PARKSWATCH

Strengthening Parks to Safeguard Biodiversity

Rapid Evaluation of the Gran Yasuní Napo

ParksWatch

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1. Introduction

Summary

Between the months of February and April 2004, ParksWatch conducted a rapid evaluation of Gran Yasuní Napo as part of our collaboration with Wildlife Conservation Society (WCS) and their Living Landscapes Program. The evaluation was done in order to establish independent baseline information regarding the area's actual state of conservation. This baseline data can be used to compare data collected in the future, utilizing the same methodology, in order to measure changes in the degrees of threats to conservation of the area's biodiversity. In this report, we will refer to the Gran Yasuní Napo as the Yasuní Biosphere Reserve because throughout Ecuador it is better known as such and because at the time of this evaluation, implementation of the UNESCO-recognized biosphere reserve was being promoted.

If the situation continues as it has up to the time of this evaluation, the area risks failing to achieve its conservation objectives over the medium term. The principal threats are related to permanent human presence –land use changes, logging, hunting, fishing, and other activities– all of which are closely linked to oil exploration and extraction in and around the reserve. Integrity of some of the northern parts of the reserve has been affected already. In the northern and western populated communities, there are reports of local species extinctions, river contamination from hydrocarbons, and use of illegal fishing methods that threaten some of the landscape species as well as new access routes that have facilitated human activity in remote places. The area's social situation is complex and makes regulation and research in the many parts of the reserve difficult.

Lack of personnel and budget has seriously limited control of the area. Administrators have very little capacity to influence planning of high-impact activities. Yasuní Biosphere Reserve has yet to be completely demarcated and much of the reserve is only protected on paper.

WCS has been working in the reserve for several years and has carried out detailed, multidisciplinary studies on its threats. Their participation has been very important for coordinating activities to improve and manage the area, and they are currently working to strengthen the reserve's administration, to integrate various stakeholders, and to increase local participation. Nonetheless, because most the threats are either directly or indirectly related to the oil extraction operations, which decision-makers consider a priority for Ecuador, assuring ecological integrity in Yasuní Biosphere Reserve is extremely difficult. Current proposals offered by different actors and the reserve's administration are focused on minimizing existing impacts; they are not enough to make substantial changes needed to guarantee long-term conservation. That depends, in large part, on political decisions regarding Ecuador's economic development model.

This report identifies several research gaps that WCS's program could cover and it offers recommendations for ensuring permanent monitoring programs in the reserve, which would help to make better decisions for the protected area.

Objectives of the evaluation

Our objective was to conduct an independent evaluation of the threats to the area and thereby establish baseline data by which future threat data collected, using the same methodology, could be compared in order to measure changes.

Due to the fact that WCS has already worked to identify threats to the reserve and has already produced detailed reports, conducted workshops, and carried out multidisciplinary diagnostics, it was doubtful that our evaluation would identify new threats or provide significantly different interpretations of previously identified threats. Yet, we sought to verify existing information.

WCS provided us with complete information, and as a result we were able to pose new questions during our evaluation work. One of those was to try to establish to what point weak institutional presence, such as the Ministry of Environment and other organizations working in the reserve, was affecting acquiring up-to-date information on threats. In addition, we wanted to know to what degree the identified threats were being controlled and better understand how lack of permanent institutional presence could affect the success of proposals to reverse those existing problems in Yasuní.

During meetings in Quito prior to our fieldwork, WCS requested that we make recommendations on how to improve activities being carried out in the area. Therefore, in this report we included several proposals to better understand specific problems so that the information could be used to improve management decisions in Yasuní Biosphere Reserve.

Methodology

The evaluation was divided in four stages. First, we conducted a literature review of the area. This step was important since it allowed us to gather reliable information about the area that would help us establish our hypothesis for the evaluation and identify stakeholders. Both the literature review and identification of stakeholders were expanded as we conducted interviews during the evaluation.

Prior to the visit to the area, we designed the evaluation and readjusted our research questions. In order to do so, we shared impressions with WCS's team in Quito and together we selected the study sites within Yasuní and coordinated evaluation-related activities. As soon as the final design was selected, we began the first interviews with stakeholders interested or involved in Yasuní's management in Quito.

During the fieldwork, we visited the most problematic areas located north, east and west of the biosphere reserve, including Vía Maxus that provides access to Yasuní National Park and the northeastern portion of the Huaorani Ethnic Reserve; Vía Auca, which runs west of the biosphere reserve; the access to Pindo in the west of the national park; and the Napo, Yasuni and Tiputini Rivers to the north, east, and central northern regions respectively. Among our activities included visits to local markets, where trade in local fauna occurs, in order to better understand the extent of the problem and its relation with oil exploration and extraction activities in the region. In the

field, we also interviewed Yasuní National Park administrators, the park guards, local inhabitants, authorities, organized groups, research groups, and other key informants.

The last step of the evaluation was to compare and contrast the data and collected information with existing information and work with area maps in order to determine the physical extent of the threats. Once the fieldwork in the biosphere reserve was complete, we met with the WCS managers to present our preliminary findings and establish special points of interest for inclusion in this report.

Results

As is shown in the following detailed analysis of threats to Yasuni Biosphere Reserve, no significant differences were found between threats identified during this evaluation and previously completed analyses. However, a potential future conflict was identified in Huaorani Ethnic Reserve that had not been recognized in previous evaluations. This potential conflict is related to the development of timber management plans that is part of the Proyecto Caimán project funded by the United States Agency of International Development (USAID). WCS's work has been centered on identifying problems that actually impact the protected area, not potential threats. Proyecto Caimán's feasibility study was completed in November 2003, only three months before this evaluation began.

Scarce NGO and administrative presence in the area seemed to be at least partly responsible for the lack of up-to-date information on Yasuní's threats. Without permanent institutional presence, which is needed to detect changes occurring in the area, it is likely that any data generated regarding threats will quickly lose significance.

