



Park Profile – Guatemala Laguna del Tigre Río Escondido Protected Biotope

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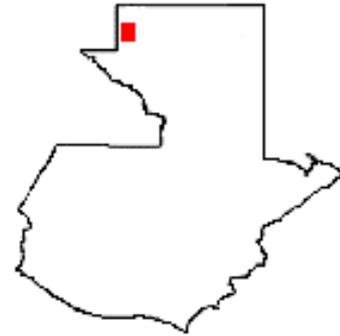
Location: San Andrés municipality in the department of Petén, in the Maya Biosphere Reserve

Year created: 1989

Area: 45,168 hectares

Ecoregion: Tehuantepec humid forest

Habitat: High forest, transitional forest, oak forest, savannahs, and wetlands



Summary

Description

Laguna del Tigre Río Escondido Protected Biotope is located in northern Guatemala, in the municipality of San Andrés, Department of Petén. Established in 1989, the park is an important Guatemalan wetland – the extensive, periodically inundated zone has a unique character, with savannahs and transitional forests. Laguna del Tigre Protected Biotope, along with the neighboring Laguna del Tigre National Park, is included in the Ramsar Convention's list of Wetlands of International Importance. The park is also included in the Montreux Register of sites where adverse change in ecological character has occurred.

Biodiversity

The park is habitat to 188 species of birds, 90 species of butterflies, 17 species of amphibians, and 55 species of fish. Though there is no official count, it is estimated that the park could support up to 130 species of mammals. The area is home to regional endemic species like the Guatemalan Howler Monkey (*Alouatta pigra*), Morelet's crocodile (*Crocodylus moreletii*), and the Central American River Turtle (*Dermatemys mawii*). Felines include the jaguar (*Panthera onca*), puma (*Felis concolor*), and the Margay (*Leopardus wiedii*). Many of the species present in the area are on the World Conservation Union (IUCN) Red List of Threatened Species.

Threats

ParksWatch has determined that Laguna del Tigre Río Escondido Protected Biotope is a **critically threatened** area, meaning that there is an extremely high risk that the protected area will fail to protect and maintain biological diversity in the immediate future, unless urgent solutions are prescribed and implemented. The principal threats stem from permanent human settlement and immigration, the advancing agricultural and grazing frontier, forest fires, gas and oil prospecting, and the lack of governmental and institutional oversight of the area.



A small savannah in a transitional forest. Low forest dominates the background, while high herbaceous cover dominates the foreground. Water frequently inundates the area of low herbaceous cover in the central portion of the photo.

Description

Physical description

Laguna del Tigre Río Escondido Protected Biotope is located in northern Guatemala, in the municipality of San Andrés, department of Petén. The biotope is one of the core zones of the Maya Biosphere Reserve, the most important tropical forest in the country. Laguna del Tigre National Park surrounds the biotope – together the two areas form the largest defined protected zone in the country (CEMEC/CONAP, 1999a). The legal boundaries of the park are between 17° 20' 00" and 17° 35' 00" latitude and 90° 56' 48" and 90° 47' 06" longitude¹ (Decreto 5-90, 1990). A considerable portion of the biotope is fragmented due to human activities such as agriculture and petroleum extraction.

Thin, fragile karstic soils dominate the area (CONAP, 1999). The landscape is flat except for the slight, undulating character of the central portion, where elevations peak at 150 meters (CEMEC/CONAP, 2000a). The climate is hot and humid, with distinct seasons. The rainy season is from June to December and the dry season is from January to May (CONAP, 1999). Laguna del Tigre Río Escondido Protected Biotope receives more rain than in other parts of the Maya Biosphere Reserve; on average, it receives 1,629 mm (CONAP, 1999). The average temperature is 30° C (CDC/CECON, 1995), with an average of 35° C in the dry season and 25° C in the rainy season (CONAP, *Ibid*).

Laguna del Tigre Río Escondido Protected Biotope has singular landscape elements, such as the lakes, wetlands, and small patches of savannah in the north of the area. The biotope is included in the 1990 Ramsar Convention's list of Wetlands of International Importance. The park is also included in the 1993 Montreux Register of sites where adverse change in ecological character has occurred (Ramsar, 2001).

¹ Según el Decreto 5-90 sus límites son: 17° 20' 00" / 90° 56' 48"; 17° 35' 00" / 90° 56' 48"; 17° 35' 00" / 90° 47' 06"; 17° 20' 00" / 90° 47' 06".

Biodiversity

Vegetation

Following the classification of Dinerstein et al. (1995), the biotope lies within the Tehuantepec humid forest ecoregion. Vegetation studies reveal that the area is heterogeneous, composed of a large number of families adapted to the different environments. Generally, trees do not exceed 40 cm in diameter except in areas of high forest. The dominant tree height is between 5 and 15 m, though in some areas trees exceed 30 m (Rodas, 1999). According to the master plan of the *Unidad de Manejo Laguna del Tigre*, which includes both the national park and the biotope, transitional forest between wetlands and high forest predominates the area, covering approximately 60% of the protected area (CONAP, 1999). Approximately 35% of the biotope is composed of wetlands, while the rest is high forest, savannah, and a small relic population of oaks (*Quercus oleoides*). Tree diversity is around 83 species per hectare (CONAP, 1999).

