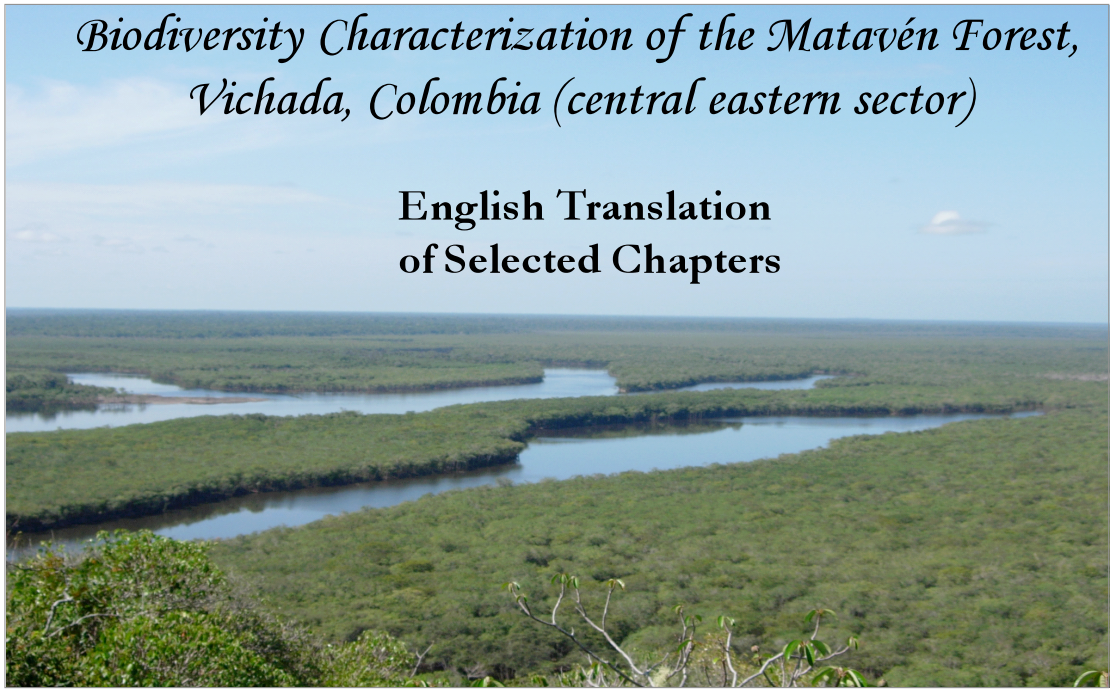
Biodiversity Characterization of the Matavén Forest, Vichada, Colombia (central eastern sector)

English Translation of Selected Chapters



Instituto de Investigación de Recursos Biológicos Alexander von Humboldt
Programa de Inventarios de Biodiversidad

Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén

Embajada Real de los Paises Bajos
Embajada de Holanda en Colombia

Ministerio de Ambiente, Vivienda y Desarrollo Territorial

Institute for Environmental Security, The Hague, Environmental Security for Poverty Alleviation programme

GTZ, Proyecto Biodiversidad y Desarrollo en Ecorregiones Estratégicas de Colombia -Orinoquia

July 2007

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For the selected report chapters and the Executive Summary in English,
http://www.envirosecurity.org/espa/mataven/

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Table of Contents

ACRONYMS

Acronym	English	Spanish
ACATISEMA	Association of Traditional Indigenous Leaders and Authorities of the Mataven Forest	Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén
ACCEFN	Colombian Academy of Pure Sciences	Academia Colombiana de Ciencias Exactas, Fisicas y Naturales
ACITAM	Association of Indigenous Leaders of the Amazonian Trapezoid	Asociación de Cabildos Indígenas del Trapecio Amazónico
AICA	Area of Importance for Bird Conservation	Área Importante para la Conservación de las Aves
ANH	National Agency for Hydrocarbons	Agencia Nacional de Hidrocarburos
COAMA	Consolidación Amazónica	Consolidación Amazónica
CP	*Political Letter - Constitution*	*Carta Política*
DCTAO	Amazon-Orinoquian Territorial Management	Dirección Territorial Amazonia-Orinoquia
ESPA	Environmental Security for Poverty Alleviation	Environmental Security for Poverty Alleviation
GEMA	Exploration and Monitoring Group	Grupo de Exploración y Monitoreo
GTI	Investigation Work Group	Grupo de Trabajo en Investigación
GTZ	German organisation for technical cooperation	German organisation for technical cooperation
IAvH	Alexander von Humboldt Biological Resources Investigation Institute	Instituto de Investigación de Recursos Biológicos Alexander von Humboldt
ICAH	*Colombian Institute of Anthropology and History*	*Instituto Colombiano de Antropología e Historia*
IES	Institute for Environmental Security	Instituto de Seguridad Ambiental
IGAC	Agustín Codazzi Geographic Institute	Instituto Geográfico Agustín Codazzi
INCORA	Colombian Institute for Agrarian Reform	*Instituto Colombiano de la Reforma Agraria*
MAVDT	Ministry of Environment, Housing and Territorial Development	Ministerio de Ambiente, Vivienda y Desarrollo Territorial
OIT	International Work Organization	Organización Internacional del Trabajo
PNN	National Natural Park	Parque Nacional Natural
REM	Special Management Regime	*Regimen Especial de Manejo*
SINA	*National Environmental System*	Sistema *Nacional Ambiental*
SINAP	National System of Protected Areas of Colombia	*Sistema Nacional de Áreas Protegidas de Colombia*
SPNN	National Natural Park System	*Sistema de Parques Nacionales Naturales*
UAESPNN	Special Administrative Unit for the National Natural Park System	Unidad Administrativa Especial del Sistema de Parques Nacionales Naturales

COMMON SPANISH TERMS LOOK UP TABLE

Spanish	English
altillanura	high plains
caño	stream
curaca/cabildo	leader of the indigenous community
resguardo	indigenous collective property
Resguardo Unificado Selva de Matavén	Unified indigenous territory of the Matavén Forest

BACKGROUND

The region known as the Matavén Forest is considered a transition zone between the Amazon forest and the Orinoquian savannas. It is a biologically valuable area not only for its biogeographical position but also because it is in a well conserved state having less than 5% of its surface area as cultivated and fallow land.

This study is the first systematic biodiversity characterization of the Matavén Stream and Orinoco River (central eastern zone of the Matavén Forest). During the characterization process, 11 members of local communities were trained in sampling techniques for biodiversity and landscape characterization. In addition, a large sound and photograph archive has been created. In the near future, this archive can support awareness and educational processes of the Matavén Forest biological richness.

The biological characterization includes five landscapes (four forests and one savanna), selected for their physiographical attributes. The internal and external characteristics of the five landscapes were analyzed in detail in terms of geomorphology, lithology/parental materials, hydrology and soils (Chapter 2). These factors help to explain the formation of the landscapes studied and to understand the diversity and composition of the organisms identified.

Using a standardized methodology (Villarreal *et al.* 2004) the following was obtained for every landscape: a representative factor, the taxonomic composition (species, families, orders), the diversity patterns (richness of species, alpha-diversity) and the complementarity (degree of change in species composition, beta-diversity) for the community of woody plants (Chapter 3), insects (specifically beetles, ants and butterflies) (Chapter 4) and birds (Chapter 5). Additionally, with the aim to create a quick partial inventory, complementary rapid samples were taken of the three biological groups mentioned before in various disturbed landscapes at different vegetation recovery stages.

At the same time, the fish composition was determined. This was done by taking samples in three water bodies (Chapter 6). The alternatives for conservation, management and administration for the protection of the Matavén Forest are analyzed in detail in Chapter 7

and the recommendations are given in Chapter 8. Finally, the organization and development of the expedition for the biodiversity characterization is shown (Annex 8.2).

(NB: Only the Executive Summary, Introduction and Chapters 1, 7 and 8 have been translated into English.)

GENERAL INTRODUCTION

Investigations and monitoring are being recognized as essential tools for the conservation and management of the Colombian biodiversity (Zambrano 2001, Memorando de Entendimiento 2006). The characterization of existing biodiversity in the different ecosystems of the country is a fundamental step in that direction. What are the comprising elements of the national biodiversity? How are those elements distributed and organized in space and time? And how are the interactions among them? These are some of the questions that the biological characterizations seek to answer. For Colombia, recognized as one of the five mega-diverse countries (Mittermeier *et al.* 1999), the task to inventorize and characterize the biodiversity is huge and complex.

The biodiversity knowledge can be developed from the hierarchical organization model for biodiversity proposed by Noss (1990). This model is based on the combination of four biodiversity levels: regional landscape, ecosystems-populations, communities-species and individuals-genes, and three attributes: composition, structure and function. This approach highlights the complexity of the biological diversity and the implications of understanding and protecting it.

The diagnosis made by Kattán and Murcia (2000) about the knowledge generated in the Natural National Park System - *Sistemas de Parques Nacionales Naturales (SPNN)* – shows that the investigation (until the year 2000) has been mainly centered on biotic community composition studies, known as inventories. These studies are focused on answering the question: what are the comprising elements of biodiversity? It is answered by establishing the number of existing species in a determined area or habitat (alpha-diversity). Recent studies (p.e. IAvH 1999, Armenteras *et al.* 2003, Kattán *et al.* 2005) have concentrated on finding the distribution patterns of biotic communities that coexist at the level of organization to respond to the second question posted: how are those elements distributed and organized in space and time? By determining the alpha-diversity, it is possible to know the rate of change of species between the different habitats. This diversity, known as the beta-diversity, defines the difference in the communities or groups of species between places.

The biota's spatial differential pattern has been identified as an essential factor for the design of regional protected areas (Kattán *et al.* 2005). In this way, a high rate of change between two habitats (few species in common between habitats) implies that both collections are irreplaceable for the conservation, while a low rate of change will indicate that preserving one locality will conserve the majority of species that are found in the other one.

This study provides information on the biodiversity of the area known as Matavén Forest, thus contributing to the consolidation of the Colombian national inventory of biodiversity. With an extent of 1,850,000 ha, the Matavén Forest is located in the south-east corner of the Vichada Department. It is located between the Vichada River to the north, the Guaviare River to the south, the Orinoco River to the east and the Chupave Stream to the west. Nowadays, the area corresponds to the "Resguardo Unificado Selva de Matavén" and is inhabited by 12,000 indigenous people from the Sikuani, Piapoco, Piaroa, Puinave, Curripaco and Cubeo ethnic groups.

The region is covered by forest and savannas in a transition zone between the Amazonian forest and the Orinoquian savannas. Because of its floristic affinity with the humid Amazon forest, the north limit is considered to be the Amazon region. The natural environment is well conserved, with less than 5% of the surface transformed into crop and fallow areas (Von Hildebrand, Chapter 7 of this report). However, the region has been little explored from a biological perspective; consequently, not enough is known about the biota.

