory (Meffe & Carroll 1997) are suggesting that, in the long term, small isolated populations will have low survival probabilities. Therefore, it is of main importance that a preserving policy based on a sustainable and regional approach is rapidly implemented.

Protected areas lacks a buffer zone and rural communities surrounding these reserves show a low level of involvement with its conservation. The forest land joining UPP and GHFPP has recently been parcelled and the newly settled poor people are beginning to press on forest remnants from the ecological corridor.

Aim and Objectives

Project aim

To contribute with the maintenance of a green corridor that connects Urugua-í Provincial Park and Guardaparque Horacio Foerster Provincial Park.

Project objectives

a) To evaluate the corridor use through systematic field surveys focused on forest dwelling species of birds and mammals.

b) To map forest fragments and land use in the ecological corridor and its surroundings.

c) To involve the local community of Maria Soledad and its surroundings in the long term conservation of this green corridor.

Cattle pastures. Behind it is observed the forest of Urugua-í Provincial Park

chapter 2

Social and environmental assessment

Social and environmental assessment

Introduction

The purpose of such a diagnosis is to get familiar with a place or a situation's reality. Before beginning a project, there must be a good understanding of the area and the community's condition. This diagnosis allows for the incorporation of an environmental perception -a subjective but important component-, contributing with qualitative information and complementing other sources of information. In this respect, there are greater chances of error making, money, time and community trust loss without a deep knowledge of local reality, knowing that a true participation of the community implies recognizing the value that people's experience and knowledge have, which could contribute to obtain a better understanding of the problems and how to solve them.

To promote sustainable conducts it is necessary first to understand the social and environmental context of human behaviour, as well as the factors that motivate and determine those (Byers 1996). This is important, in turn, for a correct design of activities that are socially and ecologically sustainable.

Human behaviour is extremely complex. Environmental diagnosis provides methods and tools to work with the community and to understand the context of its decisions, practices and actions. Any action that affects the behaviour of the people must be based on an understanding of the social and ecological context in which it happens (Byers 1996).

A deep analysis of demographic, political and socioeconomic causes that lead to the degradation of the Misiones' forest and its biodiversity exceeds the objective of this diagnosis. For a more complete understanding on these aspects we recommend to consult the works of Laclau (1994), Burkart *et al.* (2002), Chébez & Hilgert (2003) and Holz & Placci (2003). The diagnosis that we carried out during the project focuses in the current situation in the area of Urugua-í-Foerster corridor.

Interviews with local farmers

Methods

To obtain the environmental diagnosis we used two methodological approaches. We made semi-structured interviews (Tuxill and Nabhan 2001) and at the same time we carried out a participant research and observations (Byers 1996, Rodrigues Brandao 1999, Geilfus 2000).

This activity was very important during the first steps of the project for accomplishing the following aims:

- Stakeholders analysis
- Encourage communication between local community and the project team
- Local community involvement

The mentioned approaches allowed us for a reversal of learning, which means to learn with and from rural people, directly, on site and face to face, gaining from locals natural, technical and social knowledge; admitting the need to understand local knowledge, skills and practice. It was based on conversations with all groups of stakeholders in their normal surroundings, adopting sensitive attitudes to local people, learning rapidly and progressively, with a flexible use of the methods, improvisation, iteration, and cross-

checking, not following a blueprint program but instead an adaptable one in the learning process. The project seeks to understand also the women and poorer people's concerns and priorities.

In general, rural appraisal tools are designed to collect information on socio-economic relationships, land management patterns and traditional ecological knowledge of residents in a given community and its environment (Tuxill & Nabhan 2001).

Grimble & Wellard (1996) define stakeholder analysis as an approach for understanding a system, and changes in it, by identifying key actors and assessing their respective interests in that system. This approach allows identifying and choosing both interested people as well as leaders to organize and motivate others.

Our interviews also intended to get information about land and wildlife use, conservation problems and a perception of how the community protects the native forest. Finally, each interview was developed in order to announce targets of the project and stakeholders were invited to participate. This communication allowed us to create a climate of confidence between the team and the community, which facilitate logistic aspects related to access sampling sites.

We tried to interview the greatest number of stakeholders:

- Leaders of the local community
- Landowners and home owners
- Landless, newly settled people
- Occupiers, including practicing farmers and those renting properties
- Local teachers
- Protected area planners, managers and park rangers

Results

Surveyed farms

Thirty-eight interviews were carried out in farms located between Urugua-í and Horacio Foerster provincial parks during July-August 2002. We designed the survey in order to obtain a heterogeneous sample, embracing different geographic and socio-economic situations.

Surveyed farms (n=38) had an area that ranged from 5 to 308 hectares, with a mean of 50.9 ha. and a median of 24 ha. Most properties had areas of less than 40 ha (n=29), with half of them with only 20 ha. Total area covered by the 38 visited farms totalled 1885 hectares. Five farms with more than 100 ha represented more than half of total area (1,084 ha).

Structure of the population

We interviewed 15 women and 23 men. In most of the cases, only one person answered the questionnaire; yet in various opportunities, several members of the family (from both sexes) participated. These occasions allowed us to obtain a more complete answer to our questions.

Family group size had a mean of 5.43 and a median of 6. We registered persons living alone up to 11 members family groups. Surveyed farms represent a population of approximately 200 persons.

Selective logging in a farm forest fragment

Origin of the population

Being a bordering zone with recent colonization, great part of the population still maintains strong cultural and blood bonds with Brazil. The language "*portuñol*", a mixture of Portuguese and Spanish, which is widely spoken in the region, demonstrate this. Some interviews corresponded to families that had recently arrived to the zone and who do not understand the Spanish correctly.

The great majority of interviewed people (36.8%) come from different cities of the province, such as Iguazú, Eldorado, Andresito, San Antonio, Oberá and Posadas. Others come from rural settlements from this region (26.3%). Some people were old inhabitants of the areas that correspond currently to the provincial parks Urugua-í and Foerster (18.4%) and that were relocated by the provincial government when these protected areas were created.

The rate of population growth in northern Misiones, especially in Andresito, is one of the highest in all the Atlantic Forest ecoregion (Jacobsen 2003).

Land ownership

The land tenure is an important topic in order to interpret the causes of Misiones forest degradation. The situation related to land ownership (owner or occupant) and the size of these lands largely determines the current productive system. Although most of land in Misiones province is privately owned (Laclau 1994), in the area of the Urugua-í - Foerster corridor land tenure system is precarious, predominating the "occupancy permits" for public lands. Just a few settlers have regularized their land possession situation and have the property title for this land. Regularly, these "occupancy permits" are sold through an informal and dynamic system of land transaction. The 23.6% of interviewed families had occupied their farm for about a year, and generally they had bought it to another occupant without a property title. The lack of security on land possession opposes the development of long-term sustainable production models, motivating the farmers to conduct a fast degradation of their natural resources in order to produce greater short-term benefits, leaving their farm afterwards in search of more productive areas.

Overexplotation of corridor forest remnants

Land use trends

The current economy of the region is based mainly on eliminating the forest for timber extraction, slash-and-burn agriculture, cattle grazing and tree plantations. These productive systems produce soils highly susceptible to erosion, weed invasion and nutrient lost.

The farm's forest remnants are subjected to an intense selective logging of commercially exploited species like cedar (*Cedrella fissilis*), lapacho (*Tabebuia heptaphylla*), petiribí (*Cordia trichotoma*), incienso (*Myrocarpus frondosus*), guatambú (*Balfourodendron riedelianun*), cancharana (*Cabralea canjerana*), anchico colorado (*Parapiptadenia rigida*), grapia (*Apuleia leiocarpa*) and cañafístula (*Peltophorum dubium*), among others. Legal and illegal selective logging is made in a non-sustainable way, which causes overexploitation of the forest. This leads to the impoverishment and degradation of forest fragments, producing timber value (Laclau 1994) and biodiversity losses (Fimbel *et al.* 2001).

The main commercial crop in the corridor area is tobacco (65.7% of interviewed people) and is practiced by poorest farmers. It is growth in small areas (1-4 hectares) but with a tremendous social and environmental impact, implying a lot of family manual labor and great amounts of agrochemicals. At the moment, tobacco is the only income alternative that the small farmers have in this isolated region, since tobacco companies "help" the farmers by offering to them the seeds, polyethylene for breeding grounds

Tobbaco crop

and agrochemicals in advance, which are discounted from the payment when they sale the product. In addition, tobacco companies offer big incentives such as social services and the purchase of their whole production.

To grow tobacco, farmers have to first log the forest and then "clean" the land with fire, wasting great amounts of wood during this process. The ground is exposed to sun's rays and rain producing erosion and loss of nutrients, particularly in lands with deeper slopes. These deforested areas are prone to weed invasion, thus farmers must use chemical herbicides to prepare the ground for growth. Other agrochemicals like artificial fertilizers and pesticides are also used later. In most of the cases, the farmers are not trained in the use, storage and discarding of this chemicals, causing enormous risks to their family's health and to the ecosystem. Usually, after three or four years, crop productivity decreases, which is one of the main reasons for deforesting another area to continue this cycle.

Production of tobacco is labour intensive and extends throughout the year excepting February and March. In general, all the family has to collaborate, including the children. Such demands have enormous consequences like the lack of productive diversification for familiar subsistence, forcing farmers to spend the small amount of money they obtain from tobacco in travelling to buy goods in the closer cities.

Table 1. Wildlife potentially present in farms forest remnants. Local species common names are used.

Local name (scientific name)	Nº of answers
Tirica (*Leopardus wiedii o tigrinus*)	24
Poca o poquita (*Mazama nana*)	20
Yacú (*Penelope superciliaris*)	18
Zorro (*Cerdocyon thous*)	15
Monos (*Cebus apella*)	14
Pardo (*Mazama americana*)	13
Irara (*Eira barbara*)	11
Jabalí (*Tayassu pecari*)	7
Tigre (*Panthera onca*)	7
Tatú (Dasypus sp.)	6
Cutía (*Dasyprocta azarae*)	6
Macuco (*Tinamus solitarius*)	6
Tateto (*Tayassu tajacu*)	5
Puma (*Puma concolor*)	5
Do not know - Do not answer	5
Anta (*Tapirus terrestris*)	4
Gato onza (*Leopardus pardalis*)	4
Lobito de río (*Lontra longicaudis*)	4
Gato moro (*Herpaliurus yagouaroundi*)	3
Coatí (*Nassua narica*)	3
Tamandua (*Tamandua tetradactyla*)	3
Hurón (*Galictis cuja*)	2
Oso hormiguero (*Myrmecophaga tridáctila*)	2
Carpincho (*Hydrichaeris hydrochaeris*)	2
Nutria (*Myocastor coypus*)	2
Comadreja (*Didelphis* sp)	1
Osito lavador (*Procyon cancrivorus*)	1
Paca (*Agouti paca*)	1
Ardilla (*Sciurus aestuans*)	1
Yacutinga (*Pipile yacutinga*)	1

Maize is another crop that is growth in farms, generally between tobacco cycles, although due to logistic commercialisation difficulties in the region it is mainly used for domestic consumption and forage for farm animals (pigs). Other practiced subsistence crops in this region are cassava, black beans, vegetables and citruses.

In this zone, perennial crops such as the *yerba mate* (18.4% of the interviewed people) and small-scale tree plantations are poorly developed by the farmers. One possible cause is the small area of the farms, although we think that the main factor is the lack of a long-term vision due to the precarious land tenure situation. The 68% of the interviewed people have some type of forest plantation but on a small scale, generally 1-2 hectares. Selected planting species are mainly exotic (chinaberry, Australian cedar, eucalyptus and pine), although some interesting experiences with native species like *cañafístola*, *petiribí*, *loro blanco* and *timbó* can also be observed. Plantations of native *Araucaria* could be an economic alternative to exotic species plantations.

Stockbreeding is the main economic activity for the bigger farms in the corridor, although it is also carried out by some small producers, but at a smaller scale. As a consequence, an important amount of forest remnants become pasture fields. A frequent practice in the region is cattle rising under forest cover, which is thinned to enhance grass productivity. In winter months, when the pastures are less productive, the cattle browse inside forest fragments. The

Table 2. Local perception about wildlife values

Which is the value of wildlife fauna? (if it can not be hunted)	N° of answers
Do not know – Do not answer	19
The forest is theirs. They deserve to live	6
Regulates the ecosystem. The forest needs them	3
To know and enjoy	3
I like them	3
Some are important and some are damaging	2
For our kids' joy	2
Is highly valuable	2
To enrich the forest	1
To disperse species (evolution)	1

overgrazing, due to be over the land carrying capacity and to management deficiencies, begins to show signals of habitat degradation, mainly soil compaction, seedling herbivory, erosion and pollution of streams. Breeding of pigs (76% of the interviewed people) and chickens (95%) is also widely practiced in the region.

Other isolated productive activities in the corridor area are pisciculture in *tajamares* (artificially dammed streams), apiculture, ecotourism and native forest fruit marmalade (see chapter 8).

Hunting and wildlife local perception

Hunting is a culturally establish activity in Misiones province. Although is prohibited by law, sport and subsistence hunting are very common, in small farms as well as in protected areas. This is a consequence of the lack of control from authorities. It was impossible for us to assess hunting through the interviews since farmers felt inhibited to speak about this subject. A limitation we faced was the fact that during many of the interviews we were accompanied by some of the park rangers, which caused the interviewed to feel uncomfortable to respond to this type of questions. The farmers identified at least 29 wildlife species potentially present in the forest remnants in their farms, based on sightings and fauna sounds recorded during the last few years (Table 1). The species recorded mostly were those that are perceived as harmful for domestic animals (small wildcats, crab-eaten fox, tayra and jaguar), conspicuous species (tufted capuchin monkey) or bush meat species (brocket deer, guam and peccaries). Tufted capuchin monkey and white-lipped peccary were also cited as problematic species for maize crops.

Table 3. Use of forest remnants of the farms

Type of use	N° of answers
Firewood	20
Wild fruit	16
Medicinal plants	16
Cattle ranching under cover	10
Wood for construction	10
Wood for sale	9
Do not know – Do not answer	6
Assai palm (palmetto)	4
Alley cropping	4
Seeds	2
Honey	2
Handicrafts	2
Seedlings	1
Hunting	1
Organic soils	1
Tourism	1

When we investigated about alternative values that wildlife represents for farmers given that they cannot be hunted, the great majority of the people did not had an answer to this question (Table 2).

Forest in farms

Forest remnants

According to interviews, in average 55% of the area inside the farms still maintain forest with different conservation status, with values ranging between 0 and 88% of forest cover (see chapter 3).

Permits for clear cutting and selective logging

Although an important surface of forest still remains inside most of the farms, its conservation status has been highly affected during the last few years because of the successive delivery of selective logging and clear-cutting permits. The Ministry of Ecology, through the local Direction of Forests, hands in permits for five hectares slash-and-burn or for selective logging of fifty

Illegal palmetto cutting inside protected areas

native plants (50 commercial trees) to farmers when they settle initially down, for them to be able to start with land production. But in Urugua-í-Foerster corridor zone, permits are granted to farms that already had made slash-and-burn and clear-cutting in the past. The current process of deforestation that is affecting this zone should be stopped and measures for recovering degraded areas should be carried out given that this is a key area for ecological connectivity between both parks and it is in fact protected by the provincial Green Corridor law.

Native forest use

When we asked farmers about what is that they use from native forest, most of them found difficulties in finding an answer to this question. Even some said to us that they did not use the forest at all. When we reformulated the question, insisting on their daily activities, their answers were associated to the extraction of firewood, wild fruit and medicinal plants, among others (Table 3).

Table 4. Farmer's proposals for protecting the forest

That politicians invest money
To look after no wood cutting
Public awareness
Greater education is needed
To help protect the forest
To grow more and not to cut
To stop deforesting in streams riberine
To avoid cutting trees
To take measures for controlling and stopping tree logging
To plant native commercial trees
To leave a percentaje of the farm's surface with forest
To reforest and care
To inspect farms before delivering cutting permits
It is a mistake to plant exotic trees
To leave the maximum amount of native forest
Not to cut nor to hunt
Not to hunt nor cut palmetto palm
To teach their children
Each person has to protect it
We have to do more for protecting it
Not to burn
To look after our place
Not to waste wood
Each farm should have its own reserve
More government determination
Not to hunt, wood cut nor palmetto cut inside the parks
To chase the infractores
More park rangers
Not to destroy more
To plant native tree species in non-used areas
To get economic help in order to preserve forest in the farm
To plant forest curtains along the roads
To recover *capueras*
To reforest stream and along road borders

Local perception of native forest

About 90% of interviewed families responded that they prefer live near the forest. When asked about forest values, excluding potential commercial use, most of the answers associated the forest with a freshwater source (Table 4). This indicates that local community perceives the forest as a good necessary to maintain clean water availability. Therefore, this relation between forest and clean water can be viewed as a strategic tool to work with in communitarian initiatives for biodiversity conservation in this region.

About 76.3% of interviewed people consider that forest needs greater protection than the one it currently has. In addition, we proposed them to express proposals for better protecting the forest (Table 5).

Protected areas and local community

Many people from the corridor zone are old inhabitants of Urugua-í and Foerster provincial parks. With the creation of these protected areas, these families were relocated to lands adjacent to the parks. One of the problems generated by this relocation was that these old inhabitants know the parks really well, which facilitates their entering to protected areas for hunting or cutting assai palms.

With the recent sanction of the provincial Green Corridor Law and the development of conservation projects in this zone, many of these people (landless) think that they could be expelled again from their

Table 5. Native forest value.

What is the value of the forest? (If it is forbidden to cut it)	Nº of answers
Fresh water	11
Do not know – Do not answer	7
Oxygen	6
Fauna	5
For the nature	2
Health	2
Forest use	2
Tourism	2
To know	2
To have tranquillity	1
To obtain fruit	1
To conserve the jaguar	1
To conserve the soil	1
For the children	1
Because we like the forest	1

lands. Therefore, many of these initiatives generate a feeling of mistrust in the local community. This behaviour is to be expected, since, in general, creation of protected areas is done without local community participation, which in turn creates a negative feeling towards these parks and reserves.

Local perception of the function that provincial parks have can be observed in Table 6, with protection of wildlife being the one that obtained greater amount of positive answers.

The 81.6% of interviewed people knew about the existence Urugua-í P.P. but only 52.6% knew about Foerster P.P. Many of them knew this last one only by its old name, *Palmitera* Reserve. These numbers are lower than would be expected considering that most of interviewed live alongside or surrounding these protected areas. We obtained even lower numbers for people who actually visited Urugua-í P.P. (26.3%) or H. Foerster P.P. (21%). Due to the economic crisis that affected our country during the last few years, furtive hunting and illegal logging of palmettos have substantially increased in the provincial parks. During our wildlife surveys in Urugua-í P.P. we observed several hints of poachers' presence and we even had a face-to-face encounter with one of them. A high level of poaching activity affects the east border of this park.

Table 6. Local perception of the functions that provincial parks have.

What are provincial parks for?	Nº of answers
To preserve fauna	18
For future generations	9
To protect natural environment/nature	9
To have clean air	9
To preserve seed producing trees for each species	8
To conserve the forest	5
To look after the wood	4
To protect stream/drinkable water	4
Do not know – Do not answer	4
Because they are very important	3
To protect the forest from forestry companies	2
Every country should have its protected areas	1
To avoid the end of the forest	1

Reforestation and restoration

When we asked if they were interested in conducting native trees reforestation of degraded zones in their farms, 84.2% of the interviewed responded positively. The highly selected species were native edible fruiting trees and commercial timber species such as *lapacho*, *petiribí*, cedar and *cañafístula*. They also mentioned interest in planting citruses and *Paraná* pine (*Araucaria angustifolia*) trees.

chapter 3

Corridor mapping

Mapping the corridor

Introduction

The use of remote sensors and geographic information systems (GIS) is widely extended within the field of conservation biology. One widely known use for this tool is the selection of key areas for conservation and restoration (Fuller et al. 1998).

The aim of the developing a GIS for the Urugua-í Green Corridor Project was to classify land uses inside the corridor, to map forest remnants and to assign a conservation value to each of these fragments.

Additionally, we carry out a regional classification of Inland Atlantic Forest in order to map the current forest cover inside Misiones Green Corridor (MGC).

Misiones Green Corridor was created in 1999 by the provincial law Nº 3631 with the aim to protect and connect native forest remnants in Misiones. This law declares as "Sustainable Area for Multiple Uses" a large area of the province. Misiones Green Corridor extends from Iguazú National Park in the north to Cuñá-Pirú Provincial Park in the south.

Methodology

Images and map sources
In 2002, Conservación Argentina signed an agreement with the National Commission of Space Activities (CONAE) trough which this institution donated Landsat 7 ETM satellite images. Another part of this agreement involved the use of SAC-C satellite images, an argentinean satellite, for the assessment and monitoring of forest land cover inside Misiones Green Corridor.

For georeferencing this images, we bought topographic maps from the study area in the Military Geographic Institute in Buenos Aires.

Additional covertures for Misiones province and the cadastral map for Urugua-i corridor zone were provided by the GIS laboratory from the Ministry of Ecology of Misiones Province.

During our first survey campaign to the study area in May-June 2002 we obtained GPS recorded points, which would be used later for the georeferencing process and as training zones for image classification.

In order to identify the reflectance for each of the land uses present in the corridor area, we recorded points representing each of these situations (bare ground, crops, pastures, etc.) using a GPS. These points allowed us to establish training zones, which would be useful later during the classification process.

Georeferenciation of images
We only analysed a spatial subset for both satellite images. Since they did not have and associated projection system, we had to georeferenced them. Georeferenciation is the process by which a connection between page coordinates on a planar map and known real world coordinates is established. These lasts, called Ground Control Points (GCPs) in GIS terminology, were obtained from geopolitical maps from the study area and field GPS recorded points corresponding to easily identifiable features on the image (crossroads, river bifurcations, bridges, etc.). The GCPs employed for georeferenciation corresponded to sites inside the corridor as well as sites in the surrounding area.

It is highly recommended to use GCPs evenly distributed over the image and to maintain a low average square error during the georeferencing process. We georeferenced

the Landsat image to Universal Transverse Mercator (UTM) projection using 10 GCPs and obtained an average square error of 1.336.

Urugua-í Green Corridor (local scale, Landsat 7 ETM satellite image)

Land use classification

This analysis was conducted through the classification and post-classification processing of a Landsat 7 ETM image (Track/Frame: 223/78) from March 2002 provided by CONAE. The data in this image consists of intensities at seven wavelengths, 450-515nm, 525-605nm, 630-690nm, 750-900nm, 1550-1750nm, 10400-12500nm, 2090-2350nm, with a pixel size of 30 x 30 mts. and a scene size of 183 x 170 Km.

Using the ENVI 3.5 image processing software, we selected a spatial subset of 1800 x 1000 pixels from the image, which included Urugua-i Green corridor and part of its surroundings.

We studied the spectral response for each different land use (crops, pastures, native forest, etc.) using the GPS points collected in the field.

Once we knew the spectral response for each landscape feature, we constructed Regions of Interest (ROIs). Each ROI was conformed by at least 4000 pixels manually assigned to the class based on their spectral firm or colour pattern. For ROIs selection, we used the combination of the 3, 4 and 5 TM bands, which allowed an accurate identification of the landscape features. Nevertheless, all seven bands in the image were used for classification. We conducted a supervised classification using the Maximum Likelihood algorithm (Jensen 1986). Our final classification recognizes three major land use classes in the study area: native forests and *capueras* (*Capuera* is the vernacular name for Secondary Growth Vegetation), crops and pastures. Preliminary classifications recognized other landscape classes: water, exotic forestations and bare ground. These complementary classes occupied only a small fraction of the landscape and were omitted for further analysis (Nagendra & Gadgil 1999).

Forest remnants mapping

The classification map was converted to vectorial format for its processing with the ArcView 3.1 map processing software (ESRI 1998). Later, the map was used as a background map to digitalize forest remnants in the corridor area. Each fragment corresponds to one polygon of the landscape class Native Forests and *Capueras*.

We calculated the number of fragments, their area and the distances between them. Additionally, we analysed their spatial disposition within the ecological corridor and their relative distance to each of the protected areas.

Conservation value of forest remnants

A conservation value was assigned to each forest remnant based on intrinsic variables (geographic) that characterizes each of them. These variables were: area, shape, distance to the nearest protected area, distance to the nearest fragment and the number of fragments it connects.

We calculated the percentile relative values for each variable because our aim was to evaluate comparatively the importance of each fragment in our study area. In this way, the values assigned to each fragment are only valid for this particular study and cannot be compared with fragments or similar situations in other areas.

The Conservation Value for each fragment was calculated from the average between the percentile values for each of the following variables:

$$CV = A + IF + DFu + DFr + C$$

A = Percentage of the area of the fragment in respect to the bigger fragment.
IF = Shape index, calculated as the relation between maximum perimeter/ area (calculated for a perfect circle of the area of the considered fragments) and observed perimeter/ area multiplied by 100.
DFu = 100 – percentage of the distance to the nearest protected area in respect to the greatest distance recorded.
DFr = 100 – percentage of the distance to the nearest fragment in respect to the greatest distance recorded.
C = Percentage number of fragments that it connects (those located within a distance equal to or smaller than the average of the distances between each fragment and its nearest) in respect to the one that connects the greater number of fragments.

Misiones Green Corridor (regional scale, SAC-C satellite image)

Classification of satellite image
This analysis was conducted through the classification and post-classification processing of SAC-C satellite image (Track: 224) from October 2001provided by CONAE.
In this case, satellite data consisted of intensities at five wavelengths: 480-500nm, 540-560nm, 630-690nm, 795-835nm, and 1550-1700nm with a pixel size of 175x175 mts.

A spatial subset of 1400 x 2000 from the image was selected and processed by GIS raster program. This spatial subset includes all the Province of Misiones, plus neighbouring areas of Brazil and Paraguay.

Classification process for this image was conducted in a similar way as with Landsat. ROIs were constructed and afterwards a supervised classification by the Maximum Likelihood algorithm was conducted. The resulting map shows the distribution of five landscape classes in the satellite image. These five classes are: native forests and *capueras*, crops, bare ground, clouds and water. Some classes identified in the preliminary classification were merged with others because of the small area they cover.

Forest remnants mapping
The resulting map was converted to a vectorial format for its processing by GIS vector program. We over imposed to this map the limits of Misiones Green Corridor. Later, we used both of them as a background map to digitalize forest remnants inside the corridor. In this case, again, each fragment corresponds to one polygon of the landscape class Native Forests and *Capueras*.

Finally, we calculated the area of the corridor covered with forests and *capueras*.

Results

Urugua-í Green Corridor

Land use classification
The classification analysis resulted in a map with 3 landscape classes: Native forests and *capueras*, Crops and Pastures. The resulting map shows that the first class is still the predominant one inside the corridor (Figure 1). Nevertheless, most of the forest remaining in the Urugua-í Green Corridor zone seems to be secondary forest with a high level of disturbance or in initial states of recovery (*capueras*) (pers. obs.). Crops appear also as a conspicuous landscape element, with most of its representatives being of relative big size and scattered all over area. In our study area, crops involve dissimilar vegetation types. Many are herbaceous monocots such as maize and sugar cane, but others are ligneous and non-ligneous dicots such as yerba mate and tobacco. Pastures appear as the least abundant feature in this landscape, with only a few units mostly clumped in the northern part of Urugua-í Green Corridor.

Forest remnants mapping
Within our study area, we were able to identify 33 native forest fragments occupying 58.2% of the total surface (Figure 2). The average size for these remnants is 45.7 ha ± 51.9 ha, ranging from 855.5 ha to 0.8 ha.

