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## 1. SUMMARY

The Toisan Project was developed during May to September of 1999 on what is denominated as "Intag" zone, at the South-Western side of the Toisan Mountain Chain, a natural buffer zone to the Ecuadorian Ecological Reserve of Cotacachi-Cayapas. The specific study spots were two forests closer to the Junin River's basin and the one surrounding the local Community of Cerro Pelado; at this small town environmental education and training activities were also implemented.

The main general objective of the project in the biological component was to obtain basic information of the flora and bird species from a zone that had been facing serious threats from minning and timber extraction, and from which no specific studies had been made. In the social component, being the study area economically depressed, facing marginality regarding education and health attendance, and being us aware of the need to incorporate local communities with conservation studies and actions, our general goal was to establish a direct relation with the Community of Cerro Pelado and carry out environmental education and training activities that would contribute to their sustainable development.

The botanical study was focused on getting to know the conservation state, structure and composition of the flora and to determine the state of wild populations of treelike palm species specially from the genera *Ceroxylon*. The ornithological study was focused on getting to know the bird species that inhabit the zone and determining the actual state of four specific bird species: the critically endangered Yellow-eared Parrot (*Ognorhynchus icterotis*); the Giant Antpitta (*Grallaria gigantea*) and the Tanager Finch (*Oreothraupis arremonops*), both in vulnerable state; and the Hoary Puffleg (*Haplophaedia lugens*) in lesser risk. Finally, the social component was focused on carrying out a participatory diagnosis of the community of Cerro Pelado, designing and conducting training and environmental education activities to all members of that town with emphasis on children and women, and divulging information regarding the project while integrating local people to the development of our field work.

The project considered from its beginnings the presence that the Bishimetal-Materials Japanese minning company had have from 1991 to 1996 at the Toisan Corridor where it developed prefactibility studies for the extraction of copper and from which it concluded that the zone of Junin had a great potential for minning activities, specially for the extraction of copper and molybdenum. Nevertheless, among its Environmental Impacts Study no real considerations for the biological and social characteristics of the zone were made, the local forests action towards protecting the whole region's very important hydrological resources were not even mentioned, the local forests capacity to trap more atmospherical humidity than that given from normal precipitations was ignored, no well planned studies were conducted for determining the natural real value of the zone for its native species, genetical banks or ecosystem diversity, and no means of mitigation were offered for the implicit social impacts carried by the presence of an industrial company in a rural marginal area. From these premises the Toisan Project started off with its actions and its results were considerably different from the past fallacy.

The project has have valuable results which support the ecological importance of the area and its need for future conservation actions, this motivates a real consideration of a second phase for our study

For instance, from this project 95 species of plants have been registered, some of which constitute new registers for the zone, including the register of a probable new specie for science belonging to the genera *Plinia* from the Myrtaceae family. Regarding birds, 104 species have been registered, many of which are endemical and from restricted ranges; other are rare, vulnerable and in lesser risk of extinction. The community showed a broad interest in conservation issues and had a good participation in the activities we offered; as a result, children received complementary environmental education information and related activities were developed; family experimental organic orchards were established, bases for proper land use were introduced, orientation was given on community internal organization and health issues, and the first steps were taken for establishing a women's productive workshop on handicrafts. These all lead to the need for future education and training work among the community for a follow up and consolidation of what was done.

## **2. INTRODUCTION AND JUSTIFICATION.**

The Toisan mountain chain is considered an extension of the Colombian Chocó bioregion (Map N° 1) a unique ecosystem and one of the most rainy regions of the planet. The Chocó is biogeographically separated from the Southamerican Amazon's kernel by the Andean mountain chains. As a consequence of such isolation, and of its own altitudinal and geographical characteristics, it presents a very peculiar ecology, Southern Choco possibly shelters the highest proportion of specific endemism in the planet (Gentry *et al.*, 1995). The Toisan Mountain Chain has a difficult access since it presents an irregular contours with slopes with up to 90% of inclination and ground and stone secondary roads far away from its sides. A broad area of the mountain chain belongs to the Ecological Reserve of Cotacachi-Cayapas which includes zones on two different Ecuadorian provinces: the Andean Imbabura and the tropical Esmeraldas. Other important parts of the Toisan are a natural buffer zone to that Reserve.

The Reserve's land and other neighboring zones have high hydrological, mineral and forestry potentials. Industrial minning activities are a relatively new and now permanent threat to the zone besides the strong pressure that timber extraction has always have over local forests (Fundación Natura, 1995). The biological diversity of the zone is still unknown since most of the studies on the Ecuadorian Chocó have been done towards other sides of the andes and the amazon region, and exclude the Toisan Mountain Chain, probably due to its difficult access.

The Bishimetal minning company, now known as Mitsubishi Materials arrived to the Toisan region on 1991 with a special interest on the specific zones of Cuellaje and Junín, which are also part of the natural buffer zone to the Ecological Reserve of Cotacachi-Cayapas. The minning company carried out exploration activities during six years. The exploration phase had been permitted through an agreement signed between the Ecuadorian and Japanese governments, but the communities hadn't been asked or announced about the desition. As a result of information gathered during the exploration, Cuellaje was put aside for "the possibility of finding mineral deposits of economical importance in that ares was very scarce", on the other hand, the zone of the Junin rivers' bedside was seriously considered for minning extraction for studies done on Japan on 1997 revealed the existence



of copper and molybdenum in that area, according to calculations made, an estimated reserve of 318 millions of tones of copper were available (Japan International., 1998).

During the presence of the company on the zone at the exploration phase, several conflicts with the community already took place, among them: the extraction of timber without permission of the land owners, excavations were not covered afterwards-which affected the communities cattle stock, the improvised letrines for the minning team's use were placed on the Junin river's bank without any technical ordenning and discharged all their wastes (and other substances used on perforation) upon the river waters without any previous treatment, this caused skin problems on local people and made them search for other water sources for attending their domestic and agricultural needs. Furthermore, a 6 kilometers road was opened to the exploration site among primary forests, no environmental impacts studies were made in this regard, eventhough to be a legal requirement (Fieweger.,1998).

The local people didn't clearly know the intentions of the company and the national government didn't show interest in attending their questionnings, worries and the problems caused by the strangers, so the communities took action with a campaign against the companies presence and towards the defence of their rights and natural resources. On the front of this fight was DECOIN (Defense and Conservation of Intag), a local conservation NGO. Finally, the company desisted and left the zone because of the permanent and strong rejection actions that local people organized against its presence and intentions.

The communities resistance actions have been part of the news throughout the world, but it awoke special attention among conservationists due to the great value that those local forests involve as part of the Chocó bioregion and because of the lack of ecological studies among that specific zone where the Mitsubishi Co. wanted to implement open-sky industrial minning (Fieweger., 1998).In this context and guided by recommendations made by The Study of Development Actions and Protected Areas in Ecuador, and specially by DECOIN, it was a priority to study the flora and fauna of the cloud forests of the Junin river basin, at the Southwestern part of the Toisan Mountain Chain and to incorporate local peoples participation on conservation actions, specially due to the low economical income and marginality in education that they experience.

Based on these requirements, he project focused reaserched on obtaining basic information about plant and bird species of two spots where the minning company had carried out exploration activities. We set emphasis on palm populations and in the actual state of four bird species, which are endemical to the Choco bioregion. Environmental education and training activities were also implemented at the local community of Cerro Pelado.

The project's results support the natural and social importance of the zone and the urge to protect it, while allowing us to establish and sugges conservation priorities and immediate actions to incorporate communities in the protection of forests through the correct use of their natural resources. We are sure that our work will contribute for the realization of future projects in the area.

### 3. STUDY AREA

#### 3.1 Research Component.

The sample research areas are forests located at the southwestern part of the Toisan Mountain Chain, which belong to the Intag zone, province of Imbabura, Cotacachi canton, García Moreno parish. The studied forests are specifically located between the communities of Junín and Cerro Pelado and are part of the natural buffer zone to the National Ecological Reserve of Cotacachi Cayapas. (Map N° 2, taken from Rodríguez *et al*., 1997)

We established two study sites at the same places where the Bishimetal Company had conducted exploration activities in the past, the sites will be referred in this document as Toisan I and Toisan II.

Toisan I is a forest located on the edge of a small riverbed without known name, from which we found out through verbal information and observation on maps that is a tributary to the Junín river.

The forest is located in a latitudinal range from 2130 and 1706 m.a.s.l. at the next coordinates 0 18' 509" N; 78 39' 052" W. Toisan II is located at Rio Junín's edge, its altitudinal range is between 2130m up to 2286m among the coordinates: 0 18' 614" N, 78 39' 676" W.

Topographically the areas present an heterogenic contour of difficult access, where strong slopes with up to 80% of inclination are found. The sky is frequently covered by a dense mist, which later on the day transforms in rain; in the less rainy season the sky remains partially clouded and an intense mist appears during evenings and nights. (Gregory, 1997). The greater proportion of natural vegetation in the Toisan Mountain Chain is found on its western part, while on its eastern sides natural vegetation is very scarce, due to the permanent colonization, and increment in the need for agriculture and cattle raising lands.

According to Holdridge's and Cañadas' classification system, the study spots belong to the very humid mountain forest, and according to the new classification system proposed by Sierra *et al.*, 1997, the region includes the next vegetation types:

**Ever-green low mountain forest:** Type of vegetation found from 1300m to 2000m, including trees with daises from 25m to 30m and a big quantity of epiphytes.

**Mountain mist-forest:** found between 2000m and 2900m, this kind of vegetation includes an important presence of epiphytes.

#### 3.2 Environmental Education and Training Component.

The community we chose for developing our environmental education and training activities was that of Cerro Pelado, close to the study areas. It is located at the South western part of the Toisan Mountain Chain, among the zone of Intag, province of Imbabura, Cotacachi canton, and García Moreno parish, among the coordinates: 00 18' 789" N; 78 37' 197" W. It has an altitude of between 1980 and 2070 m.a.s.l., its weather is subtropical and has a very irregular topography. This communities small downtown area includes seven houses, a small elementary state school, two basic stores and a wooden chapel. The rest of

the communities homes are located at walking distances of between 30 minutes and two hours from the center.

### ***Habitat Information.***

The communities natural habitat is intervened, eventhough it is surrounded by patches of cloud forest. The Cerro Pelado properties have extentions of 10 to 90 has., some of which include forest areas from up to 6 ha., the rest of the properties are used for agriculture (remain as thicketsor are cultivated with short and long cycle products) and for cattle raising.

## **4. METHODOLOGY**

### **4.1 Botany Component**

- Sampling was made in two spots (Toisan I and Toisan II) for determining the diversity and loristical composition of the area. A set of 10 transects in 50x4 m. band were applied, all trees with a distance to chest diameter (DCD) of 2.5 cm or more were measured and tabulated.
- A general plant list was made for characterizing the local flora. The objective of gathering quantitative and qualitative inventories was to obtain information about the richness, diversity, composition and abundancy of species (Palacios *et al.*, 1997). The use of transects is an standarized methodology used by several researchers.
- Determinig floristic structure and composition contributes with information about the vegetal diversity of an area and the ecological species amplitude, while allowing the realization of an ecological classification of vegetation and ecosystems (Rangel, 1997).
- Four samples of each specie were collected, such material was pressed and preserved in alcohol during field work for its further drying and identification at the National Herbarium.

### **4.2 Ornithological Component.**

In order to obtain a preliminary bird list of the zone and data from our four specific bird species of interest, four reaserch techniques were chosen, specially due to the /irregular field conditions with strong slopes that made it difficult to collect data. 1. **Mist nets** are considered a useful tool when sampling species of understore that do not sing and that are not territorial (Terborgh *et al.*, 1990 in Guerrero 1996). 2. **Recordings** allow to register vocalization of species that are not commonly heard and rarely seen, with this method most birds can be heard at distances of more than 100 m. (Terborgh *et al.*, 1990 in Guerrero, 1996). 3. **Counting spots** are a more frequently used technique, do to its efficiency in all kinds of fields and habitats (Ralph *et al.*, 1995) enables to register species that are not regularly detected by other techniques, for instance, those species that are in (Terborgh *et al.*, 1990 in Guerrero, 1996). 4. Birdwatching walks are a complementary useful method.

- **Mist nets**

For this method 2 sampling areas were selected: Toisan I and Toisan II. In each area we established two transects and for each transect 10 mist nets were placed. All mist nets were 12m long by 2.5m tall and had 36mm of opening. The nets were placed according to area's

topography and following the altitudinal gradient in each of the slopes. Nets were operated for two days in each transect, this is four mornings per spot, from 6:00 to 11:00 and checked each 30 minutes.

The captured birds were identified and data was taken regarding age (based on feathering and moult), sex (when species with sexual dimorphism), and reproductive data (through incubating patch observations). Morphometrical data was also taken from those individuals that were difficult to identify; finally, blood samples were taken for a future genetical analysis.

#### ***Blood samples:***

For the blood sampling, we took the birds upside down in our left hands, , opened its left wing and punctured the branchial vein. The blood samples were conserved in a buffer substance that kept them at environmental temperature without need for refrigeration. The taken blood samples are in charge of Dr. Niels Krabbe, who will send them to the University of Copenhagen for genetical lab analysis.

#### **◦ Vocalization Recordings.**

We used a unidirectional microphone (Zeneisher), and a sound recording machine (Sony TMC). We obtained records for two days at each spot, this in the first hours of the day and during all available time when obtaining data from the area was possible. The sound identification was made with the collaboration of Dr. Niels Krabbe, Ornithologist.

#### **◦ Counting Spots.**

In this technique the observer remains in a spot from where he takes notes on observed and heard species in a certain lapse of time. In this study, 5 counting spots per area were used; five spare minutes were left after arrival for minimizing the impact of our steps and other sounds, afterwards we started the observation and sound recordings. The next kind of data was taken: identification of species, number of individuals, forest layer where the specie was registered and kind of record (visual or auditive).

#### **◦ Birdwatching Walks.**

We walked along each of the transects following the altitudinal gradient of the area, we also walked through trails used by the minning company years ago. We made auditive and visual registers in search for our species of interest.

### **4.3 Environmental Education and Training Component.**

Before formally starting the project, the team organized activities in order to establish a good relation with the community and to assure their participation.

We convoked two community reunions to which all inhabitants of Cerro Pelado were invited. In such oportunities, an introduction to the project's background, aims and methodologies was given. Each of the team's members introduced him/herself as part of the group and as representing the sponsoring and financing organizations (CECIA, DECOIN, ZOOBREVIVEN, and the British Petroleum Conservation Programme). Encouragement was given towards the community participation in discussing the project and setting their comments, questions and suggestions.

- We required the communities' help in choosing four people to become our field assistants and local guides during the field research among the forests. Through this,

local involvement was encouraged and the information acquired by the project was assured to be spread upon the community.

- The environmental education team established upon the communities grounds and procured building a close relation with the local families; through this a real involvement of the team with the everyday life in Cerro Pelado and with its social dynamics was pursued.

#### **4.3.1 Communities Diagnosis.**

The applied methodology was that of participative sound and community autoevaluation regarding socio-organizational, economical and environmental aspects.

- We visited eleven homes without any selection pattern, but trying to include families who lived far away from the small downtown. During this opportunities, confidence was consolidated, information about attitudes and values toward environmental issues were sound, and important information was collected regarding: common house structure, food and habits, characteristics of their parcels of land, kinds of cultivated products (both for consuming and commercializing), and agricultural practices.
- We asked twelve other people to help us answering and commenting a questionnaire with open and semistructured questions about the past and actual community situation regarding social, organizational, economical and environmental aspects. (Annex N°. 7)
- We filled out the scheme of "One day in the life of a man and of a woman of the Cerro Pelado". Through this we better understood and were able to establish the division of tasks and the time organization managed by the local families. (Annex N°. 8).
- Complementary information was obtained through direct observation and informal conversations held with community members at different opportunities.

#### **4.3.2 Environmental Education Activities for Children.**

- We chose alternative didactic materials to be used in our environmental education visits to the local school. Among them: Latinamerican legend books for children, science books with loads of photographs and drawings, ecological games and activities to be developed, a birdcomet, a world globe, and maps of the country and of the zone.
- We bought enough materials to be used by the children during our visits. For instance: 15 sets of children binoculars, boxes of crayons, pencils, colour pencils, colour clay, natural clay, scissors, rulers, a wall thermometer, a magnifying glass, notebooks, cardboards of different sizes, glue, wool, and shining sheets of paper.
- We contacted and invited the local teacher to participate in the planning and execution of our activities.
- We organized permanent visits to the small local elementary state school, during which we offered an introduction to general environmental information and analysed the problems and threats that the zone was facing. We chose to work outdoors rather than inside the only classroom, this both for comfort and for strengthening a sense of relation with nature. Each visit included story reading, drawing, painting, environmental games, and the use of clay.
- We organized a puppet workshop with the children that were interested the most and who were willing to stay after school hours. Here, several small animal masks were made in clay and painted, seven puppets were finished and three short puppet sketches

were written regarding conservation problems in the area. A puppet presentation and a morning full of games and contests for children and adults were made at the end of our stay.

