REPORT

A conservation strategy for the critically endangered Brown-headed Spider Monkey (*Ateles fusciceps*) (Primates, Atelidae) in the Coop Tesoro (NW Ecuador)

Paola Moscoso[1] y Mika Peck[2]

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[1]Fundación Mamíferos y Conservación [sindarin85@yahoo.com].

[2] Department of Biology and Environmental Science, JMS Building, University of Sussex, Brighton, East Sussex, UK [M.R.Peck@sussex.ac.uk].





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ABSTRACT

In view of the urgency to protect the remaining areas of the Ecuadorian Chocó forest, which allow the survival of populations critically in danger of extinction such as the Brown-headed Spider Monkey (*Ateles fusciceps*), we carried out a project to better understand the basis that could lead to establishing a conservation plan for the area. To achieve this, we commenced work in conjunction with the owners of the land of the Coop Tesoro (Esmeraldas, Ecuador). Various types of socioeconomic and environmental analysis were made, as too training and workshops in various areas of interest (e.g. cocoa cultivation, beekeeping and ecotourism) and elaboration of maps of land title and used of land by the Coop. A monitoring plan of primates from the area was undertaken (*Ateles fusciceps*, *Alouatta palliata* and *Cebus capucinus*) with people from the area, to understand better the use of space and distribution of primates along the area of the Coop. With these results, we proposed a plan that could be carried out in the future to stop the current expansion and deforestation in the area, in order to achieve the conservation of *Ateles fusciceps* population, which at the same time would benefit the people that are directly dependent on the forest.

RESUMEN

En vista de la urgencia que existe por proteger las áreas de bosque remanente del Chocó ecuatoriano, que permiten la subsistencia de poblaciones al borde de la extinción como el mono araña de cabeza café (*Ateles fusciceps*), se realizó un proyecto que pretende comprender mejor las bases para poder establecer un plan de conservación en el área. Para ello, se realizó un trabajo en conjunto con los dueños de las tierras de la Cooperativa Tesoro (Esmeraldas, Ecuador), mediante el cual se hicieron diversos tipos de análisis socioeconómicos y ambientales, capacitaciones en diversas áreas de interés y se elaboraron mapas de uso y propiedad de la Cooperativa. Además, se emprendió un plan de monitoreo de primates de la zona (*Ateles fusciceps*, *Alouatta palliata* and *Cebus capucinus*) con personas del área para comprender mejor el uso y distribución de los mismo en el área. Con los resultados obtenidos se propone un plan que podría ser llevado a cabo en el futuro para frenar la expansión y deforestación actual en la zona, y lograr así la conservación de las poblaciones de *Atelesfusciceps,*a la vez que se beneficiaría a las personas que dependen directamente delbosque.

1. BACKGROUND

Forests of northwest Ecuador are part of a region characterized by great endemism and biodiversity known as the Choco ecoregion, renowned as one of the richest biodiversity hotspots of the world (Myers *et al.*, 2000). Although it has worldwide recognition, the Ecuadorian Choco has suffered extensive deforestation since the early 1960s and the beginning of the land reform (McKenzie, 1994). This, along with agriculture and cattle raising are the main threats for the conservation of forests in the region (Sierra, 1996). It is estimated that 80% of the original forest cover has been devastated (Sierra, 1999). Furthermore, a significant increase in large-scale timber extraction has occurred over recent years. The timber industry has also promoted small scale logging, favoring the expansion of the agricultural frontier and the construction of new roads (Vazquez *et al.*, 2005).

Current status of one of the prime conservation areas of northwest Esmeraldas Province, the Cotacachi-Cayapas Ecological Reserve (RECC) is uncertain. Although it is part of the National Network of Protected Areas (SNAP), it faces serious threats that severely affect its ecosystems. Environmental issues in the reserve include invasions and illegal land purchasing, mining concessions and exploitation in the immediate future, land tenure conflicts, ill-defined reserve boundaries, and the rampant expansion of agriculture (CEPF, 2007). Furthermore, the reserve's buffer zones are not working as such (CEPF, 2007), diminishing the protection effectiveness of the RECC.

Even though all forest fragments are considerably large, rich in original biodiversity and surrounded by other fragments, that are highly relevant for conservation (Vazquez *et al*., 2005), few, if any, conservation measures are implemented. Thus, the fate for most of these fragments seems to be the disappearance of such. On the other hand, the extension of a conservation area directly influences the population size of large mammals (Kerr y Currie, 1995). Given the current situation of all protected areas in western Ecuador and the level of fragmentation outside protected areas, a strategy must be implemented in order to enlarge and link them through biological corridors.

Highly threatened species, susceptible to human habitat modification, such as the Brown-headed Spider-monkey survive in untouched–or barely altered–forests (Tirira, 2001). This means that such species depend on the conservation of large forest patches in order to persist. (Moscoso, 2010). Conversely, the largest populations of the spider monkey have been found in unprotected areas, neighboring the RECC (Gavilanez-Endara 2006; Baird 2007; Cueva 2008; Estevez-Noboa 2009; Moscoso, 2010). Hence, conservation measures for those areas are urgently needed.

In addition, human populations in the region have grown as new settlements are frequently established, causing extra exploitation of natural resources that are the only income source, directly affecting ecosystem conservation. Albeit colonizing could represent a conservation problem *per se*, it may well become an opportunity and a strength for conservation of ecosystems and humankind alike.

This project aims to undertake a conservation viability analysis of a sizeable tract of pristine forest in the buffer zone of the RECC, where a large population of Brown-headed Spider-monkey is found (Moscoso, 2010). As will be explained below, this project will be carried out along with local inhabitants grouped in the Cooperative Tesoro Escondido (TE). We believe that any conservation measure to be undertaken in the area will only be successful if it takes into account socioeconomic and cultural peculiarities of local people, promoting sustainable processes that benefit both the conservation of natural areas and the wealth of human populations.

AIM

Provide scientific information to underpin a comprehensive conservation strategy for the critically endangered Brown-headed spider monkey (*Ateles fusciceps*) and its habitats in a hotspot primate´s area of the Choco of NW Ecuador (Tesoro Esmeraldenio).

OBJECTIVES

1. Provide ecological information about use of space, distribution and behavioural information of primates in the Chocoan biodiversity hotspot (Tesoro E.), particularly of the Brown Headed Spider Monkey (*Ateles fusciceps*).
2. Synthesise socio and environmental information to provide alternative future development and conservation options for the hotspot.
3. Map land title and use of land of the area.

2. STUDY AREA

The field work was carried out in the settlement of Coop Tesoro (Esmeraldenio and Tesoro Escondido)(Coop TE), at approximate 4 km of Cristobal Colon town (Esmeraldas)(79°9'32.371"W0°27'21.163"N); while the social work was carried in the Cristobal Colon, that is the place where most members of the Coop live (Image 1, 2).

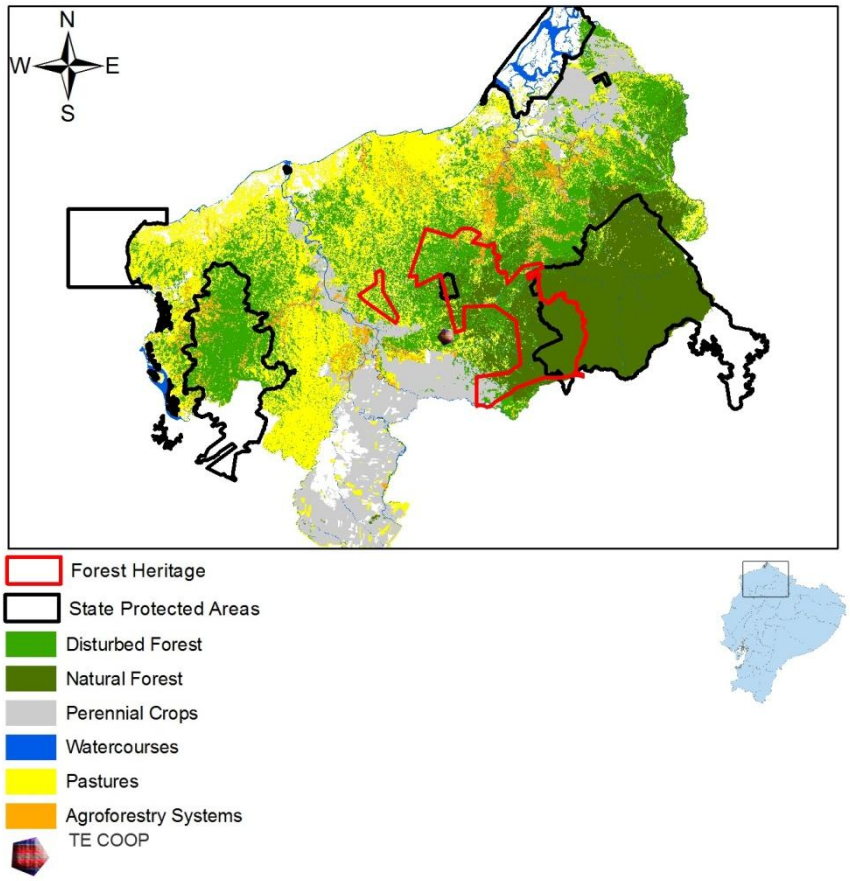

Image 1. Map of Esmeraldas province with their protected areas. The area of study, Coop TE, is showed with a red dot.

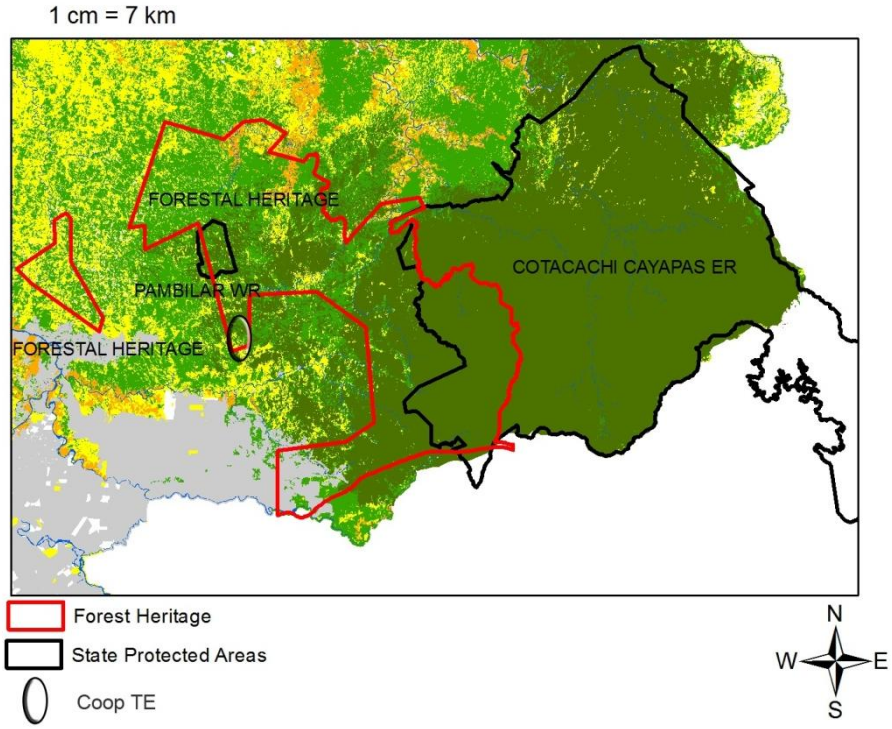

Image 2. Area of study, Coop TE (in an elliptical figure), with their neighbor protected areas, Esmeraldas province.

The forest consists of Mature Forest, Secondary forest and in Natural Regeneration. It is classified as Evergreen Foothill Forest (Sierra, 1999), and has an elevation range spanning from 200 to 800 m a.s.l. The slopes go from 5º to 60 º (Chinchero, M. y E. Jaramillo, unpublished data). Emergent trees reach 29-30 m height and 300 cm in diameter, but more regular heights are 15-19 m and 61-80 m in diameter (Moscoso 2010). July to August are considered the dry season, however this a relative term as this particular region is characterized by year round rainfall.