In addition to the above, lack of permanent institutional presence has produced several gaps in information, especially when it comes to analysis and monitoring of dynamic problems, such as hunting, commercialization of species, and some of the activities associated with oil extraction, such as vehicular traffic along Vía Maxus, crude oil spills, and presence of permanent and transient inhabitants in the area. The type and quantity of live and dead animal species from the area being sold in nearby markets are not entirely known. Impacts caused by vehicles along Vía Maxus have yet to be researched, collection of up-to-date information regarding new settlements along this route is not systematic, and there is no research in place to study the short and long term affects of oil spills in the reserve's rivers on local fauna. Without permanent programs in place to study these problems, it will be difficult to measure changes and propose corrective actions. In addition, trustworthy data are needed in order to help make decisions about increased access routes to the area, which are planned over the short and medium term. Existing facilities within Yasuní National Park could permit WCS to establish permanent monitoring programs that would help to close these gaps.

2. Characteristics of study area

Description

Yasuní Biosphere Reserve is in Ecuadorian Amazon, in northeast Ecuador, between the provinces of Pastaza and Orellana. The reserve is made up of two distinct management units: Yasuní National Park, which covers 982,000 hectares (RO, 1992), and the Huaorani Ethnic Reserve, which covers 809,339 hectares (Lara et al, 2002a). Even though official demarcation has yet to be completed, the surrounding buffer zone is approximately 10 km, making the biosphere close to 2,800,000 hectares in total (Barrera and Jorgenson, 2003).

Yasuní was declared a national park in 1979 (RO, 1979). In 1990, development of the Ecuadorian oil industry brought a change to the limits of Yasuní National Park; 621,650 hectares were granted to the Huaorani people (IERAC, 1990). This territory was added to another 66,570 hectares that had been granted in 1983 (IERAC, 1983) and to which more land was added in 2001 (INDA, 2001), and today makes up the Huaorani Ethnic Reserve.

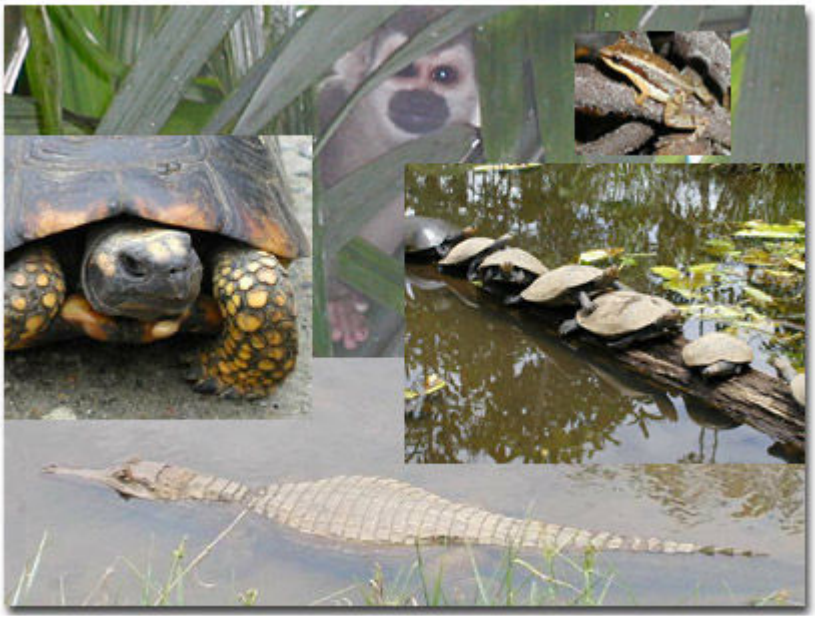
Yasuní National Park's current borders were completed in 1992. In 1989, UNESCO recognized the area as a biosphere reserve, at the Ecuadorian government's request. However, only 1,682,000 hectares are included in the official UNESCO data (UNESCO, 2001). Huaorani Ethnic Reserve does not have any specific protected area declaration, although the 1990 annexation establishes that resources should be used rationally and conserved, that human use should be restricted to subsistence activities, and that both intensive and extensive cultivation is prohibited. Paradoxically, it obliges inhabitants not to interfere with hydrocarbon exploration or exploitation. In 1999, approximately (sic.) 700,000 hectares in the southeastern portion of the Huaorani Ethnic Reserve and in the southern portion of Yasuní National Park were declared as the Tagaeri-Taromenane Intangible Zone in an effort to protect groups of uncontacted humans living in the area. Human activities that endanger their cultural and biological integrity are prohibited (PR, 1999).

Yasuní Biosphere Reserve is in the shape of an oval. Yasuní National Park is shaped like a backwards C and surrounds the Huaorani Ethnic Reserve to the north, east, and south. Its borders were established in the park's declaration. They extend north to the Napo and Tiputini Rivers, south to the Curaray River, and east to a line parallel to the Ecuadorian-Peruvian border. The declaration also created a 10 km buffer zone surrounding the park to the north, south, and west. The Huaorani Ethnic Reserve extends west in the form of an arrow.

The Huaorani territory, the national park, and the buffer zone share the same physical and biological characteristics. The biosphere reserve is a typical tropical region, its temperatures average between 23º C and 26º C, precipitation averages between 2,000 and 4,000 mm per year (MA, 1999; Jatun Sacha, 2003; MA, 2002), with a dry season that only receives 180 mm of precipitation (Jatun Sacha, 2003). It ranges between 200 and 600 meters above sea level. In general, dense rainforest covers the reserve, with tree crowns reaching 30 m and some emergents extending even further. There are many black and white water rivers, which, along with the local variations in soil, climate, and relief, determine the distinct vegetation types. These types are locally classified as: tierra firme forest, seasonally white water flooded forests (called varzeas),

permanently black water flooded forests (called igapó) and swamp forest (called moretal) (MA, 2002).

Yasuní Biosphere Reserve is an extremely diverse area, it is estimated that there are 4000 plant species, 173 mammals, 610 bird species, 107 reptiles, and 111 amphibian species (WCS, 2003). The size of intact, remaining forest is particularly important for conservation of large range species that are susceptible to fragmentation and habitat degradation from human activity. Many of the reserve's species are included on the World Conservation Union's Red List (IUCN, 2003), including the giant otter (*Pteronura brasiliensis*), the giant armadillo (*Priodontes maximus*), the South American tapir (*Tapirus terrestris*), pink river dolphin (*Inia geoffrensis*), the Amazonian manatee (*Trichechus inunguis*), harpy eagle (*Harpia harpyja*), black caiman (*Melanosuchus niger*), South American yellow-footed tortoise (*Geochelone denticulata*) and the pirarucu (*Arapaima gigas*), among others. WCS's work focuses on the giant otter (*P. brasiliensis*), the pirarucu (*A. gigas*), the tapir (*T. terrestris*), the white-lipped peccary (*Tayassu pecari*) and the black caiman (*M. niger*) (Barrera, 2004 personal communication).