#### **4.3.3 Training Activities With Women**

- Through formal talks and informal conversations we introduced the importance of the local biodiversity with emphasis on its birds, and explained sustainable alternatives to take advantage of such diverse natural resources in a long term. We specially talked about ecotourism and handicrafts.
- We organized a permanent workshop for training women in making ecological handicrafts.
- The selection and impression of a bird in cloth, the embroidery technique, and the cloth's preparation for painting were taught during the workshop.

#### **4.3.4 General Environmental Education Activities With the Community.**

- The organization of a group of birdwatchers was started. It was opened to children, women and men of all ages. During the birdwatching walks, a sharing and exchange of knowledge about the ecology and importance of local common bird and mammal species was encouraged. We counted with bibliographical support, specially with books that included photographs that local people could relate to.
- We organized periodic community reunions to report the findings and advances of our project and to attend questions and comments in this regard.
- Once the community diagnosis and fieldwork were concluded, the team organized several talks about themes that were a priority according to our observations and to the communities' own opinion. During this talks final reports of preliminary results from our field work were also presented.

#### **4.3.5 Environmental Talks to the Community.**

We managed to present each theme in a very simple understandable manner and thanks to DECOIN (who lend us its TV and VHS), and to the Ecological Reserve of Cotacachi-Cayapas forest keepers (who lend us their electric plant), we were able to complement our talks with the presentation of interesting videos for each theme and to stay later at night with the community members talking and discussing each issue.

#### **Theme 1: Forests Conservation - Importance and Threats.**

We gave an introductory talk about the Chocó bioregion with emphasis on the Intag zone, the Toisan Mountain Chain, and their high importance at a national and global range.

We gave second related talk in which we underlined the general structure of forest ecosystems and the floristical characteristics and diversity of the country, especially in relation with countries of bigger dimensions but much less biodiversity. Information about mist forests and their characteristics was included, special emphasis was set upon the importance of the Chocó forests and the need to protect them in order to assure the natural water sources and as a potential future touristic site. The next were analysed as the main threats for local forests: deforestation, expansion of the agricultural frontiers, agricultural mistaken practices (land burning, use of chemicals, planting in slopes and related erosion).

The negative effects that these practices have on soils in a medium and long term and their rebound in the economy of local families were analysed.

**Theme 2: Preliminary Report on the Project's Fieldwork Among Forests of the Toisan Mountain Chain.**

We shared with the community our preliminary results and specially mentioned the actual state of local forests, and their important recovery after the presence of the minning company. We also gave a general information about some animals that were registered and the link they keep with the balance of nature. We explained the research methods used; this explanation was reinforced with drawings and we included the participation of the local people who worked as field assistants.

**Theme 3: Animals, their importance on keeping the balance of Nature.**

We made an introduction to ecological figures such as food chains and pyramids, rescuing the importance of each layer. We used graphics and didactic schemes.

Then we focused on the niches and special functions that mammals and birds occupy in nature (plague controlling, seed dispersion, and food source for other species, turistic attractions and environmental indicators).

We made a very brief introduction to the classification of mammals and birds and focused in the species that Ecuador has, setting emphasis on the zone of Intag. We talked about the important biodiversity our country has and the importance of caring for and properly administrating such nonrenewable resources. Finally and with the help of the community we identified activities which's practice is oposite to conservation.

**4.3.6 Alternative Soil Uses Information and Training Activities.**

**Theme 1: Introduction to Organic Orchards.**

The objective of this activity was not only to inform about an agricultural alternative but to influence the food habits of the community members in a lo0ng term by giving them tools and knowledge to start cultivating different products than the traditional ones.

We started with an introductory talk about the negative effects caused by agricultural field burns of caused fires, which are a common practice in the zone. Then we focused on defining "organic orchards" and analysing their benefits. The techniques for implementing this agricultural alternative were explained, starting with the preparation of organic compost, soil preparation, sowing of seeds, kinds of seedbeds, cultivating techniques, seed transplantation, organic alternatives for plague control, and post harvesting tasks.

To put in practice what we introduced during the talk, nine homes were visited their families received practical assistance in implementing organic orchards in their parcels of land. The seeds included local traditional and nontraditional products, among them: cabbage, egg-plant, reddish onions, pearl white onion, tomatoes, lettuce, peppers, gherkins, beet-root, brocoli, spinach, salt-wort, melon, etc.

A complementary activity was to collect ethnobotanical information - different uses given to local plants (eatable, medicinal, fungicidal, plaguicidal or mithological uses) (Annex N°. 2).

**4.3.7 Educational and Informative Activities on Social Themes of Interest for the Family and the Community.**

**Theme 1: Nutrition and Hygiene.**

We started by differentiating "eating" from "nourishing" and analysing the importance of a good nutrition. We talked about the basic food groups, related them to local products and explained how to combine them in a correct way. The theme "hygiene" was divided in three parts: personal hygiene, hygiene at home and hygiene related to food preparation. The importance of waste treatment and family letrines were also covered. Finally, we talked about food assurance as a global priority theme and sustainable agriculture practices among other environmentally wise practices. We contrasted this information with that of demographical overincreasement, poverty, wrong agricultural techniques and general environmental wrong practices and attitudes.

**Theme 2: Family Planning.**

Several members of the community had shown interest in this theme and they formally suggested us to cover the contraceptive methods as part of the orientation in family issues.

We started by analysing the different aspects that couples should keep in mind before desiding to have a baby (pesonal maturity and security in the relation, economical estability, age, state of health, future plans, etc). From this, the importance of family planning was established. We divided contraseptive methods in two kinds: natural and artificial. We talked about each method, its benefits, threats, costs, and where they could look for more information and guidance. We distributed booklets and samples of some methods, this material had been previously donated by the COF (Center for Family Orientation) as part of their promotion campaign for sexual education and family planning. We concluded with an analysis of social and environmental problems caused or worsen by an increasingly growth of population at a global range and its relation with natural resources overexploitation and bad administration.

**Theme 3: Community Organization**

We started with an icebreaker activity, and then with the help of a clew of wool, we developed a group dynamic in which each participant briefly mentioned the first community problem that came to his-her mind and threw the clew of wool to another person but kept a corner or piece of the clew in his-her hand, this continued until all members have mentioned a problem and the wool string have created a complicated web; then we started the other way around beginning with the last person, who had to remember the past mentioned problem and briefly state a simple solution to it while collecting some of the wool string back into the clew, and so on until the web was untangled. The moral maxims of this activity were that we have common problems as part of the community that may affect us in different ways, that we can all think of solutions for our problems, that we must listen to each other and that we must work together to definitively solve our conflicts. While the activity was taking place, one of us took notes of every mentioned problem and its later solution, we reviewed them with the community and organized them in a "Problem Tree" which allowed us to determine problem roots-causes and effects - derived problems. Through this we all concluded that the main or "trunk problem" was the lack of internal organization among the community and the lack of communication among its members. We analysed possible immediate actions to take towards solving specific conflicts.

**5. RESULTS**



## 5.1 Botany Component.

### 5.1.1 Floristic Composition and Diversity

Quantitative plant lists were made on two spots among the local mist forests (Premontane Pluvial Forest) of the Toisan Mountain Chain. On the first spot, that we called Toisan I, 369 individuals with a DCD (distant to chest diameter) of 2.5cm or more were registered; these belonged to 29 families, 57 genera, and 77 species app. (Graphic N° 1). The most frequent species were: *Calatola costaricensis* with 26 individuals, followed by *Otoba gordoneiifolia*, and *Alsophylla cuspidata*, both with 18 individuals. Other families with important numbers of registrations were RUBIACEAE, MELASTOMATACEAE, CYATHEACEAE, MYRSINACEAE, and MORACEAE.

Through the quantitative study on what we called Toisan II, a total of 372 individuals with a DCD of 2.5cm or more were registered and corresponded to 36 families, 60 genera, and 79 species app., including two morphospecies (Graph N° 2). The most frequent species at Toisan II were: *Faramea cf. glandulosa* with 18 individuals, followed by *Otoba gordoneiifolia* with 36 individuals and then, according to number of individuals, these were the most important families MELASTOMATACEAE, LAURACEAE, MORACEAE, and MELIACEAE. (Annex N°. 1).

### 5.1.2 Vegetation in Toisan I.

A change in vegetation is notorious along the access route to our study area, forests had been burned and cut for the setting of anthropic products, among them: beans (*Phascolus spp.*), naranjilla (*Solanum quitoense*), manihot (*Manihot sculenta*), white carrot (*Arracacha zanthorhiza*), sugar cane (*Saccharum officinalis*), indian corn (*Zea maiz*), banana (*Musa sp.*), citric fruits, etc. The cultivated areas extended up to slopes with pronounced inclinations, while natural vegetation was found among nearby ravines and in the higher spots.

On Toisan I vegetation presents a higher level of intervention, signs of timber extraction are found at large blank patches among the forests, which are now colonized by shrubby vegetation. It is presumed that exploitation had taken place 5 years ago during the construction of a minning temporary campground. The study area is characterized by an irregular topography with slopes of up to 85% and some small ravines. The fields are strongly sloped down and small natural cliffs can be seen. The understore vegetation is characterized by the abundant presence of herbaceous vegetation, small shrubs and arboreal ferns, among them: *Cyclanthus bipartitus*, *Psychotria sp.*, *Anthurium spp.*, *Faramea uniflora*, *Miconia sp.*, *Palicourea sp.*, *Cyathea caracasana*, y *Alsophylla cuspidata*, tangaré trees are also commonly seen. The lower canopy was characterized by the presence of palms, trees and shrubs covered by epiphytes as the Briophytes (mosses and liverwort), Araceae, Cyclanthaceae, Bromeliaceae, Pteridophytes, orchids and lichens. Most of the individuals from this layer are branched out at their treetops. Among the most notorious are: *Prestoea acuminata* and *Prestoea sp.*, *Verbesina sp.*, *Gaisanthus sp.*, *Calatola costaricensis*, *Marila sp.*, *Psychotria cf. amethystina*, *Inga sp.*, *Cyathea sp.*, *Miconia sp.*, *Perebea sp.*, *Pseudolmedia laevigata*, *Myrcianthes rhopaloides*, *Ocotea sp.*, *Guarea kunthiana*, etc

The higher canopy was characterized by the presence of scarce individuals of wide wood and of great height, 25 to 30 m. Most trees branch out at their tops and their branches are

covered by epiphytes, some trees become hosts for vines and epiphytes. Among the most important species are *Carapa guianensis* or "tangaré", *Otoba gordoneiifolia* or "chicken blood", *Licania macrocarpa*, *Ocotea* sp. or "Alpa", *Ficus* sp., and *Matisia* sp. among the vines, the most frequent belongs to the *Clusia* genera.

#### 5.1.3 Vegetation State.

The forest is in general intervened, but patches of primary vegetation can be found especially on places with strong slopes. Something very important is the good recovery process of the zone, tree species at different growing stages can be found. Some species were flowering and fructifying at the time when this study was made, specially: *Carapa guianensis*, *Otoba gordoneiifolia*, *Calatola costaricensis*, *Clusia* sp., *Ocotea* sp., and the palm species: *Prestoea acuminata* and *Prestoea* sp., which constitute an important food source for local mammals as the guanta, peccaries, squirrels, and for some bird groups.

On certain hours of the day the forest is completely covered by fog, this phenomenon is caused by the quantity of epiphytes and trees that trap humidity and thus play an essential role in maintaining local water sources. Water from fog and mist is channeled to feed a small river that derives to the Junín river.

#### 5.1.4 Habitat Valorization

Even though the sampling spot we chose is close to the trail that leads to the ex-mining camp, it does present a good conservation state, the forest has a good number of trees with wooden trunks of considerable sizes. On neighboring zones we observed the impact that the mining exploration generated some years ago, this is evident at the trail zones and at the ex-campgrounds where blank areas are found among the forests and where pastures are found.

#### 5.1.5 Vegetation of Toisan II

Toisan II has a lot of slopes, its soil is very humid, black coloured, of soft texture and covered by a thick layer of organic material, the presence of rock in its surface is frequent. The forest's lower layer, understory, is characterized by the presence of low shrub species, herbaceous, climbing species, and epiphytes from the next families:

PIPERACEAE *Piper* sp., CYCLANTHACEAE *Cyclanthus bipartitus*, RUBIACEAE *Rhandia* sp., URTICACEAE *Urera caracasana*, ARECACEAE *Aiphanes erinacea*, MUSACEAE *Heliconia* sp., BROMELIACEAE *Pitcairnia* sp., *Guzmania* sp., GESNERIACEAE *Columnea* sp., y *Drymonia* sp. Among the important fern species: *Danaea nodosa*, *Danaea* sp., *Diplazium dividisimul*, *Diplazium maximun*, *Acrostichum danaeifolium*?, *Asplenium* spp., and *Cyathea caracasana*. We also found small trees in regeneration process.

The shrub layer is characterized by the presence of lightly branched individuals specially from the next families: RUBIACEAE *Faremea* sp., (*Faremea glandulosa*), *Faremea eurycarpa*, *Faremea uniflora*, *Palicourea* sp., *Psychotria* sp., *Rhandia* sp., MELASTOMATACEAE *Miconia* spp., THEOPHRASTACEAE *Clavija* sp., MYRTACEAE *Eugenia* sp., URTICACEAE *Urtica* af. *Arborea*, ARECACEAE *Prestoea acuminata*, *Aiphanes erinacea*, OCHNACEAE *Perebea* sp., MONNIMIACEAE *Siparuna* sp., and MYRTACEAE *Calyptantes* sp. Some small trees are also included: *Otoba gordoneiifolia* and *Carapa guianensis*, most of these individuals have epiphytes among their branches, moss, liverwort, Bromeliaceae, and climbing species.

The canopy is characterized by the presence of individuals with big wooden trunks, some with special adaptations such as lanky roots; among the most frequent: *Otoba gordoneiifolia* MYRISTICACEAE, *Carapa guianensis*, *Guarea kunthiana* MELIACEAE, *Clusia* sp. CLUSIACEAE, *Ocotea* sp., *Nectandra* sp. LAURACEAE, *Blakea* sp. MELASTOMATACEAE, *Myrcianthes* sp. MYRTACEAE, *Cecropia* sp. MORACEAE, *Licania macrocarpa* CHRYSOBALANACEAE, *Turpinia* sp.

Among the emerging canopy trees we observed: *Carapa guianensis* MELIACEAE, *Otoba gordoneiifolia* MYRISTICACEAE, *Croton* cf. *lechlerii* EUPHORBIACEAE and *Clusia* sp. CLUSIACEAE. As with shrubs, on the trees branches a great quantity of epiphytes, and climbing species were observed, among them: *Anthurium*, *Philodendron*, *Cyclanthus*, *Clusia*, etc.

#### 5.1.6 Palms and Vegetation.

The characterization of palms among the floristical composition was another of our important objectives in this study, since a palm specie, the *Ceroxylon fa. alpinum* or "wax palm", constitutes the main food source and nesting place for the yellow eared parrot, a critically endangered bird specie that our project aimed to search.

We found the next four palm species distributed among the study area:

1. *Prestoea acuminata* locally known with the name of "palmito", was the most commonly found palm specie, it forms colonies among the forests and its fruits are eaten by some species of wild turkeys squirrels, and other mammals. 2. *Aiphanes erinacea*, was the second frequently found palm specie in the study area. it's a colonial palm with triangular raquis and with long sharp thorns. 3. *Chamaedorea linearis*, was not very frequently seen among the study area eventhough its one of the most outstanding palm trees among forests due to its size, it can reach up to 5m of height and it grows alone or in colonies. 4. *Chamaedorea cf. odorata*, was frequently registered at Toisan II, it's a small understore palm that measures app. 1.50m of height, it produces fruits in bunches which are food for some common bird and mammal species.

No register was made of the "wax palm" *Ceroxylon fa. alpinum*, probably because of its common use at the religious Sunday of Palms or because of its limited distribution. Nevertheless, individuals of this specie were observed later on, close to the community of Barcelona, some of them had been planted and some were at a growing stage.

#### 5.1.7 Species of Special Conservation Interest, Rare Plants and Important Registers.

We made important registers at the plant inventory raised among the forests of the Junin's river basin, among them the new plant register for the zone of the tree fern *Laphosoria quadripinnata*, which had been registered for zones with lower altitude. A new register for the province of Imbabura was that of *Carapa guianensis*, a big tree known as "Tangaré" which gives a very fine kind of wood and produces a big quantity of seeds that are food for several mammals; it is one of the most important plant species among the Toisan forests.

Another important register is that of a specie of the *Plinia* genera and of the family Myrtaceae, it doesn't appear as an herbarium register probably do to lack of taxonomical treatment, and it is probably a new specie for science. The great amount of epiphytes, ferns and grasses not categorized among the quantitative sampling gives us a sense of the diversity the zone must have.

#### 5.1.8. Index of Similitude.

Forests upon the study area are highly heterogenic, according to Jaccard's similitude index, they have a similarity percentage of 58%, which clearly indicates there is in fact a similarity regarding diversity and floristical composition between Toisan I and Toisan II.

## 5.2 Ornithological Component

### 5.2.1 Diversity and abundancy.

The study areas were located among forests of the Junin Rivers' basin, birdwatching walks were also made in the surroundings of the local community of Cerro Pelado.