The region, particularly the parish Telembí (where the settlement of C. Colon can be found), is characterized for being one of the most needy parishes of Ecuador. The social indicators for example show that it has an incidence of human poverty of 73-78% (2001-2006); literacy of 79.4% - 83.5% (2001) and the lowest percentages of basics services (2001)(Unidad de Información Socio Ambiental, 2012).

In the area there are settlements of “mestizo (halfblood) farmers” from diverse parts of the country and close to them, are the indigenous communities of “Chachis” that live within the Chachi Reserve.

3. METHOLOGY

The project was undertaken from January 2011 and January 2012, during which a range of activities were completed (Table 1).

Table 1. Schedule of activities carried out during the project "Conserving strategy for the subsistence of remain populations of the critically endangered Brown-headed Spider Monkey (*Ateles fusc*iceps) (Primates, Atelidae) in the Coop Tesoro (NW Ecuador)".

ACTIVITY	2011-2012											
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Collection of information on land tenure, and vegetation cover maps.	X	X										
Presentation of the project to members of the Coop		**X**										
Survey of land use and tenure			**X**	**X**								
Training on monitoring techniques for studying the Brown-headed Spider-monkey		**X**										
Workshops, talks, experimental trips to conservation projects					**X**	**X**	**X**	**X**	**X**	**X**		
Interviews with Cooperative members					**X**	**X**	**X**	**X**	**X**			
Searching for and monitoring Brown-headed			**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	

Spider-monkeys												
Analysis of survey data from questionnaires and monitoring of monkey populations									**X**	**X**		
Design of a participatory conservation plan for the area											**X**	
Final report												**X**

3.1. SURVEYS AND MAP PRODUCTION

The technique of Participatory Methods (or PRA) was used for obtaining the range of information necessary to achieve the aims of this project. This methodology is commonly used mainly in rural development projects (Britha, 2005).

Nine survey visits to the town of Cristobal Colon were made between January 2011 and January 2012 (Table 2). At every visit, local inhabitants – partners of the Coop TE and non partners - were interviewed with the aim of surveying the socioeconomic and environmental situation of the area (Annex 1). The interviews (N=19; 13 men/6 women, over 30 years old) were carried out with the people who were present during training sessions, meetings and workshops. They belong to the Coop TE as well as other bordering Coops (Bravo River, Canande, 10 de Abril, Voluntad de Dios).

Table 2. Schedule of workshops and meetings conducted during the year 2010/2011 with members of the Coop. T. E. and other Coop. that surround the area.

	Workshops/Meetings	**Trainer**	**Date**	**Notes**
I	Presentation of the project and socialization with the members of the Coop.	Paola Moscoso	19 Dec 2010	
II	Group analysis work	Paola Moscoso	29 Jan 2011	
III	Workshop Introduction	Serbio Pachard	15 April 2011	

	to beekeeping			
III	Workshop Cocoa planting	Serbio Pachard	15 April 2011	
III	Workshop Analysis of a potential tourist project	Paola Moscoso, Serbio Pachard, Ma. Isabel Estévez, Néstor Paredes	15 April 2011	
IV	Workshop Analysis of the touristic potential of the area	Serbio Pachard (Universidad ESPAM), María Isabel Estévez, Néstor Paredes	19-23 May 2011	Tour of the area with several tourism students and teachers of the U. ESPAM
V	Discussion meeting with villagers on "development of a potential tourism project in the coop. Elaboration of a first scheme.	Paola Moscoso, Servio Pachard	23-29 Jun 2011	Tour of the area and discussion meetings with the people involved
V	Workshop Practice Honeycomb collection of products	Serbio Pachard	26-28 Jul 2011	
V	Workshop Shifting cultivation techniques (cocoa)	Serbio Pachard	26-28 Jul 011	
VI	Workshop Building a joint ecotourism	Francisco Molina	28-30 Ago 2011	
VII	Visit of representatives of the Coop. to Santa Lucia, Pichincha (ecotourism solidarity)		09-10 Oct 2011	En Santa Lucía Reserve, Pichincha
VIII	Meeting with leader of Coop.		13 Nov 2011	En Quito, Pichincha
IX	Project closure meeting with leaders of the Coop.		14 Jan 2012	

Survey forms were also based on previous socioeconomic analyses performed at different localities in western Ecuador (Vázquez et al. 2005). Data collected in these surveys includes general information (age, sex, birth place); socioeconomic data (job information, use of natural resources, land tenure); knowledge and perceptions about nature. Likewise, representatives of the EcoMadera Company (ecological logging company that works in the area), were also interviewed, in order to include additional information about the environmental situation of the Coop Tesoro and it´s surroundings areas. Also, a first contact was made with different NGOs that have been working in the area.

Additionally a land tenure map was produced based on local people's knowledge (during participatory map building), and also a map of land use and vegetation cover, provided by the Ministry of Environment, that overlapped with the registers of primates (see Section *Primate monitoring*).

A conservation plan for the area was designed based on the results of socioeconomic and cultural surveys, participatory maps, identification of zones where populations of the Brown-headed Spider-monkey are located and where threats to those populations are more prevalent. This plan took into account the conservation needs of the species and its habitat.

3.2. WORKSHOPS/MEETINGS

Different methods, based on PRA, were used in workshops and meetings, aimed at motivating the participation of all people attending them.

Nine visits were made to C. Colon, where a range of workshops and meetings took place from December 2010 to January 2012 (Table 1). The following aspects were analyzed and discussed with the assistants in the meetings: socioeconomic and socio-environmental situation of the Coop TE and the Cristobal Colon area; identification of problems and necessities of the Coop TE; revision of sustainability alternatives applicable for the area.

Based on the results obtained in these participatory workshops and in the socioeconomic survey previously mentioned, different workshops on sustainable activities to develop in the area were organized. Talks were given by experts on those themes identified as useful by local people. Also five members of the Coop TE were selected to have a learning experience by visiting another area where a different conservation project is running: Santa Lucia project, in Pichincha province. Santa Lucia is a community-based organization formed by local "campesino" (farmers) families who manage their own resources. They have three basic aims: to conserve and protect the cloud forest belonging to member families; to develop sustainable sources of

income for the members of Santa Lucia; to benefit directly or indirectly the residents in neighboring areas (for more information see: http://www.santaluciaecuador.com/).

3.3. PRIMATE MONITORING: BROWN-HEADED SPIDER-MONKEY (*ATELES FUSCICEPS*)/BLACK HOWLER MONKEY (*ALOUATTA PALLIATA*) AND WHITE HEADED CAPUCHIN MONKEY (*CEBUS CAPUCINUS*).

Three members of the Coop TE (Nestor Paredes, Patricio Paredes y Yadira Giler) participated in primate monitoring. They were charged with monitoring primates throughout the project. They were trained in primate monitoring techniques, particularly for studying the Brown-headed Spider-monkey (*Ateles fusciceps*). This included: searching, species identification, and data collecting. A data form for parabiologists was designed (Annex 2) and included the following information: location (latitude, longitude, elevation -Garmin 60CSx GPS-); specific location of primate troops; animal-observer distance; animal-transect distance; height; forest type; troop composition and number of monkeys; activities; and reaction to observer's presence.

The visual primate census methods consisted of daily surveys conducted between 06:00-17:00hrs (hours of primate activity), walking a distance of between 4-6 km per day depending on access to areas and terrain. Once a person had an encounter with primates, the form was filled in. This monitoring carried out for approximately seven days, once a month, over an 8 month period. At the beginning and in the middle of the project, their work was supervised to ensure the quality of the information that was collected in the monitoring.

4. RESULTS

4.1. SOCIOECOMIC AND ENVIROMENTAL ANALYSIS OF THE COOP TE AND OTHER NEIGHBOURING AREAS

4.1.1. Overview

The Coop T. Escondido was formed 25 years ago. Seven years ago, it was divided into three Coops: Tesoro Escondido, Tesoro Esmeraldenio and 13 de Abril. But at the beginning of 2012 they joined together in one Coop: Tesoro Escondido (TE). The Coop TE has 46 members (active and inactive) of which only a few families live inside the Coop (in the forest). The majority of the owners live in the settlement nearest to the area (Cristobal Colon town), and a small percentage in the nearest cities (Santo Domingo and Quito).

Most of owners of the Coop TE live In C. Colon. The town has 515 inhabitants, with each family averaging six individuals. It was formed approximately 30 years ago, when the main road was built. People that nowadays live in the town (mainly farmers) arrived from diverse localities in Ecuador, looking for a place to live, because “the price of the land was cheap”. Now most people that live in C. Colon have a property in the forest (and are members of different Coops), which is generally used as a farm. Most of them do not have legal titles of land, including the Coop TE.

Of those interviewed, 53% arrived at the area from the Sierra (highland of Ecuador), whereas the rest arrived from the Coast of Ecuador. The majority (68 %) arrived in C. Colon less than 25 years ago. Nowadays a new generation of people exist, who were born in the area.

The women of C. Colon town used to work principally in domestic activities and help on their farm, but a minority, with more academic backgrounds, work mainly as teachers. The men are employed at big companies that operate in the area such as Ecomadera, Endesa Botrosa or at private palm companies (see Section *Other Actors*); in activities on their farms, or as laborers, merchants, wood sellers or in small businesses in the town.

All of those interviewed, except one, have children. 72 % of them have more than four children. Men work principally on their farms (50 %), but also at the logging company EcoMadera (33 %) and, a small number, in palm oil companies (8 %), and as National Park rangers (8 %). Women work on their farms (43 %), in-house domestic activities (29 %), but they normally combine both activities (28 %).

Children go to the school, but some of them work or help in the activities that their parents do. The children of those interviewed go to school outside the town, at nearby bigger towns such as Golondrinas or take distance classes.

Considering human indicators of development (that measure parameters of Health, Education and Wealth), C. Colon town has a low index due to the fact that: there is only one Public School, one private and distance-learning College, one abandoned Health Center and many other poverty indicators such as no street pavements, no sewer system and restricted telephone services, etc.

3.1.2. Analysis of trends (past, present and future)

The Coop TE is relatively new (25 years). It was formed by people that are no longer members of the Coop, so most of those interviewed do not know the history of it. At the beginning, mid and short cycle crops were sown in the Coop (coffee, cocoa, rice and pastures) but most failed (Table 3).

Tabla 3. Activities that were/are done in Coop TE.

Activity	Benefits	Difficulties	Past/Present
Cacao crop	It can be sold easily in the town	Production problems because of the humidity	Past/Present
Banana crop	Own consumption	Transport difficulties for carrying to the town and other places	Past/Present
Pasture	Cattle food	Production problems (seeds not appropriate)	Past/Present
Cattle	Good income	Lack of food (pasture), lack of appropriate areas	Past/Present
Rice crop	Own consumption	Transport difficulties for carrying to the town	Past
Conservation of lands	The forest and their resources maintained	Lack of support, economic necessities	Past/Present
Logging	Good income	Difficult transportation	Past/Present* *(Ecomadera company)

With the construction of a road near the Coop, more trails were opened inside the forest and people planted more. Because of the poor production of crops and other difficulties (i.e. transportation of food, bad roads, steep terrain), many members of the Coop TE sold their lands. Nowadays there are only a few members that sow crops on their own land. Crops include: pasture, cocoa and other fruits (Table 1).

According to the majority of those interviewed (75 %), the forest has changed. Nevertheless, opinions are diverse. Some of them affirm that in the past there was less pasture whereas others say that now the forest is denser.

All those interviewed show interest in receiving training for sowing crops, raising animals (95 % of the interviewed) and developing handicraft skills (84 %). In the latter activity, most men did not show interest.

