Conservation in Countries with Multiple Crisis Factors: The Case of Los Katios National Natural Park, a World Humanity Heritage in Danger.

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Recibido 01 de septiembre de 2011, Aprobado 29 de noviembre de 2011

Abstract
Conservation biology aims to stop habitat loss and extinction of species. To achieve these goals there are several methods such as the establishment of natural reserves and national parks that in synthesis work as protected areas. However, the management of areas with high conservation priorities can be a challenge to conservation biology and all of the professionals involved in this process.

The Colombian National Natural Park, Los Katios, hosts more than the 20% of Colombian biodiversity and is located in a region which is characterised as being one of the most biodiverse and endemic points on the planet. The park was declared a World Humanity Heritage Area in 1994 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and on the 8th of July 2009, the Colombian government solicited to the UNESCO World Heritage Committee the inclusion of the park on the list of World Heritage in Danger due to the pressures from illegal activities and inefficient surveillance in the area.

Through the case of study of Los Katios National Natural Park, this review looks explores the extent to which the socio-economic situation and the internal crises of a country can influence the effectiveness of the conservation programs in protected areas. It also explains the relevance of National Natural Parks and the effects that some factors, such as violence; illegal crops; poverty; and environmental budget, can have on the performance of the conservation biology.

This review concludes that the conservation of protected areas in countries with deep internal crises, such as in the case of Los Katios in Colombia, cannot be based solely on the fundamental conservation goals and that it is necessary to include government priorities and some strategies to counteract social issues as violence, poverty and insufficient funds when creating management plans.

Keywords
Conservation Biology, Crisis factors, Los Katios National Natural Park, Biological Importance, Violence, Illegal Crops, Illegal Activities, Poverty.

I. Introduction

Conservation biology is a discipline that, in summary, looks to stop habitat loss and the extinction of the species through, for example, the evaluation and study of anthropological impacts on ecosystems; communities; and species, and the development of practical proposals to stop current and avoid future species extinction (Fraser & Bernatchez, 2001; Primack in 2002). There are several methods through which these goals can be achieved, one of which includes the establishment of natural reserves and National Parks that in synthesis work as protected areas. These areas are defined by the International Union for Conservation of Nature (IUCN) as areas of land and/or sea that are dedicated to the maintenance and protection of biodiversity and of associated natural and cultural resources and that are managed through legal or other effective methods (Scherl et al. 2004). However, the relationship between humans and the environment is an on-going one, particularly in terms of population growth and associated problems such as poverty and violence. This makes it almost impossible to consider the conservation of areas where humans are excluded. Due to this, management of areas with high conservation priorities can be a challenge to conservation biology and all of the professionals involved in this process. Natural National Parks, such as Los Katios, give a good example of the different obstacles and issues that conservation has to face in order to achieve biodiversity protection goals.

The Colombian National Natural Park, Los Katios, is located in the north-west of Colombia between the border with Panamá and the Atrato River. This park hosts more than 20% of Colombian biodiversity and is located in a region which is characterised as being one of the most biodiverse and endemic points on the planet (Myers, 2000). The park was declared a World Humanity Heritage Area in 1994 by UNESCO and on the 8th of July 2009, the Colombian government solicited to the UNESCO World Heritage Committee the inclusion of the park in the list of World Heritage in Danger due to the pressures from illegal activities and inefficient surveillance in the area (UNESCO, 2009; Ministry of Culture 2009).

The effectiveness of management in Los Katios appears to be limited by a mix of problems such as illegal logging; fishing; and hunting, and by the location of the park in one of the poorest region of the country, where just a small percentage of the government budget is destined (Palacio, 2009). Furthermore, the current actions that have been taken by the government, the Natural Reserves Department and the Environment Ministry are not enough to ensure the maintenance of the park where the inhabitants lack basic needs and the entire region is deep in health, illiteracy and poverty crises (Bonet, 2007; Palacio, 2009). Therefore it is clear that it is necessary to apply a new concept in biodiversity conservation in countries, such as Colombia, where internal crises impact upon habitat management and government priorities, in order guarantee the success of elements, such as National Parks, as areas for the protection of the biological and cultural diversity.

It is with this in mind, that one question was addressed in this report to establish the implications of the conservation of National Natural Parks within countries with internal crises, such as Colombia, and possible further actions to improve conservation strategies. This question was: To what extent the socio-economic situation and the internal crises of a country can influence the effectiveness of the conservation programs in protected areas? To answer this question, this report will explain the relevance of National Natural Parks, such as Los Katios, and the effects that some factors such as violence, illegal crops, poverty and environmental budget can have on the performance of conservation biology.

II. Conservation in Times of Crisis: Los Katios National Natural Park.

Location

The Colombian National Natural Park Los Katios is located within the states of Chocó and Antioquía in north-west Colombia, between the border with Panamá and the Atrato River. It is geographically located between 7°42´ latitude and 7°56´ north and 77°03´ longitude and 77°19´west (Figure 1) (Parques Nacionales Naturales de Colombia, 2007; Colombian Government , 2009; UNEP, 2009).