When obtaining the local bird list and searching for the species of interest, the next different habitats were visited within the study areas: pastures with thickets and dispersed trees, and cultivated and forest areas (here transects). Our total registration was of 150 bird species from 37 Families and 13 Orders. The most important Orders for their abundancy of species were Passeriformes (98 species), Apodiformes (19 species), and Piciformes (10 species). (Annex N° 3) (Table N° 2)

Among the specific study spots, we registered 104 species from 30 Families and 10 Orders. The representative Orders for their amount of species were Passeriformes (68 species), Apodiformes (14 species) and Piciformes (8 species). (Table N° 3)

### 5.2.2 Observed and Captured Bird Species among the Study Area.

In forests of Toisan I and Toisan II a total of 104 species were registered.

We covered a total of 400 hours/net in two sites. In Toisan I we covered around 4 km and registered a total of 66 species from which 20 species and 45 individuals were captured in 20 hours/net. In Toisan II we also covered around 4 km and registered a total of 86 species from which 22 species and 63 individuals were captured in 20 hours/net.

The most common species observed among Toisan I's and Toisan II's transects were: *Coligena wilsoni*, *Phaethornis syrmatorphorus*, and *Agelaiocercus coelestis* (Trochilidae); *Semnornis ramphastinus* (Capitonidae); *Myioborus miniatus* (Parulidae); *Euphonia xantogater*, *Anisognathus somptuosus*, and *Tangara parzudakii* (Thraupidae). The most frequently heard species were *Odonthophorus erythrops* (Odontophoridae); *Pharomachrus auriceps* (Trogonidae); *Grallaria flavotincta* (Formicariidae); *Myadestes raloides* (Turdidae); and *Henicorhina leucophrys* (Troglodytidae). (Annex N° 4)

In Toisan I and Toisan II the most abundant species by number of captures were: *Agelaiocercus coelestis* with 17 individuals, *Coligena wilsoni* with 13 individuals, and *Phaethornis syrmatorphorus* with 12 individuals, (all from Trochilidae); *Premnoplex brunescens* with 5 individuals (Furnariidae); and *Pseudotriccus pelzeni* with 5 individuals (Tyrannidae). From this we can say that captured species are dominated by members of the next families: Trochilidae with 42.2 % of captures, Furnariidae with 12.9% of captures, and Tyrannidae with 9.2 % of captures. (Graphic N° 3).

### 5.2.3 Sorensen's Similitude Index.

#### Observations.

Getting data from observations and walks of Toisan I and Toisan II together made this comparison. (Results on Table N° 4). From the total registered species, 49 species were common to both places, with a similitude index of 63%, which suggests that there is no significant difference between bird populations registered in each of the two sites.

## Captures

This comparison was made by getting captured species from transects in Toisan I and Toisan II together. (Analysis on Table N° 5). In this analysis, from 28 captured species 14 share 66% of similitude, which suggests that there is not a significant difference between captured bird populations in both places.

### 5.2.4 Bird Species Categorized as Endemical, Rare, Vulnerable and in Lesser Risk.

A considerable number of registered species in Toisan I and Toisan II are under "Endemical" and "Rare" status (Ridgely *et al.*, 1998) which indicates that the studied forests still keep a good state of conservation. In the surroundings of the Community of Cerro Pelado, we also registered some species under endemical and rare status.

From 150 registered species, 25 species are endemical, this is the 16.6%, from which 12 species were registered in Toisan I, 17 species in Toisan II, and 10 species in the surroundings of Cerro Pelado. A specie is considered as endemical when its distribution range is restricted to a specific geographical area (Granizo *et al.*, 1997). Our endemism is shared with Colombia and Perú and so we have 16 species registered for Ecuador and Colombia, 5 species registered for Ecuador and Perú, and 4 species registered for Ecuador, Colombia and Perú. (Annex N° 5)

We have also registered 25 species under "rare" status, this is 16.6%; and 5 vulnerable species, this is 3.3%. A specie is considered as vulnerable when it's not under critical danger or in danger, nevertheless it faces a high risk of extinction in a mid term in the wild. (Granizo *et al.*, 1997).

Finally, we registered 3 species in lesser risk of extinction, this is 2%. A species is considered in lesser risk of extinction when after been evaluated, did not fit under any category of threat nor in the category of insufficient data (Granizo *et al.*, 1997).

### 5.2.5 Endemical, Rare and Vulnerable Bird Species in Toisan I.

As important registers for Toisan I we have: *Heliangelus strophianus* (Trochilidae), an endemical specie for Ecuador and Colombia; *Haploptila castanea* (Bucconidae), rare specie; *Premnornis guttuligera* and *Pseudocolaptes johnsoni* (Furnariidae), both rare species and the least is endemical to Ecuador and Colombia and considered vulnerable for the continue quality declination of its habitat.(Granizo *et al.*, 1997).

### 5.2.6 Endemical, Rare, Vulnerable and in Lesser Risk Bird Species in Toisan II.

An important register and one of interest for our study was that of the Hoary Puffleg, *Haplophaedia lugens* (Trochilidae) since it is a specie in lesser risk and endemical to the Chocó bioregion, and from which habitat we've obtained important data, described further ahead. Other important registered species are: *Urosticte benjamini* (Trochilidae) rare and endemical specie to Colombia, Ecuador and Perú; *Ampeloides tschundii* and *Pipreola jacunda* (Cotingidae) both rare species and the least an endemical to Ecuador and Colombia; *Cyanolyca pulchra* (Corvidae) endemical to Ecuador and Colombia and considered in lesser risk of extinction; *Turdus maculirostris* (Turdidae) endemical to Ecuador and Colombia; *Hemispingus melanotis* and *Tangara vitriolina* (Thraupidae), *Lysurus castaneiceps* (Emberizidae) all considered rare; *Thripadectes virgaticeps* and *Sclerurus mexicanus* (Furnariidae) both rare species, from the least's morphological data

obtained we found out that was going through its reproductive epoch at the time the study was taking place, we were also able to register one of its nests.

#### **5.2.7 Endemical and Rare Species Common to Toisan I and Toisan II.**

Among the rare species registered as common for Toisan I and Toisan II, we have: *Aburria aburri* (Cracidae) also a natural indicator of forests quality and considered vulnerable because of its population's reduction (Granizo *et al.*, 1997); *Urochroa bougueri* (Trochilidae); *Campephilus pollens* (Picidae) and *Platicichla leucops* (Turdidae); *Coeligena wilsoni* and *Agelaiocercus coelestis* (Trochilidae); *Grallaria flavotincta* (Formicariidae) and *Thripadectes ignobilis* (Furnariidae) endemical for Ecuador and Colombia.

#### **5.2.8 Endemical, Rare and Vulnerable Bird species Registered in the Surroundings of the Local Community of Cerro Pelado.**

In this site only birdwatching walks were made upon patches of forest. We also visited the neighboring community of Barcelona and surrounding forest on the upper part of the Toisan Mountain Chain. We obtained a total of 89 registered species, represented by 29 families. The three most representative families by number of observed species were Thraupidae, Trochilidae and Tyrannidae. Among the important registers, we can mention the *Aratinga erythrogenys* and *Brotogeris pyrropterus*, rare, vulnerable and endemical species to Ecuador and Perú; *Tyrannus niveigularis* (Tyrannidae) and *Atlepetes leucopterus* (Emberizidae) endemical species to Ecuador and Perú.

#### **5.2.9 Endemical, Rare, Vulnerable and in Lesser Risk Bird Species Registered in Toisan I, Toisan II and in the Surroundings of the Local Community of Cerro Pelado.**

The endemical species registered at the study zones and at the surroundings of Cerro Pelado were: *Coeligena wilsoni* (Trochilidae); *Semnornis ramphastinus* (Capitonidae) considered in lesser risk; *Andigena laminirostris* (Ramphastidae) considered vulnerable due to the declination of its habitat's quality (Granizo *et al.*, 1997); and *Scytalopus vicinior* (Rhinocryptidae). From all the sites, Toisan II was the one with greater amount of registered endemical and rare bird species. (Graphic N°4). The number of endemical, rare, vulnerable and in lesser risk registered species per site can be found at Table N°6.

#### **5.2.10 Analysis of Food Habits.**

The analysis of birds' food habits and of the forest layers from which they take food, constitutes one of the most useful tools for determining the quality and state of a forest (Guerrero, 1996). From the species registered in Toisan I and Toisan II, 44.2% are insectivorous, 29.8% are omnivorous, 15.3% are nectarivorous, 9.6% are frugivorous, and 1.9 are meat eaters. (Graphic N° 5), Canaday suggests that insectivorous birds are the most sensible to the generated human impacts in tropical forests, due to the implicit changes that such impacts carry to micro weathers and thus towards the modification of the composition of insects.

#### **5.2.11 Results Regarding Species of Interest.**

According to a member of the DECOIN, the Yellow-eared Parrot *Ognorhynchus icterotis* had been seen on the zone about 25 years ago, elderly people from Cerro Pelado also recognized the bird's photograph and drawings and assured it could be seen long time ago, others said they'd seen it around, but during our study no records of this specie were made. Neither from the Giant Antpitta *Grallaria gigantea* nor from the Tanager Finch *Oreothraupis arremonops* did we obtain records. Nevertheless, two individuals of the Hoary Puffleg *Haplophaedia lugens*, were captured on mistnets placed upon Toisan II, unfortunately we could not obtain more extense ecological information regarding this specie for we did not record its presence during our walks, but we made a habitat characterization of the place where it was trapped.

#### 5.2.12 Hoary Puffleg's Habitat Characterization.

The spot where this specie was captured was located 15 minutes away from our campground within Toisan II. The area has a medium intervention range, constituting a secondary forest with the presence of some big trees: *Otoba gordoniiifolia*, *Licania macrocarpa*, *Clusia* sp., *Psychotrya* sp., *Chrysoclamis* sp., *Vismia* sp., and *Faramea* sp., among others. Among the most common shrub species were the *Drymonia* sp., *Faramea* cf. *Eurycarpa*, *Heliconia* sp.

Among the herbaceous climbing species we can find: *Centropogon* spp., *Brunneistera*, CAMPANULACEAE, *Gloxinia*, *Columnnea* GESNERIACEAE, *Gusmania*, *Pitcairnia*. All these plants are abundant among the area, and several of them were flowering during the time when our study took place, we were able to observe how their bright colors and tubular form allowed them to offer a potential food source for hummingbird species, among them the Hoary Puffleg (*Haplophaeida lugens*).

#### 5.3 Registered Mammals

During our study we weren't able to observe many of the mammals that inhabit the zone, excepting for the squirrels *Microsciurus mimulus* and *Sciurus granatensis*, which we observed during several occasions. Nevertheless, we registered traces and excrements of some other mammals, for instance: Mountain Lion (*Puma concolor*), Red brocket Deer (*Mazama americana*), Brown-throated three-toed sloth (*Bradypus variegatus*), Bush Dog (*Speothos venaticus*), Collared Peccari (*Tayassu tajacu*), and Common Armadillo (*Dasypus* sp.). (Tirira, 1999).

#### 5.4 Environmental Education and Training Component.

##### 5.4.1 Community Diagnosis Socio-organizational Analysis and Actions.

- Cerro Pelado is a community conformed by 47 farmer families. Its inhabitants are mainly mestizos who arrived to the zone 30 years ago in average, looking for a better future and for free land to cultivate. Their origins vary from the Ecuadorian provinces of Carchi and Loja, from the northern part of Pichincha up to Southern Colombia. Their mother tongue is Spanish.
- Among its authorities, the community has a local President and Vicepresident, which are elected, every two years and a President of Family Parents which is specifically in charge of school issues. There is only one teacher for the whole elementary school, this

person had come from another town, closer to the city and didn't show much interest in the communities problems.

- The community organization is very weak and the lack of communication among its members is another obstacle towards their development. We organized an activity related to this theme, it included an icebreaker, a problem solving game, a problem tree, a video presentation and a talk regarding this issue.
- One of the main threats to the community is their lack of an identity to motivate common actions and work for the wellbeing of all. In this regard we tried to focus our talks on the natural and human importance of the zone and how proud they should feel for belonging to and living at Cerro Pelado.
- There are not self-motivated strong leaders who could clearly identify the communities' main problems and organize positive actions towards their solution while influencing on local people's pesimistic mood. In this regard, at the end of our work they desided to choose the best-optioned person for President and to collaborate with him from the start.
- A strong sense of individuality has grown in the community during the last years, past family problems had not been solved and resentment feelings flower up when shared work is requiired. There is also a felt lack of valuing someone else's work of contribution to the community.
- Differences in religious principles between Catholic and Evangelistic families were evidenced during our visits, especially due to the temporary visit of Catholic missionaries who motivated separations between half of the community. We were able to participate in a couple of communitary work or "mingas" to clean and fix the soil and stone roads and the cementary, here a good moment was shared between the community members that participate which were not many.
- At the beginning of our work, strong feelings of unconfidence from the community members towards our team were showed, this as they explainned were caused by the negative experience they faced when the minning Company established among local forests. In this regard the community showed unity, which we explained was natural and good. At our second preliminary visit to the community, their sense of dout about our work had been partly solved due to our works' transpparency.
- The only recreational activity shared by the community especially during weekends is volleyball, and thus we tried to offer not only educational activities but recreational ones that would help to unify the community.
- The educational and training activities that we developed with the community definitively helped in gathering together all its members and sharing opinions, problems, suggestions and fun spare time with games and contests.
- Local people were aware of their organizational and social problems, they all manifested their interest in receiving orientation to face and treat their problems and actively suggested organization, health, and family planning as priority social themes to be covered in our talks and excercises.

#### **5.4.2 Socio Economical and Environmental Analysis - Related Actions.**

- Very few community members belong to the Association of Coffee Productors "Río Intag" and are beginning to cultivate coffee (*Coffea arabica*) among their farms, but the community is not organized under a productive organization such as in an association,



trade union or so on. In this regard, during our community organization talk we presented a video about a case of community commercialization of products without intermediates, this motivated the community to work together and to get organized.

- Agriculture is the main economical activity among the community. Among its products we can mention: beans, indian corn, sweet tomato, naranjilla and blackberries. All these products are successfully harvested, nevertheless, most of the community members are aware that they could obtain more profits if they get organized and obtain technical support for proper soil treatment and for production and commercialization of their products.
- Timber extraction is seen by most of the community members as destructive and non profitable if compared with the time and effort spent. Nevertheless, they admit that is a common activity due to the immediate economical need they all experience.
- They also manifested their interest for learning about sustainable practices as economical alternatives to timbering. The handicrafts workshop for women and the organic orchards workshop we offered attended to some extent these suggestions.
- Among the deforestation effects that most of the community members identified are: the strong diminish in quantity of wild animals such as: the Andean bears (*Tremarctos ornatus*), armadillos (*Dasypus novemcinctus*), porcupines (*Coendón bicolor*), deer (*Mazama americana*), sloths (*Bradypus infuscatus*), wild guinea pigs (*Cavia aperea*), monkeys of different species, Peak of the Rock (*Rupicola peruviana*) and the Plate-billed Mountain-Toucan (*Andigena laminirostris*). Among the native tree species which disappearance they identified as caused by deforestation are: cedar (*Cedrela odorata*) and Canelo (*Nectandra* sp). People also stated that water sources and river flows had diminished and that there is a need for reforestation.
- Community members are aware of the negative effects of chemical use on their crops, but explained that they do not obtain an equal production in a short term without them, especially regarding naranjilla and tree tomato harvesting. There is a need for introducing alternative use of natural organical pesticides.
- About field burns or caused fires, they recommend being very careful and to prevent fire spreads by choosing and building ground barriers. They recognize the erosion effect of this practice but it seems to be a good alternative for saving on salaries for cleaning fields for cultivation. Nevertheless, they compromised to diminish its use.

#### 5.4.3 Family Diagnosis

- Families of the Cerro Pelado are internally organized under the common scheme of Ecuadorian farmer families. The average amount of children per family is between 4 and 8. Husbands and older sons dedicate to agriculture either among their own farms or by day contract for working on others' farms, in which case their daily salary is between 15.000 to 35.000 sucres (average of a dollar). Upon the mothers and older daughters are home duties and smaller children's care. (Annex # 8). Both task types are hard and occupy almost all of the family members' time, this is why neither of them are able to permanently involve in other additional or recreational activities; there is also a lack of offers regarding training, study or creative opportunities.
- Children enter to elementary school when very young and either finish or quit school early in their lives to incorporate as productive members of their families. All children work among their own farms or someone else's farms in their spare time still when at

school, and some of them are frequently absent from school due to work. There are no middle or highschools among the neighboring communities, so if someone wanted to continue studying must move to a bigger and distant town. But most of them do not see the use of studying when they are to work in their farms.