Since its designation, Yasuní Biosphere Reserve has not been managed as such. Actually, there is no comprehensive management plan, its borders are confusing, and its zoning is not completed (Matamoros, 2004, personal communication). There has been a proposal to create the Yasuní Biosphere Reserve Management Committee since 2002 (GTP, 2002), however it has not been implemented (Barrera, 2004, personal communication).

Yasuní National Park does have a strategic management plan, approved in 1999, which includes biodiversity, and social and economic diagnostics. This document identifies the area's principal threats and prescribes actions to overcome those threats. It outlines the reserve's zoning. There are five zones in total. The intangible zone is located south of Yasuni River and it prohibits extractive activities. The restricted use zone is divided into two areas, one in which restricted tourism is permitted and one in which oil extraction is permitted, since this was authorized before, both of which follow strict regulations. In the regulated use zone, local communities can

engage in subsistence hunting and fishing as well as use other non-timber forest products. There is an extensive use zone for which a special management plan will be established. The last zone is a transition zone, actually outside of the national park, that includes Huaorani Ethnic Reserve and areas with colonization issues and permanent settlements. The park's master plan specifies that the five-year budget should be $2,438,230 (US Dollars) for environmental management activities, public use services, and administration. At the time of this evaluation, practically nothing from the management plan had been implemented (Jaramillo, 2004, personal communication).

Huaorani Ethnic Reserve also has a management plan that includes social, environmental and legal diagnostics and provides recommendations on all three aspects. The plan also proposes zoning for the area. The core zone, Tagaeri, contains uncontacted human communities and therefore other human activities are limited. There is a buffer zone and a traditional extensive use zone intended to protect the core zone. Traditional hunting activities are permitted here, but new human settlements are not. There is also a non-traditional extensive use zone where tourism, research, and properly regulated oil extraction activities are permitted. In the intensive community use zone, community managed activities are permitted but oil extraction, mining, and timber activities are prohibited. There is a recuperation zone, where productive, extractive activities are prohibited and restoration and ecosystem maintenance actions are planned. There is a special use zone, where there are highways, oil extraction activities and serious human impacts, like fauna and timber trafficking. Specific management plans are proposed for each. There is an external buffer zone created in order to avoid interethnic conflicts and various involved ethnic groups will create the norms and rules for this zone. The plan has not been implemented, mostly because priorities and objectives have not been established (Rivas, 2004, personal communication).

Yasuní Biosphere Reserve itself does not have a budget or assigned personnel. Of its management units, only Yasuní National Park has a budget ($45,000 per year) and staff (11 full-time staff: nine field staff, one accountant, and one director) (Jaramillo, 2004, personal communication). Huaorani Ethnic Reserve does not have an established budget or personnel assigned to care for the area; however, in 2004, the oil companies paid $650,000 to the Organization of the Huaorani People of the Ecuadorian Amazon (ONHAE) for damages they caused to the area (Palacios, 2004, personal communication). This money is used in various management activities. Overall, the biosphere reserve has a marked lack of personnel and budget and institutional presence, whether governmental or NGO, is limited and scarce. The reserve does have a Technical Advisory Group, which was legally established in Ecuadorian laws (PR, 2003), responsible for providing technical assistance to the area's administrators and coordinate activities among stakeholders.

Population and social aspects

There are approximately 15,000 people living in Yasuní Biosphere Reserve (MA, 2002), including kichua, huaorani, and colonists communities. Human presence is a permanent source of conflict for Yasuní and is related to most of the area's threats. Approximately 123,000 hectares of Yasuni National Park, mostly in the north and in some central and western portions, have been occupied by communities claiming possession rights or by those with land titles

(Ecolex, 2002). There are 33 established huaorani communities in Huaorani Ethnic Reserve (Lara et al, 2002a). The western and portions of the northern buffer zone are densely populated. In the last 10 years, the kichua population in Yasuní National Park has tripled and huaorani has increased by 50% (Ecolex, 2003). This has provoked resource overuse and now these resources have been considerably reduced, mostly in areas with large human populations.

Ecuadorian state agencies do not regulate oil companies' community development programs. The oil companies indiscriminately spend enormous sums of money to further their non-confrontational policy with indigenous groups; for example in 2003, Respol-YPF spent $650,000 US Dollars (Palacios, 2004, personal communication). This has created economic dependency; the indigenous huaorani people rely almost entirely on the companies as a source of money (Rivas and Lara, 2001). This dependency complicates conservation organizations' work, especially close to huaorani communities, because these communities could demand high research and monitoring fees from the organizations (Utreras, 2004, personal communication; Koester, 2004, personal communication).

Authorities lack capacity to control the complex social problems in the zone. As a result there are internal conflicts and indigenous land claims throughout the territory (Boya, 2004, personal communication; Lara et al., 2002b) and a clear perception of lack of authority in Yasuní Biosphere Reserve.

3. Threats

Yasuní Biosphere Reserve is a vulnerable area and there is a high risk that it will fail to protect and maintain its biological diversity over the medium term. Human activities compromise ecological integrity in Yasuní National Park's northern and western portions, as well as the northern portion of Huaorani Ethnic Reserve. Wildlife trafficking, hunting, and habitat destruction have caused local species extinctions in places where human pressure is greatest (Zambrano and Silva, 2003; MA, 1999). Oil extraction activities contaminate bodies of water, which in turn could be negatively affecting reproduction of bird species reliant on these waters (MA, 1999). Contamination combined with high-impact fishing techniques and boat traffic have caused local extinctions of sensitive aquatic species (Tirira, 2001). Highway construction within the forest brings about isolation of mammal and bird species (Koester, 2004, personal communication; MA, 1999) that could lead to their disappearance in the event of unpredicted, stochastic events.

The area's principal threats include hunting, fishing, and wildlife trafficking, logging, agriculture and livestock, oil exploration and extraction, new access routes, colonization, fragmentation and habitat isolation, contaminated bodies of water, and unregulated tourism.