The Matavén Forest has special biological importance because of its present conservation state, as well as its biogeographical position between the Orinoquian savannas and the Amazonian rainforest. Therefore, some studies identify the Matavén Forest as a potential area to be incorporated into the National System of Protected Areas - *Sistema Nacional de Áreas Protegidas* (Biocolombia 2000). The Special Administrative Unit for the National Natural Park System - *Unidad Administrativa Especial del Sistema de Parques Nacionales Naturales (UAESPNN),* in particular, has considered the Matavén Forest as an important conservation area that could acquire a legal form of protection. This is a possible scenario to exercise new area co-administration methods, harmonizing the interest of the legal

environmental entities and the local communities for the defense, management and conservation of wild areas with high biological value (See Chapter 7).

Various entities, Fundación Etnollano in particular, within the COAMA programme (Consolidación Amazónica-Colombia), have carried out studies and given advice in educational, health, production and natural resource management programmes to the indigenous communities living along the Vichada, Guaviare and part of the Amanavén Rivers and the Fruta and Matavén streams, in the municipalities of Cumaribo and Puerto Inírida (respectively in Vichada and Guainía departments). Other activities and processes have been oriented towards the consolidation and collective recognition of the indigenous communities' territorial rights, the legal declaration process of the Resguardo Unificado Selva de Matavén and the defense of their cultural identity.

Before 2003, the region included 16 resguardos indígenas, located more or less in a continuous strip along the northern, eastern and southern limits including a big central area of uncultivated forest land. After a long discussion and analysis process, the indigenous communities, together with Etnollano, identified the need to unify the management of the resguardos because of the value of the forests and the savannas and for the sustainability of the communities and the perpetuation of regional ecosystem integrity (Von Hildebrand, Chapter 7 of this report).

After considering step-by-step different strategies to guarantee the conservation of ecosystems and communities, and organized under the Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén (ACATISEMA), they opted to become a "resguardo". The INCORA (Colombian Institute of Agrarian Reform - *Instituto Colombiano de reforma agraria*), issued the resolution 037 from the 22 of July 2003, in which the entire region of Matavén would become one great resguardo, the Resguardo Unificado Selva de Matavén. It includes the 16 original reserves, one of which was split into two thus resulting in 17 Sectors as well as the central forested area.

ACATISEMA was born out of the interest to create a legal organization that could represent and defend the local indigenous communities. This organization has carried out activities to build the strength, cultural and social preservation of the local indigenous

communities, as well as the territorial consolidation and the conservation of the environment and the biodiversity.

The biodiversity characterization carried out in the Matavén Forest between March and April of 2007 is an effort of cooperation and mutual financing between ACATISEMA and Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). As a result, the IAvH has been able to contribute in line with its mission to coordinate, promote and execute the investigation. The IAvH has been able to develop two given functions established in Legislation 99 of 1993: execution of scientific and technological investigations in biodiversity and the creation of a national inventory for biodiversity. On the other hand, ACATISEMA expressed their interest in performing the biological characterization of one sector in the Matavén Forest. To do this, ACATISEMA coordinated, and reassigned 69% of the financial resources from the Programa Amazónico: "Strengthening community autonomy in terms of life, territory and the environment in subregions of the Amazon" financed by The Netherlands Embassy. The remaining 31% was contributed by Humboldt Institute, Institute for Environmental Security (The Hague) under the Environmental Security for Poverty Alleviation programme and GTZ (German organisation for technical cooperation), with the help of the Colombian Ministerio de Ambiente, Vivienda y Desarrollo Territorial.

This report is a compilation of results obtained during the biodiversity characterization of the Matavén Forest made by the Grupo de Exploración y Monitoreo (GEMA) from the IAvH. However, this report is structured in a larger context, with two main work lines. On one hand, it contributes to the biodiversity scientific knowledge of the defined groups (plants, birds, insects and fish) and the landscape by determining the current biodiversity state, the ecosystems and their relationships with the regional landscape. On the other hand, this work includes the process of training local inhabitants in sample techniques for the biodiversity and landscape characterization. This training was executed during the field work, using the techniques of the GEMA team for biodiversity characterization (see table 1). The training was reinforced by a course given in Villa de Leyva, between the 9th and 13th of July 2007.

The training strategy (in the field work and in IAvH offices) also applied in other areas of the country, have shown to be effective in the learning and assimilation of the sampling techniques used by the GEMA team. The purpose of the training is to generate local

capacity for the development of biodiversity inventories. In this way, the local communities can measure and control their natural surroundings as well as transfer knowledge and recognize the benefits of their conservation.

Similar experiences with the indigenous from the Kofán communities, located in the Alto Putumayo and the Ingano-Kuna located in the Fragua-Caquetá basin, contributed to the justification for declaring the Alto Fragua-Indiwasi as a Natural National Park (Parque Nacional Natural Alto Fragua-Indiwasi) by the Ministerio de Ambiente, Vivienda y Desarrollo Territorial (MAVDT). Joining efforts, spirit and competences, this sort of local alliances as described above, have not only been possible but gratifying, in the sense of bilateral learning by sharing the results from different perspectives and the different interests of the involved organizations. Therefore, the two described lines presented in this work provide support for the biodiversity conservation and sustainability of the environmental goods and services derived from the Matavén Forest.

Table 1: Members of the indigenous communities who participated in the field work for the Biological Characterization of the Matavén Forest.

Name	Ethnicity	Biological Group	Community
Camilio Pulido	Piaroa	Characterization of landscapes	Sarrapia-caño Fruta
Esteban Niño	Piapoco	Characterization of landscapes	Río Orinoco
Alejandro Pérez Bautista	Puinave	Characterization of landscapes	Bajo Guaviare
Hermes Rivera Gaitán	Piapoco	Fish	San Rafael de Morocoto, brazo-río Guaviare
Miguel Garrido García	Piapoco	Fish	Manajuare, Brazo-río Guaviare
Luis Carlos Catimay	Sikuani	Fish	Alto Vichada
Carlos Bautista	Puinave	Birds	Bajo Guaviare
Luis Rozo Manrique	Sikuani	Birds	Alto Vichada
Celedonio Ortiz	Piaroa	Birds	Sarrapia-caño Fruta
Luis Emilio Gaitán	Piapoco	Insects	Morichal, brazo- río Guaviare: Coordinador Territorio y Medio Ambiente-Acatisema
Saul Garrido	Piapoco	Insects	Manajuare, Brazo-río Guaviare
Marcelo Suárez Rivera	Sikuani	Plants	Berlin, bajo río Guaviare

OBJECTIVES OF THIS REPORT

General objective

To contribute to the understanding of the biological diversity of taxonomic groups defined in the selected landscapes of the Matavén Forest, applicable in the conservation and management of this area.

Specific objectives

- To identify and characterize the central eastern landscapes of the Matavén Forest, based on the analysis of the factors that have contributed to their formation, by selecting and sampling representative landscapes.
- To characterize birds, plants, insects (ants, butterflies and beetles) and fish in five representative landscapes and three water bodies of the Matavén Forest, in order to generate primary information for evaluating the general conservation condition and the biological value of the study area. Results would serve as a contribution toward decision making for the conservation of the Matavén Forest.
- To train members of indigenous local communities in sampling techniques by the GEMA team.

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CHAPTER 1: CONTEXT AND STUDY AREA

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1.1 Study Area

The study area is located to the east of the altillanura de la Orinoquia Colombiana, in the east corner of Vichada. The zone is specifically located in the low basin of the Matavén stream, between the Vichada River to the north and the Guaviare River to the south, in the municipality of Cumaribo. The physiographic and geological characteristics classify the area as part of the west - Guiana Shield, and correspond to the place known as Matavén Forest. This area is recognized for its highly conserved condition and biogeographical interest as a transition between the north Orinoquian savannas and the Amazon Rainforest to the south.

The Matavén Forest embraces a huge territory, with an estimated extension of 1.85 million hectares distributed between the rivers Vichada to the north, Guaviare to the south, Orinoco to the east and Chupave Stream to the west (Figure 1.1). It includes 17 indigenous territories, Sectors, with six ethnic groups located on the banks of the mentioned rivers and are grouped in one resguardo with the name Resguardo Unificado de la Selva de Matavén.

The area is characterized by geographical isolation and low population density. There exist only small indigenous population centres located along the Orinoco River and the Matavén and Fruta Streams.

In the specific study area, Serrapia can be highlighted as a settlement inhabited by indigenous people of the Piaroa ethnic group which belongs to the Sector – Caño Fruta and one small indigenous community known as Urbana La Nueva, located near the river-mouth of the Matavén Stream in the Orinoco River.

The area has been identified as a possible area to be incorporated in the National System of Protected Areas of Colombia - *Sistema Nacional de Áreas Protegidas de Colombia-SINAP* (Biocolombia 2000). It is an important conservation area that represents the biota of the rain forest to the north of the Guaviare River.

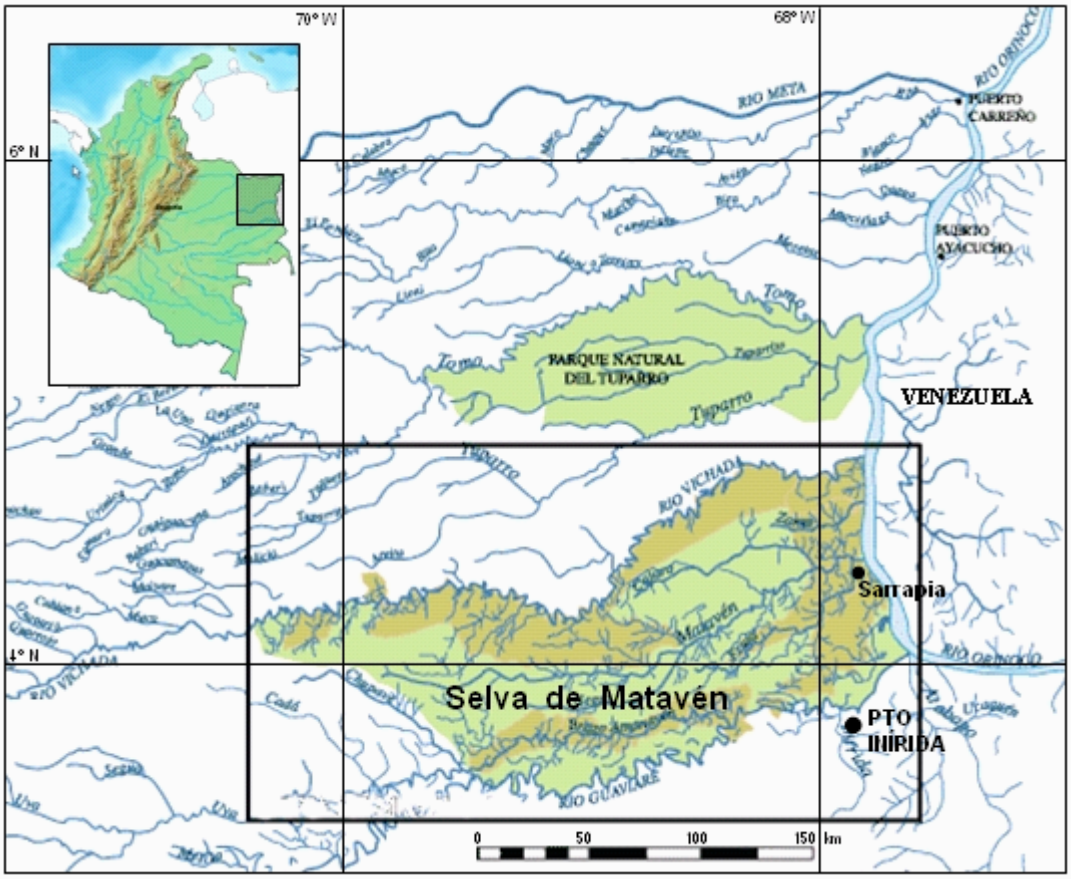

Figure 1.1: Location of the Matavén Forest (Modification of that of Fundación Etnollano 2007).