Furthermore, the majority (75%) consider that there are other ways to generate economic recourses without exploiting the forest, suggesting other alternatives for generating incomes like ecotourism (69%), small businesses, working in companies that exist in the area (15%), cultivation of cocoa (8%), and sale of plants to logging companies like Ecomadera (8%).

Most of those interviewed showed dissatisfaction with the current management of the Coop TE because they say that "there is bad organization and bad communication." The major problems identified in the Coop. are: lack of a road or good trail, lack of financial support, loss of crops (pests or because the habitat is not ideal), use of fungicides and disorganization among the members.

According to the visualization exercise to identify the "Ideal future" for the Coop, there are three main points that needs to be improved: 1) building good tracks, 2) find support for conservation, 3) more organization. They also showed interest in the following skills: Eco-Cacao planting, beekeeping, fruit growing crops and ecotourism.

4.1.3. Forest and farm resources

For those interviewed the forest is a space where wood, water and animals exist. What they can get from it is: food (mostly often mentioned is the hunting of small rodents, *Dasyprocta punctata*) (11%), wood (11%), pastures and livestock (11%), intrinsic and environmental benefits (11%), but most say they don´t get anything from the forest (55%). The extension of their properties is large: 44% of those interviewed have from 41 to 60 ha of land, 22% from 21 to 40 ha, 22% have more than 81 ha and 22% from 0 to 20 ha. Everyone has an area of forest in their properties.

Of those interviewed, 74% confirmed that they have planted crops on their properties. In the Coop TE mid and short-cycle crops, such as fruits and herbs were sown. But nowadays they only sow mid cycle crops (cocoa, bananas) and fruit trees. Only a few hectares are pasture. Most production is sold in C. Colon (through intermediaries within the village) or in Golondrinas town. 80% of those interviewed do not, and did not, have domestic animals in the Coop TE, whilst the rest have a few cattle (up to 12 individuals).

According to the interviews, the use of land in the Coop TE consists of: crops (31%), pasture (23%), reforestation (8%), and not in use (31%). Hunting seems to be rare and only of small rodents such as *Dasyprocta punctata* and *Cuniculus paca*.

Most of those interviewed (89%) knew of the Brown-headed Spider Monkey (*Ateles fusciceps*). Nobody said they liked it as a "pet" or as "food". They have seen it mainly in primary forest but also in logged areas. Only one of them had seen it only in photos.

4.1.4. Other actors in the area: Companies and NGOs

At the moment, a first contact has been made with people that work (or worked) in the area (Jaime Levi –Director of Altropico, Galo Zapata - a WCS Researcher- and Garret Siegers - Director of the EcoMadera Company). They are open to giving support, if it is necessary, for the implementation of a conservation project in the area.

*W*ithin the area and around the Coop TE there are big company owners of large areas of forest. The main companies are: ENDESA-BOTROSA (logging) (with approx. 20,000 hectares of plantations and 25,000 ha. of native forests in Ecuador), EcoMadera (logging) (with approx. 500 ha only in this area) and Private Oil Palm Companies.

However the companies that have properties within the area of the Coop TE are logging companies: 1. EcoMadera and 2. ENDESA-BOTROSA (see more in section *Map of tenure and Land use*). The first one works in two ways, one is by logging forest trees and transporting them through a system of rope and pulley and the other is by logging trees from their own plantations, mainly of "Balsa" (*Ochroma pyramidale*). BOTROSA works by cutting trees of big diameter from the forest then leaves the forest to regenerate and continues exploiting other areas. They also obtain timber from their own plantations.

An interview organized with Garret Siegers, the representative of EcoMadera. This company is very important in the area because it is the most involved with people of the Coop and C. Colon town. Their aim is "to maintain the forest, give jobs to the people of the area and to stop the pressure of deforestation". They built a community company in C. Colon ten years ago, and were formed as an "economic alternative for the people of the area". It has 16 partners, which include people from C. Colon, and gives many jobs to the people of the town. In the past they worked as a "community company" but nowadays they don´t because of "organizational problems".

Currently they have 500 ha in the area (including an area within the Coop TE) but their goal is to increase to 10 000 ha. The institutional view of development of Ecomadera is "to generate a major source of jobs through the company." They oppose "the construction of roads, plantations of cocoa, or any plan that involves destruction of the forest." They prefer to "work in disturbed areas." For those interviewed, the greatest need facing the people of the area is "the lack of employment and economic livelihood."

They think that the development options for the area through the preservation of the forest are few, so they do not support an "ecotourism project" because of "the remoteness, lack of tourism infrastructure and the need for training people." They were told that there have existed ecotourism projects in some neighboring areas such as the Coop. Simon Plata Torres, but they were unsuccessful. They also do not support the idea of cultivating cocoa or other crops because they believe that "this will motivate people to continue cutting the forest."

4.2. WORKING WITH PEOPLE: WORKSHOPS AND MEETINGS

In the meetings 55 participants attended, 30 members to the Coop TE and the rest were neighbors of different Coops. The participation in the workshops and meetings was irregular, i.e. in each meeting, from 3 to 6 people were present in past meetings and workshops.

Below each workshop is summarized to provide information on the reaction of the people who attended and the main conclusions each reached.

4.2.1. Workshop "Introduction to Beekeeping"

Serbio Pachard, a permaculturalist with more than 10 years of experience in the field and in work with rural communities, gave this workshop (Images 3,4). He provided some theoretical basis bout bees (biology) and the honeycomb, its construction, the products obtained through bees (royal jelly, honey, beeswax, propolis and pollen), production costs and production opportunities.

People showed great interest in the subject. Most of them want to get involved in the process of Beekeeping. However, some people were unhappy with the methodology for building the honeycomb, because it "takes too much time, and are not sure how to do it". They want to have "the box of the honeycomb ready made with everything available to produce".

Image 3. Introductory workshop of beekeeping led by Serbio Pachard for the members from the Coop. T. E. and other neighbouring Coops.

Image 4. Introductory beekeeping workshop led by Serbio Pachard for the members from the Coop. T. E. and other neighbouring Coops.

4.2.2.Workshop “Organic Cocoa Plantations”

Serbio Pachard, a past president of the Ecuadorian Cocoa Association, gave a presentation of their experience with this type of crop. The different kinds of cacao fruit in Ecuador were discussed; advantages of each variety, planting recommendations specific for the area and cultivation tips (Images 5, 6). In addition the importance of being able to make alliances with other organizations for the sale of the cocoa was highlighted

The workshop generated great interest amongst the people, mainly to those who currently have cocoa plantations. They were very enthusiastic about being able to connect with organizations for the sale of the seed and want to receive more training in this subject.

Image 5. Cocoa planting workshop led by Serbio Pachard for people of the Coop TE and other nearby Coops.

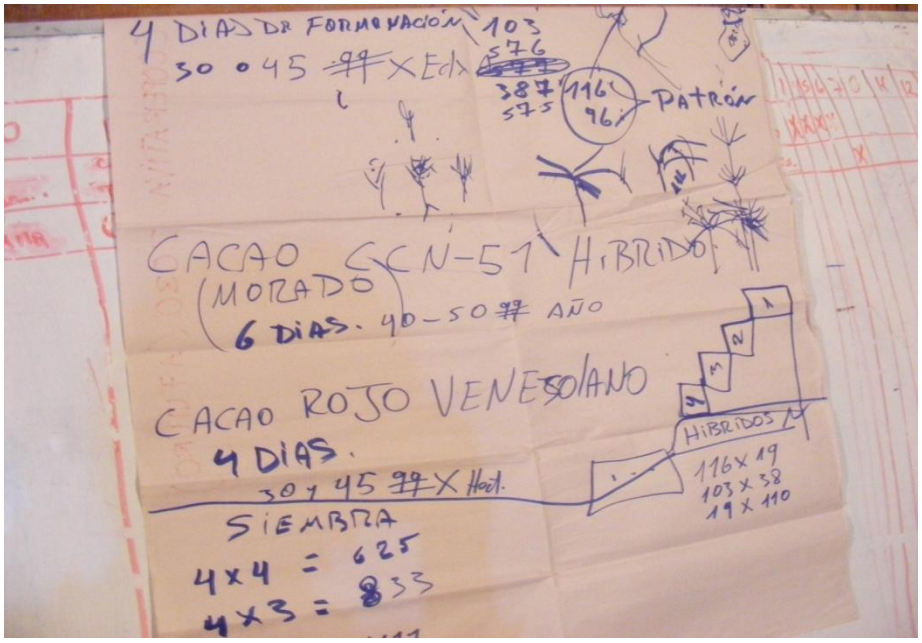

Image 6. Cocoa planting workshop led by Serbio Pachard for people of the Coop TE and other nearby Coops.

4.2.3.Workshop "Preliminary analysis of the feasibility of developing tourism in the area"

The possibility of developing a tourism project in the area was discussed. For the analysis and discussion, two people involved in tourism projects in other areas (Franciso Molina, director of the Project Santa Lucia, and Serbio Pachard, owner of an agroecological and touristic farm project) visited the Coop TE and C. Colon town. As a result of this, a plan for possible routes for visitors was designed. They made some recommendations and suggestions about the tourism plan and helped to take relevant information for tourism/tourists. This information is available in Annex 3.

4.2.4. Meeting and workshop "Analysis of a tourism project in the area"

First the concept of "community tourism" and "ecotourism" was introduced, and its requirements and impacts (Images 7,8). Subsequently, the idea of developing an ecotourism project in the area was discussed. As a result of this, a first scheme (draft) of community tourism in the area of the Coop TE was developed (Annexes 3, 4).

Image 7. Workshop "Analysis of a tourism project in the area" given in C. Colon to the members of Coop T. E. and other neighboring Coops.

Image 8. Workshop "Analysis of tourism development in the area" given in C. Colon to the Coop TE´s members and other neighboring Coops.

Francisco Molina, director of the project "Santa Lucia" a community ecotourism project, shared their experience with the members of the Coop and helped them to have a better understanding about what this kind of project involves.

Some general ideas generated during the discussion were:

• The project may begin only with the people who really want to participate (not all community members).
• The participants must follow the principles of "preservation of forest" for the management of their properties and all the Coop.
• The project could give to all members of the Coop an "incentive for conservation," (e. g. Compensation, in the form of money, given monthly or at the end of the year could be distributed to all members).
• The earnings from the project should be destined for: 1) conservation projects, 2) all the members that are part of the project and 3) a savings account (in a community bank "see below").

Although the people showed great interest in the talk and seemed to learn from the experience, some points were evidently detrimental to the development of a future project. The shortcomings of the potential tourism project are:

1. They are in the process of legalizing their title of land as "Coop."
2. Disorganization - conflict between coop landowners people.

4.2.5. Learning experience: visit to Santa Lucia communitarian project

The visitants from the Coop TE showed real interest in the project carried out at Santa Lucia. They toured the area, looking at the constructions, asking questions, talking with the representatives of the project and exchanging information. They learnt about ecological practices, such as waste management. During the visit a number of scientists gave talks about their research in the area, so they also learnt about the possibilities of working together with scientist (Images 9, 10, 11, 12).

For them the visit to the area was "an example of how they should develop a communitarian project for common benefits". They want to replicate some ideas they saw in the Lodge.

Image 9. Experiential learning visit to the "Santa Lucia Ecolodge" project, Pichincha.

Image 10. Experiential learning visit to the "Santa Lucia Ecolodge" project, Pichincha. They are learning about the operation and the construction of the ecological bathrooms.

Image 11. Experiential learning visit to the "Santa Lucia Ecolodge" project, Pichincha. Taking a tour of the touristic infrastructure.

Image 12. Experiential learning visit to the "Santa Lucia Ecolodge" project, Pichincha. They are listening to a conference about research projects undertaken by local and international scientists.