- Economical incomes rely on husbands and sons, nevertheless, several women had receive training in cabuya handicrafts, from which two women kept selling their products (cabuya bags for coffee) to the Association of Coffee Productors. The handicrafts workshop we offered for local women had a very good acceptance among the community members.
- The families common diet is based on beans, white carrot, manihot, rice, potatoes and a great quantity of non processed dark sugar. most of these are cultivated in their own farms, nevertheless they constantly buy rice, noodles, flour and vegetable grease or butter.
- Among the main farm animals they raise are cattle, chickens, pigs domestic guinea pigs, and mules. Dogs are kept as pets,
- Regarding homes, they are wooden built by their owners with the help of contracted and collaborating neighbors. The roofs are made of tiles or zink sheets, while they usually keep soil floors. Only one family among the Cerro Pelado has electricity due to a hydroelectrical plant they built by themselves.
- Rooms and sometimes even beds or mattings are shared between two or three family members, the very short distance or lack of doors between rooms and the kitchen leads to the presence of small farm animals inside the house, this may be a risk for intestinal health problems.
- Wood remains as their main fuel. Water is brought from natural sources by long strong hoses or tubes, but bathrooms are only available at school grounds for children, and only a couple of families have installed letrines.
- The main health problems are general bad oral health, specially premature loss of dental pieces; throat infections and stomach-intestinal illnesses are very frequent and worsen among small children though frequent cough and diarrhea. A need for hygiene and nutrition orientation started to be partly attended by the talks we organized about those themes.
- There is no health center close to the community, and mothers do not have professional assitance when giving birth, which they do inside their own homes with the help of their husbands, a sister, mother or experienced neighbor.

#### **5.4.4 Environmental Education with Children**

- There is only one elementary state school among the community, it has only one big classroom for the whole school and one teacher manages to divide her time to attend all grades. There was a total lack of didactic of visual materials in the classroom. We collaborated by donating posters and making a food chain set and cardboards on environmental themes to decorate the classroom, we donated all materials used and also books for them to start a small school library. We must say that the presence of books was appreciated not only by children but by adults who showed a great interest for those materials.
- At the beginning of our work with the school children of Cerro Pelado, we noticed that children were shy and afraid of speaking out, it was also a little difficult for them to

concentrate when receiving new information, reading and writing was hard for some of them, nevertheless, the use of visual materials and practical activities, games and story telling we organized helped us relate new issues with their reality. They also showed a lack of development and practice in fine manual skills, the use of scissors, clay, markers, color pencils and glue was very motivating for all of them. They all have a great deal of imagination and rapidly integrated into our games. The children already had a base of knowledge regarding some themes of the environment, but lacked among others, so what we did was to remind, reinforce, complement and focus their knowledge while applying it to practical activities. (Annex N° 9)

- Some of our activities schedule had to be modified to fit the time they had available to assist.
- The afterschool puppet workshop was successful, eight children integrated the workshop, made clay masks and cloth puppets, wrote ecological sketches and performed on the puppet presentation we organized for the community. This puppet show helped us summarize socioenvironmental problems to the community in a didactic and fun way. (Annex N°10)
- Some children could not assist to all of our activities because they had to work at home.
- The teacher did not show interest in integrating to our activities for she also had to prepare her own classes and complete her year program. Among rural areas teachers must leaderate the community unity and development for they are seen and trusted as experts in some important aspects.

#### **5.4.5 Handicrafts Workshop for Women**

- The workshop was received with great enthusiasm by all community members, many women assisted to one or another session and received an introduction to the cloth emboidery technique, but finally a stable group of seven women assisted to all sessions and developed good skills.
- Women organized their everyday tasks in order to assit to the workshop, they either woke up earlier or went to bed later than usual and counted with the help and will of their sons, daughters and husbands. Some of them took their embroidery pattern home to work on their scarce spare time in order to finish soon and stat with a second of third pattern.
- During the workshop we talked with the assistants about the ecology and importance of local birds and the entire environment.
- The workshop sessions were always great opportunities for all community members to gather at their downtown, share conversations and games and take care of the small ones while women concentrated on embroidery.

#### **5.4.6 Environmental and Training Activities with the Community.**

- Birdwatching walks had a good acceptance among the community, but due to their time unavailability on early mornings only few people were able to participate every day. Several informal reunions were made for identifying observed birds and other different animals while introducing the use of specialized books with photographs and pictures.
- The use of binoculars was introduced, this woke up a lot of enthusiasm among the community, at the end we left 15 children binocular sets for their future use.

- We organized several talks and presented them to the community, this regarding different environmental and social themes of local interest.

#### **5.4.7 Evaluation of Education and Training Activities.**

- Regarding talks and presentations, we evaluated peoples' assistance and participation range, which at the end was of 50 persons at our talks, a very good quantity of assistance. We asked questions and finally organized games and contests about the themes. We handed out prizes for these contests (educational materials).
- Regarding the workshop for organic orchards planting, all participants showed their interest in experimenting with new seeds and natural soil management. Each of the participant families received assistance, started an organic orchard and only a future follow up will allow us to know if the practice was successful.
- Regarding environmental education with children, we had everyday reviews where children participated and showed what they had learned. The puppet show was also a general evaluation of our work, since children summarized in their scripts some of the important environmental problems we had covered.
- Regarding the handicrafts workshop for women, the seven permanent participants finished a well done product and got the public recognition of the community at the end of their work.
- The followed schedule for education and training talks and workshops can be found on Annex N° 11.

### **6. ANALYSIS AND DISCUSSION.**

Recent studies indicate that tropical forests are the most dynamic around the world and appear as the ecosystems with the highest diversity of trees (Gentry, 1998). The term "dynamism" refers to the tree-growth rate, recruiting rate, and mortality rate. Mist forests of the Andean Occidental slopes are considered by many authors as an extension to the Colombian Chocó, considered as the most diverse region of the planet. (Gentry, 1995). It's been known that the Andes region contains around 10.000 plant species from the 16.000 described for Ecuador. This diversity is concentrated in altitudinal ranges from 1000-1500 and 4.000 m.a.s.l. (Jorgensen, & Leon, 1999).

The Toisan Mountain Chain presents unique ecological characteristics that underlines it as a priority zone for conservation, here two of the greatest floristical regions of America are fused together, these are: the pluvial Chocó forests, known for their high biological diversity and the Andean flora. The melting of these floristical regions together with the geographical and climatological variations have generated a great variety of unique ecological conditions that again have favoured the speciation processes of several plant groups as orchids and palms. Here are also located two endemical bird areas (EBAs): the Chocó and the Northern Central Andes. (Stattersfield *et al.*, 1998).

Forests that form the Junín River's basin are part of the natural buffer zones to the Ecological Reserve of Cotacachi-Cayapas, which are part of the Toisan mountain chain. We have observed an own complexity of cloud forest microhabitats among these forests, complexity caused by the combination of factors as: climate variations, moving air masses, fog, irregular contours, and loose soils. These factors form and give peculiar characteristics to this hydrological basin.

Eventhough the difficult access to the Toisan mountain chain, forests among the Junín River's basin are facing human threats as deforestation, agricultural expansion and hunting, and furthermore in recent years have been facing another serious threat which is industrial open-sky minning exploitation.

### 6.1 Conservation importance of forests among the Junín River's basin.

According to our studies results, this forest are highly heterogenic in their structure, probably due to the permanent presence of fog, its irregular contours and the strong intervention it had to face during minning exploration activities. This is when observing some extense blank spaces opened by timbering and which have been colonized by shrubs and herbaceous species that compit with tree species such as the Caracha coco (*Otoba gordoneiifolia*) and the Tangaré (*Carapa guianensis*) which precisely are the only species with considerable diameter among these forests.

Toisan II forests present 372 registered individuals, which represent a higher density than that of Toisan I with 369 individuals. Toisan II has a homogenic structure, most of its individuals are trees with big diameters; on the other hand, Toisan I has few trees with big diameters and opennings are common among the forests which suggests that it suffered a considerable impact from minning exploration activities. The forests are now in a recorvery and regeneration stage.

The conservation state of both study areas is different, eventhough Toisan I presents some contour and climate characteristics that can be similar to those of Toisan II, the least one presents less impacts from human intervention. The canopy reaches 20 to 30 m. of height and among its main trees there are Lacre (*Clusia dixonii*); Caracha coco (*Otoba gordoneiifolia*); Sangre de Drago (*Croton lechleri*); and Tangaré (*Carapa guianensis*).

A special characteristic of both Toisan I and II is that they present abundant communities of the next palm restricted species: Cuchirabo (*Aiphanes erinaceae*) and Dwarf palm (*Prestoea acuminata*).

Regarding bird species, we registered a total of 104 species, 65 from Toisan I and 84 from Toisan II, which indicates that diversity is higher at Toisan II. From the total of registered bir species, 49 are common to both sites and with a percentage of similitude of 63%, which suggests that bird populations are not significantly different in both of the areas. It is important to notice that there was a considerable number of endemical and rare species registered most of them from Toisan II. This underlines the importance that conserving this forests should have in order to assure the survival of such bird species.

After analysing all these facts and information, we consider that minning explotation at any scale would cause changes among local vegetation covering with implicit modifications on fauna composition and abundance; animals that relate to nature as seed scatters, insectivorons, and polinizers would be seriously affected by that activity and would have to migrate, thus an imminent disapearance of some of them would be a fact.

In the other hand, changes in forest composition due to natural or human caused phenomenoms, carry out negative changes on water availability and quality, which, affect to all zones along the river's flow, this without mentioning water, soil, air and sound pollution caused by minning activities. Moreover, since the Junín river supplies of water for several communities, its alteration will affect natural and human populations.

The importance of cloud forests is due to their capacity of trapping atmospherical humidity further more than normal precipitation. if cloud forests dissapear, a mass of foliage surface and epiphytes able to intercept environmental humidity would be lost. Regarding cloud

forests, the value of diversity is exaggeratedly high, in terms of native species, genetical banks and ecosystems. (UICN, 1995)

### 6.2 Indicators of a forests good state

One of the main problems when defining species as environmental quality indicators, is how difficult it may be to register such species since, in general, are rare due to their low natural density and because many of them require broad areas of natural forests which complicates even more to detect them. Now a days groups of species rather than species are considered for determining the quality of an area. For bird species, several groups based in diet and the forest substratum from where they obtain food, as more useful tools for determining the quality and state of a forest. Canaday suggests that insectivorous birds are the most sensible to human impacts in tropical forests, due to the changes they cause among the micro weather, which again cause modifications among the composition and abundance of insects and thus among insectivorous birds.

Insectivorous birds from the families Furnariidae and Dendrocolaptidae, and some members of the family Tyrannidae could be considered as important species as indicators of environmental quality. Among our study area, 44.2 % of bird species belong to the insectivorous group, been the group with the highest percentage. Which suggests that even though threats and intervention the area has faced, it still maintains good environmental conditions for an important number of species; nevertheless, species of less abundance that are quality indicators were also found:

Wattled Guan (*Aburria aburri*), White-tailed Hillstar (*Urochroa bougueri*), Uniform Treehunter (*Thripadectes ignobilis*), Powerful Woodpecker (*Campephilus pollens*), and Pale-eyed Thrush (*Platicichla leucops*), among others.

The presence of several flowering and fructifying plants while our study is an important fact, especially due to the interaction between these plants and groups of birds and mammals. Trees as *Otoba gordoneiifolia*, *Carapa guianensis*, *Calatola costaricensis*, contribute with the production of fruits as food for deer, peccaries, wild guinea pigs, pacas, armadillos, and also squirrels, among others. We were able to detect traces, dens and even sleeping spots on the bases of big trees especially of deer and peccaries. Regarding plants, many of the species that were registered had flowers with special structure (tubular, bell-shaped) and of bright colors to attract nectarivorous birds; while their fruits are food for frugivorous birds.

The evidence of several animals' presence in the zone is important because some of them require broad extensions of forests in order to maintain viable populations, and also because they usually inhabit low intervened or unintervented forests, among them we can mention the Mountain lion (*Puma concolor*), deer (*Mazama americana*), Bush dog (*Speothos venaticus*), sloths (*Bradypus variegatus*), and Collared peccary (*Tayassu tajacu*).

### 6.3 Community of Cerro Pelado

The community had experienced good changes towards its development during the last years, the soil and rock road was opened, a new concrete-school made of was built which included sanitary installations, the wooden chapel was obtained, and water was carried to the community from natural sources. Such benefits were a result of the important efforts that some members of the community had made for the common well being. Nevertheless, the community's actual lack of interest and optimism does it difficult to obtain other

infrastructure and service that they need and want: electricity, a community center for their reunions, family latrines and showers, an extra room for their school, a medicine cabinet or first-aid-kit and training on different productive activities.

Even though their very low economical income and the intervention of their surroundings, the Cerro Pelado people are fortunate to inhabit an area that still maintain many natural resources: fertile land, water sources, interesting forests, beauty of landscapes, and working people, which are great potentials for developing sustainable activities; but for which, internal organization is a must.

The DECOIN, local NGO, has have an initiative to orientate people in conservation and organization, this is the fention of certain clue areas as Community Natural Reserves, proposal that has have good acceptance among community members.

During our study, we were able to work with the community in definning general problems and introducing or discussing possible solutions, but time wasn't enough to cover in a profound way such issues, for this reason we believe in the need for a second phase of our project to develop an integral program for community development that includes sustainable soil use practices, handicrafts production and commercialization, environmental and social guidance and education for children and adults, and rescue of community identity.

On the other hand, local governmental and nongovernmental organizations must support the communities efforts in attending the infrastructure and services they need.

#### **6.4 Creation of Community Natural Reserves.**

Local people's participation and awareness is absolutely necessary for conserving native forests, their biodiversity and hidrological sources and for ensuring a proper use of natural resources. DECOIN, a local No Government Organisation (NGO) has developed a conservation strategy in this regard, which is already beng put in practice at the zone of Intag and is the creation of a Community Forest Reserves and Hidrological Basins web, reserves are to be managed by local communities in order to stop minning extraction threats and turn abadoned lands into well used community owned territories. In some cases, the created Reserves would have an ecotouristic extra use as an economically sustainable activity in the medium and long term. DECOIN has been studying several possibilities for the area and believe that grounds occupied once by the minning company, between the Junín River's basin and the Community of Cerro Pelado would be a priority area, this includes our study area.

The first of these Reserves is located at at one of the Bishimetals ex-study sites at Junín and was conformed in July of 1999. The property has more than 60 hactares of primary and secondary cloud forests and was bought through a donation of this NGO and an agreement beteen it and the community. An environmental management plan that incorporates environmental education, flora and fauna research, and workshops for sustainable use of natural resources is to be included as part of this initiave.

### **7. SPECIFIC RECOMMENDATIONS**

**7.1** Environmental research among the higher areas of the Toisan Mountain Chain should be promoted, the zone has implicit conservation and scientific importance and its ecology is still very little known.

7.2 A second phase of this project should be planned and conducted in order to complement the obtained results and data with those to be obtained from the higher parts of the Toisan Mountain Chain, close to the Communities of Barcelona and Junín, to continue with our search for the species of interest that could not be found during this first phase.

7.3 The important biodiversity together with the beauty of landscapes that the Toisan forests present, underlines the ecotouristical potential they have if that component is included in a future well studied management plan which include sustainable soil use, community development and forest conservation.

7.4 The organizations with interest in the zone should support its communities internal organization and the interaction between communities which will enable the proposal and execution of future conservation and community development projects.

7.5 Future projects should consider direct community involvement during the diagnosis, planning, execution, evaluation and follow up stages of the project.

7.6 It is necessary to train and promote community leaders for them to continue with education, development and conservation processes that may start with temporary projects in the area.

7.7 It is a need for the communities to create a mechanism to commercialize their products in a direct way without the presence of intermediaries.

7.8 Support the creation of tree nurseries and coordinate activities to improve a program for reforestation and soil rescue.

7.9 Regarding education, the improvement of training workshops about sustainable agriculture, cattle raising, and ecotourism along with long distance study programs in those areas would help young inhabitants in developing important skills while decreasing their migration to cities.

7.10 Local communities should support DECOIN in its initiative of creating Community Natural Reserves, since they will be the direct beneficiaries from its improvement.

7.11 We propose the creation of a Local Coordination Technical Unity to integrate and support different local initiatives that may be scattered and that may double efforts in similar but disconnected actions.



## 8. REFERENCIAS

- CANADAY, C. 1996. Loss of Insectivorous birds along a gradient of human impact in Amazonia Biological Conservation.
- CAÑADAS, L. 1983. El Mapa Bioclimático y Ecológico del Ecuador. MAG, PRONAREG, Quito.
- CARE, 1997. Metodología de Extensión Participativa con Enfoque de Género para el Manejo de los Recursos Naturales.
- CUAMÁCAS, B. & G. TIPÁZ. 1997. Árboles y Arbustos de los Bosques Interandinos del Norte de Ecuador. Publicaciones del Museo Ecuatoriano de Ciencias Naturales. Quito Ecuador.
- DUNNING, J. 1987. South American Birds. A Photographic and to Identification. Harrowood Books Newtown Square. Pennsylvania. U.S.A
- PROYECTO INEFAN/ GEF Ecuador Continental. Quito, Ecuador
- EMMONS, L.H., & F. FRANCOIS 1990. Neotropical Rainforest Mammals. A Field Guide. The University of Chicago Press. U.S.A.
- FIEWEGER., M.H 1998. Es un Monstruo Grande y Pisa Fuerte. La Minería en el Ecuador y en el Mundo, Quito Ecuador.
- FJELDSA, J., & N. KRABBE 1990. Birds of High Andes. Published by Zoological, Museum, University of Copenhagen and Apollo Books, Svendborg, Denmark.
- CECIA-Fundación Ornitológica del Ecuador, 1989. Boletín 2 "Revista Andigena".
- JAPAN INTERNATIONAL COOPERATION AGENCY, 1998. Informe Final sobre La Exploración Mineral de Cooperación Técnica en el Area de ImbaOeste, República del Ecuador.
- LAWRENCE, H. 1995. Una Campaña por Bosques Nublados Ecosistemas Unicos y Valiosos en Peligro. UICN-Union Mundial para la Naturaleza.