No management plan exists covering the entire biosphere reserve (Matamoros, 2004, personal communication), which is a significant weakness when confronting the above-mentioned threats. Huaorani Ethnic Reserve's management plan exists, but it is not being implemented (Rivas, 2004, personal communication). This is also the case with Yasuní National Park's strategic management plan (Jaramillo, 2004, personal communication).

A large part of Yasuni Biosphere Reserve exists only on paper. Authorities from the Ministry of Environment only have permanent presence in Yasuni National Park; Huaorani Ethnic Reserve has no such official institutional control. Lack of personnel and budget in the biosphere reserve is significant; the national park is the only part that has both staff and budget, but they are small. Yasuní Biosphere Reserve's limits have yet to be officially defined, and as a result there are resource use conflicts.

There are no protection measures at all in the buffer zone, and as ParksWatch interviews show, no one but the planners believe that there should be any land use restrictions there. In Huaorani Ethnic Reserve and Yasuní National Park, the contacted huaorani groups engage in all types of activities, including illegal timber sales, without any regulation. Currently, there is inadequate capacity to reduce these activities in the restricted access zones in both the national park and the ethnic reserve.

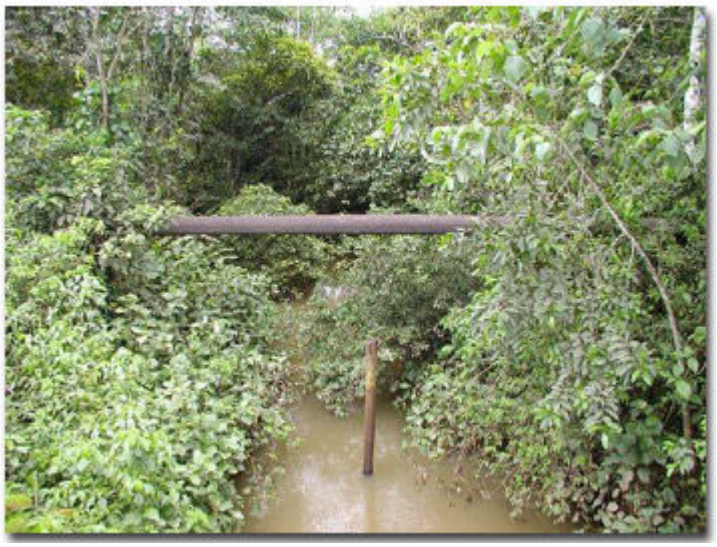
Oil extraction further complicates the situation since there is very little coordination between the Ministry of Environment and the Ministry of Energy and Mines. Consequently, a good part of the reserve is subjected to pressure from this.

Oil exploration and extraction

Oil exploration and extraction have been a serious source of conflict in Yasuní for almost two decades. Decision-makers have warranted priority to oil extraction over conservation in the area, as was clearly demonstrated in 1990 when the Ecuadorian Government changed Yasuní National Park's borders in order to allow oil extraction in block 16 (Villaverde, et al., 2004). At the same time, the territory of block 16 was appropriated to the huaorani people (Rivas and Lara, 2001), beginning the creation of what is today know as the Huaorani Ethnic Reserve.

Oil exploration and extraction exerts serious pressure on Yasuní Biosphere Reserve. In the area, including the buffer zone, there are nine oil blocks controlled by different companies (Villaverde et al., 2004). Oil concessions cover more than 60% of Yasuní National Park (600,000 hectares) (MA, 1999) and more than 50% of Huaorani Ethnic Reserve (376,000 hectares) (Lara et al., 2002a).

Oil extraction represents one of the most important threats in the reserve because of their direct and indirect impacts. Indirect impacts include fragmentation and habitat isolation, colonization, increased hunting and wildlife trafficking because of increased access routes, in addition to social disintegration in the huaorani communities, which also plays a role in the administrator's lack of control in most of the biosphere reserve.



Oil extraction in the western buffer zone, along the Auca Vía, has caused serious contamination in Yasuní Biosphere Reserve's western rivers. This photo shows one of many pipelines passing over a river. Oil spills are frequent.

Oil spills have contaminated many bodies of water in the area, mostly in the north and west (Villaverde et al., 2004; Ecolex, 2003), and Yasuni National Park's Master Plan estimates that only the rivers originating within the park and those in the south seem unaffected. The extent of the impact on bodies of water is also large in the northern half of Huaorani Ethnic Reserve, and in the biosphere reserve's buffer zone in the north and west. Accidental spills are continuous and have not been stabilized. In 2003, one of the many spills into Tiputini River extended almost 40 km into Yasuní National Park (Jaramillo, A., 2004, personal communication), and at the time of our ParksWatch field visit, we heard of a new spill affecting Napo River on the national park's northern border.

Localized deforestation caused by oil well construction and other infrastructure works in the northern half of the biosphere reserve affected more than 47,000 hectares in 2003 (Jorgenson and Copolillo, 2003). Most likely, the number of affected hectares is greater today because Vía Maxus was widened. And, even more deforestation will occur if a new highway is built so that Petrobrás can begin operations in the northern part of Yasuní National Park as planned and if a new access route is opened in western Huaorani Ethnic Reserve. Air and soil contamination have also been documented (Villaverde et al., 2004), although there is little existing information regarding its long-term effects on the area's integrity.

This photo shows the northern buffer zone, where an oil company has deforested a strip in order to install a pipeline. People we interviewed believe that activities in the buffer zone should not be restricted.

There are very little systematically collected data showing the effect that hydrocarbon contamination has on Yasuní Biosphere Reserve's biodiversity; actually there are no monitoring programs in place to study this. Ecuador's Mammal Red List (Tirira, 2001) reports that some sensitive species, such as the giant otter (*Pteronura brasiliensis*) and the Amazonian manatee (*Trichechus inunguis*), are critically endangered, and the gray dolphin (*Sotalia fluviatilis*) and pink river dolphin (*Inia geoffrensis*) are threatened. Apparently, one of the reasons their populations have suffered and seen reductions is contamination of bodies of water from oil extraction, but there are no data available that would help determine how much of their population reductions are due directly to oil contamination and what is due to other causes. Yasuní National Park's Master Plan vaguely describes some damages suffered by fauna and provides evidence that hydrocarbon contamination could be 1) causing negative effects on birds that rely on the contaminated bodies of water; and 2) threatening local extinctions of sensitive aquatic species. Nonetheless, as of this evaluation, only this general information exists regarding the extent of the problem.