Figure 1: *Los Katios National Natural Park location. Google maps*

Los Katios National Natural Park (PNNK) was initially created in 1973 covering an area of 52,000 hectares and in 1979 this territory was expanded to 72,000 hectares (Parques Nacionales Naturales de Colombia, 2007; Colombian Government, 2009; UNEP, 2009; UNESCO, 2009). The park currently is limited on its west side by the border with the Republic of Panamá, specifically by the National Park El Darién (World Humanity Heritage and Biosphere Reserve), along 48 km^2 and by the upper water division area of the Cacarica River; in the south, the park is limited by the lower area of the same river until its mouth in the Atrato River and with El Caño Gumercindo; finally the eastern limit of the park is formed by the Peye River and the Ciénagas de Tumaradó (Figure 2) (Parques Nacionales Naturales de Colombia, 2007; Colombian Government, 2009; UNEP 2009; UNESCO, 2009).

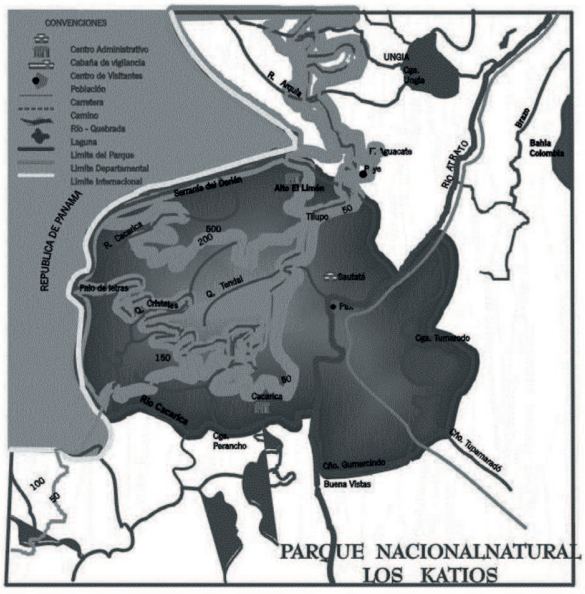

Figure 2: *Los Katios National Natural Park, hydrographical network and limits of the park. http://www.colombia.com/colombiainfo/parquesnaturales/loskatios.asp*

Biological Aspects, Importance and Other Characteristics

Due to its strategic location, Los Katios park exhibits a great variety of landscapes that are possible mainly to the hydrographical network that is present within the park´s territory (Figure 2). This network runs from the hills of the park to supply the Atrato River, which is considered to have one of the largest volumes and to be one of the most fast flowing in the world because it flows at 4900m^3 per second into the Caribbean Sea (Parques Nacionales Naturales de Colombia, 2007; Colombian Government, 2009; UNEP, 2009; UNESCO, 2009).

In addition to this network, it is possible to find a variety of hills and mountains that, together with the rivers, create waterfalls and torrents such as the Tilupo falls (100 m high), El Tendal falls (25 m high) and La Tigra falls (25 m high). The Tumarado swamps create a complex of four water bodies that cover around 2500 ha (Colombian Government, 2009; Parques Nacionales Naturales de Colombia, 2007; UNEP-World Conservation Monitoring Center, 2009). As a consequence of this hydrographical richness, the landscape of the park includes flatlands that flood during rainy seasons, flood plains along Atrato River and Cacarica River which are dominated by marshes and herbaceous vegetation, alluvial plains with rarely flooded terraces, hills up to 600 m high and more (Colombian Government, 2009; Parques Nacionales Naturales de Colombia, 2007; Velasco & Herrel 2007; UNEP-World Conservation Monitoring Center, 2009).

There are two life zones within the park: the rain forest and the high-precipitation premontane rain forest, which classify the park as a tropical rainforest biome. However the park also includes montane rain forest, low subtropical evergreen montane moist forest or cloud forest, wetlands, marshes and swamps.(Colombian Government, 2009; Parques Nacionales Naturales de Colombia, 2007; UNEP-World Conservation Monitoring Center, 2009).

The park is located in the Chocó Bio region (Figure 3), which is characterised as being one of the most biodiverse and endemic points on the planet (Myers, 2000) (Figure 4). This region is also characterised for its high rainfall and current precipitation levels range between 5000mm and 9000mm per year (Faber-Langendoen & Gentry 1991; Galeano et al. 1998; Tupac Otero & Sandino, 2003). It is estimated that the park hosts more than 550 species of vertebrates (excluding fish, which can number more than 60

species in just one river) and more than 669 botanical species of 116 families. This illustrates the great diversity of the park when it is compared with the entire region of Chocó that has been reported as having a total of 155 families (Colombian Government, 2009; Parques Nacionales Naturales de Colombia, 2007; UNEP-World Conservation Monitoring Center, 2009). Within the species of vertebrates, there are some that are reported as being vulnerable or in danger in many other areas, such as the manatee, the jaguar and the Andean bear (Parques Nacionales Naturales de Colombia, 2007). Moreover, the park hosts 25% of the Colombian avifauna and nearly 50% of the Panamean avifauna (Colombian Government, 2009).

In addition to all of this, it is important to note that the park's landscape is playing an essential role as a natural barrier for different viruses and diseases, such as the foot and mouth disease, by impeding the passage of the pathogens that could go through from South America to Central and North America (Parques Nacionales naturales de Colombia, 2007). The park and its nearby areas are also acting as a filter and convergence zone for South America and Central America taxa, a fact that can be easily supported by the presence of species such as the mouse Heteromys desmarestianus and the bird Ortalis cinereiceps which are characteristic of Central America but can be found in the Los Katios park (Parques Nacionales Naturales de Colombia, 2007; UNEP, 2009).