- GENTRY, A. 1995. La Selva Húmeda de Colombia
- GUERRERO, M., 1996. Informe sobre estudios Biológicos en la Cordillera Napo Galeras.
- GRANIZO, T., et al 1997. Lista de Aves Amenazadas de Extinción en el Ecuador. UICN-sur, CECIA, INEFAN, Ecociencia y BirdLife International. Quito.
- GREGORY, M., 1997. Diversidad y Abundancia Relativa de las Aves en San Venancio (Cuellaje), Zona de Amortiguamiento de la Reserva Cotacachi Cayapas, Imbabura, Ecuador. En: Mena *et al.*, Estudios Biológicos para la Conservación. Diversidad, Ecología y Etnobiología. Ecociencia. Quito.
- HILTY, S.L., & W. L. BROWN 1986. A Guide to the Birds of Colombia. Published by Princenton University, New Jersey.
- RANGEL, J., et al 1997. Colombia Diversidad Biótica. Volumen II Santa Fe de Bogotá D.C.
- RIDGELY, R.S., P.J. GREENFIELD & M. GUERRERO G. 1998. Una Lista Anotada de las Aves de Ecuador Continental. Fundación Ornitológica del Ecuador, CECIA. Quito.
- RIDGELY, R.S., & G. TUDOR 1989. The Birds of South America. Volume I The Oscines Passerines. University of Texas Press, Austin. U.S.A.
- RIDGELY, R.S., & G. TUDOR 1994. The Birds of South America. Volume II The Suboscines Passerines. Oxford University Press, Oxford Tokyo.
- RODRÍGUEZ, F., et. al 1997. Mapa de las Zonas de Amortiguamiento de la Reserva Ecológica, Cotacachi Cayapas. En: Mena *et al.*, Estudios Biológicos para la Conservación. Diversidad, Ecología y Etnobiología. Ecociencia. Quito.
- SIERRA, R. et. al. 1997 "Propuesta preliminar para la Clasificación de la Vegetación para el Ecuador Continental". Proyecto INEFAN/GEF-BIRF Y EcoCiencia. Quito, Ecuador.
- STATTERSFIELD, A., M. CROSBY, A LONG & D. WEGE. 1998 Endemic Birds Areas of the World . Priorities for Biodiversity Conservation. Cambridge. UK.
- TERBORGH, J.S.K. ROBINSON, T.A Parker III, C.A. Munn, N Pierpont. 1990 Structure and Organization of an Amazonian Forest Bird Community. Ecological Monographs, 60 (2 ) 213-238
- ULLOA, C. & P. JORGENSEN. 1993. Arboles y Arbustos de los Andes del Ecuador. AAU

**ANNEX N° 1**  
**List of Plants Species Registered at Toisán I and Toisán II**

**TOISAN I**

<b>FAMILY</b>	<b>GENERA</b>	<b>SPECIES</b>
MORFOESPECIE 1		
ANNONACEAE	Duguetia	<i>Duguetia</i> sp.
ARALIACEAE	Schefflera	<i>Schefflera sodiroi</i> <i>Schefflera laiogyne</i>
ARECACEAE	Aiphanes	<i>Aiphanes erinacea</i>
	Chamaedorea	<i>Chamaedorea linearis</i>
	Prestoea	<i>Prestoea acuminata</i>
ASTERACEAE	Verbesina	<i>Verbesina</i> sp.
BOMBACACEAE	Matisia	<i>Matisia</i> sp.
CLUSIACEAE	Clusia	<i>Clusia</i> sp.
	Tovomitopsis	<i>Tovomitopsis</i> af. <i>balboa</i>
CHLORANTHACEAE	Hedyosmun	<i>Hedyosmun luteynii</i>
CHRYSOBALANACEAE	Licania	<i>Licania</i> af. <i>macrocarpa</i>
CYATHEACEAE	Alsophylla	<i>Alsophylla cuspidata</i>
	Cyathea	<i>Cyathea</i> sp. 1 <i>Cyathea</i> sp. 2 <i>Cyathea</i> sp. 3 <i>Cyathea</i> cf. <i>caracasana</i> <i>Cyathea corallifera</i> <i>Cyathea straminea</i>
FABACEAE	Erythrina	<i>Erythrina megistophylla</i>
FLACOURTIACEAE	Cassearia	<i>Cassearia</i> af. <i>mariquitae</i>
EUPHORBIACEAE	Acalypha	<i>Acalypha</i> sp.
	Croton	<i>Croton lechlerii</i>
GESNERIACEAE	Besleria	<i>Besleria angustifolia</i>
ICACINACEAE	Calatola	<i>Calatola costaricense</i>
LAURACEAE	Nectandra	<i>Nectandra laurel</i>
	Ocotea	<i>Ocotea</i> sp. 1 <i>Ocotea</i> sp. 2 <i>Ocotea</i> sp. 3 <i>Ocotea</i> cf. <i>bofo</i>
	Persea	<i>Persea subcordata</i>
	Pleurothyrium	<i>Pleurothyrium</i> cf. <i>giganthum</i>
MELASTOMATACEAE	Miconia	<i>Miconia</i> sp. 1 <i>Miconia</i> sp. 2 <i>Miconia</i> sp. 3 <i>Miconia affinis</i> <i>Miconia pustulata</i>
	Blakea	<i>Blakea</i> sp.
	Meriania	<i>Meriania</i> cf.
MELIACEAE	Carapa	<i>Carapa guianense</i>
	Cedrela	<i>Cedrela odorata</i>
	Guarea	<i>Guarea kunthiana</i>
	Ruagea	<i>Ruagea hirsuta</i>
MONNIMIACEAE	Siparuna	<i>Siparuna</i> af. <i>aspera</i> <i>Siparuna echinata</i>
MORACEAE	Brosimun	<i>Brosimun</i> cf. <i>utile</i>

	Cecropia	<i>Cecropia reticulata</i> <i>Cecropia viridifolia</i> <i>Cecropia af. Andina</i> <i>Ficus af. ovalifolia</i> <i>Perebea af. xanthochyma</i> <i>Pseudolmedia rigida</i> <i>Sorocea sp.</i> <i>Otoba gordoneiifolia</i> <i>Cybianthus af. magnus</i> <i>Gaissanthus fallenae</i> <i>Eugenia sp.</i> <i>Eugenia af. calva</i> <i>Eugenia cf. monticola</i> <i>Myrcianthes rophaloides</i> <i>Plinia sp. nov.</i> <i>Panopsis sp.</i> <i>Monnina sodiroi</i> <i>Cinchona pubescens</i> <i>Faramea cf. fragans</i> <i>Faramea eurycarpa</i> <i>Faramea af. uniflora</i> <i>Isertia sp.?</i> <i>Ladenbergia sp.</i> <i>Palicourea conferta</i> <i>Psychotria sp. 1</i> <i>Psychotria sp. 2</i> <i>Rhandia cf.</i> <i>Solanum nutans</i> <i>Sphaeropteris cf. tungurahensis</i> <i>Clavija membranacea</i>
MYRISTICAEAE	Ficus	
MYRSINACEAE	Perebea	
	Pseudolmedia	
	Sorocea	
	Otoba	
	Cybianthus	
	Gaissanthus	
MYRTACEAE	Eugenia	
	Myrcianthes	
PROTEACEAE	Plinia	
POLYGALACEAE	Panopsis	
RUBIACEAE	Monnina	
	Cinchona	
	Faramea	
	Isertia	
	Ladenbergia	
	Palicourea	
	Psychotria	
SOLANACEAE	Rhandia	
SPHAEROPTERIDACEAE	Solanum	
THEOPHRASTACEAE	Sphaeropteris	
	Clavija	

## TOISAN II

FAMILY	GENERA	SPECIES
MORFOESPECIE 1		
ANNONACEAE	Duguetia	<i>Duguetia sp.</i>
ARALIACEAE	Schefflera	<i>Schefflera sodiroi</i> <i>Schefflera lasiogyne</i>
ARACEAE	Anthurium	<i>Anthurium sp.</i> <i>Anthurium cf. giganteum</i>
ARECACEAE	Aiphanes	<i>Aiphanes erinacea</i>
	Chamaedorea	<i>Chamaedorea linearis</i> <i>Chamaedorea pinnatifrons</i>
	Geonoma	<i>Geonoma sp.</i>
	Prestoea	<i>Prestoea acuminata</i>
ASTERACEAE	Verbesina	<i>Verbesina sp.</i>
BOMBACACEAE	Matisia	<i>Matisia sp.</i>
BURSERACEAE	Protium	<i>Protium sp.</i>
CLUSIACEAE	Clusia	<i>Clusia sp.</i>
	Tovomitopsis	<i>Tovomitopsis af. balboa</i>
CHLORANTHACEAE	Hedyosmun	<i>Hedyosmun luteynii</i>
CHRYSOBALANACEAE	Licania	<i>Licania af. macrocarpa</i>
CYATHEACEAE	Alsophylla	<i>Alsophylla cuspidata</i>
	Cyathea	<i>Cyathea sp. 1</i>

FABACEAE  
FLACOURTIACEAE  
EUPHORBIACEAE

GESNERIACEAE  
ICACINACEAE  
LAURACEAE

MELASTOMATACEAE

MELIACEAE

MONNIMIACEAE

MORACEAE

MYRISTICAEAE  
MYRSINACEAE

MYRTACEAE

PIPERACEAE

PROTEACEAE  
POLYGALACEAE  
RUBIACEAE

RUTACEAE  
SAPINDACEAE

Lophosoria  
Erythrina  
Cassearia  
Acalypha  
Croton  
Besleria  
Calatola  
Nectandra  
Ocotea

Persea  
Pleurothyrium  
Blakea  
Miconia

Meriania  
Carapa  
Cedrela  
Guarea  
Ruagea  
Siparuna

Brosimum  
Cecropia

Ficus  
Naucleopsis  
Perebea  
Pouroma  
Pseudolmedia  
Otoba  
Cybianthus  
Gaissanthus  
Eugenia

Myrcianthes  
Plinia  
Piper

Panopsis  
Monnina  
Cinchona  
Faramea

Ladenbergia  
Palicourea  
Psychotria  
Zanthoxylon  
Allophylus

*Cyathea corallifera*  
*Cyathea straminea*  
*Lophosoria quadripinnata*  
*Erythrina megistophylla*  
*Cassearia af. mariquitae*  
*Acalypha* sp.  
*Croton techlerii*  
*Besleria angustifolia*  
*Calatola costaricensis*  
*Nectandra laurel*  
*Ocotea* sp. 1  
*Ocotea* cf. *bofo*  
*Persea subcordata*  
*Pleurothyrium* cf. *gigantum*  
*Blakea* sp.  
*Miconia* sp.  
*Miconia affinis*  
*Miconia pustulata*  
*Meriania* cf. *pubescens*  
*Carapa guianensis*  
*Cedrela odorata*  
*Guarea kunthiana*  
*Ruagea hirsuta*  
*Siparuna* af. *aspera*  
*Siparuna echinata*  
*Brosimum* cf. *utile*  
*Cecropia reticulata*  
*Cecropia viridifolia*  
*Ficus* af. *ovalifolia*  
*Naucleopsis* sp.  
*Perebea* af. *xanthochyma*  
*Pouroma bicolor*  
*Pseudolmedia rigida*  
*Otoba gordoniiifolia*  
*Cybianthus* af. *magnus*  
*Gaissanthus fallenae*  
*Eugenia* sp.  
*Eugenia* af. *calva*  
*Eugenia* cf. *monticola*  
*Myrcianthes rophaloides*  
*Plinia* sp. nov.  
*Piper* sp.  
*Piper bullosum*  
*Panopsis* sp.  
*Monnina sodiroi*  
*Cinchona pubescens*  
*Faramea* cf. *fragans*  
*Faramea eurycarpa*  
*Faramea* af. *uniflora*  
*Ladenbergia* sp.  
*Palicourea conferta*  
*Psychotria* sp.  
*Zanthoxylon quinduense*  
*Allophylus excelsior*

SAPOTACEAE	Pouteria	<i>Pouteria</i> sp.
SOLANACEAE	Solanum	<i>Solanum nutans</i>
STAPHYLLACEAE	Turpinia	<i>Turpinia occidentalis</i>
THEOPHRASTACEAE	Clavija	<i>Clavija membranacea</i>
URTICACEAE	Urera	<i>Urera</i> af. <i>caracasana</i>
	Sorocea	<i>Sorocea</i> sp.
MYRISTICAEAE	Otoba	<i>Otoba gordoneiifolia</i>
MYRSINACEAE	Cybianthus	<i>Cybianthus</i> af. <i>magnus</i>
	Gaissanthus	<i>Gaissanthus fallenae</i>
MYRTACEAE	Eugenia	<i>Eugenia</i> sp.
		<i>Eugenia</i> af. <i>calva</i>
		<i>Eugenia</i> cf. <i>monticola</i>
	Myrcianthes	<i>Myrcianthes rophaloides</i>
	Plinia	<i>Plinia</i> sp. nov.
PROTEACEAE	Panopsis	<i>Panopsis</i> sp.
POLYGALACEAE	Monnina	<i>Monnina sodiroi</i>
RUBIACEAE	Cinchona	<i>Cinchona pubescens</i>
	Faramea	<i>Faramea</i> cf. <i>fragans</i>
		<i>Faramea eurycarpa</i>
		<i>Faramea</i> af. <i>uniflora</i>
	Isertia	<i>Isertia</i> sp.?
	Ladenbergia	<i>Ladenbergia</i> sp.
	Palicourea	<i>Palicourea conferta</i>
	Psychotria	<i>Psychotria</i> sp. 1
		<i>Psychotria</i> sp. 2
	Rhandia	<i>Rhandia</i> cf.
SOLANACEAE	Solanum	<i>Solanum nutans</i>
SPHAEROPTERIDACEAE	Sphaeropteris	<i>Sphaeropteris</i> cf. <i>ungurahuensis</i>
THEOPHRASTACEAE	Clavija	<i>Clavija membranacea</i>

## ANNEX N° 2

### List of Plants Species with Ethnobotanical Applications

<u>Nombre Científico</u>	<u>Nombre Común</u>	<u>Uso</u>
<i>Coniza</i> sp.	Yaguachi	Medicinal
<i>Carica</i> sp.	Chilguacan	Comestible
<i>Brassica napus</i>	Nabo	Comestible
<i>Erytrina edulis</i>	Porotón	Comestible
<i>Lepechina bentonicaefolia</i>	Matico	Medicinal
<i>Mintostachys tomentosa</i>	Tifo	Medicinal
<i>Ruta graveolens</i>	Ruda	Medicinal
<i>Sambucus nigrans</i>	Tilo	Medicinal
<i>Inga</i> sp.	Guaba	Comestible
<i>Matricaria chamonilla</i>	Manzanilla	Medicinal
<i>Passiflora maxima</i>	Maracuya	Comestible
<i>Nicandra physaloides</i>	Ambo	Medicinal
<i>Foeniculum vulgare</i>	Eneldo	Medicinal
<i>Peperomia</i> sp.	Congona	Medicinal
<i>Nicotiana tabacum</i>	Tabaco	Medicinal, Insecticida
<i>Begonia</i> sp.	Begonia	Medicinal
<i>Cirsium</i> sp.	Cachiserraja	Medicinal, Mitológico
<i>Solanum quitoense</i>	Naranjilla	Comestible
<i>Allium cepa</i>	Ajo	Comestible
<i>Solanum nigrescens</i>	Hierba mora	Medicinal
<i>Manihot sculents</i>	Yuca	Comestible
<i>Thropoleum tuberosum</i>	Camote	Comestible
<i>Siparuna echinata</i>		Medicinal
<i>Niphydium</i> sp.	Calahuala	Medicinal
<i>Polypodium</i> sp.	Calahuala	Medicinal
<i>Physalis peruviana</i>	Uvilla	Medicinal
<i>Phasceolus</i> sp.	Frejol	Comestible
<i>Amaranthus</i> sp.	Ataco	Medicinal
<i>Ricinus comunis</i>	Higuerilla	Medicinal
<i>Bixa orellana</i>	Achiote	Comestible
<i>Tagetes multiflora</i>	Hierba de gallinazo	Comestible, Insecticida
<i>Ciclanthera pedata</i>	Achogcha	Comestible
<i>Polymnia edulis</i>	Jicama	Comestible
<i>Colacasia esculenta</i>	Papa china	Comestible
<i>Rubus</i> sp.	Mora silvestre	Comestible
<i>Rubus niveus</i>	Mora de castilla	Comestible
<i>Ambrosia arborescens</i>	Marco	Insecticida
<i>Myrica pubescens</i>	Laurel de cera	Comestible
<i>Cucurbita maxima</i>	Zapallo	Comestible
<i>Cucurbita pepo</i>	Zambo	Comestible
<i>Inga espectabilis</i>	Guaba machetona	Comestible
<i>Capsicum</i> sp.	Ají	Comestible, Insecticida
<i>Brugamncia aurea</i>	Guanto	Mitológico, Insecticida
<i>Lents sculenta</i>	Lenteja	Comestible
<i>Fragaria vesca</i>	Frutilla	Comestible
<i>Ananas comusus</i>	Piña	Comestible
<i>Hyeronima</i> sp.	Motilón	Comestible