1.2 Characterized landscapes and sample sites

The biological characterization embraces five landscapes: four forests and one savanna, in contrast with their physiographic attributes. They are located in the low basin of the Matavén Stream and near the junction with the Orinoco River (Table 1.1, Figure 1.2) in the east corner of the Matavén Forest.

With the same number of sample sites for birds, plants and insects and with observations of internal and external characteristics of the landscapes, the characterization also includes partial samples in disturbed landscapes. The fish inventory was taken in the Matavén streams of Cajaro, Negro and Fruta and also the Orinoco River. The detail description of the characterized landscapes can be found in Chapter 2.

Table 1.1: Characterized and georeferenced landscapes sampled in the Matavén Forest.

Macrogeoform	Landscape	Code	Georeferenced Sample Sites
Residual hills in granite rocks (Parguaza granite) of the Guiana Shield (Precambrian)	Rocky residual hill forest on Guiana Shield granite	BR	Vichada, Cumaribo, 04º36'33''N, 67º51'52'' W, 300 m.
Lower flood plains of the Orinoco river (black waters)	Lower floodplain forest of the Matavén Stream	BI-a	Vichada, Cumaribo, 04º32'11'' N, 67º54'32'' W, 220 m.
	High floodplain forest of the Matavén Stream	BI-b	Vichada Cumaribo, 04º30'28'' N, 68º03'32'' W, 190 m
Lightly dry plains and sands derived from the Shield granites	Savannas of the sandy plains (white sands) lightly dry	SA	Vichada, Cumaribo, 04º31'56'' N, 68º05'28'' W; 240 m.
	Forests of the sandy plains (white sands) lightly dry	BA	Vichada, Cumaribo, 04º29'13'' N, 68º00'22'' W, 260 m.
Plio-Pleistocene surfaces dry alluvial sediments	Forest on old sedimentary plains moderately dry	BT-a	Vichada, Cumaribo, 04º33'32'' N, 68º11'51' W; 270 m.
	Forest on old sedimentary plains moderately dry	BT-b	Colombia, Vichada Cumaribo, caserío de Sarrapia, 04º29'25'' N, 67º52'19'' W, 240 m.

1.3 Regional geographic context of the Matavén Forest

Physiographic Aspects

The geomorphology and materials that compose the altillanura (high plains) de la Orinoquia are closely related with two events: the geology and genesis of the Andean chain and the denudation of geological structures of the Guiana Shield. With regards to the first, the mountains uplifted during the tertiary and quaternary period allowing for the huge erosion processes in the mountain chain, creating the savanna (*llanos)* sedimentation (Goosen 1964). Regarding the second, the denudation of Guiana Shield influences particularly the east altillanura limit, where the materials of the "basement shield" appear. This forms a narrow line of low discontinuous and isolated hills, parallel to the Orinoco River in the Vichada and Guainía Departments.

The country's east limit, the "basement shield", is represented mainly by the Complejo de Mitú, composed of Colombia's oldest rocks, formed during the transamazon orogeny (2.200 to 1.800 million years). Lithologically, it is formed by metamorphic rocks (neises, schists quartzites and amphibolites). The geological center-west border on this complex is made of Parguaza batholit (Parguaza granite) (Toussaint 1993, CI 2003) and appears in Colombia in a narrow line between Puerto Carreño and Puerto Inírida. This geological structure is part of a series of big precambrian batholits, related with tectometamorphic events which happened during the mentioned orogeny (Toussaint 1993). To this belongs the most prominent relief formed by inselberg type isolated rock hills, distributed in such populations.

It has been established that the occurrence of dry periods accompanied by strong winds related to the glacier and interglacial periods during the Pleistocene (Tricart 1976, Flórez 1992, van der Hammen 1992) did have an effect on the origin of some geo-forms, and in the type and distribution of materials that compose the altillanura. However, fieldwork observations in the Matavén Forest do not show the influence of such phenomena, contrary to what happens in the east of the Parque Nacional Natural (PNN), El Tuparro (Villarreal-Leal 2007), located to the north of the Vichada River, approximately 90 km north of the Matavén Forest.

In the eastern limit of the study area, the fieldwork data revealed a continuous cover of white sand, the product of the alteration of granitic rocks, burying the basement shield. In effect, Gaviria y Faivre (2006) points to the existence of quartz sand, arising from the dismantling and alteration of crystal rocks that compose the Shield and form the altillanura Periguayanesa. The southern eolian influence limit, with the formation of dunes, is registered in the areas around the Tomo River (Khobsi 1981).

Weather

Regionally, the precipitation in the Orinoquia and northern Amazon increases from east to west and from north to south. It varies from 1.500-2.000 mm/year to the north in Arauca and Vichada, and increased to the south reaching 2.500-3.000 mm/year. The highest rain values are shown in the piedmont of the eastern chain - *Cordillera oriental* (3.000-3.500 mm).

The annual rainfall distribution has a "monomodal" behaviour; in other words, a rain period between April and November, and a dry period between December and March.

According to the Thornthwaite climatic classification, the climate to the north of Vichada is semi-humid. Gradually it becomes more humid at the centre and south of Vichada (slightly humid and moderately humid), and humid in the north of Guainia (Eslava *et al*. 1986b). In the Koeepen climate classification, the Colombian Orinoco has the climate types tropical wet lightly humid savannas (AWI) and tropical rainforest (AMI) (north of Guainía). They are characterized by a well-defined dry period of four months, where the precipitation in the driest month is less than 60 mm, in the first case, and more than 60 mm, in the second case (Eslava *et al*. 1986b).

According to the climate classification of Thornthwaite, defined by the humidity factor (Factor humidity Fh), the Matavén Forest belongs to the moderately humid climate type (B2) (Eslava *et al.* 1986b). As for the climate classification of Kooepen, the Matavén Forest belongs to the tropical rainforest (AMI) (precipitation of the driest month > 60 mm and average temperature of the coldest month > 10°C) (Eslava *et al.*1986a).

In the Matavén Forest, there are six pluviometric stations located in the boundaries of the study area, along the Vichada, Orinoco and Guaviare Rivers (Figure 1.3). The generated data of these stations allows for the reporting of an approximate regional description of the climate behaviour of the study area, especially in terms of distribution and calculation of annual rainfall.

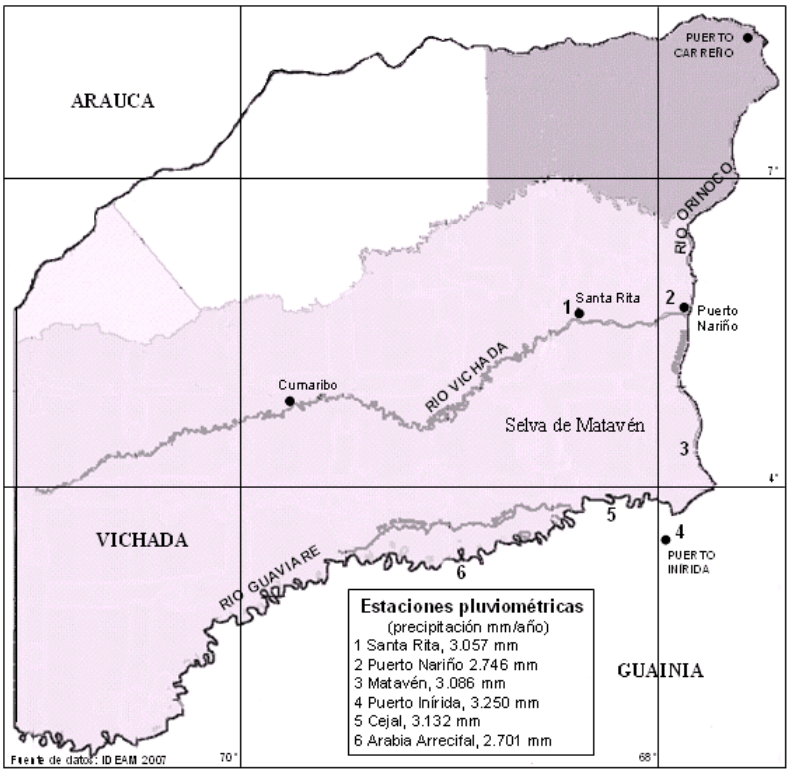

Figure 1.3: Location of the pluviometric stations.

The amount of annual rainfall in the identified stations varies between 2.476 and 3.253 mm/year (Table 1.2). The data presents a rainfall increase from north to south along the Orinoco River. In effect, the annual precipitation is 2.746 mm/year in the north (Puerto Nariño station), 3.086 mm (Matavén station) and 3.253 mm/year in the south (Puerto Inírida station). The precipitation difference between extreme stations is 507 mm/year. This rainfall behaviour probably has an effect on the increased forest cover and the decrease on savannas as it advances to the south.

Table 1.2: Monthly average precipitation values of the selected stations (mm).