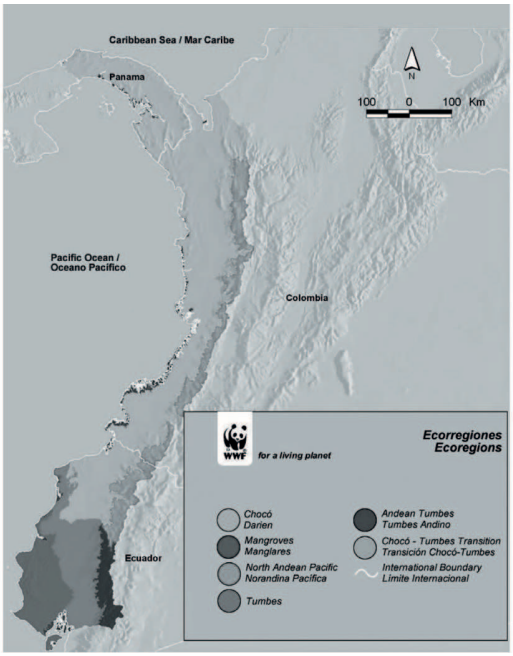

Figure 3: *Chocó Bio-region. The Chocó eco-region includes lowlands, moist forest and coastal areas. Its location generates a variety of climate patterns with annual precipitation levels of between 2000-13000mm, depending on the latitude and distance from the coast. 58% of the area remains undisturbed and it is considered to be one of the most biodiverse on the planet with a high number of endemic species (400 sp of trees and 800 of vertebrates per hectare. WWF, 2009*

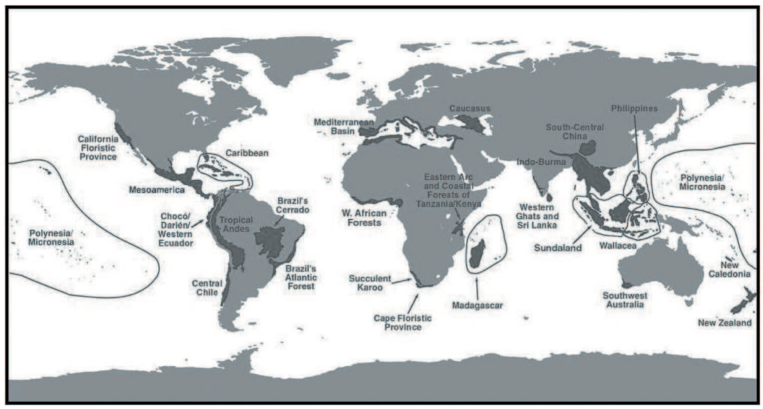

Figure 4: *The Chocó-Darién eco-region is currently considered as an important hotspot and as a priority for conservation due to its high levels of endemism and its ongoing processes of habitat loss. (Myers et al. 2000)*

Due to all this richness in terms of biodiversity, water sources and landscape, the park was declared a World Humanity Heritage in 1994 by UNESCO (Colombian Government, 2009; Parques Nacionales Naturales de Colombia, 2007;UNEP-World Conservation Monitoring Center, 2009; UNESCO, 2009). New management programs were developed to protect the biological richness of the area and maintain the health of the ecosystems, the last one being the Los Katios Management Plan 2007 – 2011 (Parques Nacionales Naturales de Colombia, 2007), which not only includes wildlife management, but also some management of the human populations that are inhabiting some zones of the park.

These populations correspond mainly to settlements that depend on fishing activity and include 238 inhabitants in Tumaradó; 324 inhabitants in Puerto de Unguía; 164 inhabitants in Comunidad de El Cuarenta; and 31 families in Comunidad de Puente America o Travesia, plus inhabitants of the indigenous reserve of Kuna Makilakuntiwala; the indigenous reserves of La Raya, Perancho and Peranchito; and the inhabitants of the Afro-Americans reserves distributed within 279,102 ha outside of the park (Parques Nacionales Naturales de Colombi,a 2007).

Actual Management and Situation

After the establishment of Los Katios National Natural Park, several attempts were made by the Colombian

Government and the system of National Parks to develop a protection and management plan. Nevertheless, it was during only the last decade that a complete management plan for the park was developed (Parques Nacionales Naturales de Colombia, 2007). This plan is looking to take action to increase the effectiveness of the park as a conservation tool and to become the first handbook for the managers and technical staff that work in Los Katios (Parques Nacionales Naturales de Colombia, 2007).

The main points of this plan are outlined in the conservation objectives (Table 1), which are essentially working towards good planning and coherence between all of the plan's components. These components are directed to protect the values of the conservation objectives and the articulation of the sectorial and intersectorial planning processes that occur at regional and national levels (Parques Nacionales Naturales de Colombia, 2007).