4.3. OTHER PROJECTS PLANNED IN THE COMMUNITY:

Savings Bank ¨Tesoro"

One of the leaders of the Coop TE, Nestor Paredes, presented a proposal to help the poorest people from the Coop by the opening a "Savings Bank ". To enable this to start, each partner should give 10 USD. The Savings Bank could provide loans and payments to people with a monthly interest of 3%. In addition more money for the savings bank could be raised through the contribution of visitors or foundations that operate in the area (such as EcoMadera), or through community activity that generated incomes. A percentage of this money would be destined for a conservation project site. The project has not started yet.

Cabins El Tesoro, Nilda Elizalde project

Two hours walk from Hoja Blanca town (at few km from C. Colon), in the middle of the Coop TE forest there is an ecotourism project directed by one of the members of the Coop, Nilda Elizalde (Images 13, 14, 15). It has functioned for a couple of years and has received some tourists, mainly foreigners. The place is settled in a strategic area for tourism. It is close to the town and the landscape is very attractive. People can see a diversity of animals with certainty (including rare species in Ecuador such as *Cephalopterus penduliger* or *Ateles fusciceps*). It is in an area with high densities of animals (e.g. the highest densities of *Ateles fusciceps* were found close to the area, Paredes, comm. pers.; personal observation). It also has other attractions such as the crystalline waters of the Gualpí river, waterfalls, springs, a unexplored cave and even archaeological remains (Images 16, 17). Today the project is still running and Nilda Elizalde wants to continue with it, involving all the members of the Coop, i.e. she is looking to establish a community ecotourism project.

Image 13. Cabin "El Tesoro", an ecotourism project based within the Coop TE.

Image 14. Nilda Elizalde, owner of the Project and Citllali Morelos, a primatologist, in the resting area at the "El Tesoro" tourism project.

Image 15. Information brochure from the "El Tesoro" ecotourism project.

Image 16. Gualpi river, within the Coop TE, Esmeraldas, one of the touristic attractions.

Image 17. Coop TE, Esmeraldas, view of the landscape in the morning.

Study plots "forest trees"

Nestor Paredes has cultivated a diversity of species of forest trees from the area in a 1 ha area based in C. Colon town (Image 18). The plot has been in existence for 10 years and most trees are adult or becoming adult, depending on species. The aim of this project is to study the growth of each specie and their problems (such as pests, etc.), to collect the seeds from them and to share the knowledge of growing and production of each species with other people. He takes data measurements of each tree regularly and other relevant information about the fruiting and flowering season.

Image 18. Study plot of local and endemic forest trees species in Cristobal Colon town. The owner, Nestor Paredes, is showing how it works.

Honorary wildlife inspectors and Ecological clubs

Recently, an ecological club was set up in C. Colon. The group of honorary wildlife inspectors are made up of settlers that work in the state protected area. They have carried out training courses in many towns of the area, in order to share their knowledge and their awareness of the conservation needs. They have also promoted the creation of ecological clubs, made up of young people from different communities. Their aim is to form a "group of conscious people that help to develop conservation projects in the area". This year they will work on collecting data on the growth of tree species in the "forests trees study plot".

Ecological School "28 of September"

This school works in C. Colon and has many ecological projects in the town. Enma Revilla is the coordinator and the main teacher of this school. Some of their plans with students are: ecological orchards, working with plastic bottles and a volunteer program.

Library in C. Colon

A project to build a library will be developed, in collaboration with Enma Revilla, the teacher at the public school in town. The aim of this project is to provide access to books that are mainly related to nature, biodiversity, conservation and ecological practices. It will be mainly directed at children but also to adults with an interest in this subject.

Verde Canande Agroecological Project

Is a project founded by people of C. Colon and is directed by Enma Revilla. It is principally an educational program about organic orchards with some families of the area, and a program of volunteers "who want to venture into agriculture, ecological housing and educational activities" (see more in http://elverdecanande.blogspot.com/).

4.4. MAP OF TENURE AND LAND USE

The Coop TE has 46 members and covers an area of 2290 ha. Each member has a certain number of hectares, i.e. there are no common areas. The size of the each property owned varies from 40 ha up to 250 ha. There is only one member who is not an individual person, i.e. the EcoMadera company. Annex 5 shows a list of all owners with their respective area of property (disturbed forest and primary forest). This data, provided by the president of the Coop showed that 12% of the total area of the Coop is logged forest while the rest (88%) is intact forest. Image 17 is a drawn by people from the Coop who attended the workshops. It shows the main division in the area and explains

how it is composed. Image 19 is a map that shows the division of the area with it's respective owners.

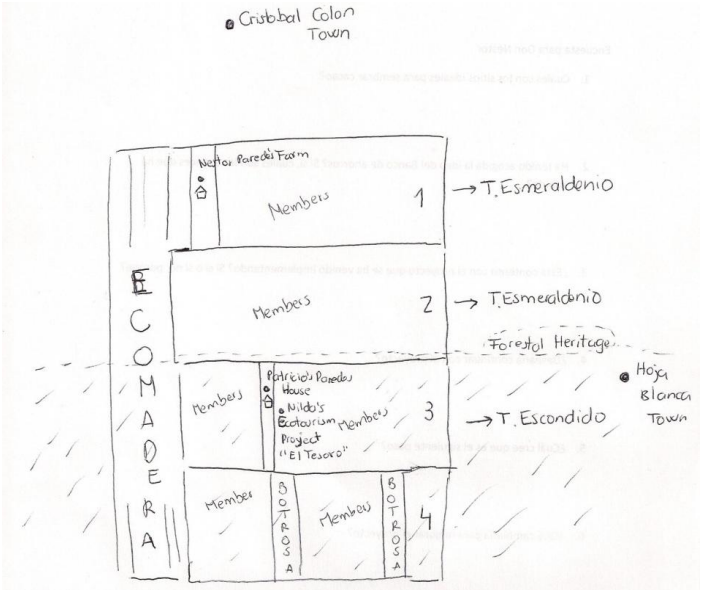

Image 19. Representation drawing of the Coop TE by their members showing the main segments (1,2,3,4), the properties of the main actors in the area and the closest towns.

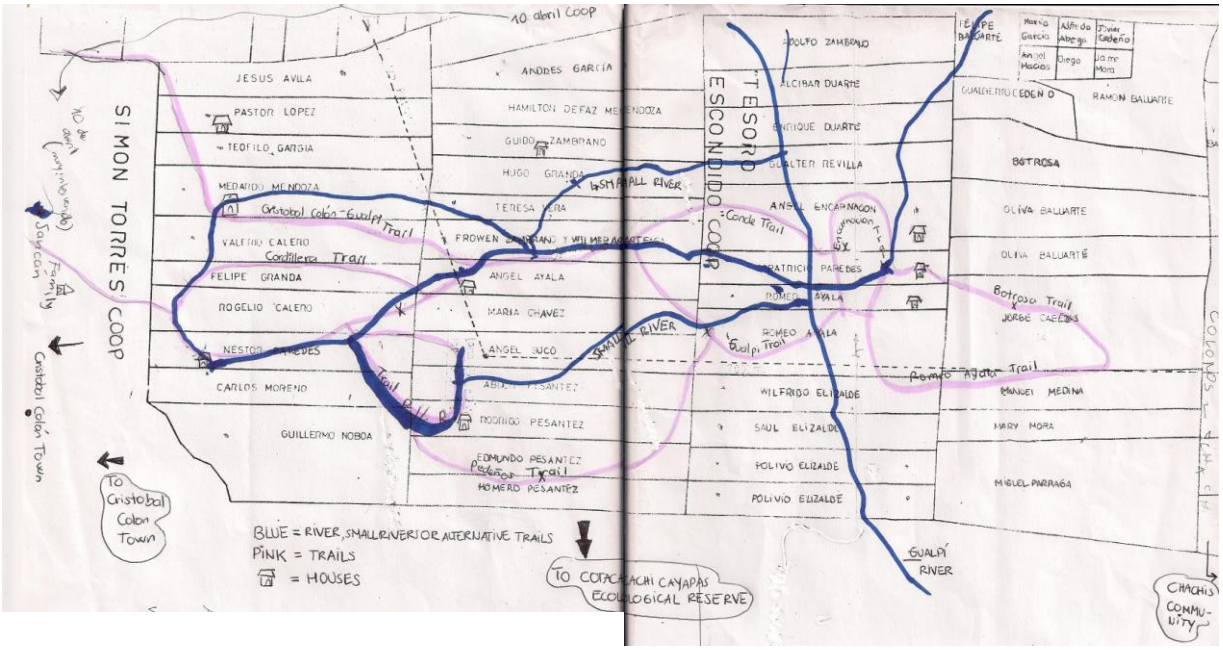

Image 20. Map of the Coop TE with the respective land title. Rivers, trails, houses and neighbor areas are showed. Pink lines represent main trails and blue lines represent small rivers and secondary trails.

The actual status of their lands is illegal; they are in the process of legalizing their titles of propriety.

On the other hand, the land use map provided by the Ministry of Environment of Ecuador (Image 21) shows that the area of the Coop is divided into: disturbed forests (mostly), natural forests and pastures (a lesser amount).

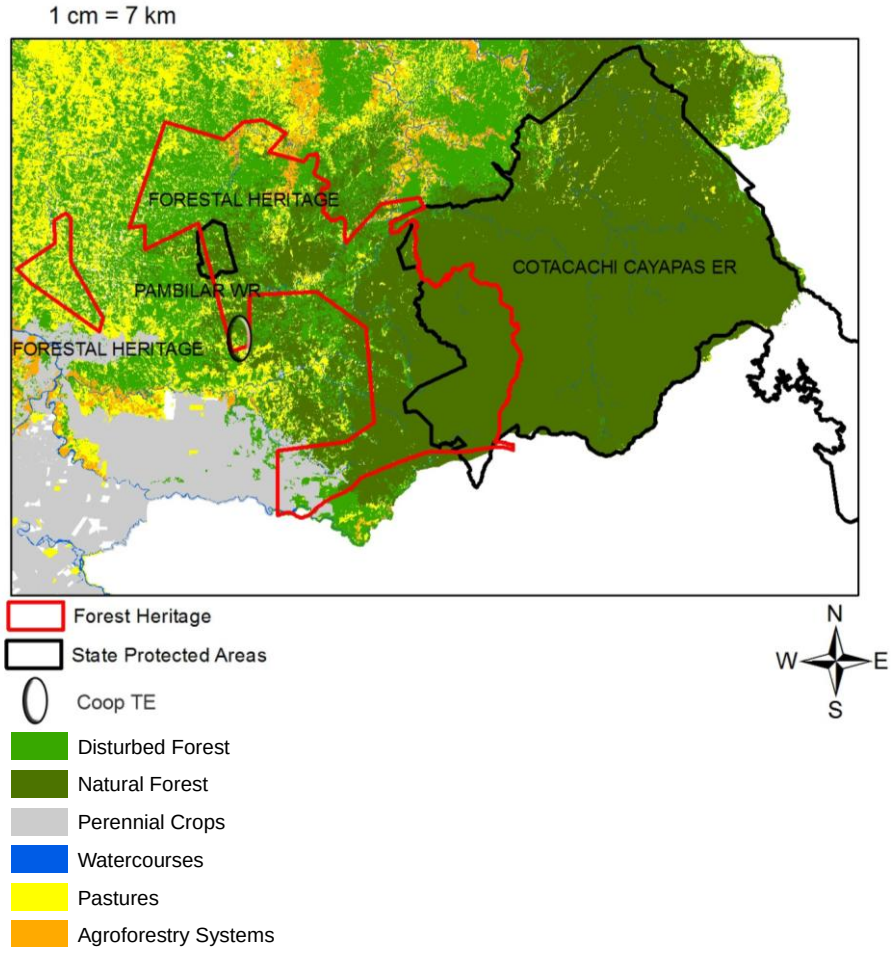

Image 21. Land use map within the area of the Coop TE (2011), Esmeraldas.