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr	Period	lat/long	Altitude (m)
Santa Rita	56	92	117	255	385	463	512	375	257	255	169	123	3057	1983-2006	04°51' N, 68°24' W	87
Puerto Nariño	43	74	78	215	399	443	524	328	238	188	130	87	2746	1984-2005	04°56' N, 67°51' W	79
Matavén	91	103	131	237	403	464	479	432	247	210	171	118	3086	1983-2006	04°17' N, 67°49' W	88
Cejal	115	138	122	262	372	454	454	389	261	220	221	125	3132	1983-2006	03°59' N, 68°21' W	94
Arabia Arrecifal	75	83	128	251	360	371	368	328	250	181	185	122	2701	1983-2006	03°30' N, 69°03' W	96
Puerto Inírida	88	113	124	285	421	488	490	404	299	222	199	120	3253	1972-2006	03°35' N, 67°55' W	100

In all the selected stations, the annual rainfall distribution has a "monomodal" behavior (Figure 1.4). The rain period takes place between April and September, in which 70% to 78% of the total annual rainfall occurs. In the same period (May, June and July), 43% and 50% of the total annual rainfall occurs, making these the wettest months of the year. After the rainy period, the precipitation decreases notably and then comes the period of less rain (October-March), in which 12% to 16% of the total annual rainfall occurs, with January and February being particularly dry (4% to 8% of the total annual rainfall).

The temperature regime in the Orinoquia is "isomegathermic", meaning that the difference in temperature between the coldest and the hottest month is less than 5°C. However, there are no temperature data from the closest stations to Matavén Forest. In the Puerto Inírida station, to the south of the study area, the average annual temperature is 26.5°C. The maximum temperatures occur in the dry season (January-March), while the minimum (25.6-25.9°C) coincide with the period of maximum rain (May to July).

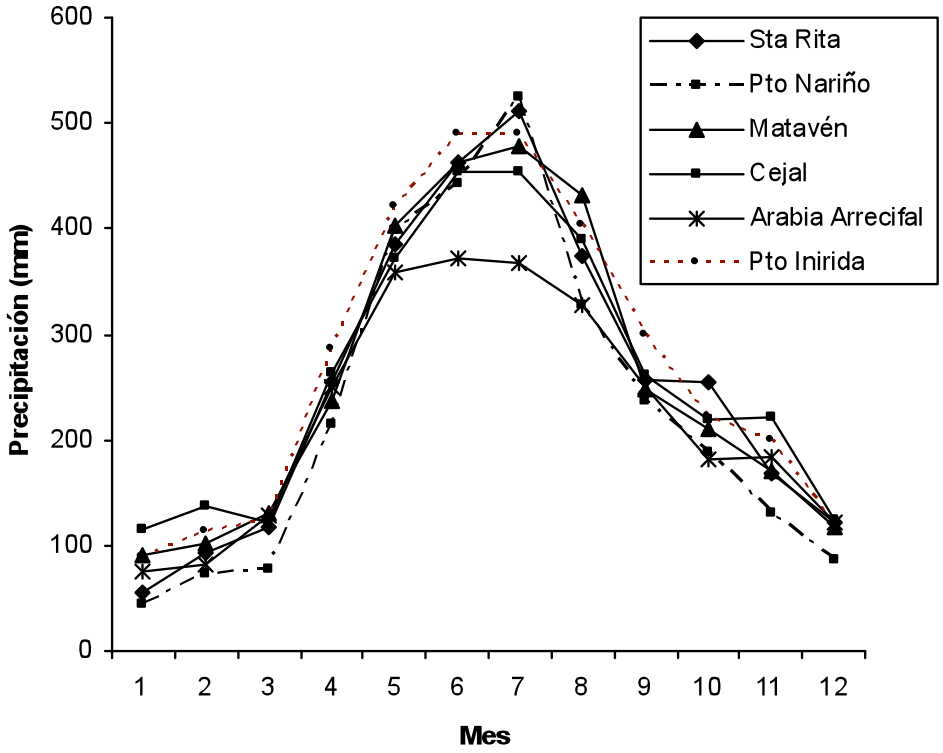

Figure 1.4: Distribución anual de la precipitación para el período 1972/1983-2005/2006.

1.4 Methodological Context

Characterization general planning

The biodiversity characterization of the Matavén Forest central eastern sector, started with the stratification of the study area into homogeneous and discrete units by their geo-form and cover. The resulting entities of this exercise correspond to the concept of landscape unit, which can be applied in biodiversity and vegetation studies (Zonneveld 1979, 1989, Etter 1990).

The landscape unit can be defined as a portion of geographic space, homogeneous in terms of its physiognomy that results from the complex interaction between its components (climate, rocks, hydrology, soil, flora, fauna and human activity) which can be recognized and differentiated from other neighbourhood portions according to the specific spatio-temporal analysis (resolution) (Zonneveld 1979, 1989, Etter 1990). The external expression of the landscapes is the result of the complex interactions between the factors that intervene in their

formation, allowing a more comprehensive explanation about the distribution behaviour, structure and composition of the organisms in the different landscapes.

To identify and delimit landscapes, it is imperative to use remotely sensed images and modern interpretation methods as well as the physiographic analysis. By these conceptual and methodological approximations, it is possible to abstract and infer the relative aspects of the present and past processes, responsible for the formation, dynamics and functioning of the landscapes.

By applying the described standpoint and methods, the sample planning and sampling of plants, insects, birds and fish, in the selected landscapes (forest and non-forest) was executed. An integral characterization in terms of landscape forming factors (geomorphology, lythology/materials, soil and hydrology) was also carried out.

Procedure

The biological characterization includes three phases described below. The sampling techniques are in line with the proposals made by GEMA for forest and aquatic ecosystems (Villarreal *et al*. 2004 and Maldonado e*t al*. 2005). However, modifications were made, especially for the vegetation sampling (see Chapter3). This was due to the presence of non-forest formations (savannas), in such a way that their inventory would have a better representation. A more detail description of this approach and the sampling techniques used for every biological group (birds, plants, insects and fish) is shown in the corresponding chapters.

Pre-fieldwork: thematic information acquisition and preliminary terrain recognition. By exploring the geographical context of the study area, and by reviewing secondary information, thematic information related with geomorphology, geology/lythology and vegetation of the Matavén Forest were collected. Also Landsat satellite images (IGAC 2006) were acquired and interpreted, aiming to identify the central eastern landscapes of the area. Descriptive aspects and external attributes were used to name the landscapes, such as vegetal physiognomy,

dominant geomorphology, lythology and landscape relative age among others. As a result, five landscapes have been identified for biological and ecological characterization.

Ten days of fieldwork were used to examine and validate the image interpretation as well as to select the sample sites and to make preparations for logistic and field operations. The recognition trip included adjacent areas of the Orinoco River and the Matavén and Cajaro Streams. This phase was done with the guidance of locals from the Sarrapia indigenous community.

The selection of landscapes and work areas was made in accordance with the financial resources and time available for the fieldwork. Conservation condition of the natural vegetation, complementarity between landscapes and logistic difficulties for support and mobility (terrestrial and aquatic) were the main area selection factors. As a result, five landscapes have been selected that represent and complement the landscapes within the central eastern region of the Matavén Forest. Also fieldwork lines (1 km in length) in each landscape were cleared.

The landscapes have been selected along the Matavén and Cajaro Streams, as well as in the Orinoco River for logistic and operational reasons. The distance between the two extremes of the sampling areas is about 45 Km in a straight line along the mentioned rivers (5-6 hours by boat in low water). Due to the complete lack of tracks and terrestrial mobility inside the Matavén Forest, the sampling and camp sites for lodging and working are distributed between 0.5 and 4 km from the river banks.

Fieldwork Phase: The fieldwork was done during the dry season, between March 4 and April 4 of 2007. The inventory includes samples from the selected biological groups (plants, birds, insects and fish), as well as the integral landscape characterization of the sampling sites. The effective time used for each biological group sampling was five days for every landscape. The fish collection was done daily along the main rivers (Orinoco, Matavén, Cajaro and Fruta) and abandoned meanders of the Matavén Stream.

The sampling of insects, vegetation and soil as well as general landscape observation were carried out parallel in each landscape, except for the birds, due to their sensitivity for sampling disturbance. The birds working group rotated between landscapes, trying to do the sampling before the other groups arrived. During this phase, it was decided that a quick partial sampling of disturbed landscapes in all or some of the biological groups should be carried out, with the aim to have a better representation in the inventory.

While sampling, the techniques were taught to 11 members, representing four ethnicities of the local indigenous communities of the Matavén Forest and who actively participated in the fieldwork. The activity took place as part of the agreement with the financing body and ACATISEMA's interest in continuity for some development processes related to appreciation, appropriation and understanding of the biological and ecological environment for the new generations.

Office and Laboratory Work Phase: This phase included the following activities: a) organization and identification of the collected biological material with the support of specialists in taxonomy; b) montage and deposit of collected material in the IAvH collection; c) organization, processing and analysis of the data; d) group discussion over the important results and recommendations; e) results integration and report writing.

Finally, the training of the 11 members was finished in the IAvH laboratories in Villa de Leyva.

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CHAPTER 7: CONCEPTUAL GUIDELINES, CONSERVATION, MANAGEMENT AND ADMINISTRATIVE ALTERNATIVES FOR THE PROTECTION OF THE MATAVÉN FOREST

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7.1 Introduction

The region known as the Matavén Forest, with an area of almost two million hectares, is located between the Guaviare River to the south and the Vichada River to the north. The west limit is given by the Chupave Stream and the east limit by the Orinoco River.

The region is covered by forest and savannas in a transition between the immense Amazon forest and the vast Orinoquian savannas and is inhabited by about 12,000 indigenous people from the Sikuani, Piapoco, Piaroa, Puinave, Curripaco and Cubeo ethnic groups. The natural environment is well conserved, with less than 5% of the surface transformed into crop and fallow areas.

Before 2003, the region included 16 indigenous resguardos, located more or less in a continuous strip along the northern, eastern and southern limits including a big central area of uncultivated forest land. After a long discussion and analysis process, the indigenous communities, together with Etnollano, identified the need to unify the management of the resguardos because of the value of the forests and the savannas for the sustainability of the communities and the perpetuation of regional ecosystem integrity. Since then, this central area has been named “la selva corazón de la salud”.

After considering, step-by-step, different strategies to guarantee the conservation of ecosystems and communities, and organized under the Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén (ACATISEMA), they opted to become one “resguardo”. On request, the INCORA (Colombian Institute of Agrarian Reform - Instituto Colombiano de reforma agraria), issued the resolution 037 of the 22 of July 2003, in which the entire region of Matavén would become one great resguardo, the Resguardo Unificado Selva de Matavén. It includes the 16 original reserves and the central forested area which is currently uncultivated.