Conservation value of forest remnants
Conservation values calculated for each of fragment were grouped in 5 categories (Figure 3). This analysis showed one huge fragment with a high conservation value, mainly due to its size and relative position with respect to both provincial parks. Three stripes of relative continuous forest are also evident from the image, these correspond to those fragments with high conservation value which could potentially be acting as connectors between both protected areas (Urugua-í and Horacio Foerster), two of them in the northern part of the corridor and one in the south.

Misiones Green Corridor
With respect to Misiones Green Corridor, forest remnants occupy 89.3% of the corridor area (Figure 4). Three big forest blocks can be identified within this corridor: Iguazú-

Puerto Península-Urugua-í, Yabotí-Moconá and Sierra Morena-Cuñapirú. These blocks are cut through by important provincial and national routes The last one, appears to be the most affected by anthropic activities, with several sectors dominated by crops or exotic tree plantations. Nevertheless, the shape index calculated or these three blocks shows that Yabotí-Moconá presents the higher perimeter/area relation, indicating that it has more exposed border due to its irregular shape.

Additionally, a marked contrast in forest cover between the three limiting countries is evident from the satellite image, with higher surface and connectivity for native forest remnants in Misiones province. Important forest remnants outside Misiones can be observed in San Rafael region (Paraguay); Iguaçú National Park and Parque Estadual Rio do Turvo (Brazil).

Conclusions

From our classified image, we are not able to discriminate between different native forests and bamboo associations. In the case of the SAC-C map, forest cover is overestimated; this could be related to the spatial resolution limitation that this type of satellite image impose (large pixel size) or with the small amount of information we count regarding land use.

Through this analysis, we were able to detect those fragments with high conservation values. We supposed that these fragments would be of outstanding value to maintain connectivity between both provincial parks. They are generally those with bigger sizes yet with relative irregular shapes. However, this method also allowed us to detect a small size fragment with high conservation importance due to its shape and relative position inside the ecological corridor.

The categorization of fragments presented here should be completed with data coming from fauna surveys as well as data representing social and economic factors, which could provide a measure of the risk each fragment faces resulting from present and future anthropic activities planned in neighbouring areas.

The conservation value that resulted for each fragment should not be viewed as an index of the order in which remnants should be depleted or deforested, but in fact as a an index showing which fragments are in greater need of restoration.

Regardless of the high forest cover that is still apparent inside the corridor, a continuous drift from native forests to crops and pastures is also evident. If current agricultural pressure continues, fragmentation will increase and parks connectivity will be compromised.

Misiones still preserves an important and continuous surface of Atlantic Forest (Galindo-Leal & Camara 2003), nevertheless, fragmentation process is more evident in the southern sector of the MGC where important intrusions of the anthropic matrix can be observed. It is clear, that proximity to routes represent other risk factor for remaining forest remnants. In this respect, it appears important that areas close to access ways receive special protection and legal treatment inside the MGC.

The effects of the isolation of natural areas, the importance of the relative size of this area and the external factors that aggravate this isolation have already been remarked by Janzen (1983). The isolation of protected areas could not only be solved with the implementation of management tools (e.g.: ecological corridors) or with the application of existent laws, but also with more investment in environmental education and involvement of local community in conservation. However, long-term success in Atlantic Forest conservation will only depend on finding a productively, profitable and sustainable model, adjusted to socio-environmental needs of the region.

Recommendations

Satellite image classification demonstrates to be a valuable tool to define human land uses and to map the remnant forest at the local scale. In such a changing landscape as the project area, estimating and monitoring forest cover and deforestation rates could give very useful information. This information could be use to improve our conservation strategy in the area. Moreover, studies of landscape connectivity will be an important tool to evaluate project success.

The utilization of an index to assess the conservation value of the corridor remnants demonstrates to be an useful tool. Forest fragments could be ranked by this index in order to establish their importance for conservation. We hope to improve this index by the incorporation of bird survey data and results from local people interviews.

After the sanction of the Misiones Green Corridor law, Misiones Green Corridor started to be implemented. Our results from SAC-C images shows that the area of the Misiones Green Corridor still preserves large tracks of Interior Atlantic Forest. These tracks are between the most important in the ecoregion for conservation. Anyway, an important part of the success of this initiative depends in the development, spreading and support to productive sustainable activities, a sustainable activity that could give an income to local farmers. Several activities threats corridor implementation: increase in the area of pine plantations, increase in human population densities, illegal timber extraction and the lack of coordinated actions by governmental agencies. We propose to continue the mapping of forest remnants with SAC-C images in the Misiones Green Corridor in order to evaluate the success of this initiative.

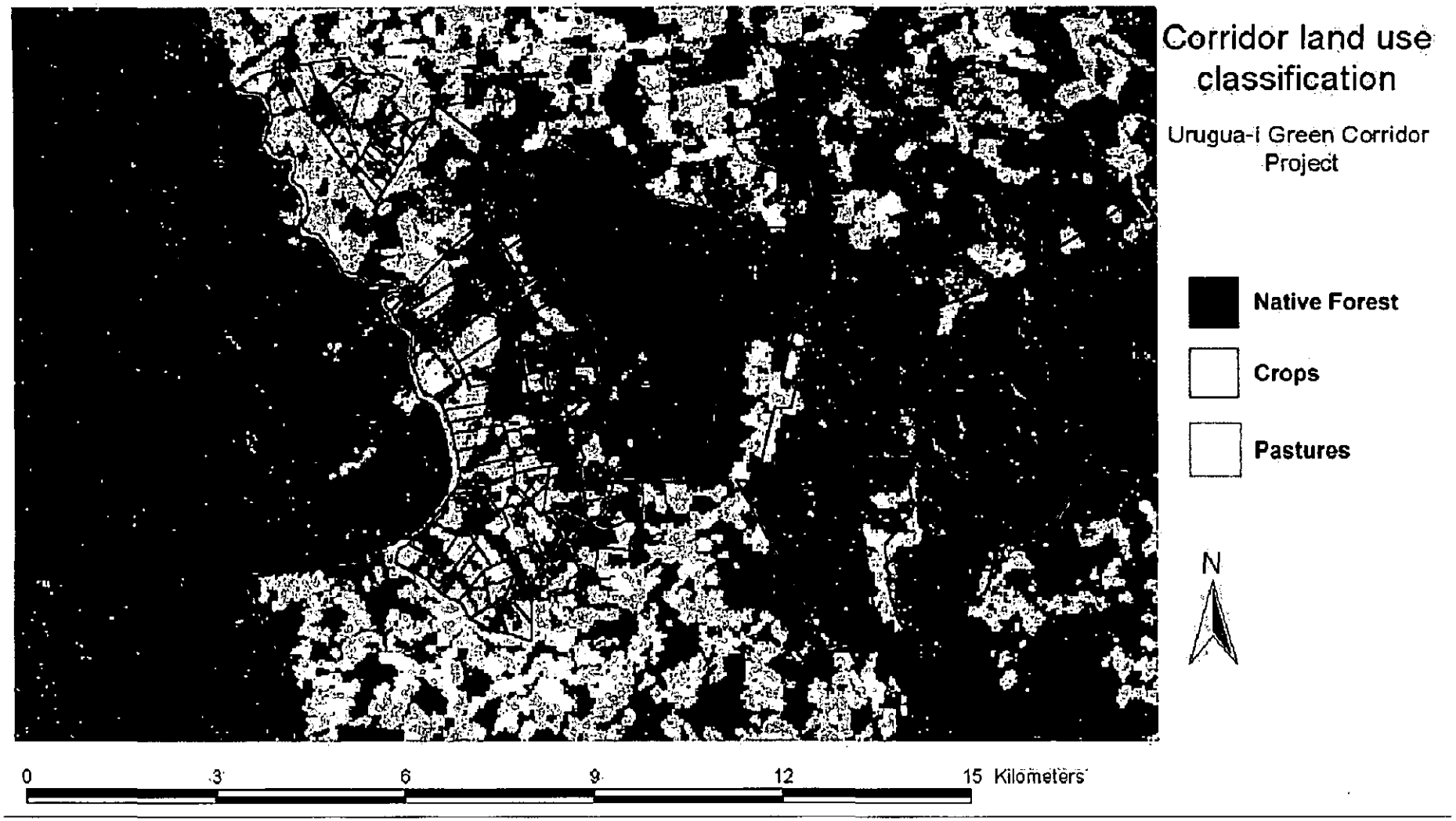


Figure 1. Clasification of land use inside the Urugua-í an Foerster Corridor.

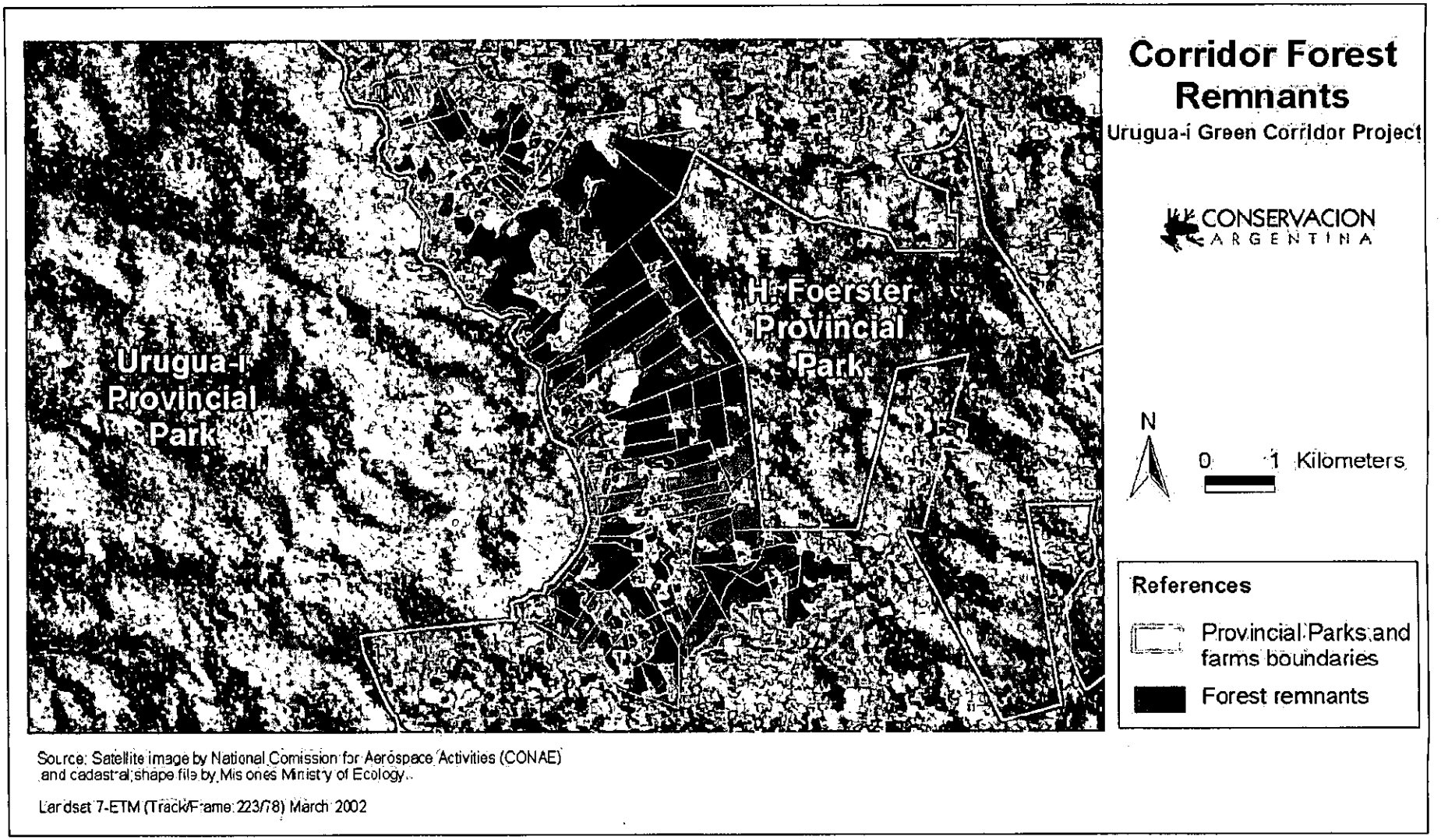


Figure 2 Corridor Forest remnants and cadastral map.

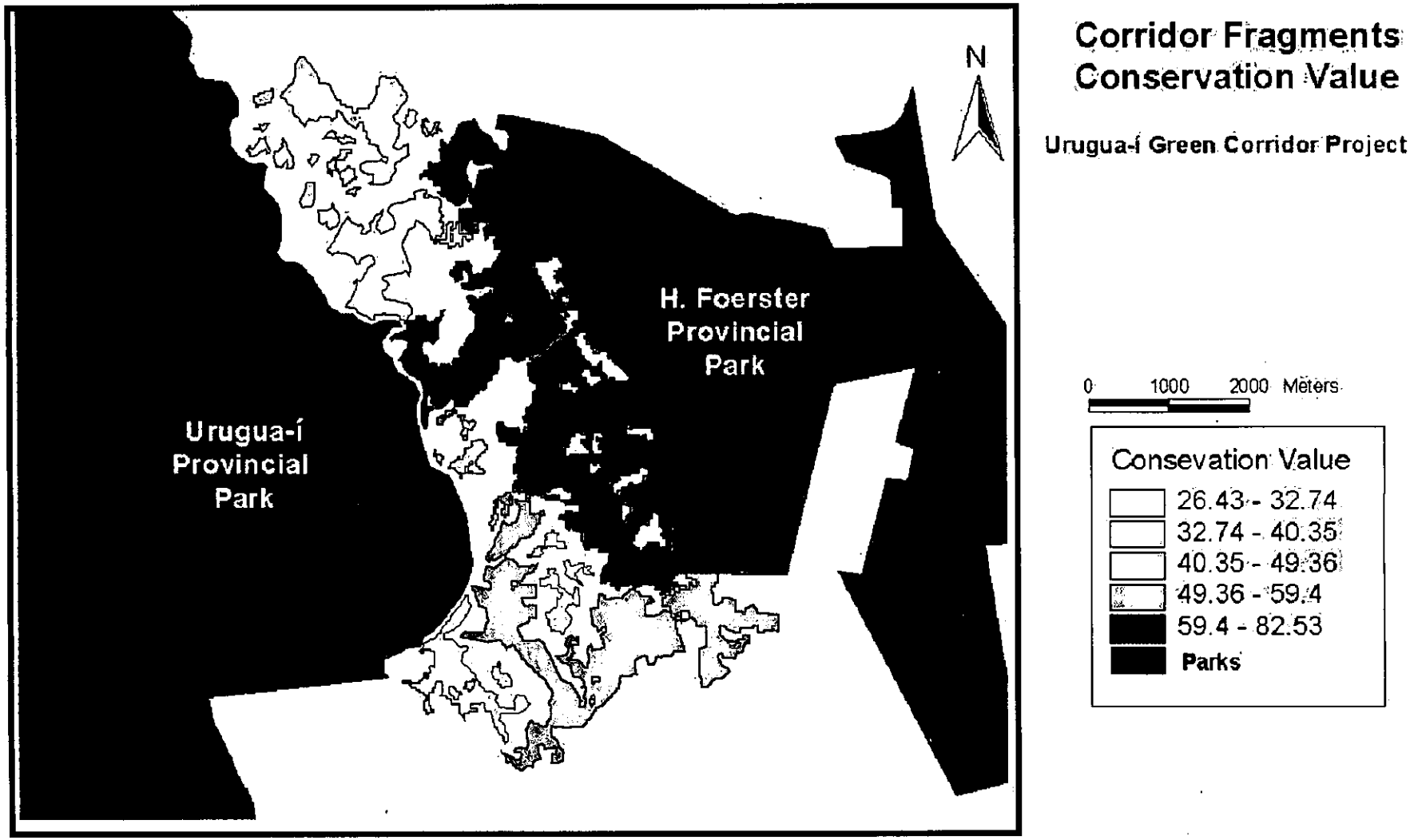


Figure 3. Conservation value of forest fragmentes inside de urugua-í Green Corridor.

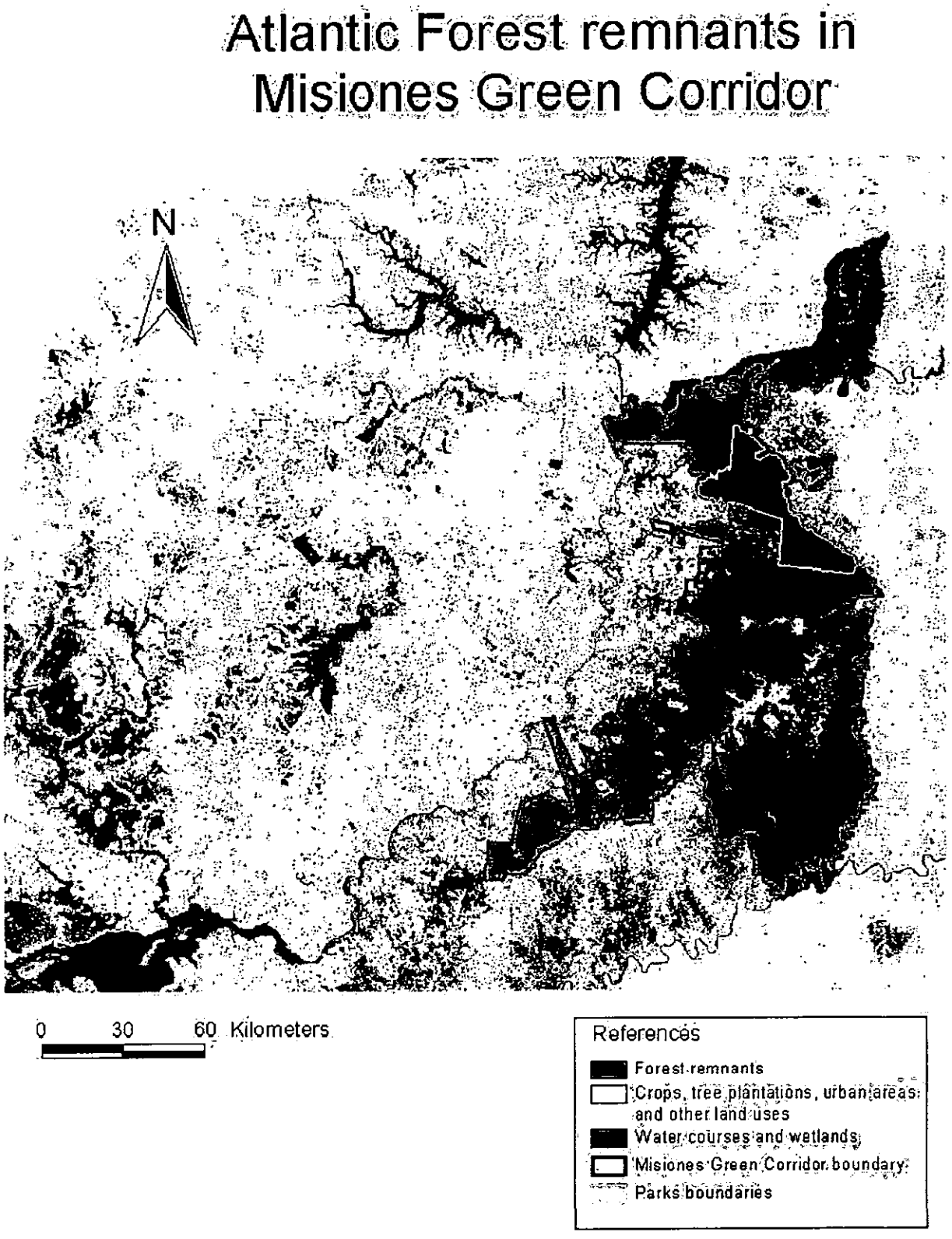


Figure 4. Atlantic Forest remnants in Misiones Green Corridor. (Source CONAE. SAC-C satellite image - october 2001).

chapter 4

Birds of the corridor

Birds of the corridor

Introduction

Birds are widely used as an indicator group for habitat quality and also as a model to assess numerous processes, such as for example the degree of connectivity between neighbouring areas. Different characteristics of this group contribute to their common use in conservation biology. Some of the characteristics are: their high diversity, the facility whereupon can study their movements and their requirements of habitat. The existences of specific guides for bird identification, a large amount of bibliography and low cost methods to captures birds are also important determinants for this phenomenon.

Urugua-í P.P. and H. Foerster P.P. include zones of "untouched" forest, including areas of regional importance for endemic species (EBA´s) (Sttatersfield *et al.* 1998), these areas are also considered as key sites for neotropical birds (Wege & Long 1995). The importance of both parks has been reinforced a few months ago when they were proposed as Important Bird Areas (IBAs) based on the information provided by this project.

Objetives

We had two specific objectives for our bird surveys, which were based on the general objective of the project regarding monitoring biodiversity. These objectives are:

1. To perform a complete list and to study habitat use by bird species
2. To establish a banding program for monitoring bird use of the corridor.

Objectives 1 and 2 were performed during two different stages.

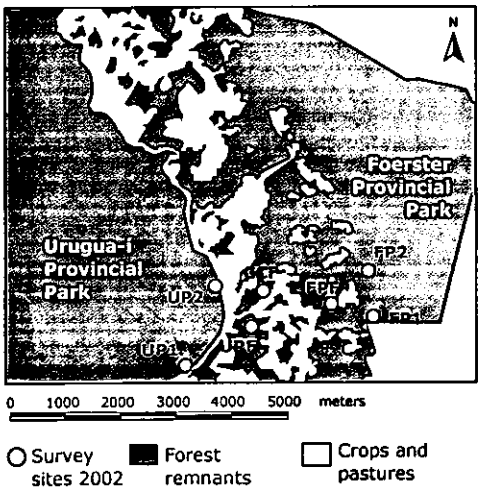


Figure 1. Map with the location of mist nets sites during September of 2002. **UP1:** Urugua-í Park, site 1; **UP2:** Urugua-í Park, site 2; **UPF:** Urugua-í Park fragment; **CCF:** Central corridor fragment; **FPF:** Foerster Park fragment; **FP1:** Foerster Park, site 1; **FP2:** Foerster Park, site 2

Methodology

Stage 1: To perform a complete list and to study habitat use by bird species

To achieve this objective, we used three different sampling methods: mist netting, point counts and Mackinnon lists. All of these methods were used between September-October 2002.

Mist netting

The use of mist nets is highly recommended to sample birds in forested areas such as Neotropical forests (Ralph *et al. 1995,* Andrew *et al. 1997*); in fact, they have been used widely for bird studies in the Atlantic forest (Dario & Almeida *2000,* Brooks *et al.* 1992, Willis *1979*). Mist nets are used to compare different sites or situations because they can be used in a systematic way, following identical sampling and temporal design. The most important limitation of mist nets is that they can only capture birds in the understory and generally exclude big species.

During September 2002, we did a preliminary sampling using mist nets inside both parks and in fragments inside the ecological corridor (Figure 1)

We ringed all captured birds with a combination of coloured plastic rings (Appendix 1). Each bird was measured, weighted and its reproductive status was determined. We also collected faecal samples and took digital photos.

Point count survey

Point count method

During October 2002 we used the point count technique to estimate bird abundances and habitat use in the corridor area (Blondel *et al. 1971*, Ralph *et al. 1995*). This method is useful for studying the relationship between habitat characteristic and bird abundances (Bibby *et al. 1992*). One hundred points were sampled in 5 parallels bands, two bands in each park and three in the corridor area (Figure 2). Twenty point counts 150 m. apart were located in each band, covering all available landscapes (forested and not forested). Point counts were sampled for two consecutive days between 6 a.m. and 10:30 a.m., recording all aural and visuals contacts during a period of 10 minutes.

Phylloscartes eximius

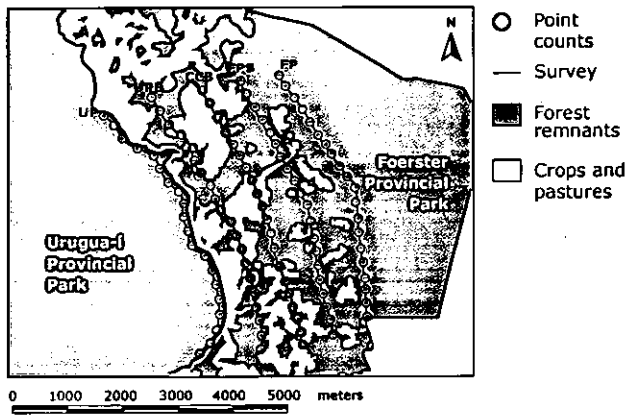


Figure 2. Locations of the sites for point count surveys.
UP: Urugua-í Park; **UPB:** Urugua-í Park band; **CCB:** Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park

We calculated an abundance index and richness and diversity were compared between bands. Bird species were divided in two groups: species that use the forest and species from open areas; we referred to bibliographic sources for correctly categorizing each species (Narosky & Yzurieta 1987, Stotz *et al.* 1996). A cluster analysis was performed to study similarities in bird communities between sampling bands.

Mackinnon lists

This is a useful technique for obtaining a list of birds and a relative abundance index for each one of them (Bibby *et al.* 1998). This method was used to complement point counts surveys in particular areas, such as riversides, which cannot be sampled with the above mentioned technique. The number of species per list was established in 15, based on previous experiences in the area (Rey *et al.* 2001).

During October 2002 we sampled the same 5 bands using this method. For each band, we calculated a relative abundance index for each recorded species as the number of lists in which the species is present / total number of lists. As an example, if a particular species is recorded in 8 of 10 lists, the relative index is 0.8. At least 10 lists were performed for each band; the sampling effort was divided proportionally to the area occupied by each landscape unit in each band.

Stage 2: To establish a banding program for monitoring bird use of the corridor.

This stage began in May-June 2003 and was continued in October of the same year. Future campaigns will be necessary to completely accomplish the objective of this program.

We located 10 permanent sampling sites at least 700 m. apart inside the corridor area. Five sites were located in an area of continuous forest between the parks; this area was selected because of its high potential for bird movements. The remaining

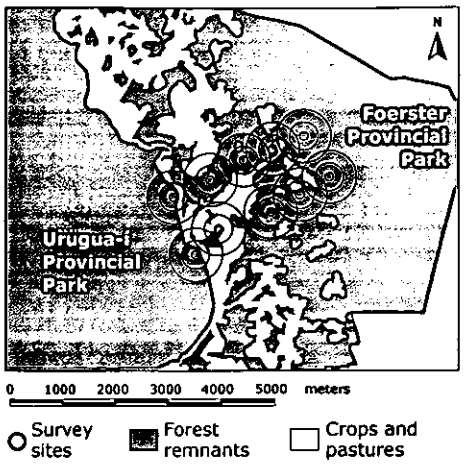


Figure 3. Map showing mist net sites and radius used for fragmentation estimates.

sites were located in a neighbouring area, which shows a higher degree of fragmentation. Sampling sites were selected using a Landsat-7 satellite image of March 2002. This image had been previously georreferenced and classified. Selected sampling sites were located in the field using a GPS.

Each site had 10 mist nets, arranged in pairs 50 m. apart, which were operated between sunrise and 5 hours later for 2 or 3 consecutive days. Captured birds were banded with numbered aluminium rings, measured (tarsus, wing and bill length), weighted and collected faecal samples.

Using the classified satellite image, we calculated the non-forested area in a radius of 250 and 500 m. surrounding each sampling site. This variable estimates fragmentation level around each site and it was related to the bird community structure.

Location of mist nets sites in year 2003 and radius of 250 and 500 m could be seen in Figure 3.

We calculated bird relative abundances based on 100 hours/mist nets, we performed a principal component analysis to assess similarities between sampling sites.

Specific guides and tape recordings were used to identify birds in the field (Narosky & Yzurieta 1987, Dalgas Frisch 1996, Straneck 1990a /1990b, Sick 1985, Ridgely & Tudor 1989/1994).