It is remarkable that this area is located in a strategic area between two large state reserves: Cotacachi Cayapas Ecological Reserve and Pambilar Wildlife Refuge. It provides a connection between the two forest reserves through blocks of forest that also belong to other Coops, organizations and neighboring reserves (La Paraíso, Río Bravo, Nuevos Horizontes, Santo Domingo, Canandé, Comunidad Chachi y Valle de Sade). In addition, part of the area of the Coop falls under a state protected area called "Patrimonio Forestal Estatal" ('Forest Heritage', Image 21). This classification is a means for protecting areas with environmental importance, but it is possible to have

private or communal property within it by following the laws, i.e. with a planning management.

At the moment the area of the Coop has neither oil palms nor mining concessions. Only the "logging companies" (see section *Other actors*) that are interested in expanding and to continue to exploit the forest in the area.

There have been many "lands problems" in the area. These include: invaders (people who arrive at "empty lands" to take possession of it) and possession by logging companies in protected areas.

4.5. PRIMATE MONITORING

Primate monitoring took place from May 2011 to January 2012 within an area of approximate 15.4 km^2. Image 22 shows the area where monitoring was conducted by the Coop TE parabiologist team and the sites of primate contact (Image 23). For the analysis of distribution and use of land of *A. fusciceps* in the Coop, there were also included some registers made in the past (Moscoso, 2010). These are also shown in the following map.

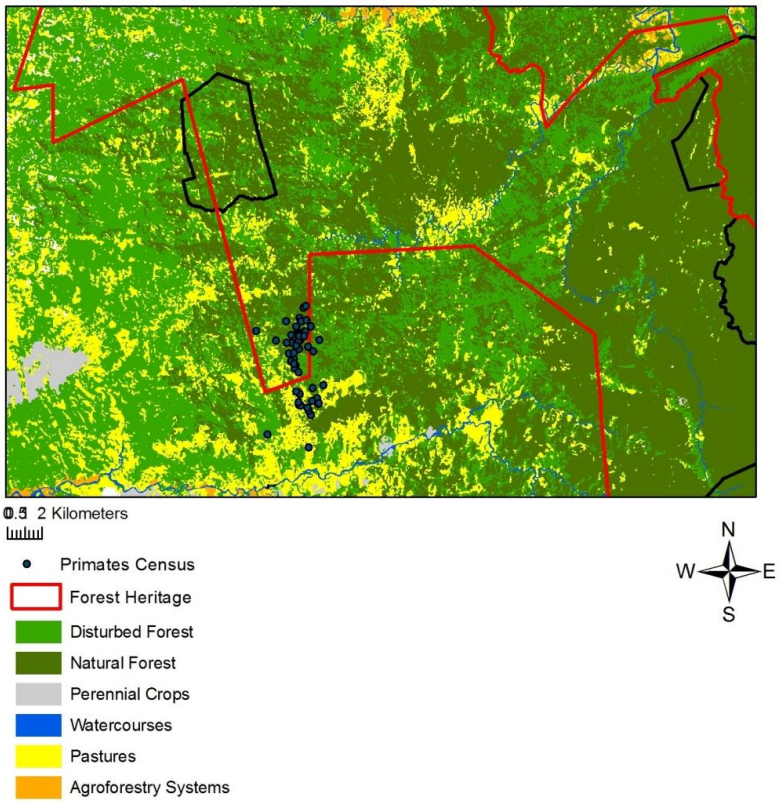

Image 22. Primate survey carried out by the parabiologist team from the Coop TE, Esmeraldas province.

Figure 23. One of the parabiologist team, Nilda Giler, with the primatologist Maria Isabel Estevez, monitoring primates in Coop TE, Esmeraldas.

In this survey 34 observations of threes species of primates were recorded; 19 of *Ateles fusciceps*, 13 of *Alouatta palliata* and 2 of *Cebus capucinus.*

4.5.1. Ateles fusciceps

Ateles fusciceps was observed 19 times, in groups of 2 up to 14 individuals. The aggrupation (number of individuals/subgroup) seen most were from 2 to 6 individuals (N=12; 63%), followed by 7 to 10 individuals per group (N=3; 16%) and from 11 to 14 individuals per group (N=4; 21%). The composition (male and female adults/subgroup) observed was: males from 1 up to 4/subgroup and females from 1 up to 8/subgroup. 84% of the observations were mixed sex subgroups and 16% only female subgroups; there were no subgroups of only male. The maximum of 3 infants per subgroup were found in 37% of the total number of the observations. The sex ratio (male:female) was 1:2.7. During the study 120 adults and 13 infants were seen.

The data collected in this survey showed that *A. fusciceps* was found only in forest (100%). Within forest they were seen in primary forest (90%) and natural gaps (10%). Image 24 shows that 67% of the registers *of A. fusciceps* were taken within natural forest, 26% in disturbed forest and 7% on pastures (N=42). In the census this species was found in the area of the Coop, mostly in natural forest, but it was also observed at the borders of pastures, even in areas of pastures that have patches of forest.

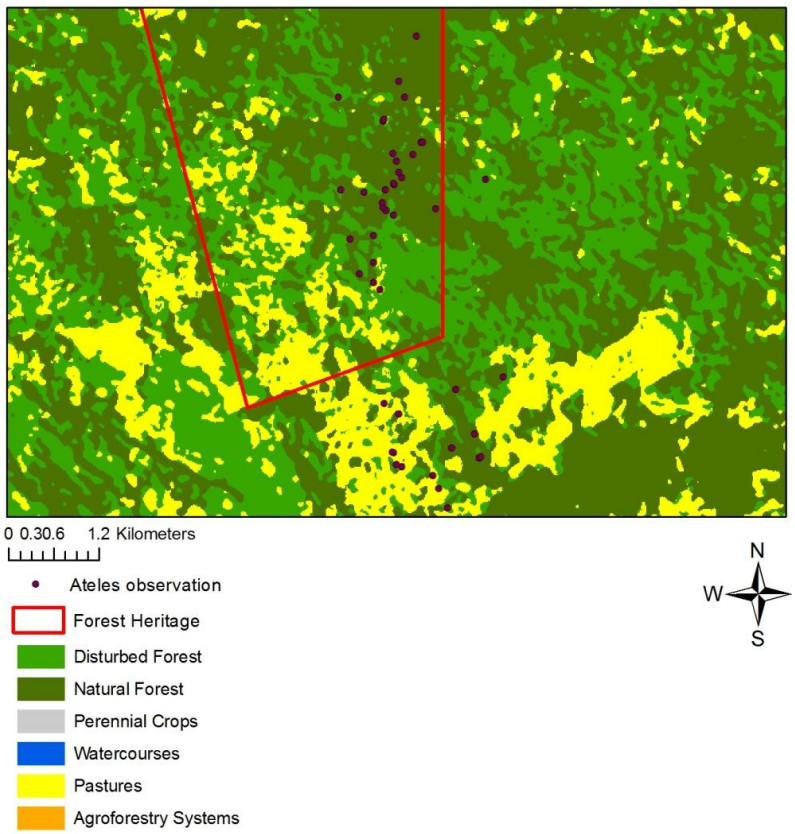

Image 24. Registers of *Ateles fusciceps* observed by the parabiologist team in the Coop Tesoro E., Esmeraldas province.

They used trees from 10 to 30 m high, but mostly from 16 to 20 m high (41%) and from 21 to 25 m high (29%)(see Figure 1).

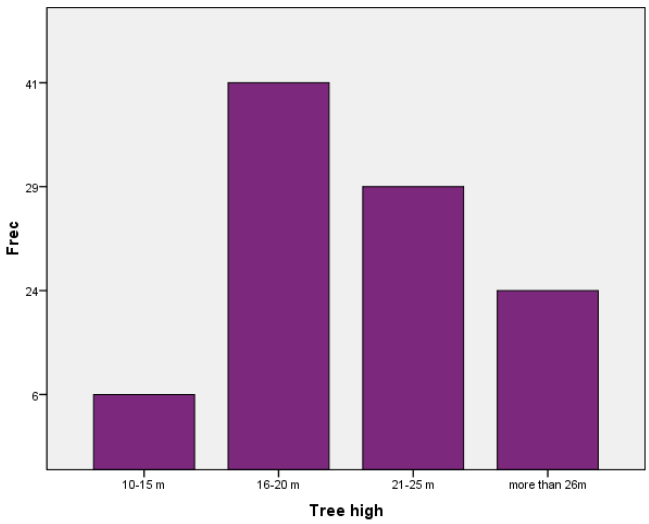

Figure 1. Tree height used by *Ateles fusciceps* during the primate census between May 2011 to January 2012 within the Coop Tesoro, Quininde.

The reaction to observers can be seen in the Figure 2. The categories alteration and approaching were the most common observed.

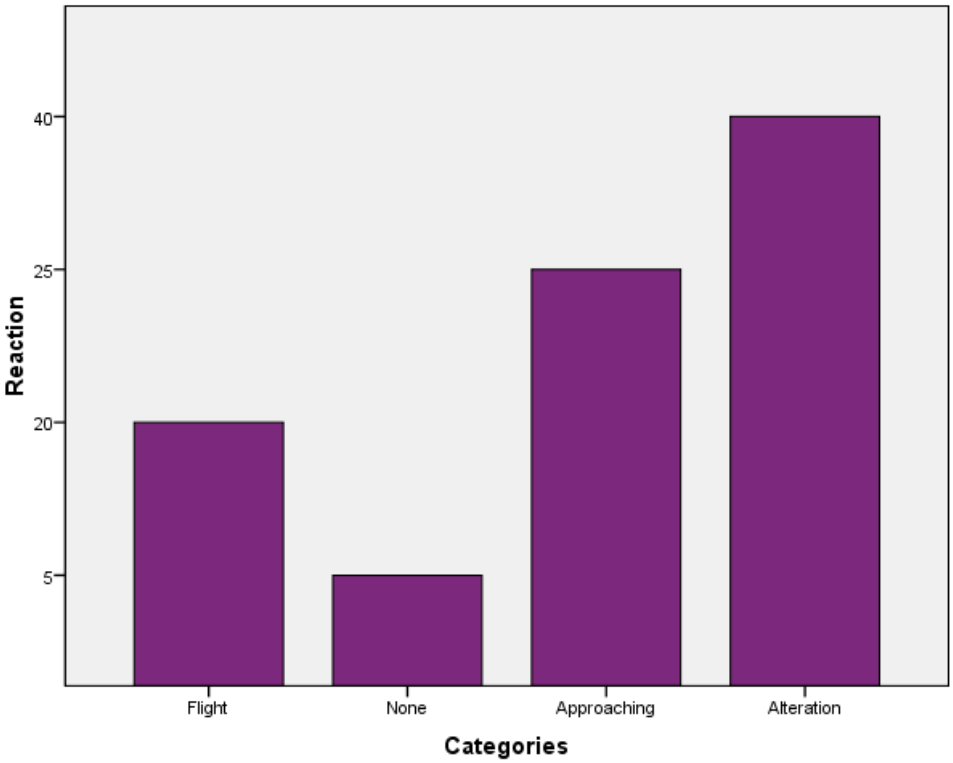

Figure 2. Different categories representing the reaction of *Ateles fusciceps* to observers. The y-axis shows the percentage of each reaction.

4.5.2. Alouatta palliata

Alouatta palliata was seen 12 times, in groups of 3 up to 7 individuals. One time it was seen in the same tree as individuals of *A. fusciceps*. The composition (male and female adults/group) observed was: males from 1 up to 2/group and females from 2 up to 4/group. They was only 1 infant/group. The sex ratio (male:female) could not be analyzed because of the large number of individuals without sex identification. During the study 58 adults and 2 infants were seen.

A. palliata were found only in forest (100%), and within it, in primary forest (92%) and natural gaps (8%). They used trees from 20 to 30 m high; they used two height categories (21 m to 25 m and 26 m to 30 m) with similar frequency (56% and 54%, respectively)(Figure 3).