From the various statements of the resolution, we mention the following two because of their importance to the development of the current chapter:

- The expansion area of the resguardo corresponds to the zone called Matavén Forest, located as an enclave within the 16 resguardos, which from a biogeographical point of

view are part of the Amazon, forming an area with the largest biodiversity in the region, making it a protection priority zone. The physical and cultural existence of the local indigenous groups depends on this protection, since the zone supports communal and cultural uses which are in line with environmental management.

- It is opportune and legally feasible to agree to requests of the indigenous people, in relation with the unification and enlargement, since the socioeconomic studies in the Conclusion chapter shows cultural, territorial, socioeconomic and practical conditions which make possible the integration and organization of these communities for a proper management and administration of the territory.

Therefore, the reserve not only constitutes an answer to the right of the indigenous people to be owners of their traditional lands, right given in the Political Letter - *Carta Política (CP),* but also guarantees the "timely protection" of the "area with the largest biodiversity in the region". From these considerations it can be concluded that with proper community management and administration, the resguardo can guarantee the protection of the region biodiversity.

The Colombian legislation on the environment includes many standards which refer to the management and protection of renewable natural resources and which establish and regulate a number of different types of biodiversity conservation areas. The resguardo is not included, however, among those types of biodiversity conservation areas. The question then is whether or not the resguardo de la Selva de Matavén can contribute to the protection of its biodiversity. Therefore, it is necessary to analyze the objectives and legal implications of a resguardo in terms of environmental authority, administration and management of the territory.

7.2 Conceptual Framework

Some general considerations

A rapid review of the articles in the Political Letter of Colombia - *Carta Política (CP) de Colombia* which refer to the indigenous people, shows that within the politico-philosophical and applied order which this Letter seeks to impart on the country's development, these particular articles receive special importance. The following are some of the aspects pertinent to the analysis.

Colombia is defined as a multi-cultural country, in which all the ethnic and cultural representations form the country's identity and should be protected. This means not only the right to exist but also the right to live according to the members' traditions and ideas. As a consequence, the CP recognizes the right of the indigenous people to the possession of traditional territories and specifically, the indigenous collective property known as a resguardo. Furthermore, to ensure the survival and cultural development, the law establishes that these areas cannot be levied, transferred or revoked. In other words, it ensures their existence and the collective property character in the hands of the indigenous communities for an undefined period of time.

It is important to note that the property is not limited to authority over the soil but also includes authority over the natural resources existing in the resguardo, since these resources are fundamental for the physical and cultural sustainability of the communities. This statement has been expressed by the Colombian Supreme Court - *Corte Suprema de Justicia*.

The CP article No. 246 establishes that the indigenous communities have jurisdictional authority within their territory, according to their own norms and procedures provided that they are not contrary to the Colombian Constitution and legislations. This recognition of the indigenous community's autonomy for their own governance, is a condition *sine qua non* to exercise their fundamental rights to live in accordance with their own ideas, otherwise they will be subordinated to the opinions and ideas of other cultures.

Finally, as noted by Roldán (2001), a number of CP articles (285, 286, 287, 329, 330) point out the indigenous communities' right to be part of the political administrative entities or in other terms to form part of the fundamental organized structure of the Colombian state. This aspect has environmental implications that have been developed in subsequent laws.

The environmental objectives of a resguardo

As mentioned before, the resguardo is not one of the types of areas with the objective to conserve species diversity and their make up at the genetic, individual, population, species, community and ecosystem levels. In other words, conservation and protection of the integrity of ecosystems (distribution, operation and evolution) are not explicit objectives of a resguardo. A resguardo's function, in this context, is to contribute and ensure the indigenous community's survival which is based on the renewable natural resources (CC. Sentencia T-405/93). Thus, the existence and availability of natural resources is essential for the resguardo's existence. According to Roldán (2001), this is a crucial characteristic or condition of a resguardo. Now, considering the natural resources continuity by avoiding disturbances of the regional ecosystem integrity, it can be said that ecosystem conservation is a principal objective of a resguardo. The non-transferable and non-revocable character of the resguardo as well as the communities' autonomy to govern and manage themselves contribute clarity to this objective. It is important to clarify that the use and exploitation of natural resources are not excluded but treated according to modes and rhythms for sustainability, and do not alter the function of the natural environment beyond its regenerative capacity.

Legal territorial possession implications on the environment

The territorial possession of the resguardo by the indigenous community includes the possession of the renewable natural resources and the right to administer and manage such territories according to their own ideas. This has two important legal implications. The first, is that the exploitation of natural resources by a third party is not possible without community authorization (CP, article 30) and the second, that the use, exploitation or disturbance of natural resources, renewable and nonrenewable, should be in accordance with the legal regime of the country. The CP article 246 ratifies that the indigenous autonomy is not absolute but is subject to the Colombian law. Furthermore, the exploitation of natural resources is subject to the protection of ecosystem integrity in order to maintain the communities' survival, thus protection becomes the main objective for the resguardo.

Finally, the communities establish their own regulations with regards to use and exploitation of the natural resources. These regulations are derived from the communities' Cosmo-vision and the specific knowledge they have about their environment.

Environmental administration and management

The CP, not only recognizes a set of rights to the indigenous communities, but it also defines the instruments that make them possible. As mentioned before, it establishes that the indigenous authorities will be able to exercise jurisdictional functions within their territory, it establishes that these authorities are are public authorities and that they have the right to be a political administrative entity. The agreement No. 169 of 1989 from the International Work Organization - *Organización Internacional del Trabajo (OIT),* validated by law No. 21 of 1991, recognizes the indigenous communities' right to know and intervene in all the aspects that affect them or their territories.

Law No. 99 of 1993, article 67 establishes that the indigenous territories have the same environmental functions as the municipalities. Article 65 defines such functions.

The **indigenous territories,** municipalities and districts with special constitutional regime and the mayors have environmental functions given by law or those given or transferred by the Ministry of Environment, Housing and Territorial Development - *Ministerio de Ambiente, Vivienda y desarrollo de Ambiente (MAVDT)* or the Regional Corporations - *Corporaciones Autonomas Regionales* with the following special attributes:

To promote and execute programmes and policies at national, regional and sector levels in terms of environment and renewable natural resources; to formulate plans, programmes and environmental projects **in their territories** in harmony with the regional, departmental and national plans, programmes and projects.
To dictate norms that control, preserve and defend **their territorial** ecological heritage, subjected to the superior legal standards.
To adopt the plans, programmes and projects for environmental development and renewable natural resources that have been discussed and approved at regional level, according to the norms for environmental planning given in the present law.
To participate in the elaboration of plans, programmes and projects for environmental and renewable natural resources at departmental level.
To collaborate with the Regional Corporations - *Corporaciones Autónomas Regionales* in the elaboration of regional plans and the execution of programmes, projects and the necessary tasks for the environment and renewable natural resources preservation.
To exercise the control and surveillance of the environment and renewable natural resources through the indigenous authorities and with the National Police support, in coordination with other entities of the National Environmental System - Sistema *Nacional Ambiental (SINA)* in order to fulfill the environmental duties of the State and to protect the constitutional right for a healthy environment.
To coordinate and lead, with the Regional Corporations advice and support from the police, the environmental control and surveillance of **their territories**, in relation with the mobility, processing, use, exploitation and commercialization of the renewable natural resources or in relation to pollution or degradation of the water, air or soil.

To dictate the rules for land planning and land use regulation of **their territories** within the limits established by law.
To execute decontamination projects for water bodies affected by spillage as well as programmes for the disposal, elimination and recycle of liquid and solid residues and the control of contaminating air emissions.
To promote, co-finance or execute projects in coordination with the Sistema Nacional de Adecuación de Tierras and Corporaciones Autónomas Regionales for irrigation, drainage, land recovery, flooding defense and river-bed control in order to properly manage and exploit the watersheds.

The present chapter does not attempt to be exhaustive in analyzing all the standards included in the environmental legal regime *(Régimen Legal del Medio Ambiente)* but refers to some in order to illustrate the administration and environmental management scope in which the resguardo exists. In this context, it is possible to establish whether the Matavén Forest can contribute to the timely protection of the regions' biodiversity.

Regarding the latter, we conclude that the resguardo can not only but also contribute to the timely protection of the regions' biodiversity and that the communities and indigenous authorities have the legal instruments to achieve it.

7.3 Towards the environmental management and protection of the Matavén Forest

The indigenous communities of the Matavén Forest have held various meetings in order to diagnose the environmental situation of their territories. The result is the identification of the environmental problems and the proposals for proper environmental management. These aspects have been compiled in a number of booklets (Fundación Etnollano & ACATISEMA 2002, Fundación Etnollano 2004a, Fundación Etnollano 2004b). A summary is provided below:

Problems identified by the Sikuani Ethnic Group
Slash and burn of forests for subsistence farming or pasturelands becomes a problem when the burned terrain is large or not used.
The burning of fallow lands becomes a problem when the land does not rest enough thus producing low yields at a low quality.
The accidental savanna burning is a serious problem and happens mainly as a result of neglect. The fire damages the terrain and many years are needed for its recovery.
Cutting of palms in large quantities or when they are not yet mature is a problem because on the long term the palms can be a scarce resource (palms are used as raw material for handicraft).
The main problem occurs when hunted animals are used for trade because they are captured in big quantities.
Nowadays the populations of "danta, wild pig, agouti, zaino and araguato" have decreased and are difficult to find in the surroundings of the communities.
Adult turtles and large quantities of eggs are collected; this makes this animal scarce and endangered.

In fishing there are five main problems: fishing with "barbasco" (the barbasco plant poisons the fish in the water), chemical fishing, net fishing, intensive fishing of ornamental fish and trade fishing.
Streams, rivers, and lakes are polluted with garbage, detergents and combustibles. This is a grave problem because it causes human illnesses and decrease or extinction of some fish species.

Problems identified by the Piaroa Ethnic Group
Indiscriminate fishing of species such as "bocón, palometa, bocachico and cachama". The fish are moving away because of the human population growth and misuse of resources; there are also problems with the Venezuelans because they fish excessively without the authorization of the community leaders.
Commercial trading of turtles because these animals can disappear.
Indiscriminate commercial hunting for species like agouti, danta, wild pig and deer with special risk for agoutis and dantas.
Raw material trade because it causes the loss of plant species, decrease of forest, animal displacement and droughts.
Water pollution by toxic waste.

Some principles
This is our territory; it has not recently come into being, but has long since been in existence. It is not land for commercial purpose, as the government thinks. The territory is Mother Nature and she has given us life under her law and it must be respected. The management of our territory is built, woven to make possible the social control of nature. In this way we have life as Piaroa people.

The life of nature is the life of the Piaroa people; in her we have our health, thoughts, education and social control of our environment. The first method to know and manage her is the dream, bank of knowledge. Each natural living being among us has a mother (gemstones) or owner who gives us norms on how to handle the resources in our territory.