Results

A total of 240 species and 53 families of birds have been detected by the team in the Urugua-í Green Corridor (200 species and 44 families), the Urugua-í Provincial Park (173 species and 50 families) and the H. Foerster Provincial Park (110 species and 36 families) (Appendix 2). Birds list includes 3 endangered species and 5 near-threatened species (IUCN 2003). Also, 53 Atlantic Forest endemics were detected.

Some of the Urugua-í Provincial Park species have been observed in other areas of the park, as the Uruzú park ranger station or the south limit. Surveys added 2 species to Urugua-í list and more than 80 species to H.Foerster. The species added by the team to the Urugua-í Provincial Park are to Manakins: the White-bearded Manakin (*Manacus manacus*) and the Band-tailed Manakin (*Pipra fasciicauda*). In the case of Foerster Provincial Park, the only previous survey before starting this project only listed 42 species; our team recorded many of those species and added 68 more.

The only previous detected species that weren't confirmed by the project in Foerster are: *Butorides striatus, Buteo magnirostris, Falco sparverius, Lophornis chalybeus, Campephilus melanoleucus, Baryphthengus ruficapillus, Baillonius bailloni, Ramphastos dicolorus, Lochmias nematura, Basileuterus rivularis, Tersina viridis, Sicalis flaveola* and *Cacicus chrysopterus*. In the cases of *Buteo magnirostris, Lophornis chalybeus, Baillonus bailloni and Sicalis flaveola,* they were recorded in neighbour farms less than a kilometre outside the park. The recording of *Campephilus melanoleucus* is quite strange and probably the species was confused. The closer *Campephilus robustus* is rare but present in most of the primary forests of the area.

More details on rare, endemic and endangered species are given at the end of this chapter.

Stage 1:

Mists nets

We captured 538 individuals, without considering recaptures, from 63 species with a survey effort of 352 net hours. A total of 529 individuals were ringed. More data on sampling results are presented in Tables 1, 2 and Appendix 3.

Basileuterus culicivorus

Individuals capture rates showed significant differences between sites (χ^2 = 233.12, df = 6, p<0.01), obtaining the lowest value for one of Foerster P.P. sites. On the other hand, species capture rates (χ^2 = 1.54, df = 6, p = 0.95) nor exclusive species capture rates (χ^2= 49222.75, df= 6, p<0.01) did not show a significant variation among sites.

Diversity did not show significant differences either, obtaining the highest value for the site closer to Urugua-í P.P. The lowest value, in the other hand, was obtained for on of Urugua-í P.P. sites.

Table 1. shows absolute results obtained for each mist netting sampling site.

Sites	Net hours	N captured individuals	Richness	N exclusive species	Diversity (Shannon index)
UP 2	210	80	30	6	3.01
UP 1	204	95	28	0	2.85
UPF	174	70	31	3	3.19
CCF	181	82	25	2	3.00
FPF	179	108	28	1	2.98
FP 1	192	48	23	23	2.99
FP 2	212	100	33	2	3.17

Table 2. show the relative results (every 100 net hours) obtained for each mist netting sampling site.

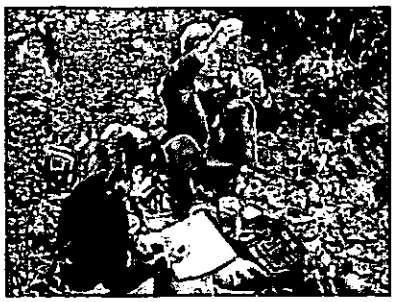
Sites	Net hours	Capture rates (individuals)	Capture rates (species)	Capture rates (exclusive species)
UP 2	210	38	14	2.86
UP 1	204	47	14	0
UPF	174	40	18	1.72
CCF	181	45	14	1.10
FPF	179	60	16	0.56
FP 1	192	25	12	1.56
FP 2	212	47	16	0.94

Cluster analysis separated sites located inside the parks from the rest of the sites. Exceptions for this analysis are represented by UPF and UP1. The first one is a site inside a farm, with a good conservation status and very near to Urugua-í P.P. The second one is a site inside Urugua-í P.P. that shows tracks of recent anthropic activities (Figure 4).

We were able to register local movements inside the parks and in the fragments, the majority of which involved movements of individuals between mist nets inside each site. Yet we could also register a movement between sites for one individual from the species *Schifornis virescens*, which moved from the fragment near to one of the parks to the central fragment.

Point counts

We obtained 1887 registers belonging to 144 species (Appendix 4). Richness showed a good fit to a quadratic regression (R^2= 0.96, p< 0.01), this indicates that a tendency towards the increase in the number of species with growing distances from protected areas exists (Figure 5). Diversity showed a pattern inverse to that of richness, with the highest diversity being registered in the bands adjacent to provincial parks.



Mist net work

Grallaria varia

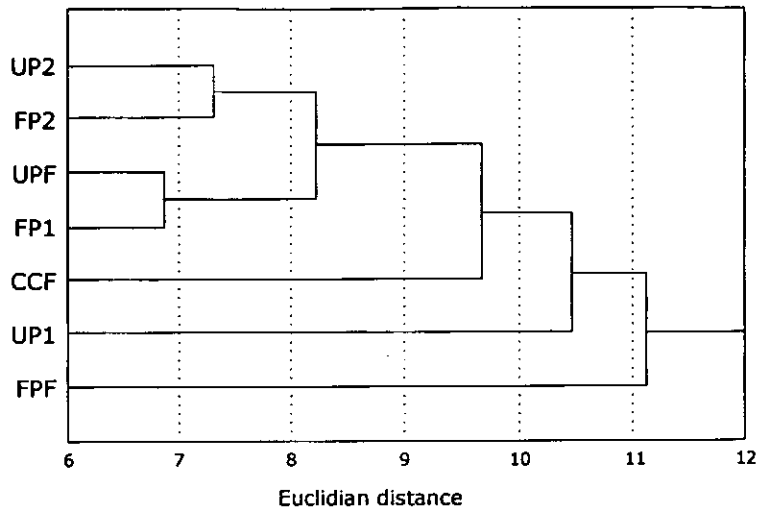


Figure 4 shows the cluster analysis obtained for the sites based on bird community for each site.
UP1: Urugua-í Park, site 1; **UP2:** Urugua-í Park, site 2; **UPF:** Urugua-í Park fragment; **CCF:** Central corridor fragment; **FPF:** Foerster Park fragment; **FP1:** Foerster Park, site 1; **FP2:** Foerster Park, site 2

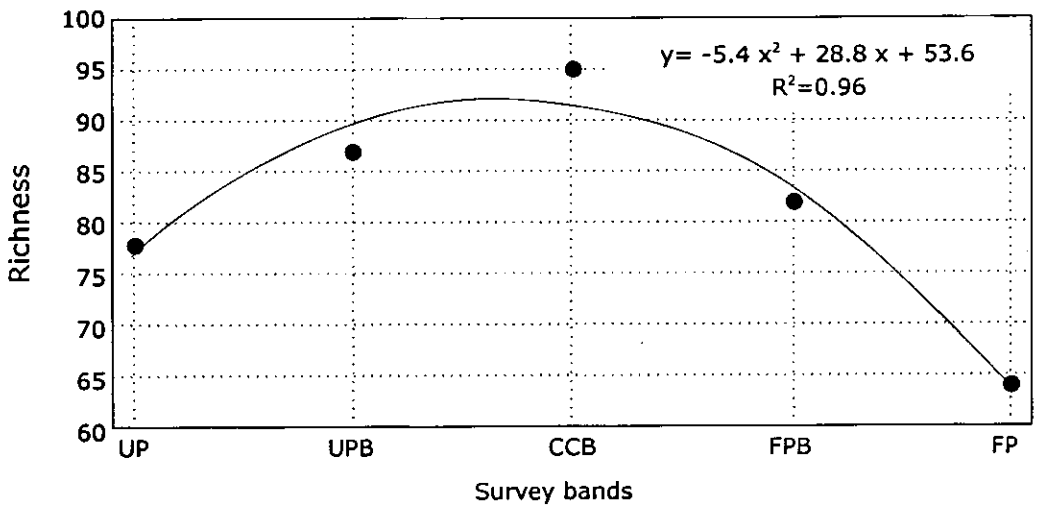


Figure 5. Richness variation as a function of distance to protected areas.
UP: Urugua-í Park; **UPB:** Urugua-í Park band; **CCB:** Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park.

band (Figure 6), while open areas species showed an inverse relation regarding this last mentioned variable (Figure 7).

Cluster analysis differentiated two groups. One of them formed by those bands that still contain large amount of forest (protected areas and FPB) and the other one by the two remaining bands (UPB and CCB) (Figure 8).

Comparing the number of individuals between bands, only 9 species (from a total of 28 with more than 20 registers) showed significant differences (Table 3).

Some species appeared exclusively associated with forest and capuera habitats, such as for example *Hypoedaleus guttatus*, *Crypturellus obsoletus* and *Chiroxiphia caudata*. On the other hand, species such as *Vanellus chilensis* and *Colaptes campestris* are

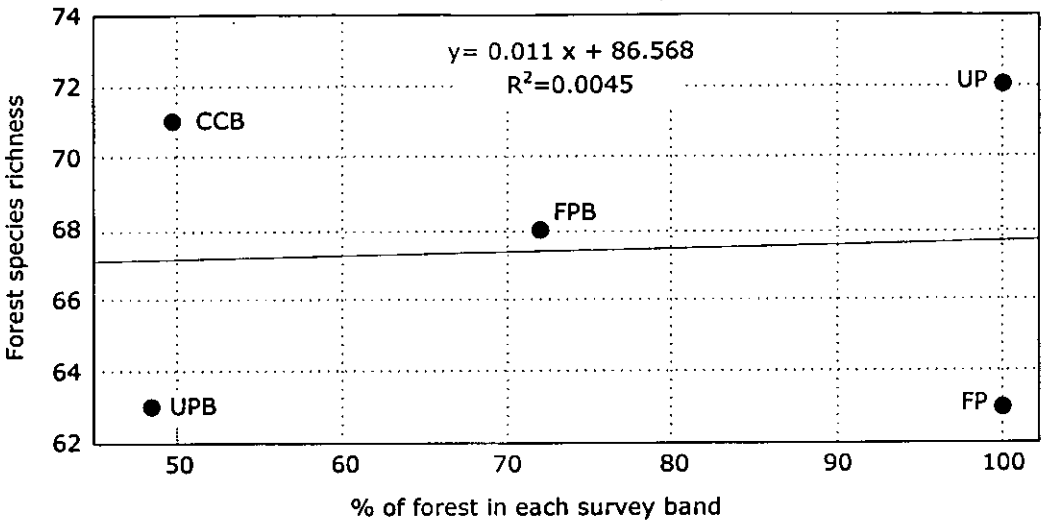


Figure 6. Nº of forest species for each sampling site.
UP: Urugua-í Park; **UPB:** Urugua-í Park band; **CCB:** Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park.

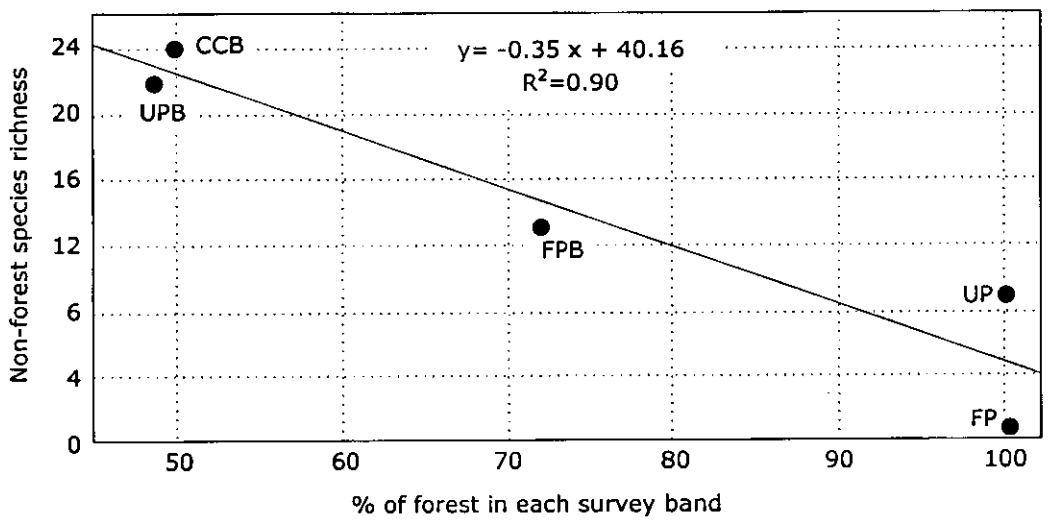
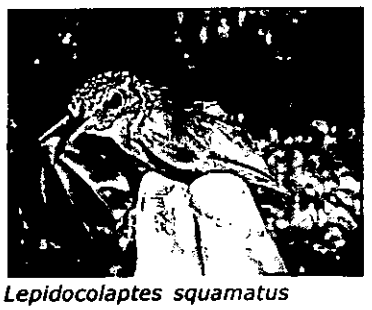


Figure 7. Regression analysis from the number of opened areas species and the percentage of forest cover.
UP: Urugua-í Park; **UPB:** Urugua-í Park band; **CCB:** Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park.


Platyrinchus mystaceus


Lepidocolaptes squamatus


Pyriglena leucoptera

Automolus leucophthalmus

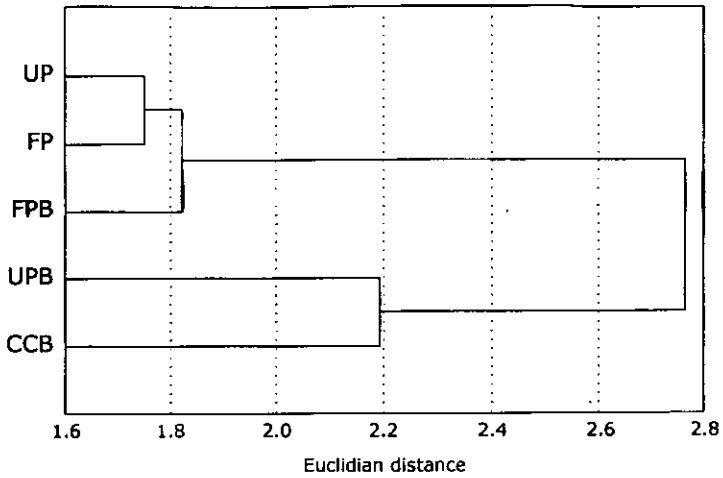


Figure 8. Sampling lines cluster analysis.
UP: Urugua-í Park; **UPB:** Urugua-í Park band; **CCB:** Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park.

remarkable due to high abundance in opened areas. Two "near threatened" species were registered in forest zones, *Tinamus solitarius* in Horacio Foerster P.P. and *Amaurospiza moesta* in the corridor area.

Table 3. Avian species that significantly differ between sampling lines (Chi-squared, $p<0.05$).

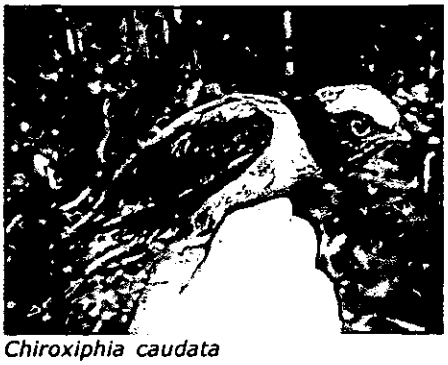
Species	UP	UPB	CCB	FPB	FP	χ^2
Thamnophilus coerulescens	19	2	6	11	11	16.6
Leptotila verreauxi	8	5	3	20	6	21.5
Turdus albicollis	14	1	7	6	13	14.0
Basileuterus culicivorus	12	2	3	7	11	11.7
Synallaxis ruficapilla	7	2	4	7	15	14.0
Troglodytes aedon	1	13	13	8	0	15.5
Columba cayennesis	14	2	0	5	10	15.2
Drymophila malura	2	2	0	9	12	16.6
Vireo olivaceus	4	0	2	2	12	18.0

Mackinnon lists

We conducted 78 Mackinnon lists for all of the 5 bands used for this survey registering 128 avian species. Main results can be observed in table Table 4 and in Appendix 5. In order to compare richness between bands, we calculate a relative estimate for the number of species regarding the total number of lists conducted in each band. The number of species per list differed significantly between surveyed bands ($\chi^2 = 460.87$, df = 4, $p<0.01$), obtaining the highest value for the CCB and the lowest value for the provincial parks.

Table 4. General results for Mackinnon lists survey.

Sites	N° of lists	Total richness	Species per list	Exclusive species	Exclusive species per list	Diversity (Shannon)
UP	17	61	3.6	7	0.41	3.89
UPB	15	68	4.5	6	0.4	3.93
CCB	19	84	4.4	19	1	4.20
FPB	17	65	3.8	7	0.41	3.87
FP	10	36	3.6	6	0.6	1.98



Chiroxiphia caudata

The number of exclusive species, which was also related to the number of total lists conducted, showed significant differences between bands (χ^2=71191.27, df = 4, p<0.01). The highest amount of exclusive species was obtained for the central band, with a frequency of one exclusive species per list. This result is possibly associated with the variety of environments present in this band (forest, capueras, crops and pastures). The band that follows in frequency is FP with an average of one exclusive species for every 2 lists approximately.

Stage 2:

Results of the monitoring program

The specific objective of the avian monitoring program was to quantify directly and indirectly the use of the corridor area by bird species. Sampling areas were selected taking into account results obtained from the analysis and classification of satellite images. On the basis of this image, we identified one sector of continuous forest between both protected parks, which had a high potential as a moving zone for birds. We also selected one neighbouring area with a higher fragmented forest matrix. Table 5 and 6 resumes the data obtained during the non-reproductive season and the reproductive season. Capture rates and diversity index offer a view, though indirectly, on the use that birds do of each of the different sectors. studied. It is important to remark that during both campaigns, the long-term patterns

Table 5. General parameters obtained for avian community during the non-reproductive season in the area of continuous (CF) and non-continuous forest (NCF)

Site	Net hours	Total captures	Capture rates	Richness	Recaptures
UP NCF	157	70	44.59	31	2
UP CF	158	89	56.05	32	3
UC NCF	189	85	44.78	23	4
UC CF	133	74	55.39	27	3
CC NCF	160	96	59.81	26	3
CC CF	139	70	50.11	23	1
FC NCF	127	56	43.89	24	2
FC CF	154	89	57.79	27	6
FP NCF	147	68	46.20	23	7
FP CF	158	89	56.15	27	7
Total	**1526**	**786**		**61**	**38**

Table 6. General parameters obtained for avian community during the reproductive season in the area of continuous (CF) and non-continuous forest (NCF)

Site	Net hours	Total captures	Capture rates	Richness	Recaptures
UP NCF	102	60	58.78	26	12
UP CF	95	40	42.11	19	5
UC NCF	100	56	55.93	27	15
UC CF	98	38	38.60	16	10
CC NCF	91	43	46.87	18	5
CC CF	118	72	60.86	18	18
FC NCF	100	55	54.79	19	7
FC CF	84	47	55.39	21	9
FP NCF	111	69	61.86	22	10
FP CF	94	72	76.13	28	11
Total	**997**	**552**		**56**	**102**

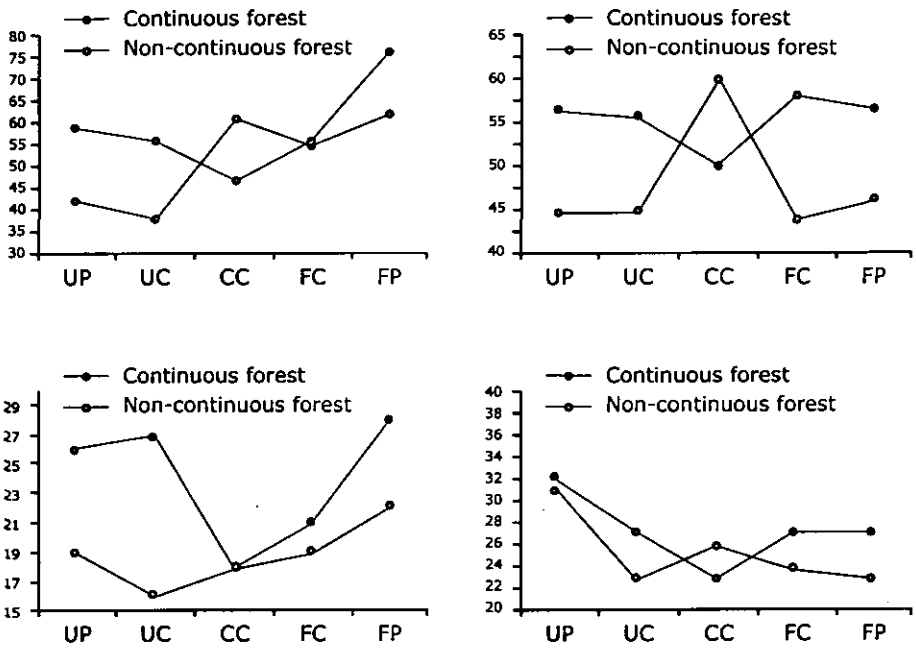


Figura 9. Capture rates (top) and richness (bottom) for the breeding season (left) and non-breeding season (right) in the areas of continuos and non-continuous forest.

in capture rates and in richness have remained very similar, even during breeding as well as non-breeding season (Figure 9).

Drymphila rubricollis

Capture rates and species richness were significantly higher in the corridor with respect to the fragmented zone (Friedman two way, p=0.04 for both variables) as would be predicted for an area with a high flux of individuals. Principal component analysis clearly separated corridor from non-corridor sites (1st axis), while the 2nd axis was strongly correlated with the surrounding matrix characteristics (measured as percentage of non forest area in a 500m radio around each survey site) (r=0.63, p<0.05). This analysis allowed us to identify one group of species that appear to be highly sensitive to the surrounding degree of fragmentation and habitat loss, which is conformed by species such as *Platyrinchus mystaceus, Lepidocolaptes squamatus* and *Drymophila spp.* (Figure 10).

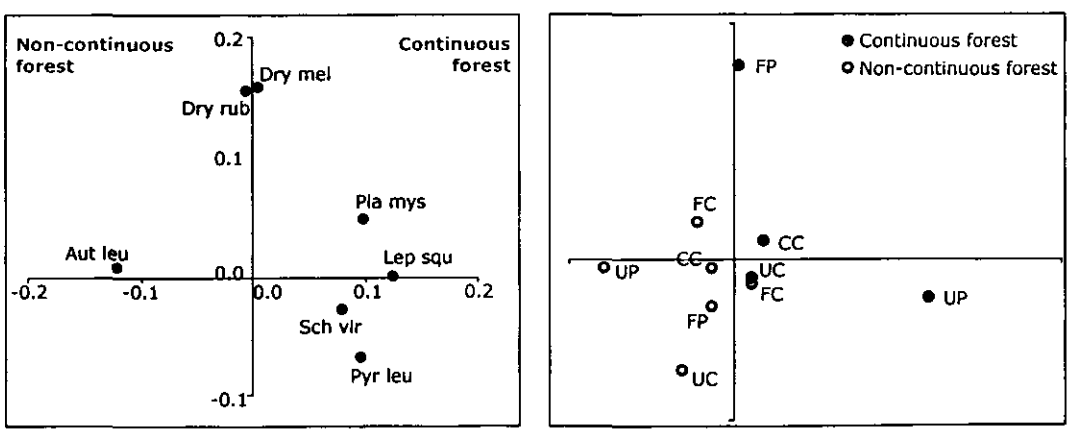


Figure 10. Principal components analysis for mist netting survey sites. For species codes see Appendix 2.

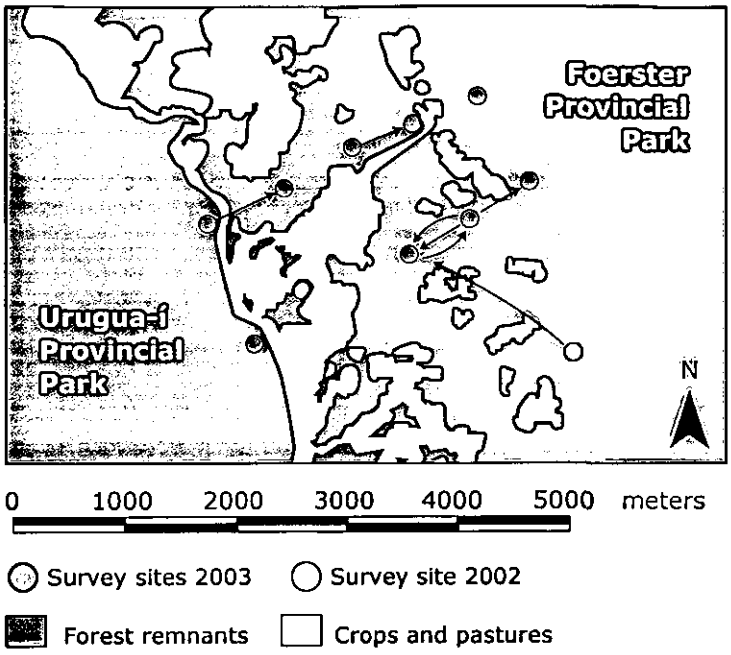


Figure 11. Bird movements between netting sites.

These results suggest, although indirectly, that there is an intense corridor use by one group of species, while there is another, restricted to protected areas, for which the current level of connectivity appear to be insufficient.

These indirect evidences allow us to infer, with a certain degree of certainty, some patterns underlying habitat use and avian movement in Urugua-í corridor, yet the central objective of our banding programme is to characterize these patterns. Recapture of previously ringed individuals gives us direct information about movement for different species. In this context, data recollection is a slow process, yet in only two campaigns we have managed to obtain an important amount of recaptures of moving ringed individuals. These results, although only preliminary for the moment, show patterns similar to those shown by indirect evidences. Registered large distance movements were always conducted through areas with forest cover and never through sectors separated by opened areas. Figure 11 resumes these movements. One interesting result resume is the intense movement registered from and towards one particular sampling site (non-continuous forest central site), similar results are obtained from indirect evidences because this site contains one of the highest capture rates and bird species richness. Fortunately, this site, which appears to be so important for birds, is located in one private farm where there is no current timber extraction or forest replacement.

Baillonius bailloni

Tape-recording

Additionally to systematic surveys, we tape recorded birds and amphibians in order to increase our biological database. The recordings of songs and calls also helped us in bird species identification during point counts. Also seems to be a good aid to locate some inconspicuous amphibian species. A total of 72 sound cuts were obtained, comprising 2.30 hours of recordings. 54 of the sound cuts were for birds (38 species) and 18 for amphibians (7 species). More details on species, locations and dates are given on Appendix 6.

Sound recordings were made with a Marantz PMD222 tape recorder and a Seinheiser ME66 directional microphone loaned by The British Library Natural Sound Archive. The performance of this equipment in the field was exceptional, obtaining good quality recordings. Tape recording in the forest is time consuming and we only could made recording after mist netting and previous to point counts surveys. Recordings were carried out in the first two weeks of October of 2002. All species sound tracks are from the Urugua-í Green Corridor area, with the exception of one day visit to El Piñalito Provincial Park (south of study area).

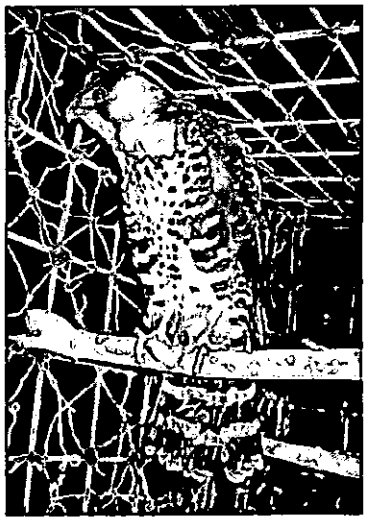
Original tapes and datasheets were delivered to the British Library Natural Sound Archive; copies are available also in Conservacion Argentina NGO and the Museum of Natural History of Buenos Aires, Ornithology Section.