It is extremely likely that oil extraction activities will continue to contaminate the reserve's waters, since a pipeline that runs along Vía Maxus crosses numerous rivers and wetlands in both the national park and the ethnic reserve. Other pipelines cross many of the reserve's western rivers and buffer zone rivers, where oil drilling is intense. In addition, oil drilling within the national park is in expansion. Petrobrás is planning to build a road in the northern sector of the protected area in order to drill in block 31. To the east, there is another area, known as block ITT, where new wells may be drilled in the future. The expansion

One of the many installations along Maxus Vía, this one in the photo is inside Yasuní National Park.

of the oil extraction activity threatens portions of the reserve that up until now have not been affected by contamination.

Oil extraction within Yasuní is out of control and it is unlikely to change anytime soon. There are limited resources for the area's management and as a result, monitoring the oil companies for environmental compliance is difficult. Even with an adequate budget, it would be very difficult to assure compliance with environmental standards since the area's administrators lack real decision-making power over the business in the protected area. In the last five years, money from oil accounted for 35.7% of Ecuador's national general budget (Llanes, 2004). As long as it remains so important to the national economy, it is unlikely that leaders will prioritize compliance with environmental laws over hydrocarbon development.

The Technical Advisory Group could help control and make decisions regarding oil extraction in the reserve, mostly they could work to encourage the companies to adopt stricter environmental business practices and they could collect funds for the protected area's management. Even though these advances would represent a great improvement over the status quo, Yasuní Biosphere Reserve would still be threatened by oil extraction. As long as oil extraction takes place within the reserve, the area's biodiversity will be seriously threatened and will continue to be impacted negatively and permanently. Completely controlling this risk is truly beyond the reach of the reserve's administrators and other organizations working in the area.

Recommendations

Lack of systematic data documenting damages caused by oil extraction encumbers the ability of the administrators and members of the Technical Advisory Group to influence these companies and decision-makers. In response, establishing a monitoring program to help understand the effects of crude oil spills on the reserve's biodiversity should be a priority. The fact that there are both pristine rivers and contaminated rivers that receive frequent oil spills is ideal for designing a research study. It will allow for comparisons between the two types of rivers and will enable researchers to identify and develop indicators that could help detect what is happening in other, non-studied areas and prevent negative impacts in areas where oil drilling has not yet begun. Two areas suited for this type of comparison are the Yasuní River, where WCS has already begun research on landscape species, and the Tiputini River, where access is easy and spills have been frequent.

Extending research into areas where oil extraction activities have not yet begun but are planned would be a good way of establishing baseline data that could then be used to study if the activities affect biodiversity and if so, how. Baseline data has been established in block 31 (Thurber and Silva, 2004), where Petrobrás plans to begin operations, but it is not independent or exhaustive. A research program could help to complement and compare Petrobrás generated data (or data from other companies working in the area), and could help serve to reinforce control over those existing operations and help make decisions regarding activities in new areas.

Even if a monitoring program reveals serious damage to Yasuni Biosphere Reserve's biodiversity, it does not mean that leaders will enter in the debate whether or not it is in Ecuador's best interest to stop oil drilling in Yasuní. A more likely scenario is if and when

decision-makers themselves question the utility of drilling in the area, then they will need this type of information. WCS could play an important role by generating these data that will be extremely valuable in the area's future conservation.

Access routes

Access route construction is intimately related to oil extraction. Roads have brought about serious colonization problems in Yasuní Biosphere Reserve, especially in the western buffer zone, along Vía Auca, and to a lesser degree in the northwestern portion of Yasuní National Park because of Vía Maxus. Both roads were built so that oil companies operating in the area could have access to their infrastructure. Jorgenson and Copolillo (2003) estimate that the area of the biosphere reserve impacted by both roads exceeds 120,000 hectares. Vía Auca, which crosses the biosphere reserve's western buffer zone and reaches the northern limits of the Huaorani Ethnic Reserve, has many side roads that have brought deforestation closer to Yasuní National Park and the ethnic reserve.

Deforestation provoked by one of Vía Auca's side roads has reached northwestern Yasuni National Park, where at least 20 families have usurped the protected area (Jaramillo, 2004, personal communication). At the time of this ParksWatch visit, between 140 and 200 hectares had been deforested, and after interviews with inhabitants and visual inspection of the parceled lands, it was calculated that the area occupied was close to 1000 hectares.

A colonist's house within Yasuní National Park, on the eastern side.

Along Vía Maxus, which crosses the northwestern portion of the park and reaches the western limits of Huaorani Ethnic Reserve, colonization is more controlled, although the entire route is occupied by settlers of communities that were previously located along Napo River. These communities have been moving south, taking advantage of the communication facilities that the road offers. The Ecolex organization (2003) calculates that approximately 40 kichua families have settled along Vía Maxus and they have taken approximately 2,000 hectares of parkland. At the time of our visit, we were able to verify that this same situation is occurring, although less rapidly, into Huaorani Ethnic Reserve, where new settlements are being established. Most recent data registered five indigenous huaorani communities (Lara et al., 2002a) that use facilities

provided by the oil company to move between the reserve, national park, and even to outside markets.

Maintenance work along Vía Maxus. This road has fragmented part of northwestern Yasuní National Park.

In addition to new settlements and loss of forest cover for agriculture and livestock, road building has brought additional impacts. Via Maxus has cut off approximately 100,000 hectares of northwestern Yasuní National Park from the rest of the protected area (Koester, 2004, personal communication). Impacts on the area's biological diversity are unknown since there is no research, although over the long term, population isolations ensure local mammal and bird species extinctions (MA, 1999).

The magnitude of road kills along Vía Maxus is relatively unknown; there is no monitoring program in place. From our field observations, we conclude that road kills are probably common since traffic of heavy vehicles serving the oil companies along Vía Maxus is continuous. The Repsol-YPF Consortium, which has the concession of block 16, claims to have strict norms that regulate vehicle speeds along the road, but during our field visit, we verified that most of the trucks and other vehicles were speeding without any type of control.