The increasing demands on the natural resources negatively impact the biodiversity of our resguardo, in addition when the population grows, the demands will also grow.

There is an indiscriminate use of nature and disrespect for the traditional activities. It begins with the exploitation of animals, turtles and fish for trading. Is it conceivable that those who trade do not have children? We have to think about our future generations. There are ways and techniques to use the resources, the water, and the forest without depleting them. When we obeyed the rules of nature, living beings trusted us, now they are offended, they can punish us, and take revenge. It is very important to project the adequate use of knowledge, to "respect" our mother nature because she is the life of the Piaroa society itself, and disrespect causes the loss of the culture. It is very important to respect the environment and the living beings that inhabit it because they deserve to live and to reproduce. Also to take into account the laws of nature, in an ordered and controlled form, and according to the Colombian law, as well as our ancestral law with respect to the care of nature and animals: it is important not to forget our culture for our well being.

Our thought and knowledge, going from generation to generation, tends to disappear. The ancestral knowledge is not lost but forgotten due to new generations' indifference for learning, in this way we lose value as a people. Taking care and spreading the knowledge is not easy for the wise because every being in nature has its own start and origin. By knowing this, the products abound. With the ancestral knowledge, products abound and when the products abound so do the Piaroa people. This knowledge brings responsibility, if we do not maintain our ancestral knowledge, what will happen? Who will give respect? Where will they end up? Where will they travel? Will they maintain the western knowledge?

The knowledge is not only material, but spiritual as the yagé liana and tobacco are used for spiritual entrancement in order to diagnose and project the future of the people. Another way to take care of the nature is by means of the spirit (yopo). If we do not respect her (nature), she punishes us. If we do not respect a sacred place, we get ill. We should organize our life in accordance with our "yagé" and with the establishment, in other words, join our knowledge with that of the west.

It is important to teach the new generation in the school, at home and in the community; what will be the responsibility of the new generation? We invite the authorities and teachers to dream with the wise for the control of nature for[1] *our grandchildren. Let us plan to administer our resources because every being has an owner; we should teach respect, the value is not about money but about maintaining our life and showing respect for nature.*

It is important to highlight the role of women in environmental protection. They should be taken into account: their educational plans, health and productive development. We should work together, man and woman in harmony. In the same way, the woman's voice should be taken into account in every project as they are bearers of the traditional and natural laws, for the harmony of the Piaroa people. From their first menstruation, the girls should be taught respect for the nature.

I am giving you the word "respect", nobody comes to teach us how to live in our environment because we received the knowledge from our ancestors. The environment has no frontiers, as a people we think in unity about respect and social control.

Organizational Aspects

What do we think about our resguardo's future? In the traditional organization, the "cacique" is the higher authority; nowadays the "cabildo" is first, then the captain, after that the teachers, leaders, promoters, women and at last, the "cacique". The only way to recover the traditional authority and with it, the ancestral law, is to find mechanisms to bring back the "cacique" to his appropriate place. There exists a political problem and therefore it is important to find strategies that answer from where we are going to administer the territory.
It is important:

- *For the cacique to train young men; these young men must be selected by the cacique himself, because not everybody is apt to fulfill this role;*
- *To create an internal regulation to ensure the protection of nature;*
- *To strengthen the territorial organization, mother nature, which is fundamental to nourish*

[1] Literal translation *towards*

the life of the Piaroa people to maintain customs and culture;
- *To promote respect of the ancestral knowledge by means of local, zonal and national organization;*
- *To revitalize the knowledge of the traditional authorities, like the cacique, captain and cabildo, for control and management; otherwise the resources will be exhausted and the existence of the Piaroa people will be lost.*

Leaders, teachers, in your hands we leave the defense and conservation of our habitat. For this, the school, is the house which will project unity, autonomy, use and control of the nature.

Actions referring to knowledge, education and training
Let's teach "respect" towards nature; do not make fun, because it is your own mother; health, education, authority, and the future life of the Piaroa people depend on her.
Let's teach, our own knowledge together with the standard education from childhood because as adults it becomes too difficult. Otherwise we will live without respect, as in these years. With the knowledge of the "white" the nature cannot be protected, only pollution and harm for health will arrive.
[We should also]:
- *Compile the traditional knowledge about the natural resources.*
- *Dialog continuously with the traditional healer (doctor) and with the elderly and take their recommendations into account.*
- *Value the indigenous natural resource norms according to our life plan.*
- *Continue with the training of leaders who are interested in suitable natural resources management.*
- *Compile the knowledge of other cultures thus widening our understanding of the protection of the environment.*
- *Train the communities in proper waste and sanitation system management.*
- *Train the youth in natural resources management*
- *Propose workshops in environmental and natural resource management, including topics such as accounting, legal and administration aspects among others.*
- *Put in practice what we have discussed and learned in the natural resource management plan meetings*
- *Prepare leaders for the good management of the natural resources, to encourage young people to consult the elderly and who can be ready to guide other members of the Matavén Forest.*
- *Rescue the traditional rules and make them applicable to women*
- *Rescue the traditional ecologic calendar*
- *Train in manufacturing our traditional derived products, for example: guava (jam), merey (wine, candy, jam), sugar cane and plantain (panela and flour)*
- *Train to replenish fish, animals and trees that are disappearing*
- *Investigate how to sow and reproduce a species before exploitation so that it does not disappear.*

Proposed actions for management
- *To find other palm species for roof building and let rest the species that are used nowadays.*
- *To let the tall palms live to protect bird nests.*

- *To avoid wild meat trade, control animal use*
- *To use solid ground for new crop parcels (conucos) in which sowing will be better and will have less weeds.*
- *To fish only for own consumption without fishing all the fish at the same time, giving them time to rest, and not to use natural or chemical poison (like barbasco), because this harms the ones who want to live, like the small fish.*
- *To protect the woody plants like patarure, sasafrás and palms.*
- *To control animal and plant trade and use.*
- *To increase the breeding of natural flora and fauna species (aquatic and terrestrial).*
- *To increase agriculture, cattle farming and breeding of minor species.*
- *To use new techniques for control, use and management of flora and fauna.*
- *We should not pollute water and soil by throwing garbage because this is bad for our health.*
- *It is necessary to plan fishing and hunting areas as well as areas for other uses like sacred sites and sites for trees. It is important to take into account the climate and air in our environment.*
- *To propose projects for sustainable production, for example in fishing or wild animal breeding.*
- *Reforestation of endangered species, like fruit and woody trees and seje and moriche palms which are very useful for man and animals.*

Proposed norms

- *Not to slash and burn trees, because it damages the forest and the animals go away to another place. To avoid accidental burn, bonfires should be extinguished when hunting begins.*
- *Not to burn stubble and bush. There are children and old people who burn "just for fun" and as a result the soil is damaged and produces nothing.*
- *Not to sow in young stubble.*
- *Not to slash the seje and moriche palms because it takes too long for them to grow and give fruit; also not to slash trees in the headwaters of streams.*
- *Not to kill agoutis for trade. Some persons kill up to 10 agoutis.*
- *Not to use barbasco (a poisonous plant) or explosives in streams or lakes, because they kill many sorts of fish that are sometimes thrown away.*
- *Not to use chemicals or poison and prevent others from using them inside our resguardo.*
- *Not to use fishing nets to capture small fish.*
- *Not to fish big amounts of decorative fish.*
- *Not to pollute the water, neither to throw waste such as tin cans or chemical products (oil residues) because they can make fish and people sick. We should think about the people who live downstream.*
- *Not to kill animals that are not to be eaten because we should not waste them.*
- *Not to burn the forest because the small and young animals die and the others go away to other places.*
- *Not to exploit mineral resources that are in the ground (gold, petroleum, diamonds) because the water gets polluted and dries out; Also not to take the fish treasure, because they (the fish) are the owners.*

It can be observed, that there is a clear community conscience over the importance to properly

manage and protect the resguardo natural environment. Various environmental problems have been identified and analyzed and specific management solutions have been proposed.
It is also clear for them, that this is a process that should improve in time and in which the community members' attitude, the learning of new ways for sustainable use of natural resources, the process to recover and apply the knowledge of the elderly and a solid community organization have a fundamental role.

Through this process and by implementing the proposed management measures, it is clear that the resguardo is already contributing to the biodiversity conservation and protection of the Matavén Forest.

Next there are some action guidelines to complement the solutions expressed by the communities which can help to re-enforce the ongoing process:

1. Resguardo and sustainable environmental management:
- To perform a Resguardo zonification based on biophysical, economic, social and cultural criteria and concerted with the community.
- To create temporal and permanent use regulations of the different zones concerted with the community
- ACATISEMA and/or the cabildos should follow up on, evaluate and change the course (when necessary) of the uses.

2. Strategy consolidation:
- To develop processes for investigation and education referring to the historical settling process;
- To develop processes for investigation and education referring to the identification and appraisal of cultural important locations;
- To develop processes for investigation and education referring to the identification and appraisal of the biodiversity components;
- To develop processes for investigation and education referring to following up on, quantifying and evaluating natural resource extraction processes;
- To develop processes for investigation and education referring to strategies that ensure food and health;
- To make strategic agreements with institutions that can neutralize or reduce the effects of external threats over the resguardo area;
- To make strategic agreements with national and international NGOs for the process of support and capacity building within the strategy for management and administration consolidation.

7.4 Concerns about the mining activities

There is a great concern within the Matavén Forest and ACATISEMA about the negative environmental, social and cultural impact derived from the subsoil exploration and exploitation. The concern has grown lately, due to the priority the government has given to the exploitation of such resources, especially hydrocarbons.
All of the Matavén Forest appears in the National Agency for Hydrocarbons - *Agencia*

Nacional de Hidrocarburos (ANH) plans, as a special zone for exploration and possible exploitation of petroleum and gas. Although the indigenous communities have control over the renewable natural resources, the resguardo figure has no possession over the subsoil.

Besides, the Colombian law does not forbid mining activities in the resguardo areas. However, it includes the communities' right to obtain and exploit mining concessions in their territories, once the requirements established by law are fulfilled. Moreover, the mining activity is subjected to the implementation of measures that avoid or minimize the negative environmental aspects as regulated in the Mining Code and the renewable natural resources and environmental protection code. It also defines mechanisms that make possible the participation of communities and their representatives in the definition and implementation of management plans in which the exploitation will take place. However, the communities can not obstruct the development of these activities.