### ANNEX N° 3

#### List of Registered Birds Species at Toisán I , Toisán II and Around the Community of Cerro Pelado

	Scientific Name	English Name	Spanish Name
	<b>FALCONIFORMES</b>		
	<b>ACCIPITRIDAE</b>		
1.	<i>Leucopternis plumbea</i>	Plumbeous Hawk	Gavilán Plomizo
2.	<i>Buteo magnirostris</i>	Roadside Hawk	Gavilán Caminero
	<b>FALCONIDAE</b>		
3.	<i>Micrastur ruficollis</i>	Barred Forest-Falcon	Halcón-Montés Barreteado
	<b>CICONIFORMES</b>		
	<b>CATHARTIDAE</b>		
4.	<i>Coragyps atratus</i>	Black Vulture	Gallinazo Negro
	<b>GALLIFORMES</b>		
	<b>CRACIDAE</b>		
5.	<i>Aburria aburri</i>	Wattled Guan	Pava Carunculada
6.	<i>Chamaepetes goudotii</i>	Sickle-winged Guan	Pava Ala de Hoz
	<b>ODONTOPHORIDAE</b>		
7.	<i>Odontophorus erythrops</i>	Rufous-fronted Wood-Quail	Corcovado Frenticolorado
	<b>COLUMBIFORMES</b>		
	<b>COLUMBIDAE</b>		
8.	<i>Columba fasciata</i>	Band-tailed Pigeon	Paloma Collareja
9.	<i>Columba plumbea</i>	Plumbeous Pigeon	Paloma Plomiza
10.	<i>Zenaida auriculata</i>	Eared Dove	Tórtola Orejuda
11.	<i>Geotrygon frenata</i>	White-throated Quail-Dove	Paloma-Perdiz Goliblanca
	<b>PSITTACIFORMES</b>		
	<b>PSITTACIDAE</b>		
12.	<i>Aratinga erythrogenys</i>	Red-masked Parakeet	Perico Caretirrojo
13.	<i>Bolborhynchus lineola</i>	Barred Parakeet	Perico Barreteado
14.	<i>Brotogeris pyrrhopterus</i>	Gray-cheeked Parakeet	Perico Cachetigris
15.	<i>Pionus seniloides</i>	White-capped Parrot	Loro Caretiblanco
16.	<i>Amazona mercenaria</i>	Scaly-naped Amazon	Amazona Nuquiescamosa
	<b>CUCULIFORMES</b>		
	<b>CUCULIDAE</b>		
17.	<i>Piaya cayana</i>	Squirrel Cuckoo	Cuco Ardilla
	<b>STRIGIFORMES</b>		
	<b>STRIGIDAE</b>		
18.	<i>Strix virgata</i>	Mottled Owl	Autillo de America Central Búho Moteado
	<b>CAPRIMULGIFORMES</b>		
	<b>CAPRIMULGIDAE</b>		
19.	<i>Nyctidromus albicollis</i>	Pauraque	Pauraque
	<b>APODIFORMES</b>		
	<b>APODIDAE</b>		
20.	<i>Streptoprocne zonaris</i>	White-collared Swit	Vencejo Cuelliblanco
	<b>TROCHILIDAE</b>		
21.	<i>Phaethornis syrmatorphorus</i>	Tawny-bellied Hermit	Ermitaño Ventrileonado
22.	<i>Colibri coruscans</i>	Sparkling Violetear	Orejivioleta Ventriazul
23.	<i>Popelairia conversii</i>	Green Thorntail	Colicierda Verde
24.	<i>Chlorostilbon melanorhynchus</i>	Western Emerald	Esmeralda del Occidente
25.	<i>Amazilia sp</i>		
26.	<i>Amazilia franciae</i>	Andean Emerald	Amazilia Andina
27.	<i>Adelomyia melanogenys</i>	Speckled Hummingbird	Colibrí Jaspeado
28.	<i>Urostickte benjamini</i>	Purple-bibbed Whitetip	Puntiblanca Pechipúrpura
29.	<i>Urochroa bougueri</i>	White-tailed Hillstar	Estrella Coliblanco



30.	<i>Coeligena wilsoni</i>	Brown Inca	Inca Pardo
31.	<i>Coeligena torquata</i>	Collared Inca	Inca Collarejo
32.	<i>Heliangelus strophianus</i>	Gorgeted Sunangel	Solángel de Gorguera
33.	<i>Haplophaedia lugens</i>	Hoary Puffleg	Zamarrito Canoso
34.	<i>Ocreatus underwoodii</i>	Booted Racket-tail	Colaespátula Zamarrito
35.	<i>Aglaiocercus kingi</i>	Long-tailed Sylph	Silfo Colilargo
36.	<i>Aglaiocercus coelestis</i>	Violet-tailed Sylph	Silfo Colivioleta
37.	<i>Calliphlox mitchellii</i>	Purple-throated Woodstar	Estrellita Gorjipúrpura
38.	<i>Acestrura</i> sp		
<b>TROGONIFORMES</b>			
<b>TROGONIDAE</b>			
39.	<i>Pharomachrus antisianus</i>	Crested Quetzal	Quetzal Crestado
40.	<i>Pharomachrus auriceps</i>	Golden-headed Quetzal	Quetzal Cabecidorado
41.	<i>Trogon personatus</i>	Masked Trogon	Trogon Enmascarado
<b>CORACIIFORMES</b>			
<b>MOMOTIDAE</b>			
42.	<i>Baryphthengus martii</i>	Rufous Motmot	Momoto Rufo
<b>PICIFORMES</b>			
<b>BUCCONIDAE</b>			
43.	<i>Haploptila castanea</i>	White-faced Nunbird	Monja Cariblanca
<b>CAPITONIDAE</b>			
44.	<i>Eubucco bourcierii</i>	Red-headed Barbet	Barbudo Cabecirrojo
45.	<i>Semnomis ramphastinus</i>	Toucan Barbet	Barbudo Tucán
<b>RAMPHASTIDAE</b>			
46.	<i>Aulacorhynchus haematopygus</i>	Crimson-rumped Toucanet	Tucanete Lomirrojo
47.	<i>Andigena laminirostris</i>	Plate-billed Mountain-Toucan	Tucán Andino Piquilaminado
<b>PICIDAE</b>			
48.	<i>Picumnus olivaceus</i>	Olivaceous Piculet	Picolete Oliváceo
49.	<i>Piculus rivolii</i>	Crimson-mantled Woodpecker	Carpintero Dorsicarmesí
50.	<i>Dryocopus lineatus</i>	Lineated Woodpecker	Carpintero Lineado
51.	<i>Veniliornis fumigatus</i>	Smoky-brown Woodpecker	Carpintero Pardo
52.	<i>Campephilus pollens</i>	Powerful Woodpecker	Carpintero Poderoso
<b>PASSERIFORMES</b>			
<b>FURNARIIDAE</b>			
53.	<i>Synallaxis azarae</i>	Azara's Spinetail	Colaespina de Azara
54.	<i>Cranioleuca erythrops</i>	Red-faced Spinetail	Colaespina Carirroja
55.	<i>Pseudocolaptes johnsoni</i>	Pacific Tuftedcheek	Barbablanca del Pacífico
56.	<i>Margarornis squamiger</i>	Pearled Treerunner	Subepalo Perlado
57.	<i>Premnoplex brunnescens</i>	Spotted Barbtail	Subepalo Moteado
58.	<i>Premnomnis guttuligera</i>	Rusty-winged Barbtail	Subepalo Alirrojo
59.	<i>Syndactyla subalaris</i>	Lineated Foliage-gleaner	Limpiafronda Lineado
60.	<i>Automolus rubiginosus</i>	Ruddy Foliage-gleaner	Rascahojas Rojiza
61.	<i>Thripadectes virgaticeps</i>	Streak-capped Treehunter	Trepamusgos Gorrrirrayado
62.	<i>Thripadectes ignobilis</i>	Uniform Treehunter	Trepamusgos Uniforme
63.	<i>Sclerurus mexicanus</i>	Tawny-throated Leaflosser	Tirahojas Goliantead
<b>DENDROCOLAPTIDAE</b>			
64.	<i>Dendrocincla fuliginosa</i>	Plain-brown Woodcreeper	Trepatroncos Pardo
65.	<i>Glyphorhynchus spirurus</i>	Wedge-billed Woodcreeper	Trepatroncos Piquicuña
66.	<i>Xiphocolaptes promeropirhynchus</i>	Strong-billed Woodcreeper	Trepatroncos Piquifuerte
67.	<i>Lepidocolaptes souleyetii</i>	Streak-headed Woodcreeper	Trepatroncos Cabecirrayado
68.	<i>Lepidocolaptes lacrymiger</i>	Montane Woodcreeper	Trepatroncos Montano
<b>THAMNOPHILIDAE</b>			
69.	<i>Thamnophilus unicolor</i>	Uniform Antshrike	Batará Unicolor
70.	<i>Drymophila caudata</i>	Long-tailed Antbird	Hormiguero Colilargo
71.	<i>Myrmeciza immaculata</i>	Immaculate Antbird	Hormiguero Inmaculado
<b>FORMICARIIDAE</b>			
72.	<i>Formicarius rufipectus</i>	Rufous-breasted Antthrush	Formicario Pechirrufo
73.	<i>Grallaria guatemalensis</i>	Scaled Antpitta	Gralaria Escamada

74.	<i>Grallaria flavotincta</i>	Yellow-breasted Antpitta	Gralaria Pechiamarillenta
75.	<i>Grallaria ruficapilla</i>	Chestnut-crowned Antpitta	Gralaria Coronicastaña
<b>RHINOCRYPTIDAE</b>			
76.	<i>Scytalopus vicinior</i>	Nariño Tapaculo	Tapaculo de Nariño
<b>TYRANNIDAE</b>			
77.	<i>Camptostoma obsoletum</i>	Southern Beardless-Tyrannulet	Tiranolete Silbador Sureño
78.	<i>Tyrannulus elatus</i>	Yellow-crowned Tyrannulet	Tiranolete Coroniamarillo
79.	<i>Elaenia pallatangae</i>	Sierran Elaenia	Elenita Serrana
80.	<i>Mecocerculus poecilocercus</i>	White-tailed Tyrannulet	Tiranillo Coliblanco
81.	<i>Mionectes olivaceus</i>	Olive-striped Flycatcher	Mosquerito Olivirrayado
82.	<i>Pseudotriccus pelzelni</i>	Bronze-olive Pygmy-Tyrant	Tirano-Enano Bronceado
83.	<i>Rhynchocyclus fulvipectus</i>	Fulvous-breasted Flatbill	Picoplano Pechifulvo
84.	<i>Platyrinchus mystaceus</i>	White-throated Spadebill	Picochato Goliblanco
85.	<i>Myiophobus flavicans</i>	Flavescent Flycatcher	Mosquerito Flavescente
86.	<i>Pyrrhomyias cinnamomea</i>	Cinnamon Flycatcher	Mosquerito Canelo
87.	<i>Contopus fumigatus</i>	Smoke-colored Pewee	Pibi Ahumado
88.	<i>Ochthoeca cinnamomeiventris</i>	Slaty-backed Chat-Tyrant	Pitajo Dorsipizarro
89.	<i>Tyrannus niveigularis</i>	Snowy-throated Kingbird	Tirano Goliníveo
90.	<i>Pachyrhamphus versicolor</i>	Barred Becard	Cabezón Barreteado
91.	<i>Tityra semifasciata</i>	Masked Tityra	Titira Enmascarada
<b>COTINGIDAE</b>			
92.	<i>Pipreola jucunda</i>	Orange-breasted Fruiteater	Frutero Pechinaranja
93.	<i>Ampelioides tschudii</i>	Scaled Fruiteater	Frutero Escamado
94.	<i>Lipaugus cryptolophus</i>	Olivaceous Piha	Piha Olivácea
95.	<i>Rupicola peruviana</i>	Andean Cock-of-the-rock	Gallo de la Peña Andino
<b>PIPRIDAE</b>			
96.	<i>Masius chrysopterus</i>	Golden-winged Manakin	Saltarín Alidorado
<b>CORVIDAE</b>			
97.	<i>Cyanolyca pulchra</i>	Beautiful Jay	Urraca Hermosa
98.	<b>VIREONIDAE</b>		
99.	<i>Vireo leucophrys</i>	Brown-capped Vireo	Vireo Gorripardo
<b>TURDIDAE</b>			
100.	<i>Myadestes ralioides</i>	Andean Solitaire	Solitario Andino
101.	<i>Platycichla leucops</i>	Pale-eyed Thrush	Mirlo Ojipálido
102.	<i>Turdus fuscater</i>	Great Thrush	Mirlo Grande
103.	<i>Turdus serranus</i>	Glossy-black Thrush	Mirlo Negribriloso
104.	<i>Turdus maculirostris</i>	Ecuadorian Thrush	Mirlo Ecuatoriano
<b>HIRUNDINIDAE</b>			
105.	<i>Notiochelidon murina</i>	Brown-bellied Swallow	Golondrina Ventricafé
<b>TROGLODYTIDAE</b>			
106.	<i>Cinnycerthia olivascens</i>	Sepia-brown Wren	Soterrey Caferrojizo
107.	<i>Thryothorus nigricapillus</i>	Bay Wren	Soterrey Cabecipinto
108.	<i>Troglodytes solstitialis</i>	Mountain Wren	Soterrey Montañés
109.	<i>Henicorhina leucophrys</i>	Gray-breasted Wood-Wren	Soterrey-Montés Pechigrís
<b>PARULIDAE</b>			
110.	<i>Parula pitiayumi</i>	Tropical Parula	Parula Tropical
111.	<i>Geothlypis semiflava</i>	Olive-crowned Yellowthroat	Antifacito Coronioliva
112.	<i>Myioborus miniatus</i>	Slate-throated Whitestart	Candelita Goliplomiza
113.	<i>Basileuterus tristriatus</i>	Three-striped Warbler	Reinita Cabecilistada
114.	<i>Basileuterus coronatus</i>	Russet-crowned Warbler	Reinita Coronirrojoza
<b>THRAUPIDAE</b>			
115.	<i>Diglossopsis cyanea</i>	Masked Flowerpiercer	Pinchaflo Enmascarado
116.	<i>Diglossa albilatera</i>	White-sided Flowerpiercer	Pinchaflo Flanquiblanco
117.	<i>Euphonia laniirostris</i>	Thick-billed Euphonia	Eufonia Piquigruesa
118.	<i>Euphonia xanthogaster</i>	Orange-bellied Euphonia	Eufonia Ventrinaranja
119.	<i>Chlorochrysa phoenicotis</i>	Glistening-green Tanager	Tangara Verde Reluciente
120.	<i>Tangara arthus</i>	Golden Tanager	Tangara Dorada
121.	<i>Tangara xanthocephala</i>	Saffron-crowned Tanager	Tangara Coroniazafrán

122. *Tangara parzudakii*
123. *Tangara ruficervix*
124. *Tangara labradorides*
125. *Tangara nigroviridis*
126. *Tangara vassorii*
127. *Tangara vitriolina*
128. *Tangara gyrola*
129. *Tangara sp.*
130. *Anisognathus somptuosus*
131. *Tersina viridis*
132. *Thraupis episcopus*
133. *Thraupis cyanocephala*
134. *Ramphocelus icteronotus*
135. *Piranga leucoptera*
136. *Tachyphonus rufus*
137. *Hemispingus melanotis*

#### **CARDINALIDAE**

138. *Saltator atripennis*
139. *Pheucticus chrysogaster*

#### **EMBERIZIDAE**

140. *Sporophila corvina*
141. *Atlapetes rufinucha*
142. *Atlapetes tricolor*
143. *Atlapetes leucopterus*
144. *Lysurus castaneiceps*
145. *Buarremon brunneinuchus*
156. *Buarremon torquatus*
147. *Zonotrichia capensis*

#### **ICTERIDAE**

148. *Psarocolius angustifrons*

#### **FRINGILLIDAE**

149. *Carduelis magellanica*
150. *Carduelis spinescens*

Flame-faced Tanager  
Golden-naped Tanager  
Metallic-green Tanager  
Beryl-spangled Tanager  
Blue-and-black Tanager  
Scrub Tanager  
Bay-headed Tanager

Blue-winged Mountain-Tanager  
Swallow Tanager  
Blue-gray Tanager  
Blue-capped Tanager  
Yellow-rumped Tanager  
White-winged Tanager  
White-lined Tanager  
Black-eared Hemispingus

Black-winged Saltator  
Southern Yellow-Grosbeak

Variable Seedeater  
Rufous-naped Brush-Finch  
Tricolored Brush-Finch  
White-winged Brush-Finch  
Olive Finch  
Chestnut-capped Brush-Finch  
Stripe-headed Brush-Finch  
Rufous-collared Sparrow

Russet-backed Oropendola

Hooded Siskin  
Andean Siskin

Tangara Cariflama  
Tangara Nuquidorada  
Tangara Verdimetálica  
Tangara Lentejuelada  
Tangara Azulinegra  
Tangara Matorralera  
Tangara Cabecibaya

Tangara-Montana Aliazul  
Tersina  
Tangara Azuleja  
Tangara Gorriazul  
Tangara Lomiamarilla  
Piranga Aliblanca  
Tangara Filiblanca  
Hemispingo Orejinegro

Saltador Alinegro  
Picogrueso Amarillo Sureño

Espiguero Variable  
Matorralero Nuquirrufo  
Matorralero Tricolor  
Matorralero Aliblanco  
Pinzón Oliváceo  
Matorralero Gorricastaño  
Matorralero Cabecilistado  
Chingolo

Oropéndola Dorsirrojo

Jilguero Encapuchado  
Jilguero Andino

**Type of Register, Habitat, Frequency and Group of Birds Species Registered at Toisán I, Toisán II and Around the Community of Cerro Pelado**

**Cerro Pelado: 2000 a 2500 m. a. s.l.**

fu = frugivorons; in = insectivorons; ne = nectarivorons; om = omnivorons; ca = meat eaters.