The categories that are used for the zoning are a guide to the principal management actions in the interior of the park such as recovery, mitigation, restoration, prevention and public use. • Zona primitiva (Primitive Zone) This zone has not been altered by any kind of human intervention in its natural structure. It is located from the east and northwest part of the park to the border with Panamá and it includes: Alto de la Guillermina, the head waters of the Cacarica River and the Cristales River, Tilupo River and Guillermina River. The primary forest is well developed and very dense with a well established rain forest in the hills and mountains characterized by trees of 20 – 35m in height. The forest associations that are present in this zone include mountain associations; high hills associations and palm associations. Theses associations include areas to establish the conservation objectives, the cultural and natural values were taken into account, as well as the current information about the area (research, studies, cartography and the knowledge and experience of the work team). Objective 1: to conserve forest associations and forest species that are listed under any risk category and that are present in the Pacific tropical forest biomes, the pacific helobiomes and in the forests along the Atrato River, with the aim of contributing to the prevention of erosion processes, sedimentation, silting and to appropriate flow management. Objective 2: to maintain the endemism centres related to the park and to contribute to the conservation of connectivity between habitats and the migratory and/or dispersion routes of flora and fauna species through the Mesoamerican Corridor between Central and South America. Objective 3: to conserve and to maintain La Tigra, El Tendal, Tendalito and Tilupo waterfalls. These waterfalls are landscape resources that represent extraordinary and exceptional beauty for the region and are considered sacred places for the Kuna-Yala cosmovision. Objective 4: to maintain the biological communities of the wetlands of the Atrato River lowlands that are supporting the sustainable fishing productivity of the region.

Table 1: *Conservation Objectives of Los Katios National Natural Park*

The management plan has three components: diagnosis, zoning and strategic plan. The first and second component includes the definition of the objectives and the analysis of the threats that will be reflected in the zoning of the park (Table 2) whereas the third component is looking to decrease the pressures on Los Katios that are threatening the environmental resources (Parques Nacionales Naturales de Colombia, 2007).

where some of the higher densities of primates in the park can be found, with groups of the species *Ateles paniscus*, *Cebus capuccinus*, *Saginus geoffroyi* and *Allouatta palliate* having been reported. Due to the difficult accessibility conditions, the human alteration is null. Uses: Preservation and research. • Zona Intangible (Intangible Zone) This zone must be maintained with minimal human intervention, with the aim of long term preservation of the natural conditions. It is located in the south and east part of the park and it includes the Cacarica and Atrato Rivers. The forests are highly heterogeneous with high growing rates and timber species that are considered to be among the tallest in the world. Uses: Preservation and research. • Zona de recuperación natural (Natural Recovery Zone) This zone has suffered alterations in its natural environment and it is destined to achieve the recovery of the ecosystem to its original state. This recovery will be part of restoration mechanisms that, in the future, will allow the managers to place the areas in the corresponding category. This zone is not continuous and it is distributed across different sectors of the park. Uses: Recovery, research, education and culture. Complementary uses: Recreation. • Zona Historico-Cultural (Historic-Cultural Zone) In this zone it is possible to find archaeological vestiges and signs of past cultures, indigenous cultures and historic scenarios. This zone includes the Tilupo, El Tendal and La Tigra waterfalls and it is located in the north-centre of the park. These places also represent sacred places for the aboriginal groups that are settled in the park and its surroundings. Uses: Education and culture, preservation and research. Complementary uses: Restricted recreation. • Zona de recreación General Exterior (External General Recreation Zone) Uses: Education, culture and recreation. Complementary uses: Research. • Zona de Alta Densidad de Uso (High Density Use Zone) Uses: Recreation, education and culture. Complementary uses: Research. It is important to clarify that there are some activities that are prohibited in all of the park's zones such as: • To spill, introduce, use or abandon toxic/pollutant substances that can affect the ecosystems and to cause damage to the biodiversity. • To use any chemical product with residual or explosive effects. • To log or cut any tree or timber resource. • To extract forestall and timber resources. • To start any kind of fire. • Any activity that can cause significant modifications on the environment or natural values. • To hunt • To collect any flora product except when the Park has authorised for research or studies and just when this collect does not represent alterations to the habitats.

Table 2: *Zoning plan for Los Katios National Natural Park.*

However, after all these measures, on the 8th of July 2009, the Colombian government solicited to the UNESCO World Heritage Committee include the park on the list of World Heritage in Danger (UNESCO World Heritage Center, 2009). Thus, this situation is allowing us to infer that the management plan for the park and the conservation strategies have been ineffective in counteracting the effects of human intervention in the area.

It is also possible to say that the concern about the situation of the park is increasing, especially if it is taken into account that the inclusion of the park in the list of World Heritage in Danger is in response to a common initiative between the Ministry of International Relations, the Ministry of Environment and Development and the Ministry of Culture. This initiative was looking to increase the public awareness of the importance of the park and to encourage international aid and support to preserve Los Katios (UNESCO, 2009; El Tiempo, 2009)

III. Issues and Problems Affecting the Conservation of Los Katios National Natural Park

Currently Los Katios National Park is experiencing a mix of problems that are influencing the situation of the park and it is possible to separate these problems into two groups: Illegal activities and government budget and other related factors.

Illegal Activities

There are three main illegal activities: logging; fishing; and hunting, and they are facilitated, as will be explained, by the natural conditions, the hydrographical network, poverty and the presence of illegal groups such as guerrillas and paramilitaries.