With the opening of Vía Maxus, remote areas of the biosphere reserve suddenly became accessible. Hunters seeking prey species and animals suitable for pets have been pressuring (presumably severely pressuring) areas along the road in the national park and the ethnic reserve. The oil companies' non-confrontational policies towards the huaorani people have further contributed to facilitating access to remote areas, since they provide huaorani communities the means to reach those places, either by providing money which they use to buy vehicles or by providing free transportation along Vía Maxus. Most likely, this road has seriously increased hunting pressure, both for subsistence and commercial purposes, along several kilometers on both sides of the road. However, the magnitude of the problem is unknown because there is no monitoring program in place.

The fact that Petrobrás has an imminent proposal to build a new 29 km road in northern Yasuni National Park (Thurber and Silva, 2004), and the existence of other projects that consider

opening roads in the park's eastern area and in the ethnic reserve's western portion suggest that this threat will spread.

Recommendations

As is the case with the last problem, the current understanding of the access routes problem is only partial and generalized. By implementing a traffic-monitoring program along Vía Maxus, impacts on fauna can be quantified. That information can help improve control practices along existing routes and predict impacts of planned roads and routes to help make decisions. The Yasuní Scientific Station offers sufficient facilities within Yasuní National Park to establish such a monitoring program.

Researching the possible island effect manifesting in the park's northwest is more complex and time consuming; it is likely that any data generated would be inconclusive in the short term and therefore unable to influence decisions regarding already proposed road construction projects. Nonetheless, WCS could encourage one of the scientific stations in the area to take on such a research project in order to better understand what is happening.

Hunting, fishing, and species trafficking

ParksWatch analysis of these threats demonstrates that they impact approximately 12% of the protected area; this is more than the 47,800 hectares (or approximately 3% of the biosphere reserve) estimated during WCS's participatory workshops. This difference is probably due to distinct perceptions used to evaluate these threats. The proceedings from the 2001 workshops (Jorgenson and Coello, 2001) show that some participants were inclined to believe that huaorani communities' hunting practices could be sustainable. This opinion could explain why they excluded parts of the huaorani territory as being impacted by hunting, fishing, and species trafficking.

However, data collected during interviews with indigenous leaders, from literature reviews, and from some specific research on hunting indicate that hunted species' populations are decreasing in huaorani territory, and hunting is therefore threatening the area's biodiversity. In order to calculate the area impacted by hunting, the most populated portion of the huaorani territory (known as huaorani protectorate) where losses of hunted species have been documented (Lara et al, 2002a) was included as was Vía Maxus, portions of the northern half of Yasuní National Park, and areas where communities have settled in Yasuní Biosphere Reserve.

Hunting and fishing are intimately related to access routes –roads and rivers– to the biosphere reserve and the populated centers. In addition to the huaorani territory previously mentioned, areas pressured by hunting include the Vía Maxus, and the western and northern portions of Yasuni National Park. The northeast feels the most fishing pressure, close to the community of Nuevo Rocafuerte (Jorgenson and Coello, 2001), although there is also fishing in other rivers like in Tiputini River, within the national park, and around communities settled along the rivers.

Hunting has caused prey species in portions of Yasuní Biosphere Reserve to disappear. Yasuni National Park's management plan reports the reduction and local extinction of populations of

white-bellied spider monkey (*Ateles belzebuth*) and Humboldt's woolly monkey (*Lagothrix lagothricha*) in the west and northeast, and extinction of the Amazonian manatee (*Trichechus inunguis*), pink river dolphin (*Inia geoffrensis*) and giant otter (*Pteronura brasiliensis*) in the upper Napo River. Zambrano and Silva (2003) report decreases of prey species' populations in communities located within the national park in the north and west. Mena et al. (1997) reports local extinction of the Humboldt's woolly monkey (*Lagothrix lagothricha*) in an area of 103 km^2 around the Queheiriono community, in the western side of Huaorani Ethnic Reserve. The Huaorani Territory Master Plan (Lara et al., 2002a) reports disappearance of bird species in several kilometers around Toñampari, within Huaorani Ethnic Reserve.

Sale of bush meat in Pompeya Norte market.

Fishing from the Nuevo Rocafuerte community pressures the river. The nets' buoys are in the left of the picture; the net extends across the entire river.

Fishing has reduced the pirarucu (*Arapaima gigas*) populations in Yasuní National Park (MAE, 1998). There are reports of use of high-impact fishing methods, such as dynamite and barbasco (Lara et al., 2002a), and fungicides (MA, 1998) in both the national park and ethnic reserve. Any body of water surrounding populated areas suffer from intense fishing, and it is estimated that in huaorani communities, fishing is intense in a 3 km diameter around the community (Lara et al., 2002a).

Wildlife taken from huaorani territory and the national park is sold in the major cities close to the biosphere reserve, including Coca, Lago Agrio, Tena and Puyo. Wildlife trafficking is especially intense along Vía Maxus where animals are destined for the market in Pompeya, which acts as a distribution center where animals are moved to farther markets in Coca and Lago Agrio. Species sold as pets include blue-and-yellow macaws and scarlet macaws (*Ara ararauna* and *A. macao*) (Lara et al., 2002a), several parrot species, and during our field visit we detected trafficking of golden-mantled tamarins (*Saguinus tripartitus*) and South American yellow-footed tortoises (*Geochelone denticulata*), which is a vulnerable species according to the World Conservation Union (IUCN, 2003). Wildlife trafficking seems to be intense along the Vía Maxus probably because the oil company Repsol-YPF offers transportation services to locals heading towards the Pompeya market without any control of transport of live or dead animals originating from Yasuní Biosphere Reserve. In Pompeya market, members of the Ecuadorian Army were seen buying wildlife pets and displaying them publicly. Different reports indicate that the most sought after species have suffered from population declines.

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

While the problems of hunting, fishing, and wildlife trafficking are known, and the locations feeling the most pressure and the markets where species are sold are also known, there is actually very little information available to further comprehend the threat these activities pose to the protected area's biodiversity. There are no systematic investigations and as a result, the actual scope of the problem on the biosphere reserve's fauna is unknown. Research on specific cases suggests that the problem could be serious.