**APODIDAE**

Toisán I			Toisán II			Cerro Pelado		
R	H	F	R	H'	F	R	H	F
o	a	r				o	a	c
o	b/a	pc	o	b/a	pc			
						o	a	c
e	b	r	e/o	b	r	e	b	r
e/o	b	pc	e/o	b	pc			
e	b	pc	e	b	co	e	b/a	pc
						e/o	b/a	pc
e	b	pc	e	b	pc	e	b	pc
						e/o	a	c
e	b	pc	e	b	pc	e	b	pc
						e	a	pc
						e	a	mc
						e	a	r
e/o	b	pc	e	b/a	co	o	a	co
			e	a	pc	e	b/a	mc
						o	a	pc
						e	a	pc
e	a	mc	e	b	mc	e	a	mc

*Streptoprocne zonaris*

### TROCHILIDAE

*Phaethornis symatophorus*

*Colibri coruscans*

*Popelairia conversii*

*Chlorostilbon melanorhynchus*

*Amazilia sp.*

*Amazilia franciae*

*Adelomyia melanogenys*

*Urosticte benjamini*

*Urochroa bougueri*

*Coeligena wilsoni*

*Coeligena Torquata*

*Heliangelus strophianus*

*Haplophaedia lugens*

*Ocreatus underwoodii*

*Agelaiocercus kingi*

*Agelaiocercus coelestis*

*Calliphlox mitchellii*

*Acestrura sp.*

### TROGONIFORMES

#### TROGONIDAE

*Pharomachrus antisianus*

*Pharomachrus auriceps*

*Trogon personatus*

### CORACIIFORMES

#### MOMOTIDAE

*Baryphthengus martii*

### PICIFORMES

#### BUCCONIDAE

*Haploptila castanea*

#### CAPITONIDAE

*Eubucco bourcierii*

*Semnormis ramphastinus*

### RAMPHASTIDAE

*Aulacorhynchus haematopygus*

*Andigena laminirostris*

### PICIDAE

*Picumnus olivaceus*

*Piculus rivolii*

*Dryocopus lineatus*

*Veniliornis fumigatus*

*Campephilus pollens*

### PASSERIFORMES

#### FURNARIIDAE

*Synallaxis azarae*

*Cranioleuca erythrops*

*Pseudocolaptes johnsoni*

*Margarornis squamiger*

*Premnoplex brunnescens*

*Premnornis guttuligera*

*Syndactyla subalaris*

*Automolus rubiginosus*

*Thripadectes virgaticeps*

*Thripadectes ignobilis*

*Sclerurus mexicanus*

						o	a	c	in
e/o/c	b/a	co	e/o/c	b/a	c	o	b/a	pc	ne
						e/o	a	mc	ne
			o	a	pc				ne
			o	a	?				ne
						o	a	pc	ne
o	b	pc							ne
			c	b	r				ne
o/c	b	r	o/c	b	r				ne
o/c	b	mc	o/c	b/a	mc	o	b	pc	ne
			o/c	b/a	pc	o	b	pc	ne
o	a	pc							ne
			c	b	r				ne
o	b/a	pc	o	a	pc	o	a	pc	ne
			o	a	pc				ne
o/c	b	co	o/c	b/a	co				ne
						o	a	pc	ne
			o	a	r				ne
			e	b	pc				om
e	b/a	co	e/o	b/a	co	e	b/a	mc	om
e	b	pc	e	b	pc	o/e	a	pc	om
o	b	pc							om
o	b	r							in
			o	b	pc				om
e/o	b	mc	e/o	b/a	mc	e	b	pc	om
e/o	b	pc	e/o	b	pc	e	b	pc	om
e/o	b	pc	e	b	pc	e	b	pc	om
						o	a	pc	in
e	b	pc	e	b	pc	e	b	pc	in
						o	b	r	in
			e	b	pc				in
e/o	b	r	e/o	b	r				in
e	a	c	e	a	c	o/e	a	c	in
			e	b	pc				in
c	b	r							in
c	b	pc							in
c	b	pc	c	b	pc				in
c	b	r							in
e	b	pc	e	b	pc				in
			e	b	pc				
			c	b	r				in
c	b	r	c	b	r				in
			c	b	r				in

**DENDROCOLAPTIDAE***Dendrocincla fuliginosa**Glyphorhynchus spirurus**Xiphocolaptes promeropirhynchus**Lepidocolaptes souleyetii**Lepidocolaptes lacrymiger***THAMNOPHILIDAE***Thamnophilus unicolor**Drymophila caudata**Myrmeciza immaculata***FORMICARIIDAE***Formicarius rufipectus**Grallaria guatemalensis**Grallaria flavotincta**Grallaria ruficapila***RHINOCRYPTIDAE***Scytalopus vicinior***TYRANNIDAE***Camptostoma obsoletum**Tyrannulus elatus**Elaenia pallatangae**Mecocerculus poecilocercus**Mionectes olivaceus**Pseudotriccus pelzelni**Rhynchocyclus fulvipectus**Platyrinchus mystaceus**Myiophobus flavicans**Pyrrhomyias cinnamomea**Contopus fumigatus**Tyrannus niveigularis**Pachyrhamphus versicolor**Ochthoeca cinnamomeiventris**Tityra semifasciata***COTINGIDAE***Pipreola jucunda**Ampelioides tschudii**Lipaugus cryptolophus**Rupicola peruviana***PIPRIDAE***Masius chrysopterus***CORVIDAE***Cyanolyca pulchra***VIREONIDAE***Vireo leucophrys***TURDIDAE***Myadestes ralioides**Platycichla leucops**Turdus fuscater**Turdus serranus**Turdus maculirostris***HIRUNDINIDAE***Notiochelidon cyanoleuca***TROGLODYTIDAE***Cinnycerthia olivascens**Thryothorus nigricapillus**Henicorhina leucophrys*

						o	b/c	pc	in
o	b	pc							in
e	b/a	pc	e	b/a	pc				in
						o	b	pc	in
e	b	mc	e	b	pc	o	b	pc	in
						o	b	pc	in
			e	b	pc	o/e	a	pc	in
			e/o	a	pc	o/e	a	pc	in
a	b	pc	e	b	pc				in
						e	b/a	pc	in
e	b	mc	e	b	mc	e	b/a	pc	in
e	b/a	pc							in
e	b	mc	e	b	mc	e	b	pc	in
						o	a	pc	in
						o	a	pc	in
e	a	pc				o/e	a	c	in
e	b	pc				o	b	pc	in
c	b	pc	c	b	pc	o	a	pc	in
c	b	pc	c	b	pc				in
			c	b	pc				in
c	b	pc							in
c	b	r							in
						o	a	mc	in
o	a	c	o/e	a	mc	e	a	mc	in
						o/e	a	pc	in
e	b	pc				o	b	pc	in
			o	b/a	pc				in
			o	b	mc				
			o	b	r				om
			o	b/a	r				om
o	b	pc	o	b	pc				om
			e	b	pc	e	b	pc	om
c	b	pc	c	b	pc	o	b	pc	fu
			o	b	r				om
e	b/a	pc	e	b/a	pc	o	a	pc	in
e	b	co	e	b	co	e	b	mc	om
c	b	r	c	b	r				om
						o/e	a	co	om
e/c	b	pc	e	b	pc				om
			e	b	pc				om
						o/e	a	co	in
c	b	pc	c	b	pc				
						e	a	pc	in
c/e	b	co	c/e	b/a	co	e	a	co	in

*Troglodytes solstitialis*

# **PARULIDAE**

*Parula pitiayumi*

*Geothlypis semiflava*

*Myioborus miniatus*

*Basileuterus tristriatus*

*Basileuterus coronatus*

# **THRAUPIDAE**

*Diglossopsis cyanea*

*Diglossa albilatera*

*Euphonia laniirostris*

*Euphonia xanthogaster*

*Chlorochrysa phoenicotis*

*Tangara arthus*

*Tangara xanthocephala*

*Tangara parzudakii*

*Tangara ruficervix*

*Tangara labradorides*

*Tangara nigroviridis*

*Tangara vassorii*

*Tangara vitriolina*

*Tangara gyrola*

*Tangara sp.*

*Anisognathus somptuosus*

*Tersina viridis*

*Thraupis episcopus*

*Thraupis cyanocephala*

*Ramphocelus icteronotus*

*Piranga leucoptera*

*Tachyphonus rufus*

*Hemispingus melanotis*

# **CARDINALIDAE**

*Saltator atripennis*

*Pheucticus chrysogaster*

# **EMBERIZIDAE**

*Sporophila corvina*

*Atlapetes rufinucha*

*Atlapetes tricolor*

*Atlapetes leucopterus*

*Lysurus castaneiceps*

*Buarremon brunneinuchus*

*Buarremon torquatus*

*Zonotrichia capensis*

# **ICTERIDAE**

*Psarocolius angustifrons*

# **FRINGILLIDAE**

*Carduelis magellanica*

*Carduelis spinescens*

			e	b	pc				in
									in
e	a	pc							
			e/o	a	pc				in
o	b/a	co	o/e	b/a	co	o/e	b/a	co	in
c	b	co	c/o	b/a	co				in
						a	b	pc	in
			e/o	a	pc				ne
e	a	pc				o	a	pc	ne
			o	a	pc				fu
c/o/e	b	mc	c/o/e	b/a	mc	o/e	a	mc	fu
						o	a	pc	om
			o	b	c	o	a	mc	om
						o	b/a	r	om
o	b/a	mc	o	b/a	mc	o	b/a	mc	om
o	b/a	pc	o	b/a	pc	o	b/a	c	om
						o	b	pc	om
o	b/a	pc	o	b/a	pc				om
						o	b	pc	om
			o	a	r				om
						o	b	pc	om
			o	a	?				fu
o	b/a	co	o/e	b/a	co	o	a	co	om
						o	a	pc	om
						o	a	pc	om
						o	b	pc	om
						o	a	mc	
			o	a	pc	o	a	pc	om
						o	b	pc	om
			e	b	r				om
			o/e	a	pc	o/e	a	c	om
						o	a	c	om
						o	a	pc	om
						o	a	c	om
			o	a	pc				om
						o/e	a	c	om
			c	b	r				
o/c	b	pc	o/c	b	pc				om
o/c	b	pc	o/c	b	pc	o	a	pc	om
			a/e	a	pc	o/e	a	c	om
						e	a	pc	om
						o	a	pc	fu
						o	a	r	fu

## ANNEX N° 5

### Endemical Birds Species Registered at Toisan I, Toisan II and Around the Community of Cerro Pelado

1 = Toisan I

2 = Toisan II

3 = Cerro Pelado

Altitud : 2130 a 2286 m.a.s.l.

Altitud: 1524 a 1726 m.a. s.l.

Altitud: 2000 a 2500 m.a.

	Ecua-Colom			Ecua - Perú			Ec -Col -Pe		
	1	2	3	1	2	3	1	2	3
1. <i>Aratinga erythrogenys</i>					x				
2. <i>Brotogeris pyrrhopterus</i>					x				
3. <i>Chlorostilbon melanorhynchus</i>			x						
4. <i>Urosticte benjamini</i>						x	x		
5. <i>Urochroa bougueri</i>						x	x		
6. <i>Coeligena wilsoni</i>	x	x	x						
7. <i>Heliangelus strophianus</i>	x								
8. <i>Haplophaedia lugens</i>		x							
9. <i>Agelaiocercus coelestis</i>	x	x							
10. <i>Semnornis ramphastinus</i>	x	x	x						
11. <i>Andigena laminirostris</i>	x	x	x						
12. <i>Pseudocolaptes johnsoni</i>	x								
13. <i>Thripadectes ignobilis</i>	x	x							
14. <i>Thamnophilus unicolor</i>								x	
15. <i>Grallaria flavotincta</i>	x	x							
16. <i>Scytalopus vicinior</i>	x	x	x						
17. <i>Tyrannus niveigularis</i>					x				
18. <i>Pipreola jucunda</i>		x							
19. <i>Lipaugus cryptolophus</i>				x	x				
20. <i>Cyanolyca pulchra</i>		x							
21. <i>Turdus maculirostris</i>		x							
22. <i>Chlorochrysa phoenicotis</i>		x							
23. <i>Tangara labradorides</i>							x		
24. <i>Tangara vitriolina</i>		x							
25. <i>Atlapetes leucopterus</i>					x				



**Rare, Vulnerable and in Lesser Risk of Extinction Birds Species  
Registered at Toisan I, Toisan II and Around the Community of Cerro Pelado**

Altitud : 2130 a 2286 m.s.n.m.  
Altitud: 1524 a 1706 m.s.n.m.  
Altitud: 2000 a 2500 m.s.n.m.

	Rare			Vulnerable			Lesser Risk		
	1	2	3	1	2	3	1	2	3
1. <i>Leucopternis plumbea</i>	x								
2. <i>Aburria aburri</i>	x	x	x	x	x	x			
3. <i>Aratinga erythrogenys</i>						x			
4. <i>Brotojeris pyrrhopterus</i>			x			x			
5. <i>Urosticte benjamini</i>		x							
6. <i>Urochroa bougueri</i>	x	x							
7. <i>Haplophaedia lugens</i>		x							
8. <i>Acestrura</i> sp.		x							
9. <i>Semnornis ramphastinus</i>							x	x	x
10. <i>Andigena laminirostris</i>				x	x	x			
11. <i>Hapaloptila castanea</i>	x							x	
12. <i>Driocopus liniatus</i>			x						
13. <i>Campephilus pollens</i>	x	x							
14. <i>Pseudocolaptes johnsoni</i>	x			x					
15. <i>Premnornis guttuligera</i>	x								
16. <i>Thripadectes virgaticeps</i>		x							
17. <i>Thripadectes ignobilis</i>	x	x							
18. <i>Sclerurus mexicanus</i>		x							
19. <i>Gralaria flavotincta</i>	x	x							
20. <i>Pipreola jucunda</i>		x							
21. <i>Ampelioides tschudii</i>		x							
22. <i>Cyanolyca pulchra</i>		x						x	
23. <i>Platycichia leucops</i>	x	x							
24. <i>Tangara xanthocephala</i>			x						
25. <i>Tangara vitriolina</i>		x							
26. <i>Hemispingus melanotis</i>		x							
27. <i>Lysurus castaneiceps</i>		x							
28. <i>Carduelis spinescens</i>			x						
	10	17	5	3	2	3	1	3	1

Table N°1

Number of plants species registered at Toisán I and Toisán II		
	Study Zones	
	Toisán I	Toisán II
N° of species	77	79
N° of individuals registered	369	372
N° of common species.	36	
% of similarity	58%	

Table N° 2

Orders and number of birds species registered at Toisán I, Toisán II, and on the surroundings of the Community of Cerro Pelado		
Orders	N° of Families	N° of Species
1. Falconiformes	2	3
2. Ciconiformes	1	1
3. Galliformes	2	3
4. Columbiformes	1	4
5. Psittaciformes	1	5
6. Cuculiformes	1	1
7. Strigiformes	1	1
8. Caprimulgiformes	1	1
9. Apodiformes	2	19
10. Trogoniformes	1	3
11. Coraciiformes	1	1
12. Piciformes	4	10
13. Passeriformes	19	98
Total	37	150

Table N° 3

Orders and number of birds species registered at Toisán I and Toisán II		
Orders	N° of Families	N° of Species
1. Falconiformes	2	2
2. Galliformes	2	3
3. Columbiformes	1	2
4. Psittaciformes	1	2
5. Caprimulgiformes	1	1
6. Apodiformes	1	14
7. Trogoniformes	1	3
8. Coraciiformes	1	1
9. Piciformes	4	8
10. Passeriformes	16	68
Total	30	104