Logging

Currently the unselective logging is causing a high level of deterioration of the Los Katios ecosystem. Each week tens of trees are cut down due to their high value as hard and fine timber (El Tiempo, 2009; UNESCO – Services, 2009; Colombian Culture Ministry, 2009). The favoured timber species include Guayacanes (*Tabebuia guayacan*), Ceibas (*Ceiba pentandra*), Cedros (*Cedrala fissilis*), Robles (*Tabebuia rosea*) and Tecas (*Tectona grandis*). To avoid the noise of machinery, trees are worked with axes for hours until they fall down. The trees are then cut in pieces and transported along rivers and streams to the Atrato River. From there, the timber is transported to Barranquilla or Cartagena from where the wood is sent to China and other Asian countries to enter the black market (El Tiempo, 2009).

Poverty

Due to the poor quality of life in the Chocó region (Table 3), the wood mafia has found a great opportunity to develop their illegal activities. The leaders of these mafia are never exposed and they usually hire local workers, taking advantage of the low economic resources of the local communities. It is well known that these mafia are promoting illegal hunting and there are few available alternatives when people are facing imminent starvation or a lack of medicines (Bonet, 2009; Murillo-Urrutia, 2001; El Tiempo, 2009).

The Colombian Chocó state is located in the Pacific Coast of the country. It has an area of 46,530km² and it is so rich in biodiversity that eight phyto-geographic regions have been established for the region. As part of the Chocó Biogeographical this state is one of the wettest places on the planet with an rainfall average of 11,700mm per year (Vasco-P *et al*. 2002). However, as is explained by Murillo-Urrutia in 2001, the Chocó state is a place of contrasts due to its rich biodiversity and culture in areas facing high levels of poverty and that have been deeply neglected. It is important to mention that in Colombia, 45% of the population was living in poverty by 2006 (Palacio 2009). However, in Chocó the poverty level reached approximately 79% in 2005, a percentage that is much higher than one ever registered by the country as a whole (Bonet, 2007). This 79% is representing 352,257 inhabitants that are distributed between urban (52%) and in rural (48%) areas (Bonet, 2007). In the same way, in 2005 the aqueduct and the sewer system in Chocó was covering just 22.5% and 15.9% of the population respectively, and the illiteracy rate was 32% (Murillo-Urrutia, 2001; Bonet 2007). The inequality is so big compared to the rest of the country that in 2006 the income of one inhabitant of Bogotá (Capital City) was eight times higher than the income of one inhabitant of Chocó (Bonet, 2007). In health terms, the Chocó state has one of the worst health outcomes with an infant mortality that is double the national average (Palacio 2009). Finally, the Chocó state is ranked as one of the 10 places with highest rainfall in the world, a fact that increases the susceptibility of humans to respiratory diseases, malaria and diarrhoea. This makes the application of sanitation and health policies, which have been historically poorly managed, very difficult (Palacio, 2007).

Table 3: *Important data about the social reality in Chocó state*

Location and hydrographical network

The location of the park is a double edged sword. Due to its inhospitable and well preserved natural conditions it is very difficult to monitor the whole area, which provides the perfect environment to hide human presence. Moreover, the high number of streams is facilitating entry and exit of intruders (El Tiempo, 2009).

Cultural Conflict

The truth is that Los Katios is reflecting the Colombian social crisis. During the last century one of the most economically important activities in the Colombian Chocó has been the extraction of gold and platinum. However, historically along the entire Atrato region (which includes the park), timber, ivory-nut and rubber extraction has been a productive and artisanal activity that is used by Afro-Americans and

indigenous people for their survival. It has always been associated with their culture and with the ways in which they relate to the environment (Bonet, 2007; El tiempo, 2009).

Illegal Groups

The paramilitary presence during recent decades has been the trigger for the control, extraction and commerce of timber in the zone. However, it has been demonstrated that the guerrilla group FARC (Fuerzas Armadas Revolucionarias de Colombia for its acronym in Spanish) is in control of one sector of the park (El Tiempo, 2009). As part of this control, the group has mined some areas and have also buried sharp handsaws with the intention of harming the people that are trying to track them (Murillo-Urrutia, 2001; El Tiempo, 2009).

Furthermore, there is another serious situation affecting the park. Twenty-five families of the Wounaan indigenous group have invaded the park as a last resort after their displacement from their native area due to the guerrilla threats and the absence of alternative available land (Murillo-Urrutia 2001; Bonet 2007; El Tiempo, 2009).

All these activities are impossible to control due to the lack of military presence in the park. This is due to the army believing that the park territory is not part of their responsibility basically because the surveillance of trees is not part of their duties (El Tiempo, 2009).

Another point is that, because the development and economy in this region is very poor, the inhabitants are turning to the easier option of the unfair exchange of money with illegal dealers (Murillo-Urrutia, 2001; Bonet, 2007; Palacio 2009).

So it is possible to conclude that the absence of available land and the armed conflict has forced indigenous groups to invade sectors of the park and as a consequence of this, several exotic species could be introduced with aim of growing crops.

Government Budget and Other Related Factors

In Colombia, there are approximately 1000 protected units which cover around 13- 15 million of hectares and in 2008, fifty-four National Natural Parks in these areas formed the Systems of National Natural Parks of Colombia (SPNN for its acronym in Spanish) (Andrade, 2009). These parks cover approximately 11,500,000 hectares, which represents 10% of the continental territory and around 5% of the total territory of Colombia (Andrade, 2009). Despite this large quantity of territory destined for Colombian biodiversity protection, between 1995 and 2002, environmental spending decreased by 81% and this was reflected by several changes to the management of the parks, such as the number of staff working in the parks decreasing. By 2005, the SPNN employed just 364 full time workers to take care of more than 50 parks (1 full time worker per 40,000 ha.). In Los Katios, for example, in 2007 there were just two control stations and six forest rangers (Myers 2005; Medio Ambiente Online, 2009).