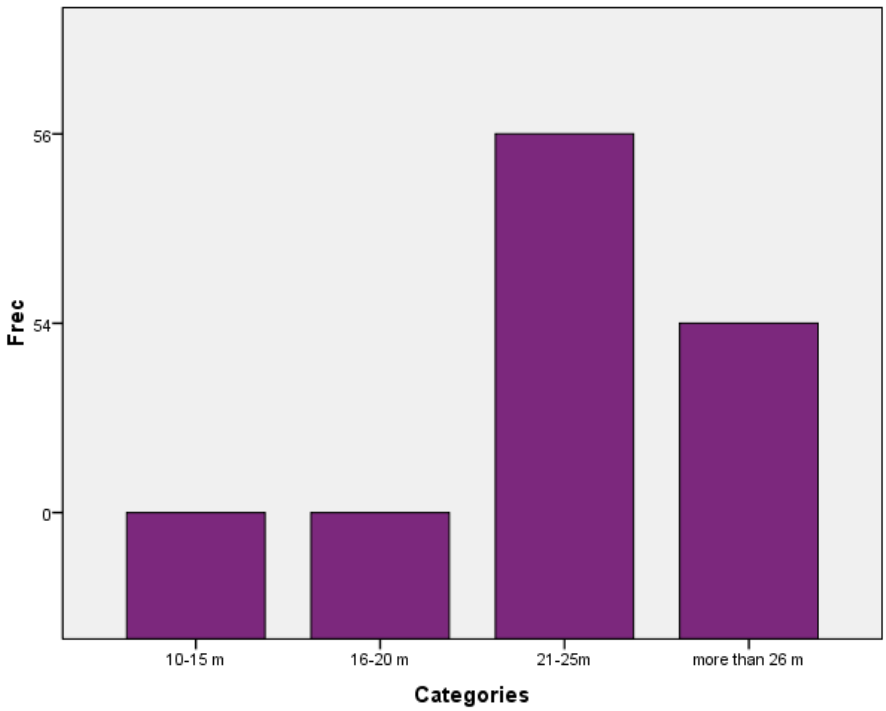

Figure 3. Tree height used by *Alouatta palliata* during the primate survey carried out between May 2011 to January 2012 in the Coop Tesoro, Quininde.

The reactions to the observer most frequently observed were: none and no alteration (Figure 4).

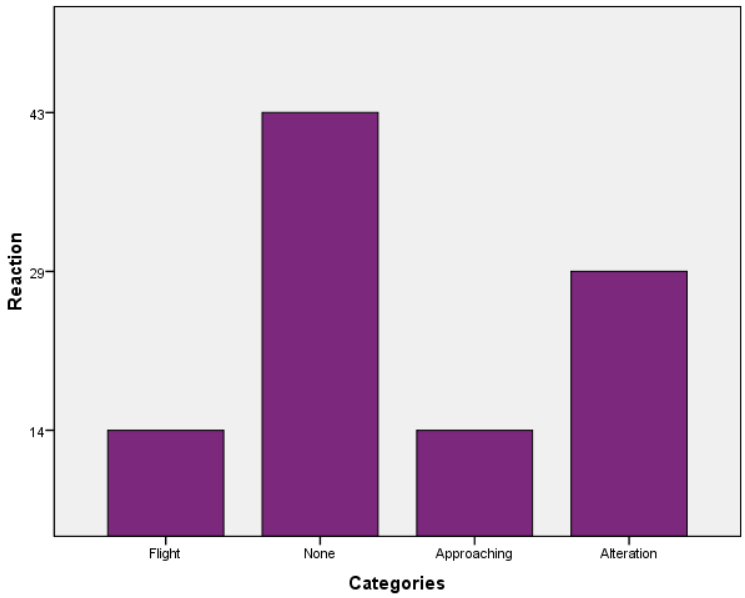

Figure 4. Different categories that represent the reaction of *Alouatta palliata* to the observer, y axis shows the percentage of each reaction.

4.5.3. Cebus capucinus

Cebus capucinus was seen 2 times, in groups of 6 individuals. Once, it was seen in the same place as *A. fusciceps.* Neither the composition nor the sex ratio could be analyzed because they could not be identified. There were no infants. They were found in forest, within primary forest and natural gaps. They used trees from 20 and 30 m in height. Further analysis could not be undertaken due to the lack of observations

4.6. RISKS TO PRIMATES AND CONSERVATION STATUS OF THE COOP TE AREA

At the moment, there is no significant risk to primates in the area of the Coop because they are abundant and they seem to travel throughout the whole area, even in logged areas. In addition, there are just a few forest fragments that have no connection with the forest. Hunting is not a problem in the area of the Coop because people do not practice it, and the few that do so hunt only small rodents. This was confirmed by the surveys (see *Surveys* section).

But there is a potential risk to primates if the expansion of the disturbed areas (due to logging, pastures and agriculture) continues and increases isolation of patches of remaining forest. In addition, other areas that surround the Coop (i.e. indigenous Chachi territory, other Coops and private properties) could present a problem for the survival of the population of primates at the Coop TE. For example, the indigenous Chachis continue to hunt primates, mainly the critically endangered spider monkeys.

“They usually keep the infant as pets and the adults as food” (Estévez Noboa, com. pers.).

This could be the reason that explains the abundance of primates within the Coop, i.e. spider monkeys tend to move away from the hunting areas (Moscoso, 2011) searching for areas without human impact, such as the area of the Coop TE. Also private companies that work in the area (such as BOTROSA and oil palm), are increasing the rates of deforestation; and the position of other Coops is unknown. According to Nestor Paredes, one of the leaders and past presidents of the Coop TE, most Coops are in good conservation status (e.g. Santo Domingo) and they want the preservation of the forest. Also, Image 19 shows that the area that surrounds the Coop, that includes protected areas (Cotacachi Cayapas ER, Pambilar WR and the Forestal Heritage) have high levels of forest connectivity, despite the fact that a large area is disturbed forest. There are small patches of pastures, between the protected areas and the Coop, and

these areas increase considerably southeast of the Coop TE (these areas are owned by other Coops that are closer to the town and to the main road).

At the moment, a large area of the Coop is protected (because of its status as Forestal Heritage) however a significant area is disturbed forest with dispersed pastures. Also it is possible to see (Image 19) that the shape of the protected area is narrow - less that 3 km, so if expansion of disturbed forest continues the protected area will become an isolated patch that will also experience the edge effect.

5. CONCLUSIONS AND DISCUSSION

Socioeconomic and Environmental situation of the Coop TE and its surroundings

The Coop. TE is formed by people who think they "need money for daily survival". Most of them are poor people that depend on the main companies that work in the area or from forest resources to ensure some monthly income. Undoubtedly the conditions they live in are precarious. They need the basic requirements that a village should have, but the government has not played any part in this. For this reason, big companies that work in the area (such as logging and palm companies), act as authorities and decide "what they need to have and what they need to do".

Besides this, the fact that the Coop and the town C. Colon are relatively "new" and made up of people from different areas (this aspect is explained for people from Esmeraldas that identify themselves as "Ecuadorians", instead of "Manabas, Orenses, etc" - from the area where they came - (Minda, 2000)), could became a problem for the conservation of it and the expansion in deforestation. They have diverse perceptions of nature, and most of them have no sense of belonging to the area (because none were born there). This is in contrast to other indigenous people in Ecuador who care about their "habitat and the habitat of their ancestors" (e.g. indigenous Sarayaku in Ecuadorian Amazonia (see more in http://www.sarayaku.com/)). Also most of them do not have ancestral knowledge to understand the "new ecosystem" in which they are living.

The combination of many indicators (such as a high birth rate, poor education, lack of a sense of belonging, poverty) shows that this area is a "weak point" and that it should be a priority area that needs addressing in both the social and environmental realms.

Analysis of trends (past, present and future)

The development of the Coop TE goes in hand with their actual interests and necessities that have led to the exploitation of resources from the forest. This originated from the necessities of people from many parts of Ecuador, who wanted to have "a better life and better income". At the beginning people tried to produce on their lands by exploiting the forest in a number of ways, but with time most people failed to get the results they expected so they decided to sell their land. Because of the difficulties of producing and working on the land most people did not deforest their properties.

Nowadays, the probabilities of making an income from their lands are low and include; i) Sell their land or part of it to timber/palm companies or to private people; ii)

Cultivate seeds that have good production, like cocoa and tropical fruits; iii.) Sale of products from cattle. Most people are waiting for "development plans from the Coop". They are willing to support projects that can generate economic resources, without exploiting the forest.

Forest and farm resources

The perceptions they have about the forest are diverse and most concepts of it are simple: from people who think there is "nothing they can obtain from it" to people who consider "the forest has its own value", from an empty value to an intrinsic value. Most people see the forest as a place of some basic components (water, wood and animals). For some people it is a space where they can develop an activity, by bringing things from "outside" (i.e. they need to put something into it) and for other people it is a space with its own resources that can be used (e.g. wood). But most people think the forest can give them some benefits, in different ways. However, nobody provided ideas showing good knowledge about the functionality of the forest.

On the other hand, primates seem to be part of the forest and are looked on as "wild animals", i.e. the people do not consider them "useful" and do not have a good understanding of them. They could not give additional information about the Brown-headed spider monkey or other species of primates when they were asked to do so.

Other actors in the area

Big companies act as the "authorities" in the area. They have thousands of hectares of forest, provide employment to people, take important decisions and carry out work that the Government should do. These organizations are important because they are key players that will define the future development and the conservation of the area. Considering that the companies are looking to expand their land the future for the conservation of primary forest is in danger. The owners of the Coop TE have the responsibility to determine whether this area will become part of the land of the companies or not.

Working with people: Workshops and Meetings

People showed great interest and enthusiasm for the 3 workshops given. They are open to receive training and to learn and apply the concepts taught. Even at the end of this project, they asked for a continuation of it. During the project they supported the aim of finding a conservation strategy for the area, but they also realized that they have to generate income to achieve this. So, for them, any kind of project that involves and supports both aspects is good. The problem that presented itself during this project was the lack of consistency in participant attendance. The reasons for this could be: 1. Lack of communication between them; 2. Lack of commitment of each

person; 3.Other priorities; and 4. Internals problems between the members of the Coop TE.

An aspect observed in some of the attendees is that they wanted immediate results, i.e. they prefer to learn about subjects that can be useful for that moment. That is the reason why people showed particular interest in “Organic Cocoa Culture” - because this can help them immediately in their plantations (considering that the fruit is already under cultivation in the area and because BOTROSA are providing plants). On the other hand beekeeping did not receive the same level of support. People showed interest, but they didn´t wanted to start the process from zero. The workshop that had most attendees and interest was the “Analysis of an ecotourism project in the area”. People were really enthusiastic about the development of a "community ecotourism project".

Working with people of the area is hard work. First, there were many personal interests amongst the people which meant that only a few of the members of the Coop TE attended the workshops given. There are internal conflicts between the people of the Coop. However, people seem to be open to community projects that involve teamwork. However, it is important that before engaging in a community-based project the members of the Coop solved their internal problems first.

Map of tenure and land use

The area of the Coop TE is in a good state of conservation; at the moment deforestation is minimal. There are many disturbed and pastures areas, however, some of them have dispersed trees and have continuity with other forest and larger areas of protected forest and forest connectivity remains high.

The main problem is the illegal status of their properties; because they are still in the process of legalizing them. This could become a problem because of the uncertain state, e.g. by “land invaders” or by the sale of land to big companies that work in the area. Also, it is important to consider that part of the terrain is part of a state protected area (Forest Heritage).