Table N° 4

Number of birds species registered at Toisán I and Toisán II		
	Study Zones	
	Toisán I	Toisán II
N° of species	66	86
Total of observed species	104	
N° of species common to both zones	49	
% of similarity	63%	

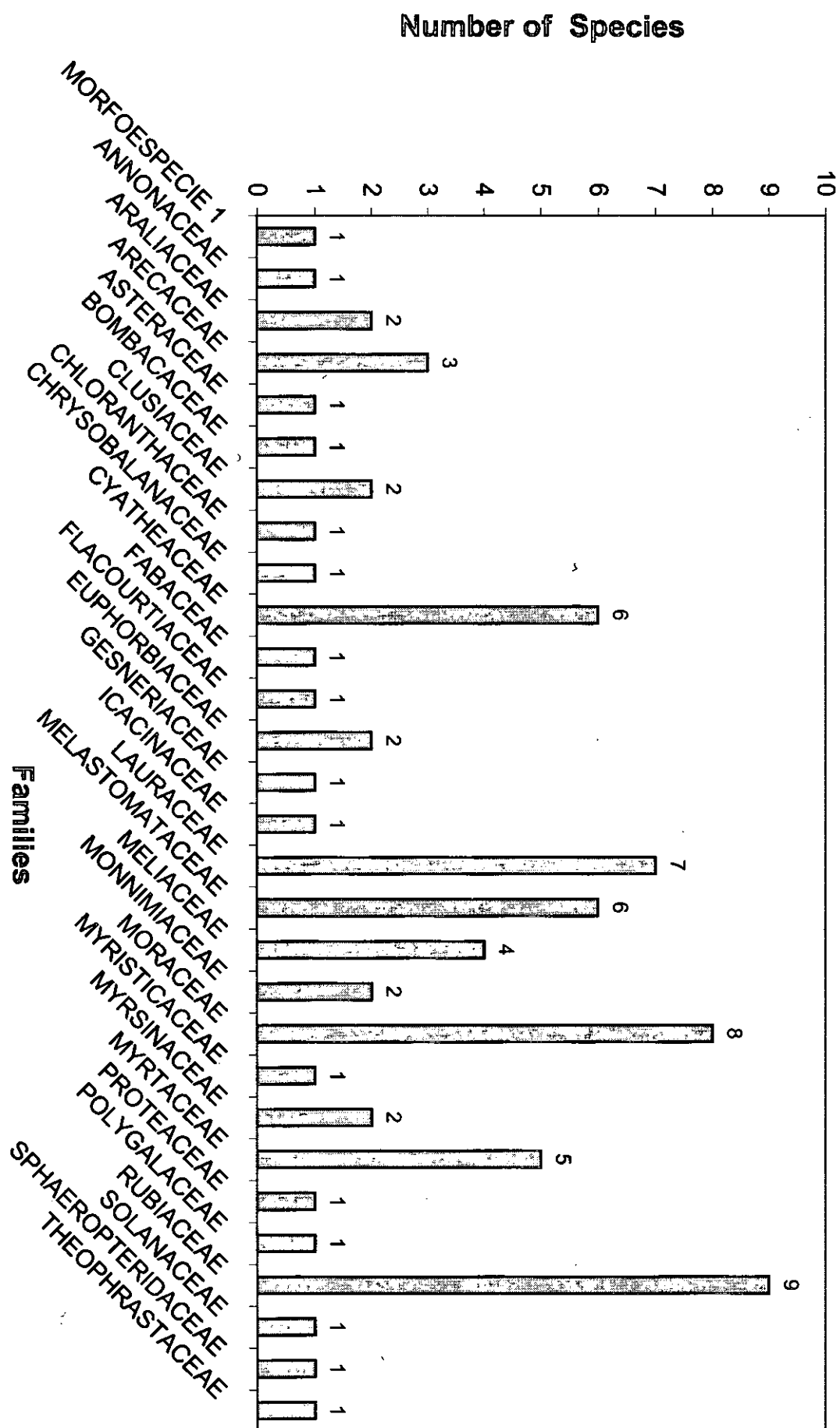
Table N° 5

Number of birds species and individuals captured at Toisán I and Toisán II		
	Study Zones	
	Toisán	Toisán II
N° of captured species	20	22
N° of captured individuals	45	63
Total N° of captured species	28	
Total N° of species captured in both	14	
Total N° of captured individuals	108	
% of similarity	66%	

Tabla N° 6

Number of birds species, endemical, rare, vulnerable and in lesser risk registered at Toisán I , Toisán II and around the Community of Cerro Pelado			
	Toisan I	Toisán II	Cerro Pelado
N° of endemical species	12	17	10
N° of rare species	10	17	5
N° of vulnerable species	3	2	3
N° of species in lesser risk	1	3	1

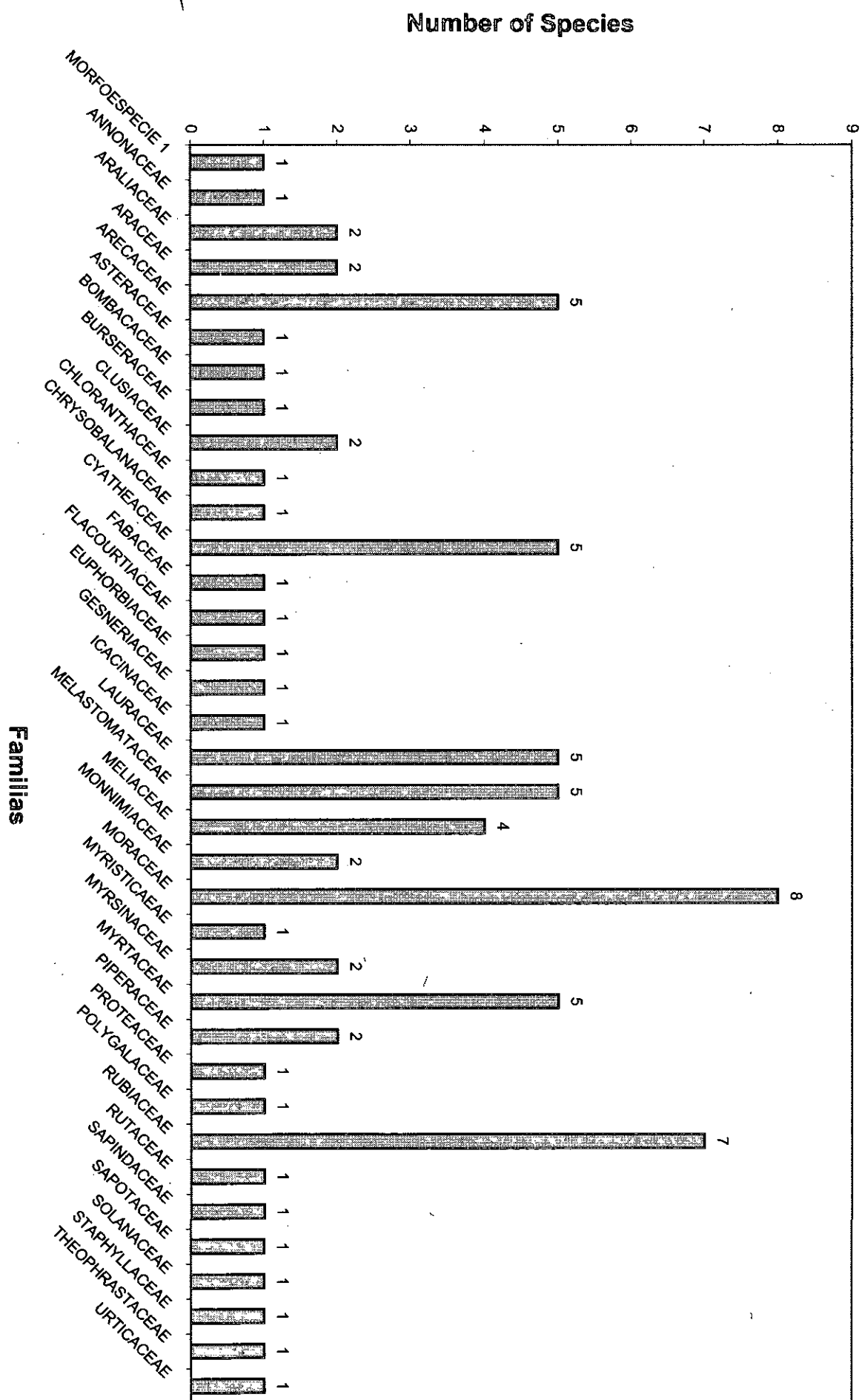
Graphic N°1. Number of Plants Species by Family Registered at Toisán I



HOJA 1 → ~ Gráfica 1.

Familias	N.- DE ESPECIES
MORFOESPECIE 1	1
ANNONACEAE	1
ARALIACEAE	2
ARECACEAE	3
ASTERACEAE	1
BOMBACACEAE	1
CLUSIACEAE	2
CHLORANTHACEAE	1
CHRYSOBALANACEAE	1
CYATHEACEAE	6
FABACEAE	1
FLACOURTIACEAE	1
EUPHORBIACEAE	2
GESNERIACEAE	1
ICACINACEAE	1
LAURACEAE	7
MELASTOMATACEAE	6
MELIACEAE	4
MONNIMIACEAE	2
MORACEAE	8
MYRISTICACEAE	1
MYRSINACEAE	2
MYRTACEAE	5
PROTEACEAE	1
POLYGALACEAE	1
RUBIACEAE	9
SOLANACEAE	1
SPHAEROPTERIDACEAE	1
THEOPHRASTACEAE	1

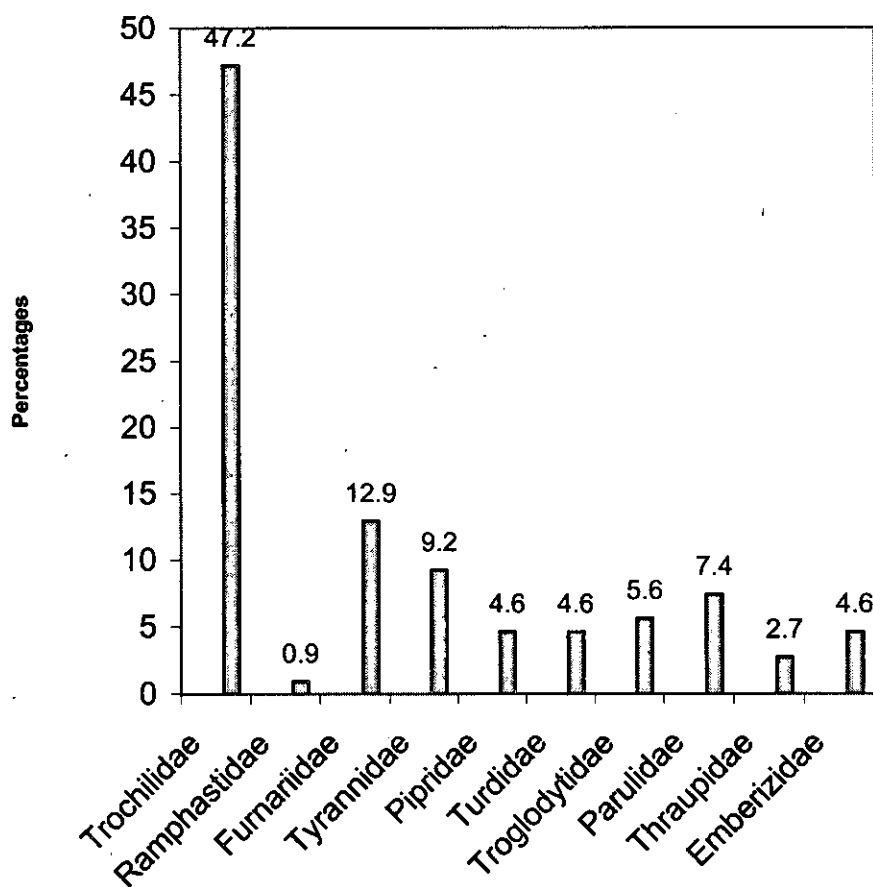
Graphic N° 2. Number of Plants Species by Family Registered at Toisán II



Hoya 2 - 2      Gophic 2.

FAMILIA	ESPECIES
MORFOESPECIE 1	1
ANNONACEAE	1
ARALIACEAE	2
ARACEAE	2
ARECACEAE	5
ASTERACEAE	1
BOMBACACEAE	1
BURSERACEAE	1
CLUSIACEAE	2
CHLORANTHACEAE	1
CHRYSOBALANACEAE	1
CYATHEACEAE	5
FABACEAE	1
FLACOURTIACEAE	1
EUPHORBIACEAE	1
GESNERIACEAE	1
ICACINACEAE	1
LAURACEAE	5
MELASTOMATACEAE	5
MELIACEAE	4
MONNIMIACEAE	2
MORACEAE	8
MYRISTICAEAE	1
MYRSINACEAE	2
MYRTACEAE	5
PIPERACEAE	2
PROTEACEAE	1
POLYGALACEAE	1
RUBIACEAE	7
RUTACEAE	1
SAPINDACEAE	1
SAPOTACEAE	1
SOLANACEAE	1
STAPHYLLACEAE	1
THEOPHRASTACEAE	1
URTICACEAE	1

Graphic Nº 3. Percentages of Birds Families Captured at Toisan I and Toisan II





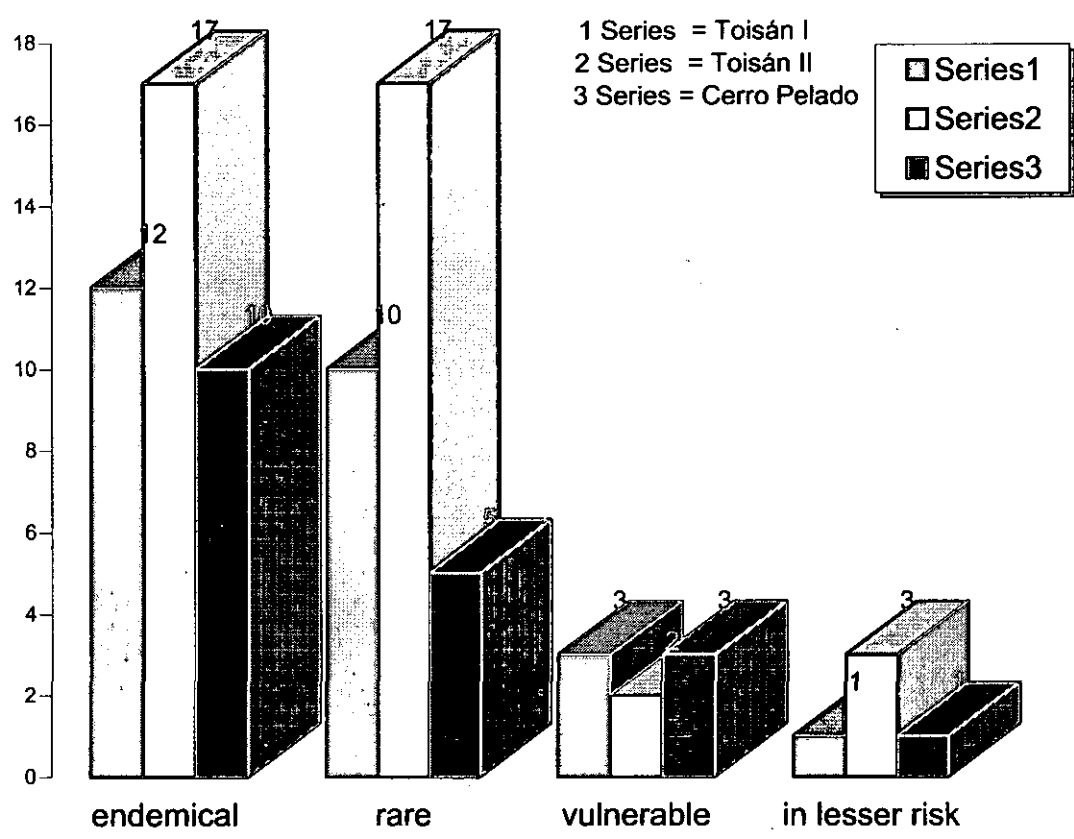
Hapa 3 ~ Greyhills 3.

Families	Percentages
Trochilidae	47.2
Ramphastidae	0.9
Furnariidae	12.9
Tyrannidae	9.2
Pipridae	4.6
Turdidae	4.6
Troglodytidae	5.6
Parulidae	7.4
Thraupidae	2.7
Emberizidae	4.6

	Toisán I	Toisán II	C.Pelado
endemical	12	17	9
rare	11	17	5
vulnerable	3	2	3
in lesser risk	1	3	1
endemical	12	10	
rare	10	5	
vulnerable	3	3	
in lesser risk	1	1	

Insectivorons	44.2
Omnivorons	29.8
Nectarivorons	15.3
Frugivorons	9.6
Meat eaters	1.9

**Graphic N° 4. Endemical, Rare, Vulnerable and In Lesser Risk of Extinction Birds Species Registered in Toisán I, Toisán II and Around of Cerro Pelado .**



**Graphic N° 5: Percentages of Food Groups of Birds Species  
Registered at Toisan I and Toisan II**