This alarming reality could be the consequence of the fact that the Colombian national budget is focussed on financing international debt and the ongoing armed conflict. Forty percent of the national budget is designated for each of these two areas (Myers, 2005) and, at this point, the remaining 20% has to be distributed between education, environment, health and general welfare.

Thus, it is possible to argue that during more than one decade, the lack of interest by the Colombian government was reflected in there being fewer rangers and little investment, inevitably negatively affecting the performance of the management programs in national parks.

In addition, the majority of the total environmental budget, especially the one that is destined for the maintenance of the National Parks, comes from overseas from countries such as Holland (Figure 5) (Myers, 2005; Colombian Government, 2008; Colombian National Parks, 2009).

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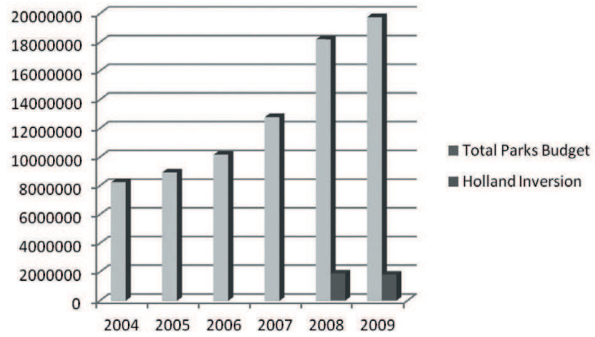

Figure 5: *Definitive budget for the SPNN during the period of 2004-2005. It is possible to see how the investment is increasing, especially from 2008, a year in which the increase was considerable. Source: Colombian National Natural Parks, 2009 http://www.parquesnacionales.gov.co/PNN/portel/libreria/php/decide.php?patron=01.0404*

Nevertheless, this scene seems to be changing. In 2007, the Colombian government decided to increase the environmental investment for the National Parks system from US$ 3,388,380 to US$7,081,440 in addition to more than US$3,000,000 from international support (SITE, 2009). These numbers changed for better when this investment was increased by new measures to more than US$15,200,000 (Medio Ambiente Online, 2009; Colombian National Parks, 2009a)

In addition, there are other important factors that are affecting the conservation of the natural parks in Colombia, especially in the case of Los Katios, such as the fact that armed groups are present in 78% of the national parks and that illegal crops have been detected in approximately 68% of the park system. These two factors are adding to the deterioration of the situation in the protected areas due to the fact that, even when these illegal crops are present in just 0.4% of the park system, the government took measures such as the aerial fumigation with 'Roundup' to eradicate these crops, which is also affecting the environment (Myers, 2005).

On the other hand, and as a paradox, the problem with the illegal activities (specifically drugs and armed groups) is protecting the area from the imminent completion of the Pan-American Highway. This highway, which is going from Alaska to Panama and from Colombia to Tierra de Fuego, is designed to run through the park, the only actual gap preventing its completion. But even with the support of the governments, there exists the concern that this project will simply open new ways to increase the illegal activities (Myers, 2005).

It is possible to affirm that the conservation of protected areas in countries with deep internal crisis, such as in the case of Los Katios in Colombia, cannot be based just on the fundamental conservation goals and it is necessary to include government priorities and some strategies to counteract social issues as violence, poverty and insufficient funds into the management plans. Therefore, conservation biology is becoming in a discipline that not only includes ecological and biological principles, but that also includes sociological, anthropological, economical and management principles. This is basically because of the need for a broad view in the implementation of conservation where there are critical problems, such as the ones that will be discussed through the following section.

IV. The Role of Some Critical Problems in Conservation Biology

As was explained by Bruner *et al.* 2001, natural parks and protected areas need to be effective in protecting biodiversity, stopping land clearing and decreasing logging and hunting rates. Additionally, Bruner et al. 2001 also concludes that this effectiveness depends greatly on management activities that include enforcement, boundary demarcation and direct compensation to the local communities. However in some countries, issues exist that directly affect the performance of these management activities and that challenge the conservation of these areas on a daily basis.

In tropical forests for example, the ecosystem itself is working as a border in which there is a convergence between the dynamic social change and the ecological, economic and political changes (McNeely, 2003). In cases such as Los Katios, these changes and the national situation start to influence local and external populations, ending up in a silent battle between conservation strategies, life standards and basic needs.

Violence and Illegal Crops

Violence

Violence is one example of a factor that contributes to this battle. Great economic disparities, in addition to the depletion of the environment or the low productivity of the land (erosion, calamities, overpopulation), can profoundly influence societies. For example, the competition for resources such as food, land, water and minerals has been the trigger for civil wars and conflicts in African and Asian nations (McNeely, 2003). As a consequence of this, armed

conflicts can lead to impacts on the environment that could be classed as negative or positive (Table 5).

However, sometimes the impacts of these conflicts are not clear enough. In Colombia for instance, the actual armed conflict is leading a contradictory process in which some populations are encouraged by the belligerent groups to stop the unsustainable and disorganised exploitation of natural resources, whereas in other areas, the population is encouraged, and even forced, to use the natural resources in a completely unsustainable and careless manner (Alvarez, 2001).