Considering that mining is *per se,* a harmful activity for the environmental, cultural and social development that the communities want for the resguardo, they have explored the national legislation seeking a norm that prevents these types of activities in their territories. The result is that the mining activity is only forbidden in the natural national parks, according to the Mining Code (Law 685/2001; article 34):

Zones excluded for mining. Exploration and exploitation types of mining work cannot be executed in declared and delimited zones for protection and development of renewable natural resources according to the legal standards. The excluded areas (for mining) are those established according to the standards, as areas integrated into the **National Natural Park System *(Sistema de Parques Nacionales Naturales, SPNN)*, regional natural parks and forest reserve zones.** The mentioned areas should be geographically delimited by the environmental authority, based on technical, social and environmental studies **in collaboration with the mining authority**, in those areas of mining interest. In order to restrict or exclude mining exploration and exploitation in zones for protection and development of renewable natural resources, the act that declares them must be **justified by studies determining the incompatibility or restriction in relation with the mining activities.** However, the mining authority can approve mining activities in areas mentioned above **except inside parks,** in a restrictive way or performed with certain methods or extraction systems that do not affect the objectives of the protected area. The mining authority should request the transfer of the required area from the environmental authority. The companies interested in the concession should present the studies that demonstrate the compatibility of the mining activities with the objectives of the protected area.

We have highlighted some aspects from the article, which we consider warrants special attention. It is clear that the excluded zones correspond to the areas integrated into the **SPNN, regional parks and forest reserves**. At the end of the article, the restriction is established for **parks** only. This creates some confusion since the article is not clear enough to define what type of protected area a **park** is. We tend to believe they are referring to natural national parks, or the areas integrated into the SPNN, since the possibility to develop mining activities in these areas is subjected to, among other aspects, the "request of transfer of the required area". Since the law establishes that SPNN areas cannot be levied, transferred or revoked (CP. article 63), the "transfer of the required area" would be unconstitutional. Yet, the term

"**parks**", as used in the article, is not consistent with article 333 from Decree 2811/74 which establishes that the areas belonging to the SPNN can only be denominated according to the nomenclature that corresponds to its category within the system.

On the other hand, article 34 establishes that the mining exclusion areas (i.e. national natural parks, according to our interpretation) should be delimited in collaboration with the mining authority, and that the declaring act should be **justified by studies determining the incompatibility or restriction in relation with the mining activities.** For the specific case of the Matavén Forest, an agreement could be reached with the mining authority for mining exclusion in an area that is considered of special interest and to demonstrate the incompatibility of mining activities with the biodiversity conservation purpose of the region. Although this can be difficult, it is not impossible.

There is the possibility to overlap a natural national park (PNN) with the resguardo to reach the desired objective. The overlap is legally possible, and is becoming relatively common: there is total or partial overlap between natural national parks and resguardos indigenas in more than twenty cases. However, there are a number of legal procedures that have to be fulfilled in order to create a PNN and once a PNN is created there will be a substantial number of consequences that affect the administration and management of the resguardo-park.

7.5 Requirements for the creation of a national natural park

According to the Law 99/93, the Ministry for Environment, Housing and Territorial Development (*MADVT)*, has the responsibility to reserve, delimit, acquire and administer SPNN areas. It can delegate administrative functions to Regional Corporations, and also allow the participation of territorial entities and civil society (IAvH 1999).

By means of Decree 2915/94, the Ministry of Environment organized the Special Management Unit for the National Natural Park System *(UAESPNN)*, which is responsible to regulate the administration and management but not to declare the areas in the system.

The legislation does not specify detailed steps to declare an SPNN area, but generally the following procedure is applied:

- The entity in charge to declare the protected area, in this case the MAVDT, presents a study justifying its creation.
- When there is an indigenous area to be totally or partially included inside the SPNN, the Colombian Institute for Agrarian Reform - *Instituto Colombiano de la Reforma Agraria (INCORA)*, together with the Anthropology Colombian Institute - *Instituto Colombiano de Antropología e Historia (ICAH)*, will make the relevant studies in order to establish a special regime for the benefit of the indigenous population.
- In mining interest zones, the area to be protected should be geographically delimited by the environmental authority, based on technical, social and environmental studies in collaboration with the mining authority.
- The resulting studies must be approved by the Colombian Academy of Pure Sciences -

Academia Colombiana de Ciencias Exactas, Fisicas y Naturales (ACCEFN).
- Once the above steps are fulfilled, the protected area declaration act must be justified by the studies which determine the incompatibility or restriction in relation with mining activities.

All the above procedures should be completed for the Matavén Forest resguardo. This offers two challenges: to elaborate a study justifying the creation of the protected area and to elaborate a study supporting the area delimitation that determines the incompatibilities or restrictions in relation with mining activities.

The first type of study is directly related with the PNN definition and their objectives established by law. It refers to an area 1) whose extension allows ecological autoregulation; 2) with ecosystems that have not been substantially altered by exploitation or human occupation; 3) where the plant and animal species, geomorphology and historical or cultural manifestations have a scientific, educational, aesthetic and recreational value.

From these objectives, it can be concluded that the area should include prominent values in terms of fauna, flora, landscape, historical, cultural or archeological relics and samples of biotic communities, physiographic regions, biogeographical units, genetic resources and endangered species in their natural estate.

A number of the above aspects must occur in the Matavén Forest in such a way that justifies the declaration of the entire resguardo and its extension as a protected area.

In addition, the study should help to determine why the mining activity is incompatible with the preservation of the natural, historical, cultural or landscape values and to demonstrate that such incompatibility applies to the entire area.

7.6 Administration and management of the "National Natural Resguardo-Park"

As mention before, the administration and management of the SPNN areas is a function of MAVDT, exercised through UAESPNN. The CP establishes that the indigenous communities are in charge of administering their resguardo in an autonomous way. As long as the objectives and the activities to be developed in the area coincide with the park and the resguardo, the administration and management strategies can be harmonized.

The permitted PNN activities are conservation, recuperation, control, investigation, education, recreation and culture and they should be performed according to the following definitions:
Conservation activities: those that contribute to the maintenance of the renewable natural resources and panoramic beauties and that foment the ecosystem's biological balance.
Investigation activities: those that lead to the knowledge of ecosystems and archaeological and cultural aspects, to be applied in the management and use of the natural and historical places of the country.
Education activities: those directed to teach management, use and conservation of existing values and those activities oriented to promote the knowledge of the natural and historic

richness of the country and the need to conserve them.
Recreation activities: entertainment activities permitted to visitors in the SPNN areas.
Cultural activities: those addressed to promote the knowledge of the regional values.
Recovery and control activities: they are the actions, studies and investigations that totally or partially recover an ecosystem or the accumulation of elements that readapt it.

The following are some of the numerous activities prohibited by law inside a PNN:

- The spillage, introduction, distribution use or abandon of toxic or polluted substances that can disturb or harm the ecosystems.
- The development of agriculture and livestock or industrial activities including hotel, mining or petroleum activities.
- Slash and burn, weeding or any cutting activity.
- All activities considered by the authority to be the cause of significant environmental modifications.
- Any sort of hunting, except hunting for scientific purposes.
- Any sort of fishing, except fishing for scientific purposes (with the corresponding permit given by the authority), sport fishing and sustenance fishing in places where, given their natural or social condition, it can be authorized and do not disturb the ecological stability of the sectors in which it occurs.
- Collection of plant material, except those authorized for investigation and special studies.
- The introduction, temporary or permanently, of animals, seeds, flowers or seeding of any species.
- The production of noise, the use of instruments or use of sound systems that disturb the natural environment or visitors.
- To carry any sort of weapon or instrument to be used for hunting, fishing or tree felling.
- To sell, trade or distribute any product, except those authorized.
- To promote, perform or participate in meetings not authorized by the authority.
- To get drunk or provoke and participate in scandals.
- To transit with commercial or particular vehicles outside the established schedule and route and to park outside the parking areas.
- To take pictures, films or sound recordings of natural values for commercial purposes without authorization.

Finally, the UAESPNN should elaborate and execute a park master plan. Such plan is based on a zonification that can have a maximum of seven different zones, each one with objectives and different types of uses:

Primitive Zone: Zone that has not been altered or has little human intervention in its natural structures.

Intangible Zone: Zone in which the environment should be protected from any human activity, such that its natural conditions are everlasting.

Natural recuperating Zone: Zone that has been altered and is destined to recapture its natural environment by using recovery mechanisms to obtain the desired ecological cycle. Once recovered, the zone should be classified accordingly.

Historic-cultural Zone: Zone with archaeological, foot prints or signs of ancient cultures, existence of indigenous cultures, historic features or scenarios where national important episodes took place.

Outdoor recreation Zone: Zone that given its natural conditions offers the possibility for outdoor recreation activities that do not modify significantly the environment.

High density use Zone: Zone that given its natural conditions, characteristics and location can offer visitors certain recreation facilities and environmental education, harmonizing with the nature and producing little modification to it.

The mentioned norms and conditions are just an overview of the rules in a National Natural Park - *PNN*. However, they give a general idea about the implications they have for the resguardo administration, management and use of natural resources, showing the incompatibilities that can arise when the two figures are overlapped.

There exists a legal instrument than can improve this circumstance. The article 7 Decree 622/77, says that when indigenous communities live in a park, a special regime should be established to the benefit of the indigenous population, respecting their permanency and their right to exploit the renewable natural resources, observing compatible technologies with the objectives of the area.

Questions that arise from this situation are, for instance, what flexibility has a special regime to ensure the rights of the indigenous communities to execute their activities according to the laws in the Colombian CP? What would be the legal status of such regime? Can this regime revoke or modify what is prohibited in the PNN Decree?

7.7 Development of Special Management Regimes in some resguardo-parks

A special management regime-***Regimen Especial de Manejo (REM)*** has not been established in any of the more than twenty national natural parks that overlap with a resguardo, in spite of the existence of the legal mandate, but in few cases the procedure has been started. Here we gathered some characteristics of the process, taking the examples of Amacayacu, La Paya and Cahuinarí PNN cases, located in the Colombian Amazon. Annex 7.1 gives an extended version of the progress in each case.

The establishment of a REM in the overlapping area of the Amacayacu national park with indigenous resguardos, emphasizes the territorial and governability aspects such as ecotourism and natural resources management.

Territory and governability

The main proposals referring to the territory are:

- to extend the resguardo to areas that have been converted to forest reserve or national park;
- to restrict the access to sacred places or those of indigenous cultural importance for people outside the local communities;
- general norms for the development of activities inside the resguardo, in particular mining activities and other developing projects.

About governability, there is the proposal for a preliminary procedure for the curaca/cabildo – leader of the community, to apply sanctions for violations in the use or management of natural resources. However, the leader can invite the UAESPNN or any other authority when necessary.