The team is especially grateful with Dr. Richard Ranft of The British Library for the loan of the equipment and his patient.

Notes on rare and endangered bird species

Here we give some comments on some species birds detected by the team during our visits to the parks and the project area. These commentaries involved mostly endangered and some near threat species. Some other species with poorly known distribution in Argentina are also included in this section.

Solitary Tinamou (*Tinamus solitarius*). A near threatened species recorded by the project team in good forest of both park and the corridor. This species is probably affected by deforestation and fragmentation, so its recording in the corridor area is promising. More information is needed to assess population situation.



Accipiter poliogaster

Grey-bellied Goshawk (*Accipiter poliogaster*). A young plumaged captive bird was located (and a photo was taken) in a farm in the south border of the Urugua-í Provincial Park in a preliminary project trip to the area (November 2001). This individual was the survivor of a couple of nestlings obtained after a pine plantation clear cut (by the austral winter). It was saved when the nest falls down. Adults disappear after a couple of days. Before the fall down of the nest, adults were seen by a local farmer chasing pigeons (*Columba sp.*). The bird was later release inside the Urugua-í Provincial Park. This record confirms the breeding of the species in Misiones against what is said by del Hoyo *et al.* (1994).

Black-fronted Piping Guan (*Pipile jacutinga*). Listed as a Vulnerable species by the IUCN (2002). This species is frequently recorded at the Uruzú guardpark station, one of the best place (with Iguazú Falls) to see the species in Argentina. Species couldn't be located in the Urugua-í Green Corridor area, even where palmetto associations are present. Moreover, local people only know the species from their visits to the Urugua-í or Uruzú rivers. The species seems not to be so dependant, at least in Argentina, on palmetto associations as previously supposed (Collar 1992); been probably more associated to riverine forests. Species had been recorded for Iguazú National Park, Urugua-í, Esmeralda and Moconá Provincial Parks (Chebez 1994; Chebez & Casañas 2001). Outside the parks its situation is uncertain. Urgent studies are needed to set its current distribution, population abundances and the impact of human activities and hunting on the species (Galleti 2001)

Pheasant Cuckoo (*Dromoccocyx phasianellus*). A rare cuckoo in Argentina. Several sparse records were obtained in the last decade, especially in the Iguazú Provincial Park (Saibene *et al.* 1996; Chebez 1992). An individual listened by Nicolás Rey during a team visit to the Urugua-í Private Reserve of Fundación Vida Silvestre Argentina-WWF on August 2002. This reserve is located in the southern border of the Urugua-í Provincial Park, protecting some interesting tracks of the Urugua-í River.

Festive Coquette (*Lophornis chalybeus*). This species lacks a skin or a photograph to confirm its presence in the country. Several records of this species in the country lack a description of the individuals. A female of this genus and probably this species was observed the 21 of October of 2002 during point counts surveys. Observation was made for a couple of minutes in herbaceous habitat at the border of the forest. Detailed information of this observation is been published at Nuestras Aves ornithological bulletin.

Helmeted Woodpecker *(Dryocopus galeatus*). Other Vulnerale species (IUCN 2003), recorded the 22 of October of 2002 during Mackinnon list survey. The species was in a farm with selective logged forest, an open forest but still with large trees. The farm was close to the H. Foerster Provincial Park. This species counts with several records for Argentina, most of them published by Chebez (1993). It is rare but widely distributed in Misiones, it also seems to be tolerant to some degree of forest alteration.

Canebreaker Groundcreeper (*Clibanornis dendrocolaptoides*). A pair of this Vulnerable species (IUCN) was observed by Nicolás Rey on November of 2001 during a preliminary survey to the area. Record was made in riverine forests of the Uruzú river. The species was detected in the border of a bamboo thicket (*Merostachys clausseni*). It is a rare

species in Argentina that could be found in some protected areas like Iguazú National Park, Urugua-í and La Araucaria Provincial Park.

White-bearded Manakin (*Manacus manacus*). A rare species, more frequent along the Iguazú river forests. One individual of this species was recorded by Gustavo Zurita on January of 2002 during mammal's surveys, confirming the presence of this species in the Urugua-í Provincial Park.

Photo: Alejandro Balbiano

Cacicus haemorrhous

Band-tailed Manakin (*Pipra fasciicauda*). Scarce and little known Manakin of Misiones. Was recorded in several occasions during mist netting surveys in the Urugua-í and Horacio Foerster Provincial Parks, where had not been listed previously (Bertolini & Gil 1990, Bertolini 1999). The species seems to tolerate some degree of forest alteration.

Ruby-crowned Tanager (*Tachyphonus rufus*). Is is a species more associated to clear areas. Previous records from Iguazú National Park were considered doubtful and possible confusions with the similar *T. coronatus* by Saibene *et al.* (1996). A pair of the species was seen in a preliminary trip to the area at the Uruzú park ranger station in a artificial feeder. A photograph was taken.

Conclusions

Project results pointed out the importance of the Urugua-í and H. Foerster PP and the corridor as a key area in the conservation of Interior Atlantic Forest birds. This affirmation is supported in the number of endangered and near threatened species, as in the number of Atlantic Forest endemic species.

Wege and Long (1995) had noticed this in part when they point out the value of Urugua-í Provincial Park for endemic bird species conservation. That affirmation could now be extended to the Horacio Foerster Provincial Park and the corridor between both protected areas.

Our results support recent designation of Urugua-í PP, H. Foerster PP and the corridor between them as IBAs (Aves Argentinas, unplublished report). These IBAs required more extensive surveys to confirm the presence of other endangered bird species recorded in the area as: *Mergus octosetaceus*, *Phylloscartes paulistus* or *Sporophila falcirostris*.

The most important threat for biodiversity conservation in the area are deforestation and illegal hunting. It is urgently needed a sustainable agroforestry system that stabilizes the landscape in order to maintain connectivity between both protected areas.

Against what we previously supposed a great number of interior forest species is still present in the fragments inside the corridor. These could have two explanations, first that fragmentation is so recent that birds communities didn't stabilized yet, and the second is that there is no effect of fragmentation on this corridor (at least at by the moment). Perhaps local bird species are pre-adapted to habitat disturbances as has been proposed by Brown & Brown (1992) and Protomastro (2001). Only a bird monitoring program could answer this kind of questions.

The greatest number of species was found in the corridor area. These could be explained by the different habitat types that this area holds. This result also pointed out that species biodiversity couldn't be the only indicator to evaluate corridor quality. Species composition changes in the community are more informative.

Pipile jacutinga in Uruzú stream

Recomendations

Based on project birds results we list a serie of recommendations to improve conservation of biodiversity in the corridor:

- To continue the bird banding monitoring program. This program is giving the first long term information about movements of forest species in Misiones and would serve for evaluating the connectivity between Urugua-í and H. Foerster Provincial Parks.

- To evaluate the possibility to include other taxa in the monitoring program, as bats or butterflies.

Pipra fasciicauda

- To continue and increase the biological sound collection. Tape recording demonstrated to be an important tool, helping in species identification and detecting secretive species.

- To increase park ranger control in the protected areas boundaries and inside the corridor. There is an increment in the extraction of native hardwoods and palmetto hearts in the corridor and parks, in part favored by sporadic controls. This situation gets worst in the last years after argentine economic crisis that reduces the amounts of money designated to conservation by governmental agencies.

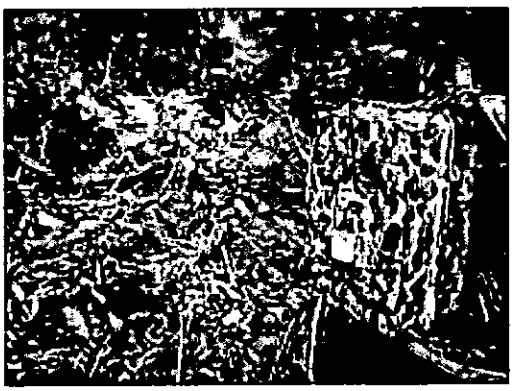
- To establish and implement a long term educational plan in the area. If people don't perceive the importance natural resources conservation and its implications in social and economic life, few objectives could be accomplished.

chapter 5

Mammals of the corridor

Mammals of the corridor

Mazama nana footprint



Camera trap

Tapir captured by camera trap in Uruzú

Camera traps activated trough an infrared sensor (Camtrack type) and during 24 hours a day were used for mammalian surveys. We selected this method over others due to the great difficulty for mammalian observation in wet forests habitat. This method has proved to be successful in this kind of habitats in several parts of the world and it is very useful for cryptic and nocturnal species (which is the case of most mammalian species in the area) (Griffiths & van Schaik 1993, Rice *et al.* 1995, Karanth & Nichols 1998, Cutler & Swann 1999). Camera traps were located along natural trails, at river borders, clay licks, and any other identified key site, in order to assure the correct representation of all habitat types and to maximise encounter rates during surveys. It was necessary to carry out several sampling days for each evaluated site due to the low natural abundance of most of forest mammalian species. In order to check photographic films and batteries, we made periodical visits to survey sites.

Unfortunately, due to equipment technical calibration problems, camera traps mammalian surveys had to be delayed. We only obtained a few photographies of dwarf brocket deer and tapir in Uruzú Park Ranger Station.

In January 2003 we conducted a preliminary mammalian survey at UPP using the track plots technique (Simonetti & Huareco 1999). We stabilished four 1,050 meters transects perpendicular to the elevation gradient and to 101 Route. Eighty-four 0.7 x 2.0 m^2 track plots were prepared (21 in each transect) separated each other by 50 meters. Parcel construction and preparation demanded lots of physical work and unfavourable climatic conditions, yet we counted with the help of park rangers for this task. Each transect was separated by a minimum of 1 kilometre from each other and they were located in opened trails used regularly by poachers from neighbouring farms. Thus, this design allowed us to assess border effect produced by the route and farms of Maria Soledad settlement.

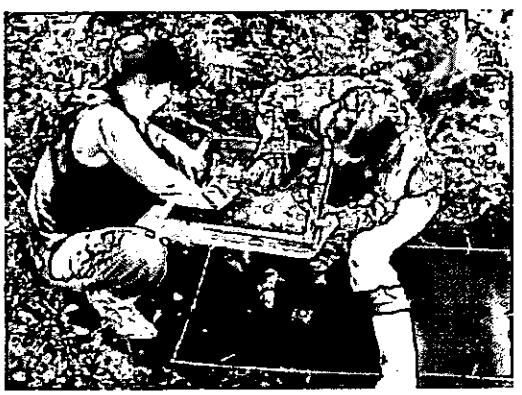
Our results show a scarcity of big size mammals in this zone of UPP, with a border effect bigger than 1 kilometer due to route effects, poaching and dogs incursions. The absence of signs from these big size mammals such as tapirs, brocket deers and peccaries in survey parcels is really notorious. Most frequent tracks belonged to domestic dogs, foxes, opossuns, brazilian rabbit, armadillos and agouti. We also registered tracks from puma, tayra and coati. Pressures over the park and its fauna were evidenced by the continuous register of dog tracks and even through a direct encounter with a poacher in one of the monitored transects.

Additionally, we made *ad libitum* observations of direct or indirect mammalian presence (tracks, faeces, carcasses and direct observation). *Ad libitum* observations in the corridor zone recorded the following mammalian species:

Dwarf brocket deer	*Mazama nana*
Red brocket deer	*Mazama americana*
Tufted capuchin monkey	*Cebus apella*
Tamandua	*Tamandua tetradactila*
Crab-eating raccoon	*Procyon cancrivorous*
Margay or Oncilla wildcat	*Leopardus (wiedii o tigrinus)*
Ocelot	*Leopardus pardalis*
Crab-eating fox	*Cerdocyon thous*
Capivara	*Hydrochaeris hydrochaeris*
Azara's agouti	*Dasyprocta azarae*

We used Becker & Dalponte (1999) guide as reference material for the correct identification of tracks in the field.

Track plot survey



Track plot construction

Tamandua run over by a car in the route

Jaguar (*Panthera onca*)

chapter 6

Native species agroforestry **tree nursery**

Native species agro-forestry nursery

From 1997 up to 2000, the NGO FUCEMA conducted a project of agro-forestry development based on the use of non-timber forest products. For this project, a native tree agro-forestry nursery was built in the same property where we have built ours. FUCEMA´s nursery was later abandoned due to the lack of permanent personnel in charge of the nursery and funding.

Palmetto seedlings

Urugua-í Green Corridor native tree agro-forestry nursery seeks to provide a conservation, education and environmental restoration tool for the sustainable development of the corridor area between Urugua-í and Foerster provincial parks.

It is located in "*San Isidro Labrador*" farm, which belongs to Foletto family, Maria Soledad settlement, Andresito, Misiones. This farm has a surface of 35 hectares, from which approximately 20 ha. of native forest is still conserved. Tree nursery installations are located near a natural diked lagoon ("*tajamar*") and close to the main house. The access is through *Picada Guardaparque Horacio Foerster* (dusty road) and it is located 1000 meters from "101" national route (debris road). *It does not currently count with cartels.*

The person in charge is provincial park ranger Aloicio Foletto. He is participating in our project as part of a co-operation agreement between the Ministry of Ecology of Misiones and Conservación Argentina, through which he is assigned on a full time basis to tree nursery maintenance duties and extension activities with local community. Foletto counts with an extensive experience in tree nursery management and participated actively in FUCEMA´s project. His soon, Fernando (20 years old), is also collaborating with the nursery as well as with other activities of the project.

Tree nursery installations cover 2,700 m² (60 m x 45 m). The structure counts with hard wood posts obtained from dead forest trees. The ceiling, conformed by different plastic mesh size, is held up by more than 1000 meters of steel suspenders.

Some of the materials used for out tree nursery construction were recycled from the old abandoned FUCEMA nursery, as well as several seedlings which had to be treated for improving their condition

Until now, the nursery has been equipped with the following materials:

Steel wheelbarrow
2 shovels
Small hand shovels
Hackle
Asada
Buckets
Irrigation beaks
Stopcock
Manual hose
100 m. de plastic hose
2,000 meters of steel wire
20,000 flowerpots (bag type)

Pre-selected tree species for the nursery were chose based on several criteria:

- **Native Forest Trees.** Used by local community for jam and liquor production. They are also bird attracting species.

- **Forestry Use Species.** Fast growing native tree species will be chosen for their use as wood and environmental services through agro-forestry techniques.

- **Species for Agro-forestry Experiments.** We will use several exotic species with potential use as family sustain for agro-forestry experiences in local farms (windbreak, shelterbelt, alleycropping, riparian forest buffer and fencing).

- **Threatened Tree Species.** We want that our nursery also fulfils a strategic function for *in-situ* and *ex-situ* conservation programmes, such as restoration experiences, tree enrichment of protected areas, education and seed bank of Misiones' threatened species.

Tree-nursery construction

The tree nursery is now almost finished with only half of its ceiling covering resting. It is currently in an early stage of production and will grow as a function of the demands of the project and as new funds are obtained for completing its whole surface.

Seedling production is currently 20,000 native species flowerpots (*Lapacho*, *Paraná* pine, *Cañafistula*, etc) and Australian cedar.

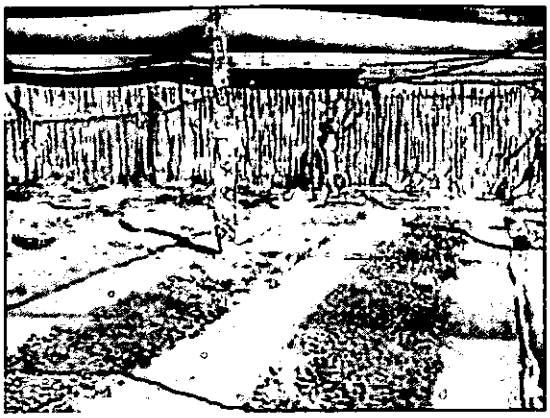
More than 5,000 seedlings (coming from the old FUCEMA nursery) have already been delivered to small rural farmers that live inside the area of the ecological corridor. The project expects to monitor this seedlings plantation success in the near future.

As a complement to these activities, we have been working on a digital photographic inventory of native tree species from the area for the future edition of an identification field guide.

Fruit and native trees
Pitanga (*Eugenia uniflora*)
Cerella (*Eugenia involucrata*)
Ybajay (*Eugenia pyriformis*)
Yacaratiá (*Jacaratia spinosa*)
Guaporetí (*Myrciaria rivularis*)
Guavirá (*Campomanesia xanthocarpa*)
Araticú (*Annona squamosa*)
Cocú (*Allophylus edulis*)
Pacurí (*Garcinia brasiliensis*)
Siete capotes (*Britoa guazumaefolia*)
Yaboticaba (*Plinia trunciflora*)
Palmetto (*Euterpe edulis*)

Native species for ecological restoration
Samohú (*Chorisia speciosa*)
Tembetarí (*Fagara hyemalis*)
Ingá (*Inga urugüensis*)
Caroba (*Jacaranda micrantha*)
Ceibo misionero (*Erythrina falcata*)

Reforestation with children in a local school



Project tree nursery

Exotic species for agroforestry experiences and familiar self-sufficiency
Australian cedar (*Toona ciliata*)
Avocado (*Persea americana*)
Mango (*Manguifera indica*)
Citruses (*Citrus* sp.)
Acerola (*Malpighia glabra*)

Native species for forestry and agroforestry use
Grapia (*Apuleia leiocarpa*)
Paraná pine (*Araucaria angustifolia*)
Loro blanco (*Bastardiopsis densiflora*)
Cancharana (*Cabralea canjerana*)
Mora amarilla (*Cholophora tinctoria*)
Loro negro or Petiribí (*Cordia trichotoma*)
Ambay guazú (*Didymopanax morototonii*)
Timbó (*Enterolobium contortisiliquum*)
Marmelero (*Enneatypus tenuiflorus*)
Azota caballo (*Lehuea divaricata*)
Rabo itá (*Lonchocarpus leucanthus*)
Rabo molle (*Lonchocarpus muehlbergianus*)
Laurel Guica (*Ocotea puberula*)
Cañafistula (*Peltophorum dubium*)
Anchico colorado (*Parapiptadenia rigida*

Tree seedlings transport for reforestation

Reforestation in Andresito Municipality during the Earth Day

chapter 7

Education for conservation

Education for conservation

Our general objectives were designed with the aim of working towards a joint action with local actors. Furthermore, we seek to create a space for meditate and exchange of knowledge regarding local natural environmental situation. In this way, we pointed towards supporting an active social positioning and consciousness around the environmental problems that affect the inhabitants of Urugua-í Green Corridor zone.

General objectives

- To strengthen Maria Soledad settlers, through educational activities, so that they have more management possibilities, allowing them to look after and to maintain the corridor between Urugua-í and Horacio Foerster provincial parks.

- To support one of UNESCO and PNUMA principal lines, working with public education institutions as a means for reaching every social sector (UNESCO 1996).

- To favour the fulfilment of one of both Provincial Parks specific objectives cited in their Management Plan.

Public Objective

We initially identified three types of publics which whom we looked forward to developing educational activities:

Educational workshop participants

- *Children that attend local schools* and satellite classrooms and that are part of the families that live in the area embraced by the project

- *Local farmers*, which conform domestic production units, base of local economic structure, with whom it would be interesting to look for alternatives and environmental characteristics.

- *Park rangers, school teachers and community authorities*, who work with environmental education through different approaches and whom we could help in order for them to continue with these educational activities in the long-term.

At first, we worked directly and specifically with park rangers, school teachers and community leaders. We focalized our work with this sector because we consider them to be local referents and responsible of action and decision taking with a strong influence on the rest of the community. We hope to be able to embrace remaining actors during a later stage of this project.

Specific objectives

1. To introduce school teachers with methodologies that provides them with new tools useful for their teaching-learning tasks[1]. We pretend that teachers, along with the educative community, formalize local environmental knowledge[2], defining and generating actions that tend towards the assignation of value to the environment.

[1] Following recent findings in education, we assumed a constructive conception of knowledge and of the teaching-learning process (Bransford & Vye 1996, Elam 1973, Lemke 1997, Perkins 1995).

[2] We took the concept of Leff, who propose that environmental knowledge "plans the reconstruction of subjectivity and of the subjects of the history: from the difference and otherness of the individual, from the diversity of colective subjects, from the identities and the memory of native people, [which] generate new forms of positioning in the world. From the most profound sense of existance of the people etnic identities and social interests are reconfigured; human rights that motivate historical changes are legitimized, oriented by autonomy, cultural diversity, political plurality and participative democracy values (Leff 1998).

2. To provide park rangers with working methodologies in non-formal education, enriching their awareness function and their role as a link between protected areas and local communities.

3. To work with the image that teachers and park rangers possess regarding farming families[3]

4. To involve teachers and park rangers with a research project, remarking the importance of this kind of knowledge for conservation actions.

Preliminary analysis of interviews with farmers

During an initial stage we conducted a preliminary analysis of the interviews with local farmers. We obtained general quantitative and qualitative data regarding the farmers themselves, which allowed us to delineate some general ideas regarding possible points with which we would like to work during the educational programme. We were able to learn as well about general patterns regarding land tenancy and fauna observation frequencies, and **direct answer** regarding the value that people assign to the forest.

By **direct answer** we refer to that interview situation where the interviewer roles influence the answers the interviewed give. In the present case, we already had a defined role, due to the fact that ours is a conservation project and that we are directly related to the Ministry of Ecology of this province. Consequently, answers should be considered as a result of this interaction, where the interviewed seeks to adequate to that he guess interests the interviewers. This means that the answers are data because they give us information about a socially situation (Guber 1991).

Etnography

Interviews were developed following an ethnographic method (Rockwell 1988, Malinowski 1985) that allowed us to obtain qualitative information about actors with which we wanted to work with in the future. This means that we seek, through the observation, interaction and development of our formal or informal interviews, to get familiar with local social practices as well as with the meaning that this practices have for diverse actors. In every step, we considered the conflictive dimension of social relations and the temporal deepness of these dynamics.

Thematic interpretation

We used thematic interpretation as the method for developing educational activities. Interpretation is a means of communication, which emphasises idea transference and the relations between them. The information is used for clarifying concepts and processes relevant as far as it is demanded by the construction of a significant knowledge.

It is a method that was developed for working in natural areas with non-captive groups, meaning by this groups that voluntarily have a good disposition for learning, do not have time limitations and do not expect to be evaluated (in the traditional sense of this word). These characteristics determine that it functions as a method that contributes with formal education. The activities carried out use resources provided by other areas

[3] We can state as our working hypothesis that there is a estigmatization of local farmers coming fom park rangers and teachers. We understand this as "a situation in which each individual is incapable for a full social acceptance." Following Goffman: "... the management of the stigma is a general trait of society, a process that is produced whenever identity norms exists..." (Goffman 1993). In order to work with this concept, the author distinguishes two types of identities: normal and estigmatizados. We should not forget that estigmatización can be understood as a classificatory act in which the other is stereotypied. (...) This classification systems which distinguish between normal and estigmatizados people are expressed through the language which is at the same time an instrument and a support for this relationships of power as well as a creator of senses that reinforce such relationships (Bilder *et al* 2000).

such as recreation, role games and story telling, among others, for developing direct experience actions and for putting into practice the use of all the senses.

We used the model of thematic interpretation (Ham 1992) for planning educational activities. As a structure for these activities we used the proposal of Cornell (1979), described in his texts: "Sharing nature with Children" and "Sharing the joy of Nature". He divides these possible activities in four groups depending on their particular objectives: focalise attention, wake up enthusiasm, direct experience and sharing of inspiration.

Fulfilled activities

Preliminary trip

From November 30th till December 8th 2002, we made a trip to the study area in order to explore and present the educational component of the project to different actors from the community. Our objective was:

To detect local educative inquiries in order to organize the education schedule in conjunction with school teachers and park rangers.


Satellite classroom

To accomplish this, we organised several meetings and interviews with local leaders (school teachers and park rangers) where we analysed the aspects regarding shape, content and organization of the activities. As a result from these interviews and from the field interaction, we were able to distinguish some aspects of the social network, which we considered very important to keep in mind for the educational programme. We have separated them depending on the social actor:

Farmers

- *We observed conflicts with the provincial parks organization.* This is related, in part, to the fact that this population had to be relocated for the creation of both parks.
- There are no organizations that nucleate farmers from the corridor area between Urugua-í - Foerster.
- Some people use the parks to go hunting, which creates conflicts with park rangers.
- Living in the surroundings of the park represent some trouble to local farmers given that wild fauna can enter to their farms, threatening their cattle.

Teachers

- They have to work with a population of bilingual kids. In this region, people use Spanish and Portuguese indistinctly. Many of the kids start school speaking only Portuguese.
- Teachers are excited about our work with them, but they do not show interest in participating in a joint elaboration of an educational plan.
- María Soledad School used to be on Urugua-í provincial park lands and, after its creation; it had to be relocated in a terrain which is nowadays in front of this park.
- Schools are officially catalogued by their infrastructure, number of teachers, courses and number of students.

Park rangers

- They are overloaded with work and they are not able to fulfil with all the duties they have been assigned with, mainly because of the lack of personal and of resources (materials, vehicles and enough fuel)

- They self-gestionate their projects and fulfil community assistance duties which are not within their mandatory assignments.

Teachers as well as park rangers refer to farmers as "simple people", not very social, with a poor knowledge and interest in the natural environment. They remark that their motivations are mainly concerned with the state of their farms and economical progress. They suggest that the main problem is that some people develop illegal activities such as logging (when it exceeds the agreed quantities) and pouching, which they account on the lack of interest regarding environmental care.

Planning

The educational programme was diagrammed and developed during one workshop in which several member of the project participated. This planning started from the following established characteristics:

- **Place:** The workshop was developed in Itatí school, whose headmaster is Rodolfo R. Mendieta, situated in Itatí colony, Andresito. This school possesses a natural Reserve, created by teachers and students inside the school terrain and which counts with a patch of lowly modified forest. The presence of this reserve was one of the main causes for selecting this particular school.

- **Time:** The workshop was developed during a complete 8-hours working day. These highly concentrated activities arose as the best possibility due to the difficulty of getting all the teachers together given the long distances that separate educational establishments and the high cost of transportation.

- **Public:** We designed a workshop that considered two kinds of publics: institutional referents (park rangers, municipality environment and tourism authorities) and school teachers. Some of the project members also participated. Although we could have considered an independent work with each of these social actors, we thought it was a good opportunity to make it in this joint way. Under these circumstances, we tried to highlight the opportunity for exchanging experiences and knowledge between them, which entail the possibility of give value to the work of each of them and remark the possibilities of a coordinated action.

- **Activities**: the workshop was developed trough a succession of interpretative, demonstrative, animation and participative activities in different places:

- Inside the classroom.
- At the school yard.
- In the school natural reserve.

Teachers, park rangers and municipality authorities, debating about the environmental education in the area.

We used a variety of interpretative resources as a way of putting into practice the different options that this means of communication propose. We used the combined techniques of:

- Asking
- Structuring
- Answering
- Playing
- Direct experience
- Use of the senses

The workshop also aimed to give:

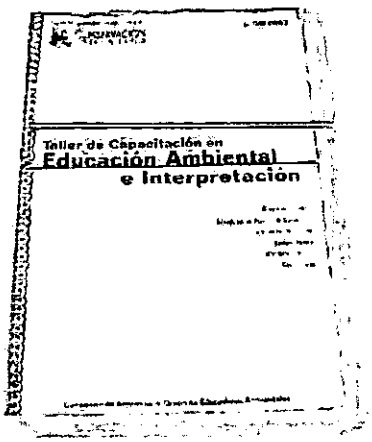
- A demonstration of the activities developed by Urugua-í Green Corridor project.