Primate monitoring

Primate survey and monitoring confirmed that three species of primates are living in the area of the Coop TE. The primate that is most frequently observed is the critically endangered *Ateles fusciceps*, followed by *Alouatta palliata* and *Cebus capucinus.* The demographic data for *A. fusciceps*, confirms that seen in another survey in the area (Cueva, 2008; Moscoso, 2010). The population could be defined as healthy in comparison to that reported for the species in other areas of Ecuador (Gavilánez-Endara, 2006; Baird, 2007; Cueva, 2008; Estévez-Noboa, 2009, Peck et al 2011). The

frequency of observation of *A. fusciceps* in the area is high; the size of the subgroups is large; the number of females and infants is also high. Something remarkable is that comparing some data with the other census in the area during the dry season (July of 2007 and 2009, Cueva, 2008; Moscoso, 2010), we see that they are similar. For example, Moscoso (2010) found a sex ratio (male:female) of 1:2.4 and in this census it was 1:2.7; the number of individual per subgroup found is high in all surveys (from 1 to 14), even in this survey we found that the highest number of individuals per subgroup in Ecuador was n=14 (registered in November 2010, during the rainy season). This suggests that, up to the present the area has good availability of resources (e.g. fruits trees) with potential to maintain a high density of primates and high numbers of individuals per subgroups, even in both seasons (wet and dry).

The use of habitat shows that the species is distributed throughout the Coop area, principally in primary forest, the habitat preferred by the species (Tirira, 2007; Moscoso, 2011), but is also present in disturbed areas, represented in the area by pastures that have patches of tree patches at bordering areas of forest. This is because the areas of disturbed forest are within the middle of the forest, so it could simply be a report from an area the spider monkey travels through during dispersal.

Conservation Strategy for the Coop TE

It is not possible to generate a zoning plan for the area because each member has their own property and own use of their land. But this does not represent a major problem in planning for the conservation of the area. The area has the potential of being kept in good conservation status if the necessary decisions are taken. Here we present some options that could help to achieve the aim of conserving one of the last healthy populations of the critically endangered brown-headed spider monkey and its habitat.

The best strategy for the conservation of the area would be to involve as many actors as is possible. Given the actual condition of the area, it is not possible to focus on just one area because the neighboring areas will affect its future. It will be necessary to include members of the Coop TE and neighboring Coops, NGOs, who are working or who worked in the area (e.g. Altropico, Wildlife Conservation Society, Jocotoco and Jatun Sacha), government, scientists, the main companies (e.g. Ecomadera), people of C. Colon, ecologic clubs, schools and other people that have an interest in conservation.

Considering that the trend in successful conservation programs has been of integrated rural development (including money, jobs, access to health and food) (Happold, 1995) and the results of this project showed the precarious conditions in which the people of the area are living, it is necessary to implement a conservation plan that would be part of a development solution for the community. This means, a program that helps them by satisfying their basic services needs (such as employment, education and health services). According to other experiences in conservation projects “if basic human

needs are not met, local communities will not engage in activities that positively benefit wildlife" (Savage et al., 2010).

A conservation program in this area should involve 6 aspects: 1) Creation, together with people, of alternative developmental projects based on their interest and existing projects that they are involved in; 2) Creation of educational programs of awareness and conservation of environment; 3) Support the programs that already exist in the area; 4) Generation of scientific research; 5) Work in disturbed forests and 6) Strengthen the protected areas. Each point will be analyzed to identify the best conservation strategy:

1) Creation of alternative developmental projects: Conservation Agriculture (CA) and Crafts Elaboration

The results generated by this project showed that it is possible to develop a range of projects that are sustainable with the environment. It is necessary to consider two kinds of projects: one for people who live in the forest and work on their farms and another, for people that live outside the forest (mainly in C. Colon).

For people who work on their farms (smallholders), the options to implement a project could include organic cocoa cultivation, beekeeping or/and tropical fruits cultivation. It is necessary to improve their techniques of cultivation by providing agroecological training or introducing the concepts of Conservation Agriculture (CA). The principles of CA are: minimal soil disturbance, soil cover and crop rotation cover and crop rotation, which are increasingly recognized as essential for sustainable agriculture. Experiences in South East Asia and Mexico with maize and wheat have shown that this practice can generate clear economic and potentially enormous environmental benefits (Erenstein, *et al.*, 2012).

The project with the greatest potential for success is organic cocoa cultivation because they already have a plantation (approximate 50 ha), it is the best paid crop (considering the fame of Ecuadorian organic cocoa in the market) and grows well in the area. If this project is implemented, it is necessary that all people involved undertake extensive training in not only ecological cacao cultivation, but also in management and administration of small businesses to ensure they become seriously committed to the project and able to make links on their own to develop their own small businesses. It could also be very beneficial (economically and environmentally) to provide certification and eco-labeling for farms that achieve the standards required. This Conservation certification would promote "integrated agriculture," - harmony between the economic needs of the farmer, the health and welfare of workers and the local community and environmental protection (Conservacion & Desarrollo, 2012).

For people who have not exploited their properties, a handicrafts project could be well supported, especially for women (householders). They could also be involved in agriculture projects by being in charge of areas that do not require living in the forest (e.g. transport of the product, packaging, etc). Personal experience of a similar project

in Colombia (Titi Project) generated positive results by the formation of an artisans cooperative for women. They used plastic bags found littered in the forests and villages of Colombia to design Eco-back packs. They trained other people from other countries to replicate the project (Savage *et al*., 2010). A project in this vein could be one good option for women in C. Colon too.

2) Creation of educational programs in awareness and conservation of environment

It is important to extend the knowledge people have about the environment, the processes that occur in the forest and the consequences of altering the ecosystem. It is also important to raise awareness of the importance of wild animals, particularly larger species such as primates, in the forest. This would provide the educational foundation that underpins the aim of the project. Understanding why they are involved in the project will help them to commit to it. It could also help to make people more conscious about the use of resources in the forest, gaining new allies for conservation.

Many successful conservation project have used a flagship for approaching people (e.g. Titi Project, Harpy Eagle project), so the image of the brown-headed spider monkey (*Ateles fusciceps*) could be used as a flagship for the project, because it is a charismatic animal, the most representative of the area and the most endangered primate species in Ecuador (Tirira, 2011). As such, it would help to lead people to the project and will increase consciousness for the need to protect them and their habitat.

Two educational programs should be developed: one for children and the other for adults. It should be borne in mind that adults do not like to receive "traditional classes" because they do not find them useful and there is a high rate of illiteracy. To include them in the program, it would be necessary to find alternative ways of teaching. For example, through their children, using public spaces in the town (by theatre, contests, shows), introducing theory in practical workshops or including them in future projects of conservation (e.g. as part of the parabiologist team).

3) Support the programs that exist in the area

There are many initiatives that were born in the area (see Section *Other plans developed in the area*), even before the arrival of this project. So, supporting these initiatives could be more successful for a program of conservation in the area than beginning one from zero. For example, working with the participation of Ecoclubs, building a library, stimulating the study of the plot of forest trees, supporting the community ecotourism project, etc. These ideas should continue to grow and also be part of the solution to alternative development in the area.

A program of "scientific ecotourism" could be useful in the area. The idea is to combine research and specialized tourism, with successful examples demonstrated by the Santa Lucia Reserve supported by national and international Universities and public volunteers.

4) Generation of scientific research

Given the conditions of the area, as one of the richest hotspots globally yet seriously endangered (Mittermeier *et al*., 1998; Myers *et al*., 2000), it is necessary to continue research in as many fields as possible. It has been identified by many NGOs, such as WCS or Jocotoco, as one of the last forests of NW Ecuador in good conservation status. This can be shown through the presence of indicator species that are extinct in most forests in NW Ecuador, such as *Panthera onca* and *Tayassu pecari* (both considered critically endangered (CR), according to the Red List of Ecuador, Tirira, 2011). These species have been reported in the neighboring areas, Pambilar Wildlife Refuge and Cotacachi Cayapas ER (WCS, not published report). Also, close to Hoja Blanca town, Jocotoco has a private reserve in which they have tourism (mostly birdwatchers) and some scientific research, such as camera traps (Jocotoco, 2012).

The forest of the Coop TE has the ideal conditions for being a "biological school" because of their conservation status, high diversity and high densities of critical species, remoteness and lack of biological studies in the area. The study of primates in this area should be continued because of the importance that this area represents for the subsistence of the populations of *Ateles fusciceps* in Ecuador and for supporting the conservation of the other endangered species of primates, *Alouatta palliata* (CR) and *Cebus capucinus* (EN) (Tirira, 2011). It is also important to say that, contrary to other places where primates flee before we see them (Moscoso, 2010) the primates in this area - particularly *Ateles fusciceps* – do not run away allowing observers to take notes of their behavior. This could be a huge advantage for studying their ecological behavior and providing an opportunity for ecotourists to observe this very rare primate.

It would be important for research carried out in the area to involve people of the Coop. This would give them not only the economic benefits but also the academic and personal growth experiences. In this manner we expect they would engage more with the project and the conservation of the forest.

5) Work in disturbed forest

A significant area of the Coop is disturbed forest and some are old pastures (i.e. abandoned pasture). It is important to work in these abandoned areas by reforesting them with native forest trees. It would be necessary to implement a program of soil restoration and reforestation with the knowledge gained from the "study plot of forest trees" at Cristobal Colon. Part of this program would also be to work in areas that are

occupied by cattle or plantations, by planting trees in a scattered fashion as we have seen primates travel through them, thereby allowing continuity of the forest.

6) Strengthen the protected areas

As was mentioned above, a large area of the Coop is protected and neighboring areas are protected, too. However disturbed forest and areas of pasture are expanding. It is important to develop a strategic conservation plan that includes all the protected areas and the connections between them. The actual size and shape of the existing Forestal Heritage (that is the protected area that includes smaller protected areas and the Coop TE and other neighboring Coops), is not adequate for the success of the conservation of the species. So, the actual status and plans of the protected area should be reviewed in collaboration with staff responsible from the Ecuadorian Ministry of Environment. On the other hand, the possibility of converting the Coop to an area of more restricted conservation and to also include other neighboring Coops, would be very beneficial for the preservation of the forest.

Other neighboring areas should also be included in this project because of the need to maintain continuity of the forest. It was also reported that other big mammals, that require larger areas for survival (e.g. *Panthera onca*), are using pastures areas, disturbed forest, oil palms and roads as a route for dispersing through the forest (WCS, not published report). This could become a problem for their conservation - even causing conflict between people and wildlife.

The future of the Coop TE and the neighboring areas is uncertain, so it is necessary to take action now for the conservation of this important area. Additionally, given the that a significant proportion of the Coop TE lies within a Forestal Heritage (Forest Heritage) site the Ministry of Environment has the responsibility to for projects undertaking afforestation programs, reforestation, exploitation and industrialization of forest resources (Congreso Nacional, 2004). It is also important to engage with the Government to ensure support of a conservation plan including restoration and reforestation of the area (as suggested in this project).

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ANEX

Annex 1. Interview of C. Colon residents and organizations working in the area.

1	Age
2	Sex
3	Were you born in this locality?
4	If not, where were you born and when did you arrive in C. Colon?
5	Where do you work?
6	What do men do in this town?
7	What do women do in this town?
8	Have you any children? How many? Ages
	Do your children go to school?
10	What do children do in this town?
11	Which is the activity that gives people more income here?
12	Would you like to learn new methods of cultivating?
13	Would you like to learn new methods of animal husbandry?
14	Would you like to learn new methods of elaboration of handicrafts?
15	How would you like C. Colon to be in the future?
	How would you like the Coop Tesoro to be in the future?
16	Does forest exist on your property?
17	What do you get from the forest?
18	Has the forest from Tesoro changed? How?
19	Do you think that there are other ways of producing income without destroying it? ¿Which on
20	Do you know the Spider monkey? If yes, where have you seen it?
21	How big is your property?
22	Do you cultivate your land?
	What do you cultivate?
	To whom do you sell the produce?
23	Do you have animals on your property? ¿Which animals?
27	Are you a member of the Tesoro E Coop? If not, of which one?
27	What kind of productive activities do you develop on your property?
28	Are you happy with the organization of the Coop? If not, why?