Negative Impacts	Positive Impacts
▪ Habitat destruction Illegal mining ▪ Deforestation ▪ Erosion ▪ Water pollution ▪ Land pollution ▪ Displacement and refugees - Over exploitation of resources - Interchange of viruses and diseases (arthropozoonosis and zoonosis). ▪ Reduction in conservation funds - Delaying conservation projects - Delaying research programs ▪ Illegal hunting as a result of new armed populations ▪ Invasion of marginal lands	▪ Creation of "Prohibited to pass zones" due to: - Anti personal mines - Camps location ▪ Decreasing pressure on habitats ▪ Recovery of vegetation ▪ Promotion of the permanence of high and dense vegetation to provide hiding places. ▪ Disarmed population = decreasing hunting rate. ▪ Reduction in habitat destruction processes

Table 5: *Impacts of war and armed conflicts in the environment. Source: McNeely, 2003*

In Colombia, some areas that are very important in terms of biodiversity richness are under the control of guerrilla groups (ELN and FARC) and paramilitaries. As a consequence of this, these areas are completely beyond the reach of national conservation strategies and programs that are improving life quality (Davalos, 2001; McNeely, 2003; Alvarez, 2001a; Alvarez, 2003). These areas include agricultural frontiers in the pacific region (Chocó region), parts of the Amazon forest and some zones in the Andean region (Figure 6).

In these areas, the armed groups are having three main kinds of effect on conservation strategies (Davalos, 2001; McNeely, 2003, Alvarez, 2001a):

- Gunpoint conservation: the community is actively excluded from the majority of productive activities by land mines and civilian curfew. Activities such as hunting and logging are banned. However in cases such as the San Lucas Mountain, clearing is also forbidden but mining is encouraged (Davalos, 2001; McNeely, 2001).
- Forest conversion: for illegal crop cultivation and cattle ranching.
- Protection of forest and other resources: due to the fact that the forest is working as shelter that protect the groups from army air surveillance.

On the other hand, due to the armed conflict in general; the military confrontations between the Colombian army and armed groups; and the permanent necessity of land to grow illicit crops, the displaced population has increased to more than 1,800,000 people, and states such as Chocó are suffering from the processes of militarisation and paramilitarisation (Murillo-Urrutia, 2001; Davalo,s 2001).

Figure 6: *Forest cover and illegal groups control areas in Colombia (Davalos, 2001). Outlined grey areas are forested areas and darker grey shadows show the areas under guerrilla control. It is possible to observe the presence of illegal groups in the region along the border with Panama, including within Los Katios National Natural Park. It is important to consider that the forested municipalities where the armed groups are located represent 33% (18% with both guerrilla and paramilitaries) of the total forest cover in Colombia (Alvarez, 2001a).*

From this, it is possible to conclude (using the case of the San Lucas Mountain as a reference (Davalos, 2001)) that in Colombia, there are two consequences of the guerrilla and paramilitary policies and the armed conflict (Davalos, 2001):

1. The guerrilla and paramilitaries campaigns that encourage mining and ranching over other forms of sustainable activities, are affecting the biodiversity and environment

quality. Through selective hunting; water pollution; and land degradation, irreversible changes in the forest structure and elements of the ecosystems are being produced.

2. Due to the generation of human displacement, the rate of settlement has decreased in some areas and as a result, the deforestation levels have also decreased.

Thus, it is possible to say that in cases such as Los Katios, in countries with armed conflict as Colombia, conservation biology strategies and their effectiveness will depend of the outcome and duration of the conflict. This dependence will be reflected in the success of protected area management plans and the continuation of the levels biodiversity.

Illegal Crops

Parts of the deforestation, logging and clearing processes which are occurring are also a result of the introduction of illegal crops (Dirección Nacional de Estupefacientes, 2009; Alvarez, 2001a; Alvarez, 2001b; Santos, 2007). These crops are distributed across the country and their expansion is persistent particularly in some areas protected as high priority for biological conservation, such as the Chocó state and its tropical rainforest. Here the land use changed from 0ha of illegal crops in 2002 to 453ha in 2003 and with this change came the destruction of more than 1,360ha of tropical rainforest (Dirección Nacional de Estupefacientes, 2009; Alvarez, 2001a; Alvarez, 2001b). Moreover, as Alvarez, 2001b also reports, Los Katios National Natural Park and Paramillo National Natural Park are hosting more than 2,250 ha destined to be used for growing illegal crops and this represents 0.4% of the total area of the parks (532,000 ha of protected land).

However, this problem is much deeper that it seems. As was mentioned before, some of the areas that register high levels of biodiversity are associated with very poor areas in terms of development and quality of life. In some of these areas, the populations are living around the illegal crops and are facing the possibility of improving their quality of life by participating in their cultivation. This is could be explained because essentially 1ha of coca cultivation represented US$2,347 of income per year by 2002, a quantity of money that farmers will never receive by cultivating legal crops (Alvarez, 2001a; Alvarez, 2001b; Davalos, 2001).

One of the Colombian government's actions to attempt to resolve this issue has been the eradication program. The main part of this program involves the aerial spraying of the herbicide 'Glyphosate' in different combinations to maximise the efficiency. This spraying is regularly done over the illicit crops; in violation of the recommendations to reduce the environmental impacts (above 10 m of height); and using five times higher doses than recommended per hectare, and this is increasing the depletion of the ecosystems (Alvarez, 2001a).