- The preparation of a practical activity by teachers and park rangers, which could be applied to everyday practices.

Didactic material

Editing a manual for workshop teachers

We produced a specific material which resumes the principal components and methods covered during the workshop, in order to facilitate the comprehension during the course of the workshop as well as to provide with future consulting material. Each participant was handed with this material as a tool for further research, depending on their particular necessities and interests. We included the following topics:



1) Bases for environmental education (based on Cafferata 1997, Fernández Balboa& Bertonatti 1998, Ham 1992, Tilden 1957). Bases for environmental interpretation (based on Tilden 1957, Ham 1992, Huizinga 1984).
2) Components and examples of interpretative activities (based on Cornell 1979).
3) Interpretative planning (based on Ham 1992)
4) Interpretative evaluation (based on Coello 1995, Hernández 2000, Monroe 2000, Stenhouse 1990, Wood & Wood 1990)
5) Natural environment of Misiones, conservation and sustainability (based on Lawrence & Bierregaard 1997, Primack *et al.* 2001, UICN-CMAP 2000, WRI *et al.* 1992)

Bibliographic packages for schools, park rangers stations and for other local and regional institutions

Each school (6 in total) was handed with one package of bibliographic information regarding conservation of the native forest in Misiones, as well as posters and stickers from the project. The park ranger's stations received one copy of a Environmental Education book (Ham 1992).

The Workshop

It was developed following this schedule:

1. Workshop Introduction
Participant presentation and introduction to the workshop. Remarking of the utility of Environmental Education and Interpretation: challenging what looks impossible with everyday elements.

2. Development

a. ¿What is it and what is the utility of Environmental Education and Interpretation?

- Participative definition of Environmental Education (EE).
- EE objectives.
- EE insertion into formal education.
- Participative definition of Environmental Interpretation (EI).
- EI principles: Freeman Tilden's principles.

b. EI characterization.

- Three characteristics of EI..
- Four skills of EI.
- Three useful strategies: asking, answering and structuring.
- Ductility.

c. Educative resources in EE and EI applied to this region – Activities in the school reserve.

- Definition and differentiation of resources.
- The use of senses as a resource.
- The game as a resource.
- Forest resources.

d. Planning and evaluation of EI.

- Topic and theme.
- Ideas, facts and the 7±2 rule.
- Presentation activities and diagnostic evaluation.
- Closing activities and evaluation.
- Types and characteristics of evaluation in EE and EI.

e. Teachers and local referents role in the conservation and valuation of Misiones forest.

- Valuation the Green Corridor zone.
- The role of teachers and park ranger as agents in local education.

3. Conclusion and closing activity of the workshop.

Evaluation instances

The evaluation was conducted in a step-by-step basis at the end of each section. The final activity allowed us to integrate every concept worked during the workshop as well as to evaluate its extent. It was also suggested as a space in which the participants could evaluate this proposal, the team organization and the work of the coordinators. We aim to follow, support and act as consultants for teachers interested in intensifying this proposal.

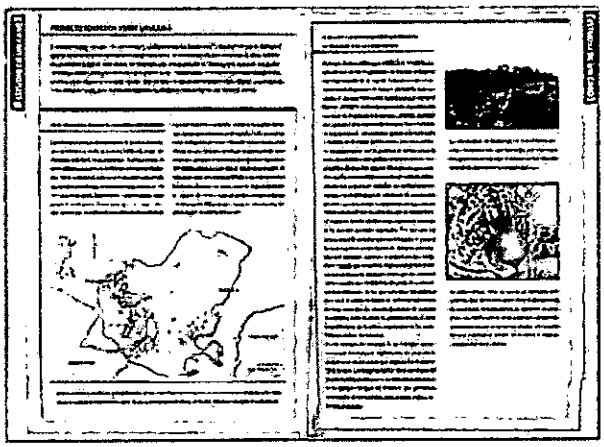
Balance and projection

- We provided teachers and park rangers with tools for their work in education.
- We worked in a participative way for the valuation of their roles and duties in the community.
- We were able to generate a space for discussion and exchange of ideas regarding problems, alternatives and the role that farmers have inside local environmental situation.
- We were able to get participants from different backgrounds together and to make them meditate about the importance of the role they fulfil and the possibilities for action that they posses given the available resources.
- We left an opened link between the coordinators of the project as well as with other groups who are developing environmental education in the province.

We consider that the main long term goals that we have fulfilled during this workshop were:

1. To strengthen the work of different community referents.
2. We reinforced the linkage between them, suggesting about the possibilities and potentialities of developing a coordinated work using the available resources.

Talk in the field to local school children about the project activities



Urugua-í Green Corridor Project as a study case in a national school textbook

Other activities

In addition to the work organized with teachers and park rangers, we developed some activities with students of local schools during 2003.

During June, we were invited by Andresito authorities to present our project and activities to students from schools of the area. This was organized as part of a natural environment meeting sponsored by Andresito community.

During October, we organized an event with students from four different schools from the study area. We delivered them with talks about birds present in this area and also with demonstrations on our bird working methodology using mist nets in order to monitor avian movement inside the corridor. These activities enhance kids' enthusiasm and promote their curiosity regarding different aspects of the place where they live.

Our project as a study case for national formal education

During the first months of 2003, our project was included as a study case in a national school textbook pointed towards students of the Polimodal level from secondary schools. The text includes the focus on conservation of our work and also gives information regarding problems that affect the forest in Misiones through the incorporation of ecological concepts such as connectivity, island biogeography and populations viability.

chapter 8

Exploring sustainable income alternatives

Exploring sustainable income alternatives

Photo: Alejandro Balbiano

Local women bottling liquors of native tree fruits

Since 1997, in Maria Soledad settlement works a cooperative of farm women dedicated to the production of native fruit marmalades and liquors. This group started their activities under the implementation of a project of the argentine NGO FUCEMA (Environmental and Species Conservation Fundation), called the "Agroforestry Development Project based on the Multipurpose Use of the Native Forest in Misiones".

The women of the group elaborate the marmalades and several rural families pick up the fruits from trees in their properties. The women group obtains money from the products sells, but there are others persons from Maria Soledad community that are directly beneficiate from this activity, those are the people that provided the women with the fruits of their farms.

The following is a list of the native tree species that they use in their products:

Species	Scientific Name	Use
Yacaratiá	*Jacaratia spinosa*	Fruit and jam
Pindó	*Syagrus romanzoffianum*	jam
Palmito	*Euterpe edulis*	marmalade
Ubajay	*Hexachlamys edulis*	jam and liquor
Araticú	*Rollinia emarginata*	marmalade
Pitanga	*Eugenia uniflora*	jam and liquor
Pacurí	*Rheedia brasiliensis*	jam
Guavirá	*Campomanesia xanthocarpa*	marmalade
Cerella	*Eugenia involucrata*	jam and liquor

Conservación Argentina is committed to support this productive initiative that faces several problems. The most important problems are the products commercialization and the insertion of a local brand in the regional market. By Conservación Argentina is supporting one of the few sustainable alternatives implemented in the Misiones Green Corridor. The success of these kinds of activities would be crucial in the future of Misiones Green Corridor. The aims of this productive alternative were:

- To contribute in the stabilization of the landscape, forest and crop mosaic, in an area of outstanding value for biodiversity, contributing to its preservation and the maintenance of the Urugua-í - Foerster biological corridor

- To generate direct incomes from the use of native forests fragments in the farms by the utilization of non-timber products.

- To fortify this initiative as a productive sustainable alternative helping to improve lifestyles of local farmers.

We had identified the most important problems and limitations currently faced by this productive initiative. Those are born on the lack of organization in the group, discontinuities in product elaboration and the previously mentioned difficulties in product commercialization and merchandize.

Palmetto jam

Developed activities

During the implementation of the project a fluid and permanent contact was established with the members of the cooperative. One of the group women is the wife of the park ranger assigned by the Ministry of Ecology to the Urugua-í Green Corridor Project.

As a first setp to support and impulse this initiative, we have developed and improved the product presentation. This was implemented with a change in the design of the product labels, incorporating an illustration for each fruit variety and reducing their impression costs. Product image was also strengthened, incorporating to its etiquette the following legend: "Misiones Forest Ecological Product". A leaflet was also printed explaining product's characteristics, describing wild fruits and the social and ecological impact of the initiative.

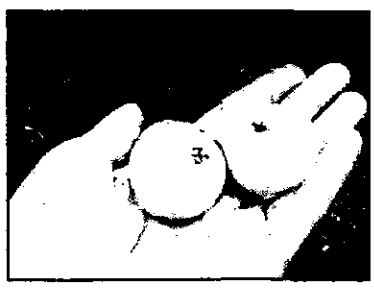
Promotion of this initiative was obtained by the publication of articles in many national magazines. The initiative products and aims were also promoted by our participation in local radios. An article appeared in an airline magazine, Southern Winds (SW); and recently starting from that publication, a national distributor of home-made jams was interested in the acquisition and commercialization of the product.


DULCES Y LICORES
DE LA SELVA
Publication of an article about sustainable enterprises

Finally, these products had been presented to the "Products from the Forest International Award FidBosque 2003" organized by the Interamerican Institute for the Cooperation in Agriculture (IICA) through the RedBosque Group of the Rural Agroindustry Development Program (PRODAR), which depends on the IICA. This award was orientated to resolve some of the commercialization, production and sustainability problems of non-timber products in Latin America. After an evaluation by technicians of those institutions, the project presented by the team members in association with Maria Soledad cooperative was honored with the First Award between other 18 products of 4 countries. This award will contribute during 2004, to work out on some of the bottlenecks of the native fruit productive initiative.


Pitanga


Siete capote


Ubajay

chapter 9

Involving local people

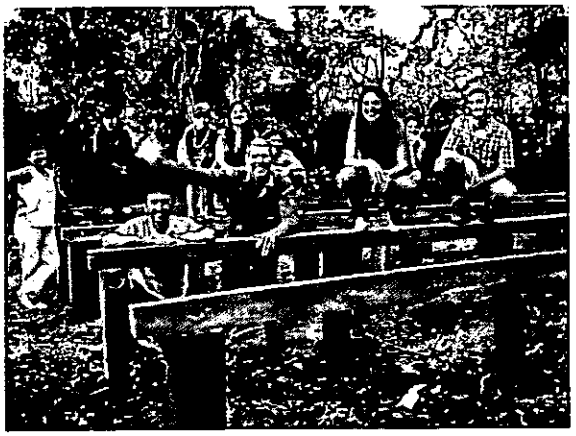
Involving local people

Social meeting with local community

New satellite classroom in the Urugua-í Green Corridor

During the interview development in August 2002 in the corridor area, local farmers showed themselves preoccupied for the absence of a school in the zone, since the nearest school (María Soledad) was too far to walk to. The settlers had already been assigned a 1-hectare forest property for the construction of a future satellite class, but they were still waiting for the government to work out this problem.

Thanks to that park ranger Foletto was assigned to work in the project (through an agreement between Conservación Argentina and the Ministry of Ecology of Misiones), he could begin to work in environmental extension activities, mainly incentivating the community participation in the conservation of forest fragments that exist at the moment inside the farms and in the reforestation with native trees.



New school under construction

Foletto organised several community members (most of them fathers of future students of the school) to build with them the needed school. During our survey campaign in January 2003, we collaborated in the search for donations (all wood was donated by local logging companies) in Andresito town and we share social meetings with local families. In these informal meeting, repeated many times during the project execution, we could share ours visions about Urugua-í -Foerster corridor conservation. In many occasions our points of view were coincident.

In March 2003, the school already counted with one teacher and was beginning its scholar year. This one could play an important role in corridor conservation since it is located in a vulnerable area, recently occupied and under a constant process of deforestation. This initiative of the local community, with the support and leadership of a provincial park ranger and the assistance of this project, allowed for the creation of a feeling of trust and collaboration with the community which will facilitate, in the future, new ways for protecting our forests.

Reforestation carried out together with the students in the garden of the new school

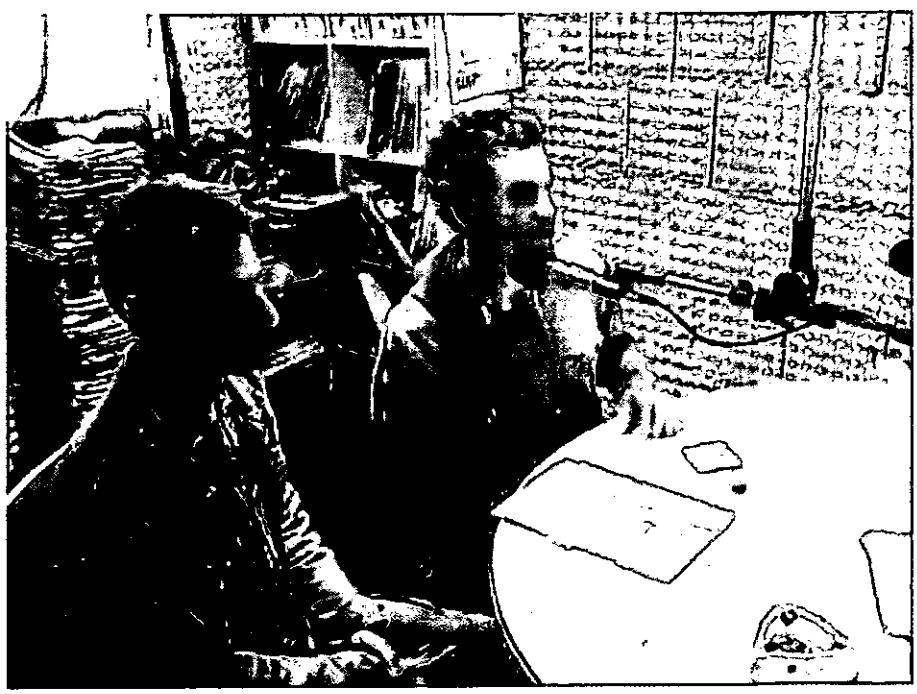
Reforestation

During June 2003 in the Earth Day celebration, we organised a reforestation journey along with the schools of Andresito town. School children and members of the project team planted forest trees next to San Francisco riverbank in the town of Andresito, we also donated seedlings for urban forestation.

Additionally, we organised a reforestation journey in the new satellite classroom constructed in the area of the corridor along with children, their families and their teachers. We planted seedlings of the project tree nursery and placed cartels with the names of the used native species.

chapter 10

Project **communications**



Project communications

Radio programme

The project in a newspaper

Communication of the project activities was a highly developed issue of the project. It had a central role to obtain support, participation and recognition.

Media activities were developed with our attendance in nationwide and local radios and some television programmes. Press releases in newspapers, articles in magazines, design of leaflet and sticker, creation of a website, public presentations, congress participations, design and distribution of a project newsletter and inclusion of the project as a study case in a High School textbook.

Radio

- Radio Nacional, Buenos Aires
- Local Radios of Andresito, Misiones
- Weekly radial micro-program of the project at FM Andresito, Misiones
- Radio America, Buenos Aires

Television

- 13 Channel. TV Programme. Posadas, Misiones

Newspaper

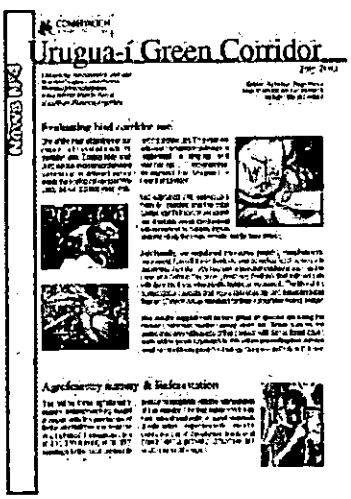
- El Territorio Newspaper. Posadas, Misiones
- Ala Delta. Tigre, Buenos Aires

Magazines

- ¿Cómo ves? Scientific magazine of the Universidad Autónoma. Mexico. Article: Trip to Misiones Forest
- Bienvenido a bordo. Article: Andresito, Join towards conservation.
- Winds. Article: Jams and liquors from the forest, a creative conservation initiative.

Informative project presentations

- Buenos Aires University
- Aves Argentinas (BirdLife partner)
- Misiones Conservation Projects Meeting. Organized by the National Park Administration (APN). ElDorado, Misiones.
- Environmental Meeting. Organized by Andresito Municipality. Andresito, Misiones.
- Instituto de Pesquisas Ecológicas (IPE), Brazil
- Fundación Vida Silvestre Argentina (WWF partner)



Project newsletter

Congress participations

- 1st National Congress on Natural Protected Areas. Huerta Grande, Córdoba.
- VII Neotropical Ornithological Congress. Termas de Puyehue, Chile
- Remote Sensing Congress. Organized by CONAE, Buenos Aires.

Pagina Web del proyecto

- www.conservacion-arg.com.ar (in construction)

Urugua-í Green Corridor Project Newsletters

- This press release were distributed by e-mail in PDF format to more than 300 people (per newsletter), related to conservation projects and institutions in Argentina and worldwide. Two versions were made, one in English and other in Spanish.

Leaflets and stickers

More than 4,000 digital photos of the project

chapter 11

Capacity **building**

Capacity building

The Gold Award of the BP Conservation Programme 2002 not only allowed us to start a conservation Project in Misiones forest, it also have a great impact strenghthing our personal and group capabilities. The award made possible to create our local NGO, called Conservacion Argentina, which was consolidated in the last two years with the implementation of the Urugua-í Green Corridor Project.

Establishing two important partnerships

- We establish an agreement of cooperation with the Maimónides University in Buenos Aires. After this agreement we could count an office to work in Project activities. Also the University gives us its logistic support (for example facilitating a van in a couple of Project trips) and the advice of their specialists for the implementation of the project.

- The other important institutional agreement was with the Ministry of Ecology, Renewable Natural Resources and Tourism of Misiones Province. This agreement was formalized by the signature of a cooperation agreement between the Minister and our NGO president. The Ministry assigned one of their park ranger to work fulltime with the project in the Urugua-í - Foerster corridor area. The park ranger, Aloicio Foletto, lives in the area and is now coordinating all the native tree nursery activities. This tree nursery was constructed in his property. He is a very dedicated and enthusiastic person and also collaborates in other project activities.

The Project was also honored with the support of several others institutions. Idea Wild Foundation and the American Birding Association donated equipment and books. The Deer Specialist Group (IUCN) supported part of our large mammal's surveys. The National Commission for Aerospatiale Activities (CONAE) donated us satellite images. Recently, network supported the native based fruit production of marmalades and liquors, a sustainable initiative.

We also interact with other institutions during this time for a better implementation of our project activities and a better achievement of our objectives. Between those institutions are Buenos Aires University (Applied Ecology Laboratory), Andrés Guaicurarí Municipality (Andresito) in Misiones, Environmentalist Educators Group, British Library, FUCEMA, Fundación Vida Silvestre Argentina (FVSA) and Aves Argentinas. Also, one of the team members in Misiones was honored with a fellowship from the WWF Russel E. Train Education for Nature programme.

The project team also has strength. Several members started their postgraduate studies (master and doctoral students) and new members had been incorporated: an anthropologist, environmental educators, biology undergraduate students, park rangers and local young farmers. Now, the project count with six of their members living and working in the study area.

Several national and international courses and workshops were attended by our team members. Between the most remarkable ones are:

- Biological survey techniques for conservation expeditions. BP Conservation Programme and Expedition Advisory Centre. UK, 2002. (3 team members)

- GIS and Remote Sensing. University of Buenos Aires. Argentina, 2002-2003. (3 team members)

- Tropical Ecology and Conservation. Organization of Tropical Studies (OTS). Costa Rica, 2003-2004. (2 team members)

- Frugivory and Seed Dispersal Ecology. Instituto de Biología de la Conservacao. Brazil, 2003. (1 team member)

- IV Latin-American Course in Conservation Biology and Wildlife Management. Instituto de Pesquisas Ecológicas (IPE). Brazil, 2003. (1 team member)

- Interior Atlantic Forest Ecology and Conservation. Fundación Vida Silvestre Argentina. 2003. (1 team member)

- Participative Management of Environmental Conflicts. Fundación Cambio Democrático. Argentina, 2003. (1 team member).

Hyla faber

chapter 12

Lessons **learned**

Lessons learned

- Work with a long-term vision. The experience obtained during the project's first two years showed us that, in order to produce a conservation impact, our work with local community participation need to show continuity, presence, patience, motivation and responsibility.

- It is important to understand the main causes for those behaviours that affect human-nature relationships in order to be able to initiate conservation actions that tend towards a change in the critical aspects of current land use patterns and biodiversity loss.

- Partnerships with local governmental organisms, municipalities, NGO's and universities increase the long-term sustainability of the project.

- Capacitating local teachers and park rangers in conservation education increases the impact and sustainability of our actions.

- It is important to responsibly manage the expectations that can be generated in local community from a project of this extent.

- The presence of field researchers decrease illicit activities (poaching, logging and palmetto cutting) in protected areas.

- Reforestation and agroforestry as small model experiences. It is more effective to begin working with a few local farmers, since this facilitates the implementation, evaluation and monitoring of the project activities.

- Working with the community is a slow process and it's based mostly on mutual learning and trust construction.

- It is necessary to strengthen local capacities for the successful development of conservation initiatives.

- Sustainable income alternatives need support, organization and continuity.

- The relations between institutions are important.

- Identification and involvement of key stakeholders and local leaders increase the impact of the project.

- Communication and diffusion of project's actions is a good way of obtaining support and participation.

chapter 13

Future conservation action recommendations

Future conservation action recommendations

Key continuos forest tract along the Urugua-í Green Corridor

□ Guarantee conservation of key connectivity areas in the corridor

To ensure connectivity between both protected areas for certain interior forest species, more sensitive to forest fragmentation, is necessary to protect large tracts of forest with little human presence that permit animal movements. This is the case of large mammal species inside the corridor area, and some bird species like the Solitary Tinamou. The team project identified a group of extensive farms with large tracts of forests in the north of the corridor. Particularly, one of the properties was considered as a key area to ensure large mammals movement through the corridor. We strongly recommend to avoid the subdivision of these properties and to consider seriously their acquisition for conservation purposes. The only acquisition one of these properties that crosses the corridor would have a great impact in landscape conservation. International funds like the *Arcadia Fund* from FFI or the IUCN-Netherlands, could be applied in order to acquire one or more of these key properties. In the case that they could be acquire other conservation tools must be implemented to avoid forest fragmentation.

□ Regularization of land tenancy

Corridor farmers are amused to move to other areas after a few years of intensive agriculture practices. This land use doesn't help to generate a feeling of property with the place they inhabit, tending to minimize natural resources value. Regularization of land tenancy became a central issue to ensure landscape stabilization. We strongly recommend local municipal and provincial authorities to consider a plan to facilitate the land tenancy in this key area. The application of the measures will be a great incentive to investments in long term sustainable alternatives as forest plantations, agroforestry systems and native forest management.

□ Improve of control measures

It is necessary to implement better control systems to care the natural resources. Governmental agencies would strength provincial park ranger corps, giving them more support and the necessary resources to carry out their activities (this includes uniforms, vehicles, fuel, and support personnel). The Forest Provincial Office should tend to the professional improvement of its staff and must ensure the necessary resources for their control activities.

□ Evaluate the continuity of selective logging and clearing permits in the Urugua-í - Foerster corridor

Legal permits for clearings and selective logging in the corridor area was long ago given. Moreover, some of these permits have been renewed to some properties in subsequence years. In consequence, we recommend avoiding future approbation of clearing and selective logging permits in the area. Even when this could be a conflictive measurement, we think that is necessary considering the importance of the area and

its role in Misiones Green Corridor connectivity. On the other hand to these land use limitations, incentives should be applied to farmers that preserve forests remnants in their lands or that are involved in agroforestry alternatives. These incentives could be implemented as tax reductions for the protection of forests, or subsidies for agroforestry alternatives implementation.

□ Continue and support applied research in the protected areas and their surroundings

Applied research should be supported in the protected areas of Misiones Green Corridor. This is necessary because of the lack of biodiversity information about these areas. Accurate biological data is also urgent to settle conservation programmes for endangered species and to improve management plans to the parks. Complementary to these studies, agricultural and agroforestry research is needed in order to solve some of the present sustainability problems of productive alternatives.

□ Park rangers work with protected areas surrounding communities is needed

Under a modern vision of conservation is necessary that park rangers interact and work with surrounding communities of the protected area. They spent great time in the area during their activities, so they have a central role in the involvement of local communities in conservation issues. An increase of local community involvement in conservation reduces conflicts in the limits of protected areas. To accomplish this park rangers and Ministry of Ecology technical staff needs to be trained on proper manners to interact with local community.

□ NGOs, governmental agencies and universities needs to coordinates efforts in the management and conservation of protected areas

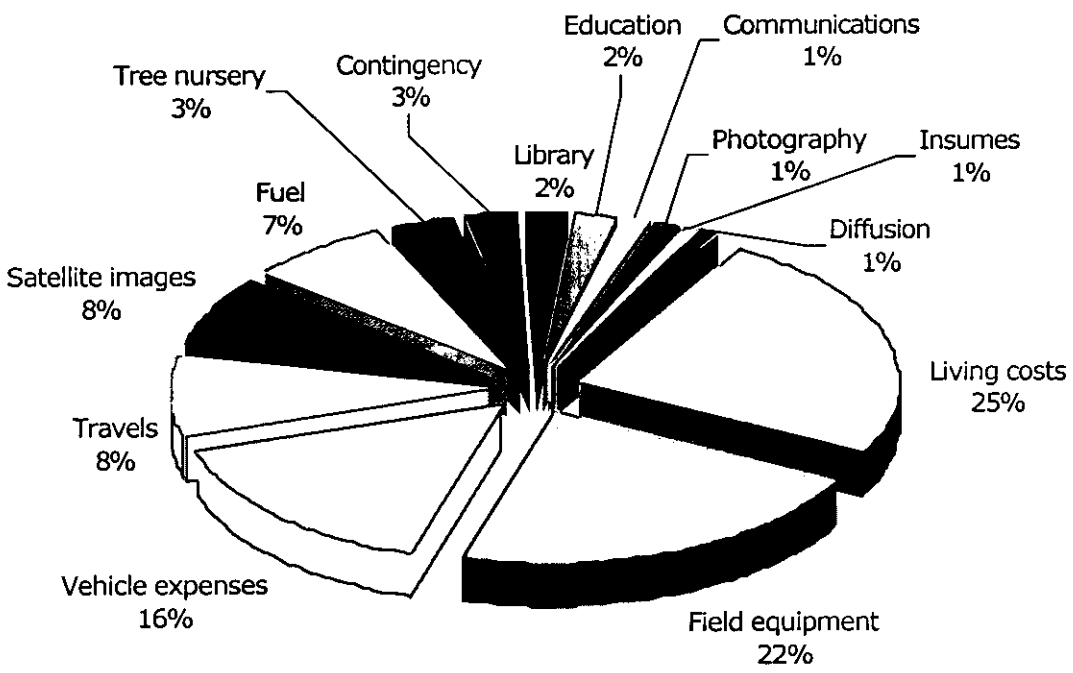
Several institutions are working today in the north of Misiones, but institutional interaction is limited. Better and more coordinated interaction between governmental agencies, universities and NGOs teams is needed to coordinate efforts and improve conservation strategies. Working as a group some of the most challenging conservation bottlenecks could be faced in cooperation. Efficient communication resources should be implemented to share results and advances about their projects. We consider our relationship with the Ministry of Ecology a promising experience in that direction.

chapter 14

Financial **Report**

Incoming resources	*April 2002 - July 2003* u$s
BP Conservation Programme	10,650
IUCN Deer Specialist Group/Wildlife Trust	1,000
Maimonides University	2,700
CONAE	1,200
Idea Wild Foundation	1,500
Total income resuorces	**17,050**

Analysis of expenditure



Bibliography

cited

Bibliography cited

Becker, M. & J.C. Dalponte. 1999. Rastros de mamíferos silvestres brasileiros: um guia de campo. 2da edición. UNB y Edicoes IBAMA. 180pp.