Interview questions for NGOs, foundations or other programs that work in the area.

1	Name of the NGOs
2	Name of the interviewee
3	What kind of activities does your institution develop in the area?
4	Since when?
	What do you think will happen with the natural resources in the zone under
5	actual management conditions? (institutional opinion)
6	What is your vision of development in the area? (institutional opinion)?
7	Which is the main need in the area?

Annex 2. Primate observation form used for the surveys in Tesoro Esmeraldeño.

Date:
Name:

Weather:	Sunny	Cloudy	Rainy

Name of the trail:
Starting position (coordinates): Final position:
Start time (hour): Final time:

Primates information

Position of primates (coordinates):
Name of the trail:
Observation time:
Distance monkey– observer:
Distance animal-transect:
Height of first animal I observe:

Numbers of individuals:

¿How many males? ¿How many females?
¿How many infants?

Point of observation:	Forest	Forest edge	Grassland	Cultive
Zone in forest:	Primary forest	Secundary forest	Natural gap	Gap
Activity of group:	Movement	Rest	Feed	
Reaction to the observer:	Flight	No reaction	Approaching	Alteration

Annex 3. Preliminary analysis on the feasibility of tourism development in the area.

Possible touristic routes* (once arrive to C. Colon town)

ROUTE 1: HOJA BLANCA – CRISTOBAL COLON
Level of effort – high/ Duration – 5 to 6 days-

- Access to Hoja Blanca town (1st day)
- Hoja Blanca town – Patricio´s House in T.E. forest (2nd day)
- Walk along main trails (3rd day)
- Patricio´s house- Finca Nestor (4th day)
- Finca Nestor – Farm Curtinkapa in C. Colon town (5th day).

ROUTE 2: HOJA BLANCA – PATRICIOS´HOUSE
Level of effort - medium / Duration - 3 days-

- Access to Hoja Blanca town (1st day)
- Hoja Blanca – Patricio´s house in T.E. forest (2nd day)
- Return to Hoja Blanca town (3rd day)

ROUTE 3: Farm Curtinkapa
Level of effort - low to medium / Duration -2 to 3 days-

- Farm Curtinkapa in C.Colon town (1st day)
- Farm and forest tour (2nd day).

Transport information:
Travel Quito - Cristobal Colon town

a) The bus Quito-Quininde in Coop "Transportes Esmeraldas" leaves at 9:10. The cost is $ 5.00 and travel time takes between 4 ½ to 5 hours (time arrival is at 13:45).

b) Other possibilities Quito-Quininde (in the same Coop) are at 11:15, 12:20, 14:15, 16:00, 18:55, 20:10, 22:10 and 23:50. It is better to call beforehand(022505099)

c) In Quininde the buses to C. Colon leave from the Coop Kennedy between 14:00 to 14:30 and at 16:00. These buses do not always arrive to C. Colon town, only

to Golondrinas town, therefore charge $ 1.50 for 60 or 90 minutes in length. In Golondrina town it is necessary to pay for a truck or small bus) that charged $ 20.00 to C. Colon (call Pedro Diaz 089 646 438 for this service). It takes 3 hours from Quininde–C. Colon.

d) Another option is to take the bus in "Transportes Quininde" from Quininde to "La T town" (every hour). The cost is $ 2.00 and travel time is 2 ½ hours. From "la T" a camioneta can be rent (Mario Paredes). The value for a truck from "la T" to C. Colon is $ 8.00.

Travel Guayaquil – C.Colon town

a) The bus leaves at 23:00 from the "Coop Kennedy". This bus arrives at 04:30 to Santo Domingo city and to C. Colon town arrives between 09:00 and 09:30. It returns between 10:30 to 11:00 but only to Santo Domingo. There is a direct bus that leaves at 04:30 Guayaquil.

b) The "Coop Kennedy" has an option that leaves from Guayaquil at 08:30 but it arrives only to Golondrinas at 18:00.

c) Other options are from Santo Domingo city to "la T town" in "Transporte Quininde", buses usually leave every hour or half an hour at a cost of $ 3.50. The "Coop Kennedy" also leaves at 10:30 from Santo Domingo, and arrives to C.Colon at 15:00.

Travel Cristobal Colon town– Hoja Blanca town

a) The travel time from C. Colon to Hoja Blanca is 90 minutes by car (truck). The cost of the truck is $ 50.00 (call for service to Mario Paredes, 085185331).

b) There is a bus from C.Colon–Hoja Blanca ($ 3.50) at 17:00 or from the "T town" –Hoja Blanca ($ 2.50). The bus arrives at Hoja Blanca at night. Hoja Blanca town has no hotels for accommodation, but it is possible that people receive tourists at home or for camping. It is also possible to find food in some dining rooms in the town ($ 2.00 - $ 2.50).

Accommodation and food possibilities:

Cristobal Colon town a) The property (big house) from Ninfa Paredes (080851955) can accommodate 16 people. There is only one toilet and one shower. Normally charges $ 3.00 for nationals and foreigners $ 5.00.

b) Another accommodation option is the home of Emma Revilla. $ 10.00 usually charged overnight.
c) The food price usually ranges between $ 2.00 and $ 2.50. There are two restaurants in the town.

Tours information (duration of travel, accommodation and costs in Tesoro forest):

a) *The first section* is Hoja Blanca – Patricio´s house.

Two 2 ½ hour, slowly walked (1.5 km / hour). Jadira, Patricio´s wife would be responsible for cooking (cost 2.50). There is space for camping and they could adapt their house for tourists. Five minutes from the house of Patricio there are some cabins from Nilda Elizalde, which have the capacity to accommodate 14 people (6 couples and 8 bunks). They have two bathrooms. The cabins are well equipped, also have a dining room. They have a tour package that includes $ 10.00 for three meals, snacks most welcome cocktail and $ 7.00 per stay.

b) *The second section* is Patricio´s house – Gualpi river.

It takes approximately 2 hours, slowly. In Gualpi there is an area to place the tents (5 tents).

c) *The third section* is Gualpi river- Conde.

Walking slowly is 4 hours of travel. It is necessary to carry food.

d) *Fourth section is* Conde - Verde Canande Camp.

It takes approximately 90 minutes walking slowly. At Verde Canande Camp there is space for camping. The house has space for four tents that use Verde Canande workers.

d) *Fifth section* is Verde Canande – C.Colón town.

Four to five hours of travel, slowly.

Conditions of Trails:

People should be in a good condition of health for walking in the forest T.E. The first part of the section, from Hoja Blanca town – Patricio´s house trail, is muddy in winter time. In general, the are many slopes, mainly in the section from Gualpi river - Verde Canande Camp. From Verde Canande to Finca Nestor it is possible to find areas for logging from Verde Canande company (pulley system).

Some attractions observed along the tour:

a) Section 1 (Hoja Blanca-Patricio´s house): Patricio´s house is a small farm where native people live in the forest of the Coop. They have a small "Tilapia" (a fish) pool, chickens and horses. It could be a place for tourists to learn about the daily life of native people, and they could be part of it helping in the activities of the farm.
A strategic point near this place is the ecotourism project of Nilda Elizalde. She has a big cabin for tourists (see section *Other plans*). The view of the landscape is spectacular and it is possible to see many birds and even primates from the cabins.

b) *Section 2* (Patricio´s house – Gualpi): Leaving the house of Patricio, on the trail to Gualpi river, it is possible to find traces of archaeological remains of vessels. There are tree species representatives of the Chocoan forest such as the "Sande"(*Brosimum utile*). It is possible to see (almost always) *Ateles fusciceps* and *Alouatta palliata*. Also there are many small water cascades within the trails. Finally it reaches a pristine river called Gualpi, near to a waterfall. It is possible to swim and go fishing in the river.

c) *Section 3* (Gualpi - Conde): Leaving Gualpi, there is a "hard slope", but reaching the glade it is common to observe all the species of primates (*Ateles fusciceps, Alouatta palliata* and *Cebus capucinus*). There were many traces of mammals (*Tayassu pecari* and *Puma concolor*). Other mammals that could be found are sloths (*Choloepus hoffmani*) and squirrels *(Microsciurius mimulus* and *Sciurus granatensis*). Among birds, the Umbrella bird (*Cephalopterus penduliger*) and turkeys (*Penelope* spp.) are common, and also toucans, parrots, partridges and "cubalanes." This section ends in a grassland area.

d) *Section 4* (Conde - Verde Canande Camp): It is very common to see all primate´s species in this area. This trail is characterized by ponds of water, where it is possible to find shrimp and native fish. In general, species of flora are representative Sande (*Brosimum utile)*, Guadaripo (*Nectandra guadaripo*), Guayacan (*Tabebuia chrysantha*).

e) *Section 5* (C. Verde Canandé - C. Colon): In this section is more possible to find capuchin monkeys (*Cebus capucinus*) and striking flora specie. It also crosses several rivers and streams.

Annex 4. Plan of the main actors involved in the potential project of community tourism in the area of T.E.

Roles	**Person in charge**
Guide	Nestor Paredes
	Patricio Paredes
	Mario Paredes
	Pablo Rodríguez
	Galo Conde
Food in C.Colon town	Odilia Zambrano (restaurant)
	Yolanda o Yadira Paredes
Food in Tesoro forest	Yadira Paredes
	Nilda Elizalde
Accommodation *in C. Colon*	Ninfa Paredes
	Emma Revilla
	Curtinkapa Farm (Mr. Luis)(in tents)
Accommodation in *Tesoro forest*	Nilda Elizalde (cabins)
	Patricio Paredes (camp area, in tents)
	Camp area in tents (near Gualpi river)
Mules	Manuel Montalban
	Adolfo Zambrano
	Candelario Dominguez
Transport	Mario Paredes (car C.Colón – Hoja Blanca/ la "T" – Hoja Blanca)
	Pedro Diaz (car Golondrinas – C.Colon)

Options for community benefits:

Option	**Description**	**Beneficiaries**
Community Bank	A percentage of the income would go to the bank. The money would be used for common benefits like emergencies, urgent needs or work within the Coop.	All
Pay for the entrance into a property	A fee for passing through the property for the owner.	Personal
Roles for people who take part of the tourist project	Payment for work: i. e. cleaning the trails, put signs on it, helping in some needy activity	Personal
Association with Sociobosque (Program of the Government)	Program that pays for the preservation of forest. This money could go to the community bank.	All
Elaboration of handicrafts and sell of organic products.	Could be sold to tourists.	Personal, All
Volunteer program	Volunteers could pay for living in this area and could participate in some daily activities. This money could go to the community bank.	All

Annex 5. List of the members of the Coop TE.

Name	Size area (ha)	DF	PF
Adolfo Zambrano	50	12	38
Alcivar Duarte	50	4	46
Angel Encarnación	100	10	90
Angel Suco	50	1	49
Candelario Dominguez	50	10	40
EcoMadera S.A.	400	44	356
Efren Loor	50	14	36
Enrique Duarte	50	8	42
Farias	40	8	32
Franciso Conde	50	12	38
Fredy Cedeño	50	4	46
Jesús Ávila	60	6	54
Jorge Mendoza	50	8	42
Luis Cedeño	50	5	45
Manuel Medina	100	15	85
María Chávez	50	4	46
Mariana García	50	2	48
Medardo Mendoza	60	8	52
Néstor Paredes	60	6	54
Pablo Rodríguez	50	5	45
Patricio Paredes/Yadira Giler	50	5	45
Polvio Elizalde	100	15	85
Ricarte Rodríguez	50	10	40
Rogel Revilla	70	6	64
Romeo Ayala	110	15	95
Rosa Montalván	90	4	86
Saul Elizalde	50	8	42
Victor Garofalo	50	2	48
Walter Revilla	50	1	49
Wilfrido Elizalde	50	5	45
?	50	2	48
?	50	6	44
?	50	0	50
Total	2290	265	2025
%		12	88

*DF= Disturbed forest/PF= Protected Forest