Recommendations

Knowing that the Pompeya Norte Market is the largest market for species coming from Vía Maxus, and knowing that buying and selling of bush meat and wildlife pets occurs on Saturdays, makes this place a key site for initiating a monitoring program intended to better understand the situation. Depending on the research design, type and quantity of species and intended use could be identified as well as the animal's origin, the role played by different communities, and other information of interest. This program could also help document the oil company's role in this problem and it could help propose solutions in one of the most-pressured areas. This monitoring study could also measure changes resulting from proposed programs in the area to regulate hunting, and at the same time, it could serve as a way to evaluate to what extent the results of the participatory workshops some organizations are holding around Pompeya are or are not being altered by participant's perceptions.

Timber exploitation

Illegal timber trafficking has been detected in the western portion of the Huaorani Ethnic Reserve and in the western part of Yasuní National Park. This illegal activity is principally taking place along the Indillama and Tiputini Rivers in the northwestern part of the park, and along the Rumiyacu, Tiguino, Shiripuno and Cononaco Rivers in the western portion of huaorani territory, and along the Tivacuno River, which forms the border between the two protected areas. The Vía Auca, from the western part of the park to the western part of huaorani territory, facilitates access to the rivers and subsequently is the way out for loaded logging trucks. Illegal timber trafficking has also been detected along Vía Maxus, and as is the case with wildlife trafficking, the oil company facilitates its logistics to transport the timber along the road and via Napo River (Ecolex, 2003). Indigenous Huaorani people are involved, they grant extraction "permissions" to external loggers (Jatun Sacha, 2003) who then pay them; usually the pay is only one-tenth (or less) the timber's market value (Ecolex, 2003).

High-valued timber species are most sought after and include cedar (*Cedrela* sp.) (Jatun Sacha, 2003) and mahogany (*Swietenia macrophylla*). Their exploitation has reached the Tagaeri-Taromenane Intangible Zone, which apparently has been a source of conflict between uncontacted indigenous groups and the Huaorani who maintain contact with the outside world (Jatun Sacha, 2002), and between the Huaorani selling the timber and the buyers (Ecolex, 2003).

This problem is difficult to resolve because of corrupt public officials, who apparently receive payoffs to permit loaded trucks through without inspection or to release confiscated trucks (Ecolex, 2003). If this did not happen, control would not be overly complicated since there are only two possible routes from Vía Auca to transport the timber. Nonetheless, controlling this activity surpasses any organization's current capacity and responsibility. The most organizations working in the area could do to resolve this problem is try to influence and persuade decision-makers to pay attention to the problem and get them to commit to fighting corruption and impunity.

Lack of personnel, budget, and institutional weakness

Of the two management units, only Yasuní National Park has a budget for managing the area, and it is insufficient at that. Per hectare, the budget comes to $0.04 US Dollars, which demonstrates an enormous shortfall. If all members of the field staff are taken into account and without considering shifts, vacations, or temporary labor shortages (which is best-case scenario), each staff member is responsible for more than 109,000 hectares. Huaorani Ethnic Reserve does not have personnel or budget for control. This is the same situation in the buffer zone. These data illustrate the seriousness of the biosphere's lack of staff and budget. They also help explain why the threats continue unabated and they help demonstrate the incapability to give attention to the area's problems.

Lack of personnel and budget are one of the reasons for the obvious weak institution. In addition, decentralization policies initiated in 2001 (MA, 2001) have caused a divide between the Ministry of Environment's Central Office and its regional Coca branch, which has been subordinated to the Provincial Advisory Council instead. Technicians have been marginalized when it comes to

decision-making, both at the ministerial level as well as at the advisory council, which means that many important decisions respond to political interests that do not reflect pressing needs. Decentralization has weakened the only administration within the biosphere reserve, that of Yasuni National Park, which has lost its autonomous management authority and no longer depends on the regional office of the Ministry of Environment.

The fact that Yasuní Biosphere Reserve does not have any administration makes it hard to believe that it will be able to function as such and implement the category of protection recognized by UNESCO. The biosphere reserve declaration and use restrictions contained in Huaorani Ethnic Reserve's adjudication are the only legal bases existing for considering huaorani territory a protected area (Morales, 2004, personal communication), and as long as it is not made to function as a biosphere reserve, the area's conservation status will continue in uncertainty as it has up until now. A clear indication of this is that the Ministry of Environment's geographic system does not include data from the Huaorani Ethnic Reserve, as it does not consider it part of Ecuador's natural areas.

Lack of budget and personnel together with weak administration of Yasuní Biosphere Reserve are some of the area's most serious problems since they impede the possibility of taking control of the situation or of regulating any of the activities occurring within. Currently, there is no capacity to enforce the laws, which makes Yasuní Biosphere Reserve a protected area on paper only.

The area's primary financing should come from the national Ecuadorian coffers and from independent sources. Actions should be taken to inform decision makers about the consequences of lack of coordination between Ministry of Environment Offices, lack of a comprehensive administration for the entire biosphere reserve, and lack of budget for Yasuní. This could be the Technical Advisory Group's responsibility in addition to helping to find funding from independent sources. Existence of several groups demanding resolution of these problems could help facilitate decision-making.

Uncontrolled tourism

Yasuní Biosphere Reserve began receiving tourists more than 15 years ago. The most visited areas are in huaorani territory and in certain northern areas of the national park where visitor facilities exist. Even though there are fees for tourists entering the national park (Jaramillo, 2004, personal communication) and some communities in the huaorani territory (Lara et al., 2002a), mechanisms for controlling illegal tourism operators or making sure that permitted companies comply with the fee requirements do not exist. Illegal tourism operators cause several problems; the most serious include wildlife trafficking, garbage generation, lack of contamination prevention measures (Jatun Sacha, 2003), and illegal entry into the Tagaeri-Taromenane Intangible Zone, an area where tourism is prohibited.

The threat posed by tourism to Yasuní Biosphere Reserve's biological diversity is not of great magnitude. Its root cause is lack of capacity to control the area's access. If the reserve's personnel and budget increase, tourism could be controlled and regulated in such a way that it would become a source of income and its impacts could be minimized.

Future forestry programs

In 2002, consulting firm Chemonics International began the project Conservation of Indigenous Managed Areas (Proyecto Caiman) with financing from the United States Aid for International Development (USAID). They started activities in huaorani territory in order to support the area's consolidation, strengthen the Organization of the Huaorani People of the Ecuadorian Amazon (ONAEH) and help seek sustainable financial alternatives for the area's people (Palacios, 2004, personal communication).