Benstead, P.J., R.D. Hearn, C.J.S. Jeffs, D.A. Callaghan, J. Calo, G. Gil, A.E. Johnson & A.R. Stagi Nedelcoff, 1993. "Pato Serrucho '93", An expedition to assess the current status of the Brazilian Merganser, *Mergus octosetaceus*, in North-East Argentina, Final Report, inf. inéd. 69 pp.

Bertolini, P. & G. Gil. 1999. Plan de Manejo del Parque Provincial Urugua-í. Ministerio de Ecología y R.N.R.-Deleg. Téc. Regional NEA de la Adm. de Parques Nacionales. Inf. inéd. Posadas, Misiones. 96 pp.

Bertolini, P. 1999. . Plan de Manejo del Parque Provincial Guardaparque Horacio Foerster. Ministerio de Ecología y R.N.R. Inf. inéd. Posadas, Misiones.

Bertonatti C. & J. Corcuera. 2000. Situación ambiental Argentina 2000. Fundación Vida Silvestre Argentina (FVSA). Buenos Aires.

Bibby C., M. Jones & S. Marsden. 1998. Expedition Field Techniques: Bird Surveys. Expedition Advisory Centre, Royal Geographical Society. London. 134pp.

Bilder, P., Canelo B., Goldberg C. & Vivaldi A. 2000. Estigmatización en el contexto escolar, un estudio de caso (In press).

Blondel, J. C. Ferry & B. Frochot. 1971. La méthode des indices ponctuels d´abuondance (IPA) ou des relevés d´avifauna par "stations d´écoute". Alauda 38: 55-71.

Borrini-Feyerabend, G. (ed.) 1997 Beyond Fences: Seeking Social Sustainability in Conservation, IUCN, Gland, Switzerland.

Bransford, J & Vye, N. 1996. "Una perspectiva sobre la Investigación Cognitiva y sus implicancias para la Enseñanza", En Resnick, L. & Klopfer, L., Curriculum y Cognición, Ed. Aique.

Brooks, T.M., R. Barnes, L. Bartina, S.H.M. Butchart, R.P. Clay, E.Z. Esquivel, N.I. Etcheverry, J.C. Lowen & J. Vincent. 1993. Bird surveys and conservation in the Paraguayan Atlantic Forest. Project CANOPY '92. Final report, inf. inéd. BirdLife Cambridge.

Brown, K.S. & G.G. Brown. 1992. Habitat alteration and species loss in brazilian forest. In: T.C. Withmore & J.A. Sayer (Eds) Tropical deforestation and species extinction. Chapman & Hold, London.

BSP/CI/TNC/WCS/WRI/WWF. 1995. A Regional Analysis of Geographical Priorities for Biodiversity Conservation in Latin America and the Caribbean. Biodiversity Support Program, Washington, D.C.

Burkart, R., J.P. Cinto, J.C. Chébez, J.J. García Fernández & E. Riegelhaupt. 2002. La selva misionera: opciones para su conservación y uso sustentable. FUCEMA, Argentina.

Byers, B.A. 1996. Understanding and Influencing Behaviors in Conservation and Natural Resources Management. African Biodiversity Series, No. 4. Biodiversity Support Program. 80pp.

Cafferata, A. 1997. Bases para la inclusión de la educación ambiental en los diseños curriculares. En: Apuntes del Curso de Capacitación en Educación Ambiental. Departamento de Educación. Fundación Vida Silvestre Argentina.

Cafferata, A. 1997. Transdisciplina, según la teoría educativa española. En: Apuntes del Curso de Capacitación en Educación Ambiental. Departamento de Educación. Fundación Vida Silvestre Argentina.

Chebez J.C., N. Rey, M. Barbaskas & A.G. Di Giacomo. 1998. Las aves de los parques nacionales de la Argentina. Administración de Parques Nacionales & Asociación Ornitológica del Plata. Monografía Especial LOLA N°12. Buenos Aires. 127pp.

Chébez, J.C. & D. Varela. 2001. Corzuela Enana. En: Ciervos Autóctonos de la Argentina y la acción del hombre (Dellafiore & Maceira Eds). Secretaría de Desarrollo Sustentable y Política Ambiental. Buenos Aires. 95pp.

Chébez, J.C. 1992. Acerca de la presencia de algunas aves misioneras. El Hornero 13 (3): 257-258. A.O.P., Bs. As.

Chébez, J.C. 1994. Los que se van. Especies argentinas en peligro. Ed. Albatros. Buenos Aires. 604pp.

Chébez, J.C. 1995a. Nuevos datos sobre *Dryocopus galeatus* (Piciformes: Picidae) en la Argentina. Hornero 14: 54- 57.

Chébez, J.C. 1996. Fauna Misionera. Catálogo sistemático y zoogeográfico de los vertebrados de la provincia de Misiones (Argentina). Ed. LOLA. Monografía Especial Nº 5. Buenos Aires. 320 pp.

Coello, S. 1995. La evaluación diagnóstica, formativa y sumativa. Revista del Club Militar Brasileño N 320, enero y febrero. Brasil.

Collar, N.J., L.P. Gonzaga, N. Krabbe, A. Madroño Niet, L.G. Naranjo, T.A. Parker & D.C. Wege. 1992. Threatened birds of the Americas: The ICBP/IUCN Red Data Book. Third edition, part 2. Smithsonian Inst. Press, ICBP. Cambridge. 1150pp.

Cornell, J. 1979. Sharing Nature With Children, Dawn Publications.

Cornell, J. 1989. Sharing The Joy Of Nature, Dawn Publications.

Crespo, J.A. 1950. Nota sobre mamíferos de Misiones nuevos para la Argentina. Com. Mus. Arg. Cs. Nat.. Ciencias Zoológicas. 1 (4). Buenos Aires. 14pp.

Crespo, J.A. 1982 Ecología de la comunidad de mamíferos del Parque Nacional Iguazú, Misiones. Rev. Mus. Arg. Cs. Nat. "Bernardino Rivadavia". Ecología III: 45-162. Buenos Aires.

Cullen Jr., L., M. Schimink, C. Padua & I. Morato. 2001. Agroforestry benefit zones: a tool for the conservation and management of Atlantic Forest fragments, Sao Paulo, Brazil. Natural Areas Journal 21(4):345-55.

Cutler T. & D. Swann. 1999. Using remote photography in wildlife ecology: a review. Wild. Soc. Bulletin 27:(3)

Dalgas Frisch, J. 1996. Aves Brasileiras 1. Canto de Aves do Brasil. CD. Editora Dalgas-Ecoltec Ltda. Sao Paulo.

Dário F.R. & A.F. de Almeida. 2000. Influence of forest corridor on avifauna of the Atlantic Forest. Scienti Forestalis 58:99-109.

del Hoyo, J., A. Elliott & J. Sargatal. 1994. Handbook of the Birds of the World: New World Vultures to Guineafowl. Lynx Edicions.

Dietz L. A. 1996. Community Conservation Education Program for the Golden Lion Tamarin in Brazil: Building support for habitat conservation.

Dinerstein E., D. Olson, D. Graham, A. Webster, S. Trimm, M. Bookbinder & G. Ledec. 1995. Conservation Assessment of the terrestrial Ecoregion of Latin America and the Caribbean. WWF-World Bank. Washington D.C. 145pp.

Dominy, N. J. & B. Duncan. 2001. GPS and GIS methods in an African rain forest: applications to tropical ecology and conservation. Conservation Ecology 5(2): 6. [online] URL: http://www.consecol.org/vol5/iss2/art6

Elam S. 1973. La Educación y la Estructura del Conocimiento, Ed. El Ateneo.

Elcome D. & J. Baines. 1999. Steps to Success-Working with residents & neighbours to develop and implement plans for protected areas. IUCN, Commision on Education and Communication; European Committee for EE, Switzerland. 42pp.

ESRI. 1998. ArcView GIS Version 3.1. Environmental Systems Research Institute, Inc. Redlands, California, USA.

Farrington J. 1996. Socio-economic methods in natural resources research . Natural Resource Perspectives. Overseas Development Institute (ODI), UK.

Farrington J. 1998. Organisational roles in farmer participatory research and extension: Lessons fron the last decade. ODI Natural Resource Perspectives N°21. Overseas Development Institute. London, UK. 8pp.

Fernández Balboa, C & C. Bertonatti. 1998. Fundamentos, objetivos y técnicas en interpretación ambiental. En: Apuntes del Curso de Capacitación en Educación Ambiental. Departamento de Educación. Fundación Vida Silvestre Argentina.

Fimbel, R.A., A. Grajal & J.G. Robinson (eds). 2001. The cutting edge: conserving wildlife in logged tropical forest. Columbia University Press. 808pp.

Forman R. 1995. Land mosaic. The ecology of landscapes and regions. Cambridge Univ. Press. Cambridge. 632pp.

Galetti, M., P. Martuscelli, F. Olmos & A. Aleixo. 1997. Ecology and conservation of the jacutinga *Pipile jacutinga* in the Atlantic Forest of Brazil. Biological Conservation 82:31-39.

Garrafiel, D.R., F.R.C. Nobre & J. Dain. 1999. Manual da metodologia Pesa. Uma abordagem participativa. Grupo de Pesquisa e Extensão em Sistemas Agroflorestais do ACRE (PESACRE). Rio Branco, Brasil. 33pp.

Geilfus, F. 2000. 80 herramientas para el desarrollo participativo: diagnóstico, planificación, monitoreo, evaluación. 3era. Ed. San Salvador, IICA/GTZ. 208pp.

Goffman, R. 1993. "Estigma. La Identidad deteriorada." Amorrortu Editores. Buenos Aires.

Griffiths M.G. & C.P. van Schaik. 1993. Camera-trapping: a new tool for the study of elusive rain forest animals. Trop. Biodiv. 1:131-135.

Grimble, R. & Wellard, K. 1996. Stakeholder methodologies in natural resource management: a review of principles, contexts, experiences and opportunities.

Guber, R. 1991. El salvaje metropolitano. Legasa, Buenos Aires.

Ham, S. H. 1992. Interpretación Ambiental: Una guía práctica para gente con grandes ideas y presupuestos pequeños. North American Press. Goleen, Colorado.

Heinonen Fortabat S. & J.C. Chebez. 1997. Los mamíferos de los parques nacionales de la Argentina. Monografía Especial LOLA N°14. Buenos Aires. 70pp.

Hernández, O. 2000. Evaluación. En: Day, B.A. y M. C. Monroe (eds.) Educación y Comunicación Ambiental para un mundo sustentable: un manual para practicantes internacionales. GreenCom y Academia para el Desarrollo Educativo, Washington D.C.

Huizinga, J. 1984. *Homo ludens*. Alianza-Emecé. Madrid, España.

ICBP. 1992. Putting biodiversity on the map: priority areas for global conservation. Cambridge, UK. 90 pp.

IUCN. 2003. 2003 IUCN Red List of Threatened Animals. IUCN, Gland, Switzerland.

Jacobson S. & S. Padua. A System Model for Conservation Education in Parks: examples from Malaysia and Brazil. In: Conserving wildlife. International education and communication approaches (Ed: S. Jacobson). Columbia University Press, New York. 302pp.

Janzen, O. 1983. No park is an island: increase in interference from outside as park size decrease. Oikos 41:402-410.

Jensen, J.R. 1986. Introductory digital image processing. Prentice Hall, NY.

Karanth K.U. & J.D. Nichols. 1998. Estimation of tiger densities in India using photographic captures and recaptures. Ecology 79:2852-2862.

Keuroghlian A., S. Vanderwall & B. Longland. 2001. The impact of peccaries on keystone fruit species in a semi-deciduous Atlantic Forest fragment. Libro de resúmenes V Congreso Internacional Manejo de Fauna Silvestre en Amazonía y Latinoamérica. Cartagena de Indias, Colombia. September 10-14, 2001.

Laclau, P. 1994. La conservación de los recursos naturales y el hombre en la selva Paranaense. Boletín Tecnico N° 20. FVSA. Buenos Aires. 139pp.

Leff E. 2000. Tiempo de sustentabilidad. Revista Memoria N° 137, http://www.memoria.com.mx/, Cemos.

Lemke, J. 1997. Aprender A Hablar Ciencia, Ed. Paidós.

Long, A.J. 1996. Establishing conservation priorities using endemic birds. In C.S. Harcourt and J.A. Sayer (Eds.), The Conservation Atlas of Tropical Forests: The Americas. Simon and Schuster, London, pp. 35-46.

Mackinnon J. & K. Phillips. 1993. A field guide of the birds of Sumatra, Java and Bali. Oxford University Press, Oxford.

Malinowski, B. 1975. "Confesiones de ignorancia y fracaso". La antropología como ciencia. Barcelona, Anagrama, pp. 129-139.

Massoia, E. 1980. Mammalia de Argentina I. Los mamíferos silvestres de la Provincia de Misiones. IGUAZÚ I (1): 15-43. A.C.N.A. Castelar, Argentina.

Massoia, E., O. Vaccaro, G. Galliari & S. Ambrosini. 1987. La mastofauna del Río Urugua-í, Provincia de Misiones. Rev. Mus. Arg. Cs. Nat. "B. Rivadavia", Zool, XIV (8): 111-124, Buenos Aires.

Meffe, G. K. & C.R. Carroll. 1997. Principles of conservation biology. 2nd edition. Sinauer Associates Inc. 729pp.

Mittermeier, R.A., N. Myers, J.B. Thomsen, G.A.B. da Fonseca & S. Olivieri. 1998. Biodiversity hotspots and major tropical wilderness areas: Approaches to setting conservation priorities. Conservation Biology 12(3):516-520.

Mittermeier, R.A., N. Myers & C.G. Mittermeier. 1999. Biodiversidad Amenazada: Las ecorregiones terrestres prioritarias del mundo. CEMEX - Conservación Internacional. 430pp.

Monroe, M. C. 2000. Ensayando los productos de Educación y Comunicación Ambiental. Capítulo 8. En: Day, B.A. y M. C. Monroe (eds.) Educación y Comunicación Ambiental para un mundo sustentable: un manual para practicantes internacionales. GreenCom y Academia para el Desarrollo Educativo, Washington D.C.

Myers, N. 1988. Threatened biotas: Hotspots in tropical forests. The Environmentalist 8(3):1-20.

Myers, N., R.A. Mittermeier, C.G. Mittermeier, G.A.B. da Fonseca & J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature (403):853-858.

Nagendra, H. & M. Gadgil. 1999. Satellite imagery as a tool for monitoring species biodiversity: an assessment. Journal of Applied Ecology 36:388-397.

Narosky T. & D. Yzurieta. 1987. Guía para la identificación de la aves de Argentina y Uruguay. Asoc. Ornitológica del Plata. Buenos Aires. 345pp.

Newmark W.D. 1993. The role and design of wildlife corridor with examples from Tanzania. Ambio 12(8):500-504.

Olson, D.M. & E. Dinerstein. 1997. The Global 200: A representation approach to conserving Earth's distinctive ecoregions. World Wildlife Fund, Washington, D.C.

Padua C., S.M. Padua & L. Cullen Jr. 2002. Within and sorrounding the Morro do Diabo State Park: biologicalll value, conflicts, mitigation and sustainable development alternatives. Environmental Science & Policy 5:69-78.

Partridge, W.H. 1954. Estudio preliminar sobre una colección de aves de Misiones. Rev. Mus. Arg. Cs. Natur., Cs. Zool, 3: 87-153. Buenos Aires.

Partridge, W.H. 1956. Notes on the brazilian merganser in Argentina. The Auk 73: 473-488.

Perkins, D. 1995. La Escuela Inteligente, Ed. Gedisa.

Placci, L.G., S.I. Arditi, P.A. Giorgis & A. Wüthrich. 1992. Estructura del palmital e importancia de *Euterpes edulis* como especie clave en el Parque Nacional Iguazú, Argentina. Yviraretá 3 (3):93-108.

Protomastro, J.J. 2001. A test for preadaptation to human disturbances in the bird community of the Atlantic Forest. In: Alburqueque J.L. *et al.* (Eds.) Ornitologia e Conservacao da ciencia as estrategias. Editora Unisul, Tubarao.

Rabinovich J. & E. Rapoport. 1975. Geographical variation of diversity in Argentine passerine birds. Journal of Biogeography N° 2: 141-157.

Ralph C.J., G.R. Geupel, P. Pyle, T.E. Martin, D.J. Desante & B. Milá. 1996. Manual de métodos de campo para el monitoreo de aves terrestres. Gen. Tech. Rep. PSW-GTR-159. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 44 pp.

Rey N., D. Varela, M. Villagra & M.I. Bellocq. 2001. Efectos de las Plantaciones Forestales sobre la comunidad de Aves de la Selva Paranaense de Misiones. Conservación Argentina/Universidad Maimónides/ Universidad de Buenos Aires. Unpublished report. Buenos Aires, 6pp.

Rice C., T. Kucera & R. Barrett. 1995. Trailmaster Camera System. Wildlife Society Bulletin 23:(1).

Ridgely R. & G. Tudor. 1989. The birds of South America. Vol. I: the oscine passeriformes. Univ. of Texas Press. Austin. 516pp.

Ridgely R. & G. Tudor. 1994. The birds of South America. Vol. II: the suboscine passeriformes. Oxford Univ. Press. Oxford. 814pp.

Rockwell, E. 1988. Perspectiva de la investigación cualitativa sobre la práctica docente. Didac, 12, 22-25.

Rodrigues Brandao, C. 1999. Repensando a pesquisa participante. Editora Brasiliense. 252pp.

Saibene, C., M. Castelino, N. Rey, J. Calo & J. Herrera. 1996. Relevamiento de las Aves del Parque Nacional Iguazú. Ed. LOLA, Monografía Especial Nº 2. Buenos Aires. 35pp.

SAREM. 2000. Libro Rojo. Mamíferos Amenazados de la Argentina. (Díaz & Ojeda Eds.). Sociedad Argentina para el Estudio de los Mamíferos. 106pp.

Sick H. 1985. Ornitología brasileira, uma introducao. Vol. I and II. Ed. Universidade de Brasília. Brasília.

Stattersfield, A.J., M.J. Crosby, A.J. Long & D.C. Wege. 1998. Endemic Bird Areas of the World: Priorities for Biodiversity Conservation. Birdlife International, Cambridge, UK.

Stotz, D.F., J.W. Fitzpatrick, T.A. ParkerIII & D. K. Moskovits. 1996. Neotropical birds: ecology and conservation. University of Chicago Press. Chicago.

Straneck, R. 1990a. Canto de las aves de Misiones I. Editorial LOLA. Buenos Aires. Cassette. 24 pp..

Straneck, R. 1990b. Canto de las aves de Misiones II. Editorial LOLA. Buenos Aires. Cassette. 30 pp.

Sutherland, W. 1996. Ecological Census Techniques: a handbook. Cambridge University Press. 336pp.

Tilden, F. 1957. Interpreting Our Heritage, University of North Carolina Press.

Tuxill, J. & G.P. Nabhan. 2001. People, plants and protected areas. A guide to in situ management. Serie: People and plants conservation manual. Earthscan Publications Ltd, London. 248pp.

UNESCO. 1996. Trends in Environmental Education since Tbilisi Conference, International Environmental Education Program Unesco - Pnuma, 1986, Spanish Version: Departamento de Urbanismo, Vivienda y Medio Ambiente del Gobierno Vasco, 1996

Wege, D & A. Long. 1995. Key areas for threatened birds in the neotropics. BirdLife International. BirdLife Conservation Series N°5. Cambridge.

Whitman A.A., Hagan J.M. & Brokaw N.V. 1997. A comparison of two bird survey techniques used in a subtropical forest. The Condor 99:955-965.

Willis, E.O. 1979. The composition of avian communities in remanescent woodlots in southern Brazil. Papeis Avulsos, Zoologia 33:1-25.

Appendix

Appendix 1. Survey sites ringing parameters

Site	ring color	ring number	Position
Urugua-í Park	Yellow	1	Indistinct
	Orange	1	Left
Urugua-í Park Band	Light blue	1	Left
	Black	1	Left
Central Corridor band	Black	1	Right
	Orange	2	Indistinct
Foerster Park Band	Light blue	1	Left
	Back	1	Left
Foerster Park	Red	1	Left
	Orange	1	Right

Appendix 2. Bird species list detected during project surveys in the corridor and neighbor provincial parks.

	Families and species	Abbreviature	Common name	Register	UP	C	FP	Habitat
	FAMILY TINAMIDAE							
001-	**Tinamus solitarius*(nt)	Tin sol	Macuco / Solitary Tinamou	*a,c,d*	R	O	R	P
002-	*Crypturellus obsoletus*	Cry obs	Tataupá Rojizo / Brown Tinamou	*a,d*	R	R	R	P
003-	*Crypturellus parvirostris*	Cry par	Tataupá Chico / Small-billed Tinamou	*a,d*	R	U		b,C,S
004-	*Crypturellus tataupa*	Cry tat	Tataupá Común / Tataupa Tinamou	*a,c,d*	C	F	F	B,c,P,S
005-	*Nothura maculosa*	Not mac	Inambú Común / Spotted Nothura	*d*		R		G
	FAMILY PHALACROCORACIDAE							
006-	*Phalacrocorax brasilianus*	Pha bra	Biguá / Neotropic Cormorant	*d*	R	R		A
	FAMILY ARDEIDAE							
007-	*Tigrisoma lineatum*	Tig lin	Hocó Colorado / Rufescent Tiger-Heron	*c*		R		A
008-	*Cochlearius cochlearius*	Coc coc	Garza Cucharona / Boat-billed Heron	*d*	O			A
009-	*Egretta thula*	Egr thu	Garcita Blanca / Snowy Egret	*d*		U		A
010-	*Casmerodius albus*	Cas alb	Garza Blanca / Great Egret	*d*		R		A
011-	*Bubulcus ibis*	Bub ibi	Garcita Bueyera / Cattle Egret	*c,d*		U		A
012-	*Butorides striatus*	But str	Garcita Azulada / Striated Heron	a,c	R	R		A
	FAMILY THRESKIONRNITHIDAE							
013-	*Mesembrinibis cayennensis*	Mes cay	Tapicurú / Green Ibis	*d*	R			A
	FAMILY CICONIIDAE							
014-	*Mycteria americana*	Myc ame	Cigüeña Cabeza Pelada / American Wood Stork	*d*		O		A
	FAMILY CATHARTIDAE							
015-	*Coragyps atratus*	Cor atr	Jote Cabeza Negra / Black Vulture	*a,c,d*	U	F	U	V
016-	*Cathartes aura*	Cat aur	Jote Cabeza Colorada / Turkey Vulture	*a,c,d*	F	F	U	V
017-	*Sarcoramphus papa*	Sar pap	Jote Real / King Vulture	*a,c,d*	R	R		V
	FAMILY ACCIPITRIDAE							
018-	*Leptodon cayanensis*	Lep cay	Milano Cabeza Gris / Grey-headed Kite	d	R			P
019-	*Elanoides forficatus*	Ela for	Milano Tijereta / American Swallow-tailed Kite	*c,d*	U			V
020-	*Rosthramus sociabilis*	Ros soc	Caracolero / Snail Kite	*d*		R		A

References

* = Atlantic Forest endemism

Note: classification mostly follows Barnett and Pearman (2001)

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nt = Near-threatened

Type of registration
a = point counts
b = mist nets
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Habitat
A = Streams and ponds
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G = Grassland (sometimes with scatter trees)

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021-	*Ictinia plumbea*	Ict plu	Milano Plomizo / Plumbeous Kite	*a,c,d*	U	U	U	P,S
022-	*Accipiter poliogaster*	Acc pol	Esparvero Grande / Grey-bellied Goshawk	*d*	O			B
023-	*Buteo magnirostris*	But mag	Taguató Común / Roadside Hawk	*a,c,d*	R	U		B,C
024-	*Spizastur melanoleucus*	Spi mel	Aguila Viuda / Black-and-White Hawk-Eagle	*d*		R		V
	FAMILY FALCONIDAE							
025-	*Micrastur ruficollis*	Mic ruf	Halcón Montes Chico / Barred Forest-Falcon	*a,b*	U	U	U	P,s
026-	*Micrastur semitorquatus*	Mic sem	Halcón Montes Grande / Collared Forest-Falcon	*a,d*	R	R	R	P
027-	*Caracara plancus*	Car pla	Carancho Común / Southern Crested-Caracara	*a,c,d*		R		G
028-	*Milvago chimachima*	Mil chi	Chimachima / Yellow-headed Caracara	*a,c,d*	R	R		G,S
029-	*Falco rufigularis*	Fal ruf	Halcón Negro Chico / Bat Falcon	*d*	R			P
	FAMILY CRACIDAE							
030-	*Penelope superciliaris*	Pen sup	Yacupoí / Rusty-margined Guan	*c,d*	U	R		B,P,S
031-	**Pipile jacutinga* (VU)	Pip jac	Yacutinga / Black-fronted Piping-Guan	*d*	R			P
	FAMILY ODONTOPHORIDAE							
032-	**Odontophorus capueira*	Odo cap	Urú / Spot-winged Wood-Quail	*a,c,d*	U	R	U	P
	FAMILY RALLIDAE							
033-	**Aramides saracura*	Ara sar	Saracura / Slaty-breasted Wood-Rail	*a,c,d*	U	U	U	B,c,p,s
034-	*Pardirallus nigricans*	Par nig	Gallineta Negruzca / Blackish Rail	*a*		R		A
035-	*Gallinula chloropus*	Gal chl	Pollona Negra / Common Gallinule	*a,c,d*		R		A
	FAMILY JACANIDAE							
036-	*Jacana jacana*	Jac jac	Jacana / Wattled Jacana	*a,c,d*		U		A
	FAMILY CHARADRIIDAE							
037-	*Vanellus chilensis*	Van chi	Tero Común / Southern Lapwing	*a,c,d*		U		G
	FAMILY SCOLOPACIDAE							
038-	*Tringa solitaria*	Tri sol	Pitotoy Solitario / Solitary Sandpiper	*d*		R		A
	FAMILY LARIDAE							
039-	*Phaetusa simplex*	Pha sim	Atí / Large-billed Tern	*d*		O		A