Additionally, the creation of a directive committee is proposed for the REM development. The committee should be composed of junior curacas (curacas menores), the senior curaca (curaca mayor), the park head, the Amazon-Orinoquian Territorial Management - *Dirección Territorial Amazonia-Orinoquia (DCTAO)*, the general directorate of UAESPNN, one delegate from Corporación para el Desarrollo Sostenible del Sur de la Amazonia (Corpoamazonia) and one delegate from the Asociación de Cabildos Indígenas del Trapecio Amazónico (ACITAM). Some of the functions of this committee are as follows:

- To define the policies and general action lines;
- To develop the park's management plan and the resguardo life plan - *plan de vida;*
- To find and administer the financial resources;
- To follow up the agreed compromises.

The committee will be assisted operationally by a local REM committee composed of curacas of each community, traditional authorities, indigenous delegates from the Grupo de Trabajo en Investigacion (GTI) (for the ecotourism, natural resources and education groups) and the

head of the PNN Amacayacu and his team. Some of their functions will be:

- To formulate the action plan;
- To ensure the fulfillment of the established norms;
- To coordinate project formulation;
- To gather the communities.

Proposals for ecotourism development

It is important for the communities to reflect on the ecotourism aspects, since this is an intense activity around Leticia and because the Amacayacu PNN tourism management has been given to private entities. The proposed norms are mainly directed towards indigenous behaviour to guarantee the ideal biological and ecological conditions and needs for the sustainability of different tracks such as, the maintenance of the natural forest cover along each side of tracks; no to cut trees, lianas or plants in general; not to offer any plant material to visitors, no to cut trees to show their resins and not to extract any animal or plant material on behalf of visitors, among others.

Other norms seem to be directed to prevent behaviour that scares tourists, such as hitting "bambas" with sticks but rather with hands; long term maintenance of tracks; not to hunt in front of visitors and not to leave the bullet case behind; not to have captive animals to amuse visitors. Finally, it is proposed that the visitors have to respect the beliefs of the community and follow the norms and restrictions established.

Proposals for natural resource management

The proposals concerning fish management are aimed at permanent or temporal prohibition of some activities. Although traditional methods for fishing are allowed (stick, fish hook, arrow and net), it is forbidden to traverse nets in the mouth of the Amacayacu river or its tributaries and in the river mouth of streams arriving to the Amazon River. Poison fishing is forbidden in all water bodies of the region. It is forbidden to fish Piracucú fish in the lakes Julio, Zabala, Tipista and Vuelta Grande and the lower part of the Amacayacu River. Finally, it is forbidden to fell fruit trees, located at the side of rivers, streams or lakes, which fruits feed some fish species. The temporal restrictive norms forbid the use of any nets in the Amacayacu River, lakes and streams during June, July, August, September and especially when fish are mating. Net fishing, as community work, is allowed during those months after consulting with the cabildo and the community monitors. The request should be communicated with the Amacayacu PNN. In the high-water season, net fishing is allowed where every person can have a maximum of two traverse nets at the same time but only for a maximum period of 12 hours.

The proposals for forest exploitation are prohibitive or conditional. The cutting of fruit trees in general, and palms is forbidden; extraction of caraná palm leaves for outsiders is forbidden.

Other tree uses such as felling for family subsistence is allowed, but the community leader should be informed; the felling of woody trees for trading requires a permit from the curaca after approval by the assembly and the park head.

For hunting, the activities are also prohibitive or conditional, for example, manatee hunting for any purpose, hunting of caimans, any monkeys, turtles and capybaras and all other wild fauna for trading purposes are forbidden. The restrictions established that only the community members are allowed to hunt, and yet, the trading of wild animal meat can only occur inside the community, unless there is a permit given by the curaca, in which case it is possible to trade up to 30 kilos of wild meat to local boarders. Other norms proposed refer to the transit of boats in the park or resguardo area, to waste disposal and to the conditions in which investigations in the overlap area can take place.

The case of overlapping resguardos with PNN La Paya and that of resguardo Predio Putumayo with PNN Cahuinarí, present proposals similar to the above case, although in each case there are particular emphases. In the first case, the central themes refer to natural resources exploitation, entry of outsiders to the area, recovered areas, cattle farming management, slash and burn, sanctions, control and surveillance.

In the case Cahuinarí PNN, the emphasis has been on the park administration, investigations in the overlapping area, services that the park can offer to the communities and about the zonification of the overlapping area. For the natural resource management, the proposals include a lot of prohibitions and/or conditions for hunting, fishing and use of building materials. It also proposes mechanisms to control the use and extraction of resources by means of an inventory, the definition of sanctions and how to apply them.

The three cases presented here give an idea about the concepts, norms and management strategies that are proposed to harmonize the administration, use and management of the overlapping areas. It can be observed, that the emphasis in each case is different, in part because of their geographical locations, their distances to towns and cities and their relationships with the market are different. Amacayacu, by the shores of the Amazon River, is relatively near Leticia, and there is intense tourist activity in the park. La Paya, by the Putumayo River, is not far from Puerto Leguízamo, which has less economic activity than Leticia. In this zone the illicit crops are intensive. Cahuinarí, by the Caquetá River, is far from any town, city or market, there is no economic activity but some fish and wild meat trade occurs sporadically.

Close reading of Annex 7.1 shows that a high percentage of the proposed norms for the use of natural resources are restrictive or even prohibitive, not only for outsiders but also for the inhabitants of the resguardo communities. It also gives the impression, that they try to express the rules referring to the area administration and management strategies in such a way that the indigenous autonomy is adjusted to the administrative and management functions of the environmental authority, defined in the legislation.

We hope this chapter can contribute to the Matavén Forest resguardo communities reflection in making the political decision "to marry" with a PNN, sacrificing in major or minor ways a part of their autonomy, instead of impeding the development of mining activities in their territory. The park as well as the resguardo status are not revocable: the marriage is forever.

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CHAPTER 8:
SUMMARY AND RECOMMENDATIONS

8.1 Summary

The results of this study emphasize the following aspects:

1. The registered woody plants, birds, insects and fish, exhibit typical components of the Orinoquian and Amazonian region of Colombia. These results show the great heterogeneity of the region, reflecting the Matavén Forest biogeographical position.

2. The physiographic contrast between the five sample landscapes, show a low number of shared species for each of the woody plants, insects and birds. Therefore the species interchange between landscapes, the so-called beta-diversity, is high.

3. From the five characterized landscapes, the "planicies sedimentarias (BT-a)" and the "bosques de cerros rocosos residuales (BR)" are the least extended landscapes from the central eastern zone of the Matavén Forest. However, these landscapes show the highest alpha-diversity of the sample groups.

4. The fish sample includes a total of 137 species and 7904 individuals. The great majority (77%) belong to only 15 of the registered species. Eight species identified are new for the Colombian Orinoquian region.

5. The training given to 11 members of the indigenous communities, gave added value to this study, considering the general perception of the GEMA team about the little knowledge that the communities adjacent to the sample sites have of their environment. Additionally, this activity helps the local communities to value and appreciate their natural environment.

8.2 Recommendations

Integral recommendations are presented that are relevant to preservation and management of the area. They are based on the results of the present study and the analysis of secondary source information.

1. Due to the high landscape heterogeneity present in the sample zone (central eastern section) of the Matavén Forest, some landscapes had to be excluded due to time limitations. Therefore, it is recommended to take samples in other partially flooded savannas "sabanas parcialmente inundables" located at the north of the Matavén Stream, since it presents characteristics that can have a different composition and structure from the biological groups already studied.

2. Due to the great extension of the "Resguardo Unificado de la Selva de Matavén" and taking into account that ACATISEMA wants to characterize the entire resguardo, it is recommended to extend this type of study to other sections of the resguardo, with the purpose of obtaining representative information for the whole. For more details about other types of existing landscapes in the resguardo see Annex 8.1.

   Taking into account the high beta-diversity found in this study, it is expected that an extended sample area will show an increase in the diversity of the registered species for the groups of interest. In fact, indigenous people from other sections of the resguardo stated that in the zones where they live the species are different from those found in the study area.

   However, it is important to mention that due to issues of accessibility, new expeditions will imply higher costs. Therefore it is essential to prioritize the landscapes and the sample sites, possibly according to criteria such as contrast in landscapes, exclusivity, distribution, anthropological pressure and cost to perform the biological characterizations.

3. It is necessary to extend the fish exploration area along the Matavén Stream and its tributaries. This will allow a better view of the species composition and a better understanding of their relation with other water bodies in the Orinoco Basin.

4. The creation and declaration of a national natural park is a long and rigorous procedure that requires the approval of various organizations, among them the National Agency of Hydrocarbons - *Agencia Nacional de Hidrocarburos (ANH)*. The management of the resguardo as a resguardo and national natural park combined would be the responsibility of the indigenous communities settled in the area and the environmental authority, specifically the Special Administrative Unit for the National Natural Park System - *Unidad Administrativa Especial del Sistema de Parques Nacionales Naturales (UAESPNN)*. Consequently, a declared park over a resguardo area will affect its autonomy because it will limit the authority of the communities.

5. It is suggested to name the area as Area of Importance for Bird Conservation - *Área Importante para la Conservación de las Aves (AICA)"*. This figure of conservation would not affect the autonomy of the settled indigenous communities, but will be of national and international recognition to the conservation action that the resguardo is performing in this area.

   As mentioned in Chapter 5 – "The Birds", the Matavén Forest would be the second AICA in the Vichada Department and would conform to a network of more than 112 sites in Colombia (Franco y Bravo 2005) and another 15,000 around the world that promotes global recognition and development of conservation projects for the protection and monitoring of these areas (BI 2007). The nomination is possible since it fulfills the criteria A2, which establishes that the bird species must be restricted to an endemic area. In this case, 33% of the species are restricted to an endemic zone called white sand forests of the Orinoco-Negro, "selvas de arenas blancas del Orinoco-Negro", located in the Matavén Forest.

6. It is recommended to advance the consolidation and integration processes of the resguardo which have been carried out until now. Such processes relate to, for instance, the economic alternatives, management of natural resources and seeking and establishing alliances for the execution of projects. Working with universities, could be an interesting alternative for the execution of long term investigations with varied approaches but that supply the identified needs of the resguardo and its people.

7. Due to the geographic position of the Matavén Forest, the conservation and proper use of the natural resources require bilateral efforts between Colombia and Venezuela. The integral management and coordination of fishing rules, for example, are essential for the success and coherence of conservation measurements, management and fishing exploitation.

8. Last, but not least, as mentioned during this study, the Matavén Forest is an important region in biological and environmental terms. It is the responsibility of everyone, but mainly of its residents, to maintain the natural resources as well as the goods and services that the surroundings generate, to guarantee the present and future of the generations to come.

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