The project is multifaceted and includes activities such as territorial delimitation, support to develop a strategic plan for the ethnic reserve, training in legal matters, and development of economic activities such as tourism, extraction of non-timber forest products, local crafts market creation, and timber extraction following management plans.

This last activity is meant to counteract environmental damage and economic losses caused by illegal timber activity in the Huaorani Ethnic Reserve. In November 2003, the non-governmental organization Jatun Sacha completed a consultation in which it analyzed conditions for sustainable forest management in Huaorani Ethnic Reserve (Jatun Sacha, 2003). Their report recommended an experimental project in association with the Ñoneno community and the local ONHAE organization so that forestry activities could begin in the area. Under this project, Huaorani Ethnic Reserve's potential for forestry management covers 77% of the area and would require a creating a system of timber roads in 369,000 hectares.

Even though the project is in its early stages, technical and social concerns are apparent. Opening additional access routes could, over the long term, mean that people exert pressures never felt before on the biodiversity held within the ethnic reserve's 550,000 hectares. The fact that 70% of the huaorani people have hunted or habitually hunt large species (Lara et al., 2002a) gives an idea of the pressures that the area could face if remote zones were suddenly accessible, especially considering that hunting is not likely to reach sustainable levels in the medium term. The fact that there have only been a few profitable conventional forestry activities in Ecuador (Jatun Sacha, ibid.) creates questions about how forestry management is planned for the Huaorani area. Since operation costs of managed activities are usually more than conventional extraction, in order to have a profitable operation they will need to decide whether to harvest large areas every year or increase the number of species extracted annually. In both cases, impacts on the forest could be greater than those currently felt with illegal logging. The huaorani communities' social situation is very complicated, with communities where the relationship with oil companies has distorted the perception of a market economy (Rivas and Lara, 2001). In these circumstances, the risks associated with promoting forestry management activities are very high and the activity could actually turn out to be a bigger threat to the area than a solution to the problems associated with illegal logging.

Recommendations

Results from the wildlife trafficking monitoring program along Vía Maxus could be used to better understand the risks associated with opening new roads, whether they are for oil or timber. This information could be used to make better decisions regarding timber activity.

Tiputini River under an Amazonian rainfall.

4. Conclusions

Yasuní Biosphere Reserve is facing serious problems that threaten to cause it to fail to meet its objectives over the medium term if remedial actions are not implemented immediately. Permanent human presence and oil extraction compromise the area's ecological integrity.

The area is very complex, and lack of personnel and budget, weak institution, and lack of political will have turned it into an area protected only on paper. Its borders are not completely determined and there is no comprehensive management plan covering the entire biosphere reserve. The independent management plans that do exist for each management unit within the reserve (Yasuní National Park and Huaorani Ethnic Reserve) are not being implemented.

Presence of settled communities within the reserve and the complex social situation in some complicate the panorama. The work that non-governmental organizations could do in the area is insufficient to resolve certain problems, such as oil extraction inside the reserve, since this activity is supported by high-level governmental authorities that give little thought to conservation when compared to hydrocarbons and the income it provides to the country.

Currently there is very little quantitative data regarding how wildlife trafficking is eroding the area's biological diversity and the extent to which opening of access routes influences the problem. Information about the effects of heavy and normal traffic along the road that crosses western Yasuní on fauna is scarce. Although it is known that certain species have disappeared

from some populated areas in the park and ethnic reserve because of permanent and transitory human presence, the full magnitude of this situation is unknown. There is no research studying the possible island effect in northwestern Yasuní National Park created by road construction and increased human population.

Making informed decisions is extremely difficult because only scarce information is available. In addition, lack of information decreases organizational capacity to influence projects planned for the area. It also makes measuring changes over time or proposing corrective actions difficult. Generating information is critical, especially considering that new access roads are being planned in order to increase volumes of oil extracted. The only way to try to influence these projects is to inform decision makers of their potential consequences. Nonetheless, one impediment to generating this needed information is that governmental and non-governmental presence in the area is scarce.

The results of this evaluation show that relying on existing information is not enough to completely understand the extent of the rapidly changing problems in Yasuní Biosphere Reserve. Instead, systematic monitoring programs are needed to fill in the information gaps that currently exist. Measuring changes will be very difficult if baseline data have not been established by which to compare results. This leads us to conclude that the hypothesis established at the beginning of the evaluation, that lack of permanent organizational presence could alter understanding of threats and reduce the possibilities of conservation success, could become a reality, especially as it concerns the problems described in this report.

Monitoring efforts carried out to date have been extremely valuable for identifying the area's landscape species and for providing analytical bases for managing the area. Nonetheless, efforts would improve with permanent organizational presence in Yasuní National Park. One possibility that deserves consideration is establishing an agreement with Yasuní Scientific Station to set up an office with permanent staff. This station's location, at km 40 along Vía Maxus, is ideal for studying changes in a critical area of the park and huaorani territory.

This will help generate information to better understand the impacts from human activity associated with the area's road. Access from the station to Napo River is relatively uncomplicated, either via road or Tiputini River, and makes continuing the monitoring that began in Yasuní River a natural next step. In addition, it would help facilitate new research of landscape species in Tiputini River area. This data is needed to better understand the impact of oil extraction activities on biological diversity since it is one of the rivers most seriously affected by crude oil spills and would allow for comparison with lesser-impacted areas, like Yasuní River.

Establishing a permanent program in the area would also facilitate research on species killed by vehicles, and would increase understanding of the role the Repsol-YPF Company plays in wildlife trafficking. In addition, proximity to Pompeya is convenient for establishing a program to monitor sale of Yasuní species in the Pompeya Norte Market and would complement the socioeconomic data being generated about the nature and extent of wildlife species uses. This program would be a low-cost, relatively simple way to generate data on species use in communities surrounding Pompeya and in the huaorani communities along Vía Maxus. The data

could also be used to compare, contrast, complement and build upon the work already being done.

Establishing a permanent monitoring program should be the first step to influencing decisions regarding oil extraction activities in the area since the results of such a program would be valuable to understand better the devastating effects these activities have on a unique part of the world. This evaluation shows that oil drilling is seriously and negatively impacting Yasuní Biosphere Reserve. In the end, the Ecuadorian authorities have the responsibility to decide between Yasuní's conservation or its eventual destruction.

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