Finally, given the current conditions, it is necessary for national and international agencies develop projects to create jobs and to increase the income of rural populations, in particular those living close to areas of high conservation priority, with the aim of promoting the conversion to other sustainable practices. In addition, the conservation of forest in countries with illicit problems will also depend on successful and fair economic incentives to stop deforestation and reduce the illegal activities and on the development of new international policies that request better control in consumer countries that are, in effect, maintaining the drugs market thanks to the high level of demand (Alvarez, 2001b, Santos, 2007).

Poverty

As has already been mentioned, poverty is frequently related to the use of the natural resources and it is influencing greatly the human response to conservation processes. Nevertheless, as poverty is such a broad topic, this last part of the discussion will just refer to the existing relationships between poverty, local populations and protected areas.

It is widely known that some of the poorest countries around the world have a significant proportion of their territories designated as protected areas and natural reserves (Scherl et al., 2004). Communities that are settled around these protected areas, particularly communities in developing countries such as Colombia, are usually poor and marginalised mostly due to the fact that the protected areas are normally located in less agriculturally productive lands or in remote regions that do not have any access to markets (Scherl et al., 2004).

Most of the time these areas are located in rural zones where the local populations are mostly minority groups, such as African-descendants; aboriginal groups; or famers, and these rural poor are dependent on access to a great proportion of natural resources to sustain their livelihood (Scherl et al., 2004). It is estimated that within the National Natural Parks System of Colombia for example, there are around 36,695 indigenes, 46,376 farmers and 8,325 afro-descendents (Andrade, 2009) and as in the case of Los Katios and the Chocó region, these

communities are frequently neglected and not provided with development opportunities or social services (Scherl et al., 2004).

It is also known that as part of a conservation strategy, many protected areas have to be cleared of human residents (Brockington and Schmidt-Soltau, 2006). But in actual fact, several reports mention that in African and South American regions, around 50-100% of the natural reserves and protected areas are occupied by people, but that this occupancy and the use of the natural resources is manly illegal due the fact that these areas are meant to be unoccupied (Brockington and Schmidt-Soltau, 2006). These new restrictions following the declarations of areas as being protected have also led to other sections of the population becoming displaced (Scherl et al., 2004; Brockington and Schmidt-Soltau, 2006).

So at this point it is important to explain that the conservationist's decision is legitimate, but when this decision is imposed without considering the size of the minority population that is being affected, a new set of problems start to be generated (Andrade, 2009). Most of the time the protected areas are presented as generating benefits, but they may be hiding the inequality in the distribution of the costs and benefits that occur in society as a by-product of the conservation decision. This inequality will promote the perception of inefficiency and illegitimacy in the affected communities and will increase the political vulnerability of the conservation model (Andrade, 2009).

This situation is closely related with poverty indices in and around protected areas. Economists usually explain that the creation of natural reserves can generate an opportunistic cost that will increase and perpetuate the poverty of the area (Scherl et al., 2004) due to the loss of potential agricultural lands and basic resources for communities that have been living in the areas for decades.

So from this point, the whole problem of poverty and protected areas starts to become a cyclic problem. Decisions to restrict access to resources or to evict people are also threatening the environment with a new form of degradation as a result of the clearing of new areas or invasion of virgin territories (Scherl et al., 2004). With these new levels of habitat degradation, new measures to conserve the biodiversity have to be taken, thus restarting the cycle.

It is therefore important for conservation biologists to develop a broad understanding of how the local communities and the protected areas are related in ways such as gender; class; ethnicity; and identity structure, because the ecological and social impacts of human coexistence with the environment is an issue that extends beyond the boundaries of the protected areas or natural reserves (Scherl et al., 2004).

V. Conclusion

- In conclusion, if all the factors mentioned above are included in the evaluation of the effectiveness of protected areas in countries under internal crisis, it is possible to argue that the national situation is affecting conservation strategies and the performance of conservation tools such as natural parks and natural reserves considerably.

- Within the actual political and socio-economic frames, conservation biology could be working as a half tool due to the insufficient and ineffective laws and policies, as well as the negligible compensation for the local communities. This kind of management, as is shown in the new declaration of Los Katios as a World Humanity Heritage in Danger, is not the most highly recommended method of facing oncoming challenges of biodiversity preservation, and it can also trigger or exacerbate factors of the social conflict that is associated with conservation. The kinds of situation that were explained above are generating a huge social and political vulnerability in the conservation tools, which are changing from a social benefits speech to a battle space for a basic resources and survival.

- Thus, to improve the success of tools such as protected areas it is necessary to expand conservation biology to include different factors and instruments that will facilitate the integration of the National Government with the ethnic and cultural authorities, as well as with the indigenous communities. In this form, these communities will be recognised as conservation subjects that can include their territories as a contribution to biodiversity preservation and that, with the correct management, can receive real retributions to improve their quality of life (Andrade, 2009).

- Finally, unless the protected areas and relevant issues in the development

strategies of countries such as Colombia start to be considered as a priority, as well as the basic needs of the entire national population, many protected areas will fail in the achievement of the conservation goals. As the IUCN mentions in the 5th World Park Congress "Protected areas should not exist as islands, divorced from the social, cultural and economic context in which they are located".

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