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	FAMILY COLUMBIDAE							
040-	*Columba livia*	Col liv	Paloma Casera / Rock Pigeon	*d*		R		H
041-	*Columba picazuro*	Col pic	Paloma Picazuró / Picazuro Pigeon	*a,c,d*	U	U		B,P,s
042-	*Columba cayannensis*	Col cay	Paloma Colorada / Pale-vented Pigeon	*a,c,d*	F	U	F	B,P
043-	*Columbina talpacoti*	Col tal	Palomita Colorada / Ruddy Ground-Dove	*a,c,d*		U		c,S
044-	*Claravis pretiosa*	Cla pre	Palomita Azulada / Blue Ground-Dove	*d*	R			B
045-	*Leptotila verreauxi*	Lep ver	Yerutí Común / White-tipped Dove	*a,c,d*	U	U	R	P,S
046-	*Leptotila rufaxilla*	Lep ruf	Yerutí Colorada / Grey-fronted Dove	*a,b,c,d*	U	R	U	P
047-	*Geotrygon montana*	Geo mon	Paloma Montera Perdiz Castaña / Ruddy Quail-Dove	*b*		R		P
	FAMILY PSITTACIDAE							
048-	*Aratinga leucophthalmus*	Ara leu	Calancate Ala Roja / White-eyed Parakeet	*d*	R	R	R	P
049-	**Pionopsitta pileata*	Pio pil	Lorito Cabeza Roja / Red-capped Parrot	*d*		O		P
050-	*Pionus maximiliani*	Pio max	Loro Maitaca / Scaly-headed Parrot	*c,d*	F	F	F	C,P,S
051-	*Pyrrhura frontalis*	Pyr fro	Chiripepé Común / Reddish-bellied Parakeet	*a,c,d*	F	F	F	P,S
	FAMILY CUCULIDAE							
052-	*Coccyzus melacoryphus*	Coc mel	Cuclillo Pico Negro / Dark billed Cuckoo	*c*		R		S
053-	*Piaya cayana*	Cia cay	Tingazú / Squirrel Cuckoo	*a,c,d*	U	U	R	B,C,P,S
054-	*Crotophaga major*	Cro maj	Anó Grande / Greater Ani	*d*		R		A
055-	*Crotophaga ani*	Cro ani	Anó chico / Smooth-billed Ani	*a,c,d*	U	F	R	B,g,S,C
056-	*Guira guira*	Gui gui	Pirincho / Guira Cuckoo	*a,c,d*	O	R		B,g,S,C
057-	*Tapera naevia*	Tap nae	Crespín / Striped Cuckoo	*a,c,d*	U	R	U	B,P,S
058-	*Dromococcyx phasianellus*	Dro pha	Yasiyateré Grande / Pheasant Cucckoo	*d*	O			P
059-	*Dromococcyx pavoninus*	Dro pav	Yasiyateré Chico / Pavonine Cuckoo	*a,d*	R		R	P
	FAMILY TYTONIDAE							
060-	*Tyto alba*	Tyt alb	Lechuza de Campanario / Common Barn-Owl	*d*		R		H
	FAMILY STRIGIDAE							
061-	*Otus choliba*	Otu cho	Alicuco Común / Tropical Screech-Owl	*d*	R			B,P

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062-	*Otus atricapillus*	Otu atr	Alicuco Grande / Black-capped Screech-Owl	*d*	R			P
063-	*Glaucidium brasilianum*	gla bra	Caburé Chico / Ferruginous Pygmy-Owl	*d*	R	R		P
064-	*Athene cunicularia*	Ath cun	Lechucita Vizcachera / Burrowing Owl	*a,c*		R		G
	FAMILY NYCTIBIIDAE							
065-	*Nyctibius griseus*	Nyc gri	Urutaú Común / Common Potoo	*d*	U	U	R	B,P,S
	FAMILY CAPRIMULGIDAE							
066-	*Lurocalis semitorquatus*	Lur sem	Añapero Castaño / Short-tailed Nighthawk	*d*	R			P
067-	*Nyctidromus albicollis*	Nyc alb	Curiango / Pauraque	*d*	F	F	U	B,C,S
068-	**Caprimulgus sericocaudatus*	Cap ser	Atajacaminos Oscuro / Silky-tailed Nightjar	*d*			R	P
069-	*Caprimulgus parvulus*	Cap par	Atajacaminos Chico / Little Nightjar	*d*		R		C
070-	*Hydropsalis torquata*	Hyd tor	Atajacaminos Tijera / Scissor-tailed Nightjar	*d*		U		C
	FAMILY APODIDAE							
071-	*Chaetura meridionalis*	Cha mer	Vencejo de Tormeta / Ashy-tailed Swift	*d*	U	U	U	V
	FAMILY TROCHILIDAE							
072-	**Phaetornis eurynome*	Pha eur	Ermitaño Escamado / Scale-throated Hermit	*a,b,c,d*	F	F	U	B,P,S
073-	*Anthracothorax nigricollis*	Ant nig	Picaflor Vientre Negro / Black-throated Mango	*a*		U		G,S
074-	**Stephanoxis lalandi*	Ste lal	Picaflor Copetón / Black-breasted Plovercrest	*d*		R	R	P,S
075-	*Chlorostilbon aureoventris*	Chl aur	Picaflor Común / Glittering-bellied Emerald	*a,d*		F		C,S
076-	**Thalurania glaucopis*	Tha gla	Picaflor Corona Violácea / Violet-capped Woodnymph	*a,d*	F	F	F	B,P,S
077-	*Hylocharis chrysura*	Hyl chr	Picaflor Bronceado / Gilged Sapphire	*d*		R		C
078-	*Amazilia versicolor*	Ama ver	Picaflor Esmeralda / Versicoloured Emerald	*d*	R	U		B,P,S
079-	*Lophornis (chalybeus?)*	Lop cha	Coqueta Verde / Festive Coquette	*d*		R		B
	FAMILY TROGONIDAE							
080-	*Trogon rufus*	Tro ruf	Surucuá Amarillo / Black-throated Trogon	*a,b,c,d*	R	U		P
081-	**Trogon surrucura*	Tro sur	Surucuá Común / Surucua Trogon	*a,c,d*	C	C	C	B,P,S
	FAMILY ALCEDINIDAE							
082-	*Megaceryle torquata*	Meg tor	Martín Pescador Grande / Ringed Kingfisher	*d*	R	U		A

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083-	*Chloroceryle amazona*	Chl ama	Martín Pescador Mediano / Amazon Kingfisher	*d*	R	F		A
084-	*Chloroceryle americana*	Chl ame	Martín Pescador Chico / Green Kingfisher	*d*		U		A
	FAMILY MOMOTIDAE							
085-	**Baryphthengus ruficapillus*	Bar ruf	Yeruvá / Rufous-capped Momot	*a,d*	U			P
	FAMILY BUCCONIDAE							
086-	*Nystalus chacuru*	Nys cha	Chacurú Cara Negra / White-eared Puffbird	*a,c,d*	O	U		C,G,b
087-	*Nonnula rubecula*	Non rub	Chacurú Enano / Rusty-breasted Nunlet	*b*	R	R		P,S
	FAMILY RAMPHASTIDAE							
088-	*Pteroglossus castanotis*	Pte cas	Arasarí Fajado / Chestnut-eared Aracari	*d*	R	R		S
089-	**Baillonius bailloni*(nt)	Bai bai	Arasarí Banana / Saffron Toucanet	*d*		R		P
090-	**Selenidera maculirostris*	Sel mac	Arasarí Chico / Spot-biled Toucanet	*c*		R	R	P
091-	**Ramphastos dicolorus*	Ram dic	Tucán Pico Verde / Red-breasted Toucan	*a,c,d*	U			P,S
092-	*Ramphastos toco*	Ram toc	Tucán Grande / Toco Toucan	*d*	R	R		P
	FAMILY PICIDAE							
093-	**Picumnus temminckii*	Pic tem	Carpinterito Cuello Canela / Ochre-collared Piculet	*a,b,c,d*	F	R	U	P,S
094-	*Melanerpes candidus*	Mel can	Carpintero Blanco / White Woodpecker	*a,c*	R	R		S
095-	**Melanerpes flavifrons*	Mel flav	Carpintero Arcoiris / Yellow-fronted Woodpecker	*a,c,d*	U	R		B,S
096-	**Veniliornis spilogaster*	Ven spi	Carpinterito Oliva Manchado / White-spotted Woodpecker	*a,b,c,d*	R	R		B,P,S
097-	*Colaptes melanochloros*	Col mel	Carpintero Real Verde / Green-barred Woopecker	*a,c,d*		R		S
098-	*Colaptes campestris*	Col cam	Carpintero Campestre / Field Flicker	*a,c,d*		U		C,G
099-	*Celeus flavescens*	Cel fla	Carpintero Copete Amarillo / Blond-crested Woodpecker	*a,c,d*	U	R	R	P
100-	**Dryocopus galeatus*(VU)	Dry gal	Carpintero Cara Canela / Helmeted Woodpecker	*c*		R		S
101-	*Dryocopus lineatus*	Dry lin	Carpintero Garganta Estriada / Lineated Woodpecker	*a,c,d*	U	U	U	B,P,S
102-	**Campephilus robustus*	cam rob	Carpintero Grande / Robust Woodpecker	*a,d*	R	R		P
	FAMILY FURNARIIDAE							
103-	*Furnarius rufus*	Fur ruf	Hornero / Rufous Hornero	*a,c,d*		F		B,C,G
104-	**Synallaxis ruficapilla*	Syn ruf	Pijuí Corona Rojiza / Rufous-capped Spinetail	*a,b,c,d*	U	F	U	B,P,S

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105-	*Synallaxis spixi*	Syn spi	Pijuí Plomizo / Spix´s Spinetail	*c,d*		R		B,S
106-	**Synallaxis cinerascens*	Syn cin	Pijuí Negruzco / Gray-bellied Spinetail	*a,b,c,d*	F	F	U	B,P,S
107-	*Cranioleuca obsoleta*	Cra obs	Curutié Oliváceo / Olive Spinetail	*d*	R			
108-	**Clibanornis dendrocolaptoides*(VU)	Cli den	Tacuarero / Canebreaker Groundcreeper	*d*	R			P
109-	*Syndactila rufosupercilliata*	Syn ruf	Ticotico Común / Buff-browed Foliage-gleaner	*a,b,c*	U	C	U	P,S
110-	**Philydor lichtensteini*	Phi lic	Ticotico Ocráceo / Ochre-breasted Foliage-Gleaner	*a,b*	R	U	U	P,S
111-	*Philydor rufus*	Phi ruf	Ticotico Grande / Buff-fronted Foliage-Gleaner	*b,d*	R	R	R	P,S
112-	**Philydor atricapillus*	Phi atri	Ticotico Cabeza Negra / Black-capped Foliage-Gleaner	*a,b*	R	O	U	P
113-	**Automolus leucophthalmus*	Aut leu	Ticotico Ojo Blanco / White-eyed Foliage-Gleaner	*a,b*	U	R	R	P
114-	**Sclerurus scansor*	Scl sca	Raspahojas / Rufous-breasted Leaftosser	*b,c*	R	R	R	P
115-	*Lochmias nematura*	Loc nem	Macuquito / Sharp-tailed Streamcreeper	*c*		R		A
116-	*Xenops minutus*	Xen min	Picolezna Chico / Plain Xenops	*b*	O			P
117-	*Xenops rutilans*	Xen rut	Picolezna Rojizo / Streaked Xenops	*a,d*	R			P,S
	FAMILY DENDROCOLAPTIDAE							
118-	**Dendrocincla turdina*	Den tur	Arapasú / Thrush-like Woodcreeper	*a,b,c*	R		R	P
119-	*Sittasomus griseicapillus*	Sit gri	Tarefero / Olivaceous Woodcreeper	*a,b,c,d*	F	A	F	B,P,S
120-	**Xiphocolaptes albicollis*	Xip alb	Trepador Garganta Blanca / White-throated Woodcreeper	*a,b,c*		O	R	P
121-	*Dendrocolaptes platyrostris*	Den pla	Trepador Oscuro / Planalto Woodcreeper	*a,b,c*	R	R	U	P
122-	**Lepicocolaptes fuscus*	Lep fus	Chinchero Enano / Lesser Woodcreeper	*a,b,c*	R	F	F	B,P,S
123-	**Lepidocolaptes squamatus*	Lep squ	Chichero Escamado / Scaled Woodcreeper	*a,b,c,d*	U	U	U	B,P
124-	**Campylorhamphus falcularius*	Cam fal	Picapalo Oscuro / Black-billed Scythebill	*b*	R	O	R	P,S
	FAMILY THAMNOPHILIDAE							
125-	**Hypoedaleus guttatus*	Hyp gut	Batará Goteado / Spot-backed Antshrike	*a,c*	U	U	U	B,P,S
126-	*Batara cinerea*	Bat cin	Batará Gigante / Giant Antshrike	*a,d*		O	O	P
127-	**Mackenziaena severa*	Mac sev	Batará Copetón / Tufted Antshrike	*a,b,c,d*	R	U	U	P,S
128-	**Mackenziaena leachli*	Mac lea	Batará Punteado / Large-tailed Antshrike	*a,c*	U	R	U	p,S
129-	*Thamnophilus caerulescens*	Tha cae	Choca Común / Variable Antshrike	*a,b,c,d*	F	U	F	B,P,S

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130-	*Dysithamnus mentalis*	Dys men	Choquita Común / Plain Antvireo	*a,b,c,d*	F	C	F	B,P;S
131-	*Herpsilochmus rufimarginatus*	Her ruf	Tiluchí Ala Rojiza / Rufous-winged Antwren	*a*	R			P
132-	**Drymophila rubricollis*	Dry rub	Tiluchí Colorado / Bertoni´s Antbird	*b,d*	R	O	R	b,P,s
133-	**Drymophila malura*	Dry mal	Tiluchí Estriado / Dusky-tailed Antbird	*a,c*	R	R	U	b,S
134-	**Pyriglena leucoptera*	Pyr leu	Batará Negro / White-shouldered Fire-eye	*a,b,c,d*	U	C	U	B,P,S
	FAMILY FORMICARIIDAE							
135-	*Chamaeza campanisona*	Cha cam	Tovaca Común / Short-tailed Antthrush	*a,b,c,d*	R	R	U	P,S
136-	*Grallaria varia*	Gra var	Chululú Pintado / Variegated Antpitta	*a,c,d*	U	R	R	P
137-	**Hylopezus nattereri*	Hyl nat	Chululú Bayo / Speckle-breasted Antpitta	*b,d*	R		R	P
	FAMILY CONOPOPHAGIDAE							
138-	**Conopophaga lineata*	Con lin	Chupadientes / Rufous Gnateater	*a,b,c,d*	F	F	U	P,S
	FAMILY RHINOCRYPTIDAE							
139-	**Scytalopus speluncae*	scy spe	Churrín Plomizo / Mouse-coloured Tapaculo	*a,d*	R		R	S
	FAMILY TYRANNIDAE							
140-	**Mionectes rufiventris*	Mio ruf	Ladrillito / Great-hooded Flycatcher	*a*	R	R	R	
141-	*Leptopogon amaurocephalus*	Lep ama	Mosqueta corona parda / Sepia-capped Flycatcher	*a,b,c,d*	C	C	F	
142-	**Hemitriccus diops*	Hem dio	Mosqueta de Anteojos / Drab-breasted Bamboo-Tyrant	*a,b,c*	F	C	C	
143-	*Todirostrum plumbeiceps*	Tod plu	Mosqueta Cara Canela / Ochre-faced Tody-Flycatcher	*a,c,d*	U	R	F	
144-	*Corythopis delalandi*	Cor del	Mosquitero / Southern Antpipit	*a,b,c,d*	F	R	U	
145-	*Capsiempis flaveola*	Cap fla	Mosqueta Ceja Amarilla / Yellow Tyrannulet	*a,c,d*	O	R	R	
146-	*Myiopagis viridicata*	Myi vir	Fiofío Corona Dorada / Greenish Elaenia	*a,b,c*	U	U		
147-	*Elaenia flavogaster*	Ela fla	Fiofío Copetón / Yellow-bellied Elaenia	*a,c,d*	O	R		
148-	**Phylloscartes eximius* (nt)	Phy exi	Mosqueta Media Luna / Southern Bristle-Tyrant	*a,b,c,d*	R	R		
149-	*Phylloscartes ventralis*	Phy ven	Mosqueta Común / Mottle-cheeked Tyrannulet	*b,d*	R	U	U	
150-	**Phylloscartes sylviolus* (nt)	Phy syl	Mosqueta Cara Canela / Bay-ringed Tyrannulet	*b*			R	
151-	**Myiornis auricularis*	Myi aur	Mosquetita Enana / Eared Pygmy-Tyrant	*a,c*	R	O		
152-	*Tolmomyias sulphurescens*	Tol sul	Picochato Grande / Yellow-olive Flycatcher	*a,b*	R	O	R	

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153-	*Platyrinchus mystaceus*	Pla mys	Picochato Enano / White-throated Spadebill	*a,b*	R	U	U	
154-	*Lathrotriccus euleri*	Lat eul	Mosqueta Parda / Euler´s Flycatcher	*a,b,c,d*	U	R	U	
155-	*Contopus cinereus*	Con cin	Burlisto Chico / Tropical Pewee	*a*	R	R	R	
156-	*Knipolegus cyanirostris*	Kni cya	Viudita Pico Celeste / Blue-billed Black-Tyrant	*d*	R			
157-	*Colonia colonus*	Col col	Yetapá Negro / Long-tailed Tyrant	*a,c,d*	F	U	U	
158-	*Machetornis rixosa*	Mac rix	Picabuey / Cattle Tyrant	*a,c,d*		R		
159-	*Sirystes sibilator*	Sir sib	Silbador / Sirystes	*a,c,d*	F	F	F	
160-	*Myarchus (swainsoni?)*	Mya swa	Burlisto Pico Canela / Swaison´s Flycatcher	*d*		O		
161-	*Myiarchus tyrannulus*	Myi tyr	Burlisto Cola Castaña / Brown-crested Flycatcher	*d*		R		
162-	*Tyrannus melancholichus*	Tyr mel	Suiriri Real / Tropical Kingbird	*a,c,d*		U		
163-	*Tyrannus savanna*	Tyr sav	Tijereta / Fork-tailed Flycatcher	*a,c*		U		
164-	*Empidonomus varius*	Emp var	Tuquito Rayado / Variegated Flycatcher	*a,c*		R		
165-	*Megarhynchus pitangua*	Meg pit	Pitanguá / Boat-billed Flycatcher	*a,c.d*	F	F	U	
166-	*Conopias trivirgata*	Con tri	Benteveo Chico / Three-Striped Flycatcher	*d*	R			
167-	*Myiodynastes maculatus*	Myi mac	Benteveo Rayado / Streaked Flycatcher	*a,c*	U	U	R	
168-	*Miozetetes similis*	Mio sim	Benteveo Mediano / Social Flycatcher	*a,c,d*	U	U		
169-	*Legatus leucophaius*	Leg leu	Tuquito Chico / Piratic Flycatcher	*a,c*	R	R		
170-	*Pitangus sulphuratus*	Pit sul	Benteveo Común / Great Kiskadee	*a,c,d*	U	C	U	
171-	*Pachyramphus viridis*	Pac vir	Anambé Verdoso / Green-backed Becard	*a*	U	R		
172-	*Pachyramphus castaneus*	Pac cas	Anambé Castaño / Grey-naped Becard	*a,d*	U	U	U	
173-	*Pachyramphus polychopterus*	Pac pol	Anambé Común / White-winged Becard	*d*	R			P
174-	*Pachyramphus validus*	Pac val	Anambé Grande / Crested Becard	*a,d*	R			
175-	*Tityra cayana*	Tit cay	Tueré Grande / Black-tailed Tityra	*a,c,d*	R	R		
176-	*Tityra inquisitor*	Tit inq	Tueré Chico / Black-crowned Tityra	*a,c,d*	U	U	R	
	FAMILY COTINGIDAE							
177-	**Pyrodeus scutatus*	Pyr scu	Yacutoro / Red-ruffed Fruitcrow	*d*	R	R	R	P,S

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	FAMILY PIPRIDAE							
178-	**Schiffornis virescens*	Sch vir	Flautín / Greenish Manakin	*a,b,c,d*	F	F	F	P,S
179-	*Pipra fasciicauda*	Pip fas	Bailarín Naranja / Band-tailed Manakin	*b,d*	U		R	P,S
180-	**Chiroxiphia caudata*	Chi cau	Bailarín Azul / Swallow-tailed Manakin	*a,b,c,d*	U	U	R	B,P,S
181-	*Manacus manacus*	Man man	Bailarín Blanco / White-bearded Manakin	*d*	O			P
	FAMILY VIREONIDAE							
182-	*Cyclarhis gujanensis*	Cyc guj	Juan Chiviro / Rufous-browed Peppershrike	*a*	R	U	U	P,S
183-	*Vireo olivaceus*	Vir oli	Chiví Común / Red-eyed Vireo	*a,b,c*	R	R	F	P,S
184-	**Hylophilus poicilotis*	Hyl poi	Chiví Coronado / Rufous-crowned Greenlet	*a,d*			R	P
	FAMILY CORVIDAE							
185-	*Cyanocorax chrysops*	Cya chr	Urraca Común / Plush-crested Jay	*a,c,d*	F	F	F	B,c,p,S
	FAMILY HIRUNDINIDAE							
186-	*Progne chalybea*	Pro cha	Golondrina doméstica / Gray-breasted Martín	*a,c,d*		R		G,H
187-	*Tachycineta albiventer*	Tac alb	Golondrian Celeste / White-winged Swallow	*d*		R		A
188-	*Tachycineta leucorrhoa*	Tac leu	Golondrina ceja blanca / White-rumped Swallow	*c,d*		R		C,G
189-	*Notiochelidon cyanoleuca*	Not cya	Golondrina barranquera / Blue-and-White Swallow	*c,d*		R		A
190-	*Stelgidopteryx ruficollis*	Ste ruf	Golondrina Ribereña / Southern Rough-winged Swallow	*d*	R			A
	FAMILY TROGLODYTIDAE							
191-	*Troglodytes aedon*	Tro aed	Ratona Común / House Wren	*a,c,d*	R	F		C,H
	FAMILY TURDIDAE							
192-	**Turdus subalaris*	Tur sub	Zorzal Campana / Eastern Slaty Thrush	*b,d*	R	O	R	B,s,P
193-	*Turdus rufiventris*	Tur ruf	Zorzal Colorado / Rufous-bellied Thrush	*a,b,c,d*	O	U	O	B,C
194-	*Turdus leucomelas*	Tur leu	Zorzal Sabiá / Pale-breasted Thrush	*a,b,d*	R	R		P
195-	*Turdus amaurochalinus*	Tur ama	Zorzal Chalcharero / Creamy-bellied Thrush	*a,c*		R		S
196-	*Turdus albicollis*	Tur alb	Zorzal Cuello Blanco / White-necked Thrush	*a,b,c,d*	F	C	A	P,S
	FAMILY MIMIDAE							
197-	*Mimus saturninus*	Mim sat	Calandria Grande / Chalk-browed Mockingbird	*a,c,d*		R		G

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	FAMILY MOTACILLIDAE							
198-	*Anthus lutescens*	Ant lut	Cachirla Chica / Yellowish Pipit	*d*		R		G
	FAMILY PARULIDAE							
199-	*Parula pitiayumi*	Par pit	Pitiayumí / Tropical Parula	*a,c,d*	U	U	U	P,S
200-	*Geothlypis aequinoctialis*	Geo aeq	Arañero Cara Negra / Masked Yellowthroat	*a*	R	R		B,S
201-	*Basileuterus culicivorus*	Bas cul	Arañero Común / Golden-crowned Warbler	*a,b,c,d*	C	C	C	p,S
202-	*Basileuterus rivularis*	Bas riv	Arañero Ribereño / Netropical River Warbler	*d*	R			A
203-	**Basileuterus leucoblepharus*	Bas leu	Arañero Silbador / White-rimmed Warbler	*a,b,c,d*	A	A	A	P,S
	FAMILY THRAUPIDAE							
204-	*Conirostrum speciosum*	Con spe	Saí común / Chestnut-vented Conebill	*a*		R		S
205-	*Cissopis leveriana*	Cis lev	Frutero Overo / Magpie Tanager	*a,c,d*	U	U	R	g,P,S
206-	**Pyrrhocoma ruficeps*	Pyr ruf	Pioró / Chestnut-headed Tanager	*a,b,c,d*	F	C	F	P,S
207-	*Hemithraupis guira*	Hem gui	Sairá Dorada / Guira Tanager	*a,b,c,d*	R	R	R	B,P,S
208-	**Tachyphonus coronatus*	Tac cor	Frutero Coronado / Ruby-crowned Tanager	*a,b,c,d*	A	C	C	P,S
209-	*Tachyphonus rufus*	Tac ruf	Fruterro Negro / White-lined Tanager	*d*	O			B
210-	*Trichothraupis melanops*	Tri mel	Frutero Corona Amarilla / Black-goggled Tanager	*a,b,c,d*	C	C	C	P,S
211-	*Habia rubica*	Tab rub	Frutero Morado / Red-crowned Ant-tanager	*a,b,d*	R	R	F	P,S
212-	*Thraupis sayaca*	Tha say	Celestino Común / Sayaca Tanager	*a,c,d*	U	F	U	C,H,S
213-	*Pipraedea melanonota*	Pip mel	Saíra de Anfifaz / Fawn-breasted Tanager	*a,c*	R	R		S
214-	*Euphonia chlorotica*	Eup chl	Tangará Común / Purple-throated Euphonia	*a,c,d*	U	U	R	P,S
215-	**Euphonia pectoralis*	Eup pec	Tangará Alcalde / Chestnut-bellied Euphonia	*a,c,d*	R	R		P
216-	**Tangara seledon*	Tan sel	Saíra Arcoiris / Green-headed Tanager	*a,c,d*	R	R		S
217-	*Dacnis cayana*	Dac cay	Saí Azul / Blue Dacnis	*c*		R		S
218-	*Tersina viridis*	Ter vir	Tersina / Swallow Tanager	*a,c,d*	R	R		P,S
	FAMILY EMBERIZIDAE							
219-	*Coryphospingus cucullatus*	Cor cuc	Brasita de fuego / Red Pileated-Finch	*a,c*	R	R		B,S

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220-	*Volatinia jacarina*	Vol jac	Volatinero / Blue-Black Grassquit	*a*		U		C,G
221-	*Sporophila coerulescens*	Spo coe	Corbatita Común / Double-collared Seedeater	*a,c*		R		B,G
222-	**Amaurospiza moesta* (nt)	Ama moe	Reinamora Enana / Blackish-Blue Seedeater	*a,b,c*	R	U	R	P,S
223-	**Haploszpiza unicolor*	Hap uni	Cigarra / Uniform Finch	*b*	R		R	S
224-	*Sicalis flaveola*	Sic fla	Jilguero Dorado / Saffron Yellow-Finch	*a,c,d*	O	R		H
225-	*Sicalis luteola*	Sic lut	Misto / Grassland Yellow-Finch	*a*		R		G
226-	*Ammodramus humeralis*	Amm hum	Cachilo Ceja Amarilla / Grassland Sparrow	*a*		R		G
227-	*Zonotrichia capensis*	Zon cap	Chingolo Común / Rufous-collared Sparrow	*a,c,d*	R	U		C,g,p,S
	FAMILY CARDINALIDAE							
228-	**Saltator fuliginosus*	Sal ful	Pepitero Negro / Black-throated Grosbeak	*a,c,d*	R	R	R	B,S
229-	*Saltator similis*	Sal sim	Pepitero Verdoso / Green-winged Saltator	*a,b,c*	R	R	R	C,p,S
230-	*Cyanoloxia glaucocaerulea*	Cya gla	Reinamora Chica / Glaucous-Blue Grosbeak	*b,c*			R	P
231-	*Cyanocompsa brissonii*	Cya bri	Reinamora Grande / Ultramarine Grosbeak	*a,b,c,d*	R	O		P,S
	FAMILY ICTERIDAE							
232-	*Cacicus haemorrhous*	Cac hae	Boyero Cacique / Red-rumped Cacique	*a,c,d*	C	F	F	c,g,P,S
233-	*Cacicus chrysopterus*	Cac chr	Boyero Ala Amarilla / Golden-winged Cacique	*c*	R			B
234-	*Icterus cayanensis*	Ict cay	Boyerito / Epaulet Oriole	*a,d*	R	R	R	c,p,S
235-	*Agelaioides badius*	Age bad	Tordo Músico / Baywing	*d*		R		C
236-	*Gnorimposar chopi*	Gno cho	Chopi / Chopi Blackbird	*b*	R		O	B,p
237-	*Molothrus bonariensis*	Mol bon	Tordo Renegrido / Shiny Cowbird	*a,c*		U		G
238-	*Molothrus oryzivorus*	Mol ory	Tordo Gigante / Giant Cowbird	*a,d*	R			p
	FAMILY FRINGILLIDAE							
239-	*Carduelis magellanica*	Car mag	Cabecitanegra Común / Hooded Siskin	*a*		O		C
	FAMILY PASSERIDAE							
240-	*Passer domesticus*	Pas dom	Gorrión / House Sparrow	*d*		O		H
				TOTAL	**172**	**200**	**110**	

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Appendix 3. Relatives abundancies registered by mist nets inside the Urugua-í - Horacio Foerster corridor. Abundances are expresed as the number of captured individuals per 100 mist hours).

Species	Abbreviature	Abundance per site						
		UP 2	UP 1	UPF	CCF	FPF	FP 2	FP 1
Amaurospiza moesta	Ama moe	0	0	0.57	1.11	0	0.94	0
Automolus leucophthalmus	Aut leu	0	0.49	0.57	0	0	0.47	0.52
Basileuterus culicivorus	Bas cul	1.9	2.94	2.3	0.55	1.68	2.83	0.52
Basileuterus leucoblepharus	Bas leu	2.38	3.92	2.3	6.64	3.35	2.36	0.52
Campylorhapmhus falcularius	Cam fal	0	0.49	0	0	0.56	0	0
Chamaeza campanisona	Cha cam	0.48	0	0.57	0	0	0	0
Chiroxipia caudata	Chi cau	0.95	0	0	0	0	0	0
Conopophaga lineata	Con lin	0.95	1.96	0	1.66	1.12	0.94	1.04
Corythopsis delalandi	Cor del	3.33	0.49	1.15	0	0	2.83	1.04
Cyanocompsa brissonii	Cya bri	0.48	1.96	1.15	0	0	0	0
Cyanoloxia glaucocaerulea	Cya gla	0	0	0	0.55	0	0	0
Dendrocincla turdina	Den tur	0.48	0	0	0	0	0	1.57
Dendrocolaptes platyrostris	Den pla	0	0	0.57	0	0.56	1.89	0
Drymophila ferruginea	Dry fer	0.48	0.49	0	0	0	0	0
Dysithamnus mentalis	Dys men	0.48	0.49	2.87	1.11	6.14	2.83	1.04
Habia rubica	Hab rub	0	0	1.15	0	0	0.94	2.09
Hemitrhaupis guira	Hem gui	0	0	0	0	0.56	0	0
Hemitriccus diops	Hem dio	0.48	2.94	1.15	2.77	2.23	1.89	1.04
Lathrotriccus euleri	Lat eul	0.95	0	0	2.21	4.47	0.47	0.52
Lepidocolaptes fuscus	Lep fus	0	0	1.72	0	0	0.94	0
Lepidocolaptes squamatus	Lep squ	0.48	0	0	0	0	0	0
Leptopogon amaurocephalus	Lep ama	1.9	1.47	2.3	2.21	2.23	1.42	1.57
Leptotila rufaxilla	Lep ruf	0	0.49	0.57	0	0	0	0
Mackenziaena severa	Mac sev	0	0.49	0	0.55	0	0	0
Micrastur ruficollis	Mic ruf	0.48	0	0	0	0	0	0.52
Mionectes rufiventris	Mio ruf	0	0	0	0	0	0	1.04
Myiopagis viridicata	Myi vir	0	0	0	0.55	0	0	0
Nonnula rubecula	Non rub	0	0	0.57	0.55	0	0	0
Phaethornis eurynome	Pha eur	0	0	0	1.66	0	0	0.52
Philidor atricapillus	Phi atri	0.48	0	0	0	0.56	0	1.57
Philydor rufus	Phi ruf	0	0.98	0	1.11	1.68	0.47	0.52
Phiyidor lichtensteini	Phi lic	0	0.49	0.57	1.11	1.12	0	0
Phylloscartes eximius	Phy exi	0	0	0.57	0	0	0	0
Phylloscartes sylviolus	Phy syl	0	0	0	0	0	0.47	0

UP1: Urugua-í Park, site 1; **UP2:** Urugua-í Park, site 2; **UPF:** Urugua-í Park fragment; **CCF:** Central corridor fragment; **FPF:** Foerster Park fragment; **FP1:** Foerster Park, site 1; **FP2:** Foerster Park, site 2

Species	Abbreviature	Abundance						
		UP 2	UP 1	UPF	CCF	FPF	FP 2	FP 1
Phylloscartes ventralis	Phy ven	0	0.98	0	0	0	0.47	0
Picumnus temminckii	Pic tem	1.43	1.47	0	0	0	0	0
Pipra fasciicaudata	Pip fas	0.95	0	0	0	0	0	0
Platyrinchus mistaceus	Pla mis	0	0	0	1.66	0.56	0.47	0
Pyriglena leucoptera	Pyr leu	0	0	0.57	1.11	1.12	1.89	0
Pyrrhocoma ruficeps	Pyr ruf	1.9	1.96	0.57	3.32	3.91	1.42	0
Saltator similis	Sal sim	0	0	0	0	0	0	0.52
Schiffornis virescens	Sch vir	0	0.98	2.87	0	0.56	2.83	1.04
Sclerurus scansor	Scl sca	1.43	0	0	0	0	0	0
Sittasomus griseicapillus	Sit gri	0	0.49	1.15	1.66	1.68	0.94	0
Synallaxis cinerascens	Syn cin	0.48	0.98	0.57	0	0.56	0.94	0
Synallaxis ruficapilla	Syn ruf	0.48	1.96	0	1.11	2.79	0.47	0
Syndactyla rufosupercilliata	Syn ruf	0.48	0.49	0	1.66	1.12	0.47	0
Tachyphonus coronatus	Tac cor	5.24	11.27	1.72	3.87	7.82	7.56	1.57
Thalurania glaucopis	Tha gla	0	0	0	0	0	0.94	1.04
Thamnophilus caerulescens	Tha cae	0	0	0	2.77	0	0.47	0
Thlypopsis sordida	Thl sor	0	0	0	0	0	0.47	0
Tolmomyias sulphurescens	Tol sul	0.48	0.49	0.57	0	0	0	0
Trichothraupis melanops	Tri mel	5.71	1.47	2.87	2.77	7.82	2.83	3.13
Trogon rufus	Tro ruf	0	0	0.57	0	0	0	0
Turdus albicollis	Tur alb	1.43	3.43	4.59	1.11	3.91	1.42	1.57
Turdus leucomelas	Tur leu	0.48	0.49	1.72	0	0.56	0	0
Turdus rufiventris	Tur ruf	0	0	0	0	0.56	0.47	0
Turdus subalaris	Tur sub	0.48	0	0.57	0	0.56	0.94	0
Venilliornis spilogaster	Ven spi	0	0	0.57	0	0	0	0
Vireo olivaceus	Vir oli	0	0	0.57	0	0.56	0.47	0
Xenops minutus	Xen min	0.48	0	0	0	0	0	0
Xiphocolaptes albicollis	Xip alb	0	0	0	0	0	0	0.52
Average		**0.61**	**0.75**	**0.65**	**0.73**	**0.97**	**0.76**	**0.40**

UP1: Urugua-í Park, site 1; **UP2:** Urugua-í Park, site 2; **UPF:** Urugua-í Park fragment; **CCF:** Central corridor fragment; **FPF:** Foerster Park fragment; **FP1:** Foerster Park, site 1; **FP2:** Foerster Park, site 2

Appendix 4. Relatives abundancies registered by Point counts in the Urugua-í - Foerster Corridor.

	Species	PU	BPU	BC	BPF	PF	Mean
1	Bas leu	1.35	0.85	0.95	1.25	1.6	1.2
2	Tro sur	0.95	0.8	0.55	1.05	0.85	0.84
3	Pit sul	0.35	1.05	1.6	0.6	0.25	0.77
4	Cya chr	0.8	0.8	0.5	0.45	0.4	0.59
5	Tac cor	0.35	0.35	0.55	0.6	0.8	0.53
6	Pyr leu	0.55	0.3	0.3	0.65	0.7	0.5
7	Tha cae	0.95	0.1	0.3	0.55	0.55	0.49
8	Lep ver	0.4	0.25	0.15	1	0.3	0.42
9	Tur alb	0.7	0.05	0.35	0.3	0.65	0.41
10	Tod plu	0.4	0.3	0.2	0.25	0.65	0.36
11	Bas cul	0.6	0.1	0.15	0.35	0.55	0.35
12	Cro ani	0.2	1.25	0.3	0	0	0.35
13	Syna ruf	0.35	0.1	0.2	0.35	0.75	0.35
14	Tro aed	0.05	0.65	0.65	0.4	0	0.35
15	Sch vir	0.4	0.05	0.5	0.25	0.5	0.34
16	Col cay	0.7	0.1	0	0.25	0.5	0.31
17	Cry tat	0.45	0.25	0.4	0.2	0.2	0.3
18	Cac hae	0.4	0.5	0.2	0.35	0	0.29
19	Lep ruf	0.3	0.15	0.3	0.3	0.4	0.29
20	Sit gri	0.25	0.2	0.35	0.35	0.3	0.29
21	Sal sim	0.1	0.4	0.4	0.25	0.25	0.28
22	Tit inq	0.3	0.1	0.6	0.2	0.2	0.28
23	Mac lea	0.35	0.2	0.1	0.3	0.35	0.26
24	Tur ruf	0.15	0.35	0.45	0.3	0.05	0.26
25	Zon cap	0	0.8	0.25	0.25	0	0.26
26	Dry mal	0.1	0.1	0	0.45	0.6	0.25
27	Fur ruf	0	0.75	0.45	0	0	0.24
28	Col pic	0.25	0.4	0.35	0.1	0	0.22
29	Syn cin	0.35	0.2	0	0.3	0.25	0.22
30	Lep ama	0.3	0.15	0.15	0.35	0.05	0.2
31	Vir oli	0.2	0	0.1	0.1	0.6	0.2
32	Cha cam	0.1	0	0.25	0.25	0.35	0.19
33	Dys men	0.25	0	0.05	0.25	0.35	0.18
34	Gra var	0.4	0.05	0.2	0.05	0.15	0.17
35	Mac sev	0.15	0.05	0.05	0.3	0.3	0.17
36	Cor del	0	0	0.05	0.1	0.65	0.16
37	Myi mac	0	0.15	0.25	0.35	0.05	0.16
38	Pic tem	0.25	0	0.05	0.25	0.25	0.16
39	Sir sib	0.2	0.15	0.3	0.15	0	0.16
40	Tap nae	0.35	0.25	0.15	0.05	0	0.16
41	Tur ama	0	0.55	0.2	0.05	0	0.16
42	Gui gui	0.05	0.45	0.2	0.05	0	0.15
43	Cor atr	0	0	0.7	0	0	0.14
44	Pac vir	0.3	0.15	0	0.25	0	0.14
45	Van chi	0	0.1	0.6	0	0	0.14
46	Hyp gut	0.35	0	0	0	0.3	0.13
47	Tit cay	0	0.1	0.25	0.3	0	0.13
48	Col cam	0	0.2	0.4	0	0	0.12
49	Meg pit	0.05	0.15	0.25	0.1	0.05	0.12
50	Phy fro	0	0.55	0	0.05	0	0.12
51	Pio max	0.3	0.25	0	0	0.05	0.12
52	Cry obs	0.25	0.05	0.05	0	0.2	0.11
53	Lat eul	0.15	0	0.05	0.05	0.3	0.11
54	Pac cas	0.15	0	0.15	0.1	0.15	0.11
55	Tri mel	0.1	0	0.1	0.25	0.1	0.11
56	Tyr sav	0	0.1	0.35	0.1	0	0.11

UP: Urugua-í Park; **UPB:** Urugua-í Park band; **CCB:** Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park

	Species	PU	BPU	BC	BPF	PF	Mean
57	Eup chl	0.1	0.15	0.1	0.15	0	0.1
58	Mol bon	0	0.4	0.1	0	0	0.1
59	Ara sar	0.05	0	0.2	0.05	0.15	0.09
60	Chi cau	0.2	0.1	0.1	0	0.05	0.09
61	Con lin	0.2	0	0	0.15	0.1	0.09
62	Hem gui	0	0	0.05	0.15	0.25	0.09
63	Nys cha	0.15	0.2	0.1	0	0	0.09
64	Pia cay	0.15	0.1	0.15	0	0.05	0.09
65	Pit ful	0	0	0.05	0.3	0.1	0.09
66	Sic fla	0.05	0.2	0.1	0.1	0	0.09
67	Thr say	0	0.25	0.15	0.05	0	0.09
68	Hem dio	0.25	0	0	0	0.15	0.08
69	Cis lev	0.1	0.05	0.1	0.1	0	0.07
70	Col col	0	0.1	0.05	0.2	0	0.07
71	Lep fus	0.1	0.05	0.1	0.05	0.05	0.07
72	Synd ruf	0.05	0	0.1	0.15	0.05	0.07
73	Tur leu	0.1	0.15	0	0.1	0	0.07
74	Cyc guj	0.05	0	0	0.15	0.1	0.06
75	Ela fla	0.05	0.2	0.05	0	0	0.06
76	Lep squ	0.1	0	0.1	0	0.1	0.06
77	Mim sat	0	0.25	0.05	0	0	0.06
78	Pha eur	0.1	0	0.05	0.05	0.1	0.06
79	Pro cha	0	0.1	0.15	0.05	0	0.06
80	But mag	0.05	0.05	0.1	0.05	0	0.05
81	Cap fla	0	0.05	0	0.1	0.1	0.05
82	Col tal	0	0.2	0	0.05	0	0.05
83	Cry par	0.05	0.1	0.1	0	0	0.05
84	Leg leu	0	0.2	0.05	0	0	0.05
85	Myi sim	0	0.1	0.05	0.1	0	0.05
86	Tol sul	0.1	0	0	0	0.15	0.05
87	Tyr mel	0	0.1	0.1	0.05	0	0.05
88	Hab rub	0.1	0	0	0.1	0	0.04
89	Mel fla	0	0	0.1	0.1	0	0.04
90	Mic sem	0.05	0.1	0.05	0	0	0.04
91	Mil chima	0.05	0.1	0.05	0	0	0.04
92	Pol pla	0	0.05	0.15	0	0	0.04
93	Bat cin	0	0.05	0	0.05	0.05	0.03
94	Cel fla	0.1	0	0	0	0.05	0.03
95	Cor cuc	0.05	0.1	0	0	0	0.03
96	Dry lin	0	0.05	0.1	0	0	0.03
97	Eup pec	0	0	0	0.15	0	0.03
98	Ict plu	0	0	0.1	0.05	0	0.03
99	Myi aur	0.05	0.05	0.05	0	0	0.03
100	Pyr ruf	0	0	0	0	0.15	0.03
101	Tan sel	0	0	0	0.15	0	0.03
102	Ter vir	0	0.1	0.05	0	0	0.03
103	Tin sol	0	0	0	0	0.15	0.03
104	Xip alb	0	0	0	0.05	0.1	0.03
105	Amm hum	0	0.1	0	0	0	0.02
106	Ara leu	0.05	0	0	0.05	0	0.02
107	Ath cun	0	0	0.1	0	0	0.02
108	Aut leu	0	0.1	0	0	0	0.02
109	But str	0	0	0.1	0	0	0.02
110	Cha and	0	0	0.1	0	0	0.02
111	Chl aur	0	0.05	0.05	0	0	0.02
112	Den pla	0.05	0	0.05	0	0	0.02

UP: Urugua-í Park; **UPB:** Urugua-í Park band;
CCB: Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park

	Species	PU	BPU	BC	BPF	PF	Mean
113	Mac rix	0	0	0.1	0	0	0.02
114	Mel cac	0.1	0	0	0	0	0.02
115	Mic ruf	0.05	0	0	0	0.05	0.02
116	Odo cap	0	0	0	0	0.1	0.02
117	Par pit	0	0	0	0.1	0	0.02
118	Pip mel	0	0.05	0.05	0	0	0.02
119	Sal cae	0	0.05	0	0.05	0	0.02
120	Scy spe	0	0	0	0	0.1	0.02
121	Tha gla	0.05	0	0	0.05	0	0.02
122	Vol jac	0	0.1	0	0	0	0.02
123	Ama moe	0	0	0	0.05	0	0.01
124	Ant nig	0	0.05	0	0	0	0.01
125	Con spe	0	0	0.05	0	0	0.01
126	Cya bri	0.05	0	0	0	0	0.01
127	Den ful	0	0	0	0	0.05	0.01
128	Dro pav	0	0	0	0	0.05	0.01
129	Emp var	0	0.05	0	0	0	0.01
130	Geo aeq	0	0.05	0	0	0	0.01
131	Hyl poi	0	0	0	0	0.05	0.01
132	Jac jac	0	0	0.05	0	0	0.01
133	Lop cha	0	0	0.05	0	0	0.01
134	Mio ruf	0.05	0	0	0	0	0.01
135	Myi vir	0	0.05	0	0	0	0.01
136	Phi atr	0.05	0	0	0	0	0.01
137	PhI lic	0	0	0.05	0	0	0.01
138	Ral nig	0	0.05	0	0	0	0.01
139	Ram dic	0	0	0.05	0	0	0.01
140	Sca ory	0	0	0.05	0	0	0.01
141	Sic lut	0	0	0.05	0	0	0.01
142	Spo cae	0	0.05	0	0	0	0.01
143	Tro ruf	0	0	0	0.05	0	0.01
144	Ven spi	0	0	0	0.05	0	0.01

UP: Urugua-í Park; **UPB:** Urugua-í Park band;
CCB: Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park

Appendix 5. Relatives abundancies registered by Mackinon lists in the Urugua-í - Foerster Corridor. Abundances are expresed as the number registered individuals per list.

	Specie	PU	UPB	CCB	FPB	FP
1	Ama moe	0	0	0	0,06	0
2	Ara sar	0,12	0,07	0,11	0,12	0
3	Ath cun	0	0	0,05	0	0
4	Bas cul	0,12	0,07	0,16	0,18	0,2
5	Bas leu	0,29	0,4	0,47	0,65	1
6	Bub ibi	0	0,07	0,11	0	0
7	But mag	0,12	0,07	0	0,06	0
8	But str	0,06	0	0,05	0	0
9	Cac chr	0,12	0	0	0	0
10	Cac hae	0,18	0,07	0,11	0,12	0
11	Cap fla	0,12		0,05		0
12	Car pla	0	0,07	0,16	0,12	0
13	Cat aur	0,06	0	0,05	0	0
14	Cel fla	0,06	0	0	0	0,1
15	Cha cam	0,12	0,07	0,16	0,12	0,5
16	Chi cau	0	0	0,05	0	0
17	Cis lev	0,18	0,13	0	0,18	0
18	Coc mel	0,06	0	0	0,12	0
19	Col cam	0	0	0,16	0,06	0
20	Col cay	0,41	0,4	0,11	0,41	0,7
21	Col col	0,06	0,07	0,05	0,29	0
22	Col mel	0	0	0	0,12	0
23	Col pic	0,06	0	0,11	0	0
24	Col tal	0	0	0,11	0	0
25	Cor atr	0,12	0,27	0,21	0,06	0,2
26	Cor cuc	0,18	0,07	0,05	0,12	0
27	Cor del	0	0	0	0,06	0,5
28	Cro ani	0,18	0,4	0,21	0	0
29	Cry tat	0,12	0,07	0,05	0,06	0,5
30	Cya bri	0	0,13	0	0	0
31	Cya chr	0,35	0,13	0,16	0,18	0,1
32	Cya gla	0,06	0	0	0	0
33	Dac cay	0	0	0	0,06	0
34	Den pla	0	0,07	0,05	0,18	0
35	Dry gal	0	0	0	0,06	0

	Species	UP	UPB	CCB	FPB	FP
36	Dry lin	0,12	0	0	0	0,1
37	Dry mal	0	0	0	0,06	0
38	Dys men	0	0	0	0,18	0,1
39	Ela fla	0	0	0,05	0	0
40	Ela for	0,12	0	0	0	0
41	Emp var	0	0,13	0,11	0	0
42	Eup chl	0	0,07	0	0	0
43	Eup pec	0	0	0	0,06	0
44	Fur ruf	0,06	0,27	0,16	0,12	0
45	Gal chl	0,06	0	0,05	0	0
46	Gra var	0,12	0	0,21	0,12	0,2
47	Gui gui	0,06	0,33	0	0	0
48	Hem dio	0	0	0	0	0,1
49	Hem gui	0	0	0,05	0	0
50	Hyp gut	0	0	0	0,06	0,2
51	Ict plu	0,24	0,07	0,21	0,12	0
52	Jac jac	0	0	0,05	0	0
53	Lat eul	0	0	0,05	0	0
54	Leg leu	0	0,07	0,05	0	0
55	Lep ama	0	0,07	0,05	0	0
56	Lep fal	0	0	0,05	0	0
57	Lep fus	0,06	0	0,05	0,06	0
58	Lep ruf	0,18	0,13	0,26	0,24	0,5
59	Lep ver	0,29	0,27	0,05	0,41	0,4
60	Loc nem	0	0,07	0	0	0
61	Mac lea	0	0,07	0,11	0	0
62	Mac rix	0	0	0,05	0,06	0
63	Mac sev	0	0	0	0	0,3
64	Meg pit	0,18	0	0	0,06	0
65	Mel can	0	0	0,05	0	0
66	Mel fla	0	0,07	0,05	0,12	0,1
67	Mil chi	0	0,07	0	0	0
68	Mim sat	0	0	0,05	0	0
69	Mol bon	0	0,07	0,05	0	0
70	Myi aur	0,06	0	0	0	0

	Species	UP	UPB	CCB	FPB	FP
71	Myi mac	0.47	0.33	0.16	0.24	0
72	Myi sim	0.06	0	0	0.06	0
73	Not cya	0	0	0.05	0	0
74	Nys cha	0.06	0	0	0	0
75	Odo cap	0	0.07	0	0	0
76	Par pit	0.18	0	0	0	0
77	Pen sup	0	0.07	0	0	0
78	Pha eur	0	0.13	0	0.06	0
79	Phy exi	0	0	0.05	0	0
80	Pia cay	0.35	0.13	0.11	0	0
81	Pic tem	0.06	0.07		0.12	0
82	Pio max	0.29	0.2	0.11	0.06	0
83	Pip mel	0	0.07	0.11		0
84	Pit sul	0.35	0.53	0.47	0.35	0
85	Pro cha	0	0.07	0.05	0.12	0
86	Pyr fro	0.29	0.13	0.21	0.06	0.3
87	Pyr leu	0	0.07	0.06	0.06	0.1
88	Pyr ruf	0	0.07	0.05	0.12	0
89	Ram dic	0	0	0.05	0	0
90	Sal ful	0	0	0.05	0	0
91	Sal sim	0.18	0.07	0.16	0.24	0.2
92	Sar pap	0	0	0.05	0	0
93	Sch vir	0	0	0.05	0	0
94	Scl sca	0	0	0	0	0.1
95	Sel mac	0	0	0	0	0.1
96	Sic fla	0.06	0.07	0.16	0.06	0
97	Sir sib	0	0	0.16	0.24	0
98	Sit gri	0.06	0.07	0.05	0	0
99	Spo cae	0	0	0	0.06	0
100	Syn cin	0.12	0.27	0	0.29	0.3
101	Syna ruf	0.24	0.27	0.21	0.47	0.6
102	Syn spi	0.12	0	0	0	0
103	Synd ruf	0	0	0.05	0	0.1
104	Tac cor	0.18	0	0.11	0	0.2
105	Tac leu	0	0	0.11	0	0

	Species	UP	UPB	CCB	FPB	FP
106	Tan sel	0	0	0	0.12	0
107	Tap nae	0.29	0.07	0	0.06	0
108	Ter vir	0	0.13	0.11	0	0
109	Tha cae	0	0.2	0.21	0.06	0
110	Thr say	0	0.07	0.05	0	0
111	Tig lin	0	0	0.05	0	0
112	Tin sol	0	0	0	0	0.1
113	Tit cay	0.06	0.07	0	0	0
114	Tit inq	0.35	0.07	0.21	0.29	0.2
115	Tod plu	0.18	0.07	0.11	0.06	0
116	Tri mel	0	0.13	0.05	0.18	0
117	Tro aed	0	0.13	0.21	0.18	0.1
118	Tro ruf	0	0	0	0.06	0.1
119	Tro sur	0.24	0.53	0.37	0.65	0.7
120	Tur alb	0.12	0.07	0.21	0.06	0.5
121	Tur ama	0.12	0.07	0.05	0.06	0
122	Tur ruf	0.53	0.33	0.16	0.41	0.3
123	Tyr mel	0.06	0.07	0.16	0	0
124	Tyr sav	0	0.13	0.16	0	0
125	Van chi	0	0.53	0.26	0	0
126	Ven spi	0	0.13	0.05	0.06	0
127	Vir oli	0	0	0	0	0.1
128	Xip alb	0.06	0	0	0	0.1
	Total sp.	**61**	**68**	**84**	**65**	**36**
	Total listas	**17**	**15**	**19**	**17**	**10**
	Sp x lista	**3.6**	**4.5**	**4.4**	**3.8**	**3.6**

UP: Urugua-í Park; **UPB:** Urugua-í Park band;
CCB: Central corridor band; **FPB:** Foerster Park band; **FP:** Foerster Park

Appendix 6. List of bird species Tape-recorded during October 2002

	Species	Site	Date
1	*Tapera naevia*	UP	October 6
2	*Hemitriccus diops*	UP	October 6
3	*Basileuterus culicivorus*	UP	October 6
4	*Todirostrum plumbeiceps*	UP	October 6
5	*Euphonia pectoralis*	UP	October 6
6	*Basileuterus leucoblepharus*	UP	October 6
7	*Turdus albicollis*	UP	October 6
8	*Picumnus temminckii*	UP	October 6
9	*Tachyphonus coronatus*	UP	October 6
10	*Scytalopus speluncae*	UP	October 6
11	*Columba cayanensis*	UP	October 6
12	*Thamnophilus caerulescens*	UP	October 6
13	*Trogon surrucura*	UP	October 6
14	*Piryglena leucoptera*	UP	October 6
15	*Grallaria varia*	UP	October 6
16	*Dromoccocyx pavoninus*	UP	October 6
17	*Lathotriccus euleri*	UP	October 6
18	*Schiffornis virescens*	UP	October 6
19	*Cyclarhis gujanensis*	UP	October 6
20	*Leptopogon amaurocephalus*	UP	October 6
21	*Synallaxis cinerascens*	UP	October 6
22	*Cacius haemorrhous*	UP	October 6
23	*Pyrrhura frontalis*	UP	October 6
24	*Thraupis sayaca*	UP	October 6
25	*Tinamus solitarius*	UP	October 7
26	*Corytophis delalandi*	UP	October 7
27	*Hypodaeleus guttatus*	UP	October 7
28	*Rhampotrigon megacephala*	EP	October 8
29	*Turdus subalaris*	EP	October 8
30	*Pionopsitta pileata*	EP	October 8
31	*Chiroxiphia caudata*	EP	October 8
32	*Sittasomus griseicapillus*	EP	October 8
33	*Pachyramphus castaneus*	EP	October 8
34	*Legatus leucophaius*	UP	October 11
35	*Crypturellus tataupa*	UP	October 11
36	*Myiodynastes maculatus*	UP	October 11
37	*Geothlypis aequinoctialis*	UP	October 11
38	*Piaya cayana*	UP	October 11
39	*Tyrannus savanna*	LF	October 11

List of amphibian species tape recorded during October 2002

	Species	Site	Date
1	*Hyla minuta*	UP	October 6
2	*Ololygon nasica*	UP	October 6
3	*Physalaemus barbouri*	UP	October 7
4	*Ololygon fuscovaria*	UP	October 7
5	*Bufo crucifer*	UP	October 7
6	*Physalaemus (biligonigerus?)*	EP	October 8
7	*Hyla faber*	UP	October 11
8	*Aplastodiscus perviridis*	UP	October 11

References

UP = *Urugua-í Provincial Park* EP = *El Piñalito Provincial Park* LF = *Local farm*