High Forest

High forest is scattered in small clusters in the northeast and western sections of the biotope. Collectively, they occupy around 5 % of the total area (CONAP, 1999). High forests are typically composed of leafy, dense, and frequently buttressed trees growing at medium and low elevation. The canopy reaches more than 25 meters high, with individual trees jutting out up to 30-35 meters high. Under a closed canopy, the mid-story exists between 12 and 15 meters, while the understory reaches around 6 meters high. The breadnut (*Brosimum alicastrum*) is one of the more abundant species, along with zapotillo (*Pouteria reticulata*), silión (*P. amygdalina*), yellow sapote (*P. campechiana*) and sapodilla (*Manilkara zapota*) (CONAP, 1999). The silión (*P. amygdalina*) is listed on the World Conservation Union (IUCN) Red List of Threatened Species as “vulnerable.” The understory of the higher elevation, shady high forest has a diverse abundance of palms, like the cohune (*Orbignya cohune*), bayleaf palm (*Sabal morrisiana*), Chamaedorea palm (*Chamaedorea* sp.), and bayal (*Desmoncus ferox*).

Transitional Forest

The majority of the biotope (around 60%), particularly in the center, west, and east, is comprised of transitional forest (CONAP, 1999). Transitional forests are a mix of high forest, low forest, and savannahs in varying proportions (CONAP, Ibid.). These forests have an intimate relationship with water and spend a portion of the year completely inundated. The degree of inundation determines the species composition. In areas with impermeable soil with insufficient drainage, water is present on the surface during the rainy season, but dries out during the dry season. Low forests dominate these areas. Typical species include the black olive (*Bucida buceras*), logwood casha (*Haematoxylum campechianum*), cojché (*Nectandra membranacea*), seagrapes (*Coccoloba* sp.), and palms like the bayleaf palm (*Sabal morrisiana*) and the escobo (*Chryosophila argentea*) (CONAP, 2001a). Savannahs dominate the areas where standing water remains longer, while high forests grow in areas where the soil drains quickly.



Low forest in a transitional forest

Wet Savannahs and Wetlands

Extensive savannahs only occupy a small portion of the northern part of the biotope, covering a total of 2 % of the protected area (CONAP, 1999). Extreme seasonal conditions dictate the type of vegetation, with the area inundated in the rainy season and arid in the dry season (Pennington and Sarukhán, 1998). Herbaceous plants and jimbal, a little described bamboo presumed to be *Bambusa longifolia*, thrive in these conditions. The presence of water determines whether the savannahs are slowly replaced by wetlands, which are permanently wet, with standing water or water just beneath the surface. Sawgrass (*Cladium jamaicensis*) is the dominant vegetation. The wetlands occupy 35% of the total area of the biotope, mainly in the central portion. A smaller marshy area occurs in the southeastern part of the area. The landscape in the savannahs and marshy areas is flat and vegetation does not exceed 1.5 – 2 meters. These areas have a long history of wildfire, which seems to encourage the expansion of the savannah (Méndez *et al.*, 1998).

Oak Forest

A small relic area of oak forest lies in the northeastern portion of the protected area. ParksWatch found this previously undescribed area on a site visit in a hilly area surrounding a savannah. This unusual habitat is located next to a petroleum extraction area. Oaks (*Quercus oleoides*) up to 15 meters high dominate the open overstory, while broad, leafy plants and palms occupy the thick, shady understory.



Oak forest

Fauna

The biodiversity of the Laguna del Tigre Río Escondido Protected Biotope has not been extensively studied. The master plan lists 180 species of birds, 90 species of butterflies, and 17 species of amphibians for the combined national park and protected biotope in Laguna del Tigre Río Escondido area (CONAP, 1999). 130 species of mammals are presumed to live in the parks (Zarza and Pérez, 2000). Jaguar (*Panthera onca*), Baird's tapir (*Tapirus bairdii*),

red brocket deer (*Mazama americana*), collared peccary (*Tayassu tajacu*), and Guatemalan howler monkey (*Alouatta pigra*) have been sighted (Barrios, 2003, pers. comm.). Threatened and endangered species include Morelet's crocodile (*Crocodylus moreletii*), a regionally endemic reptile that is listed on the Guatemalan National Council of Protected Areas' (CONAP) Red List (2001c). The Central American River Turtle (*Dermatemys mawii*), the jaguar (*P. onca*), Guatemalan howler monkey (*A. pigra*) and the red brocket deer (*M. americana*) are listed on IUCN's Red List (2003). CONAP's Red List of Fauna includes several felines and other mammals in the area as highly endangered (CONAP, 2001c). CONAP's Red List of Flora considers that many of the flora species in the area could become endangered if their commercial use is not strictly regulated (CONAP 2001d).

Management

Laguna del Tigre Río Escondido Protected Biotope was created in 1989 through the Protected Areas Law, Decree 4-89. With the Law Declaring the Maya Biosphere Reserve, Decree 5-90, the geographical boundaries of the biotope were established and its status as a core zone of the Maya Biosphere Reserve was declared. In a completely informal manner, the biotope had already been created and registered in 1986, through an act of the National Corporation for the Promotion and Economic Development of Petén. The act granted the Center for Conservation Studies at the University of San Carlos de Guatemala (CECON) the right to administer the area (FYDEP, 1986). Decree 5-90 formally recognized this arrangement. The institutional presence of CECON has been weak since the biotope was created: they have never been able to control the illegal activities in the area. These incursions continue to increase in severity and occur with complete impunity.

There are eight park rangers assigned to the biotope and a director that also administers three other areas in the Petén. The eight park rangers are divided between two stations situated at the northern and southern ends of the park. Two rangers are stationed as guards, while the other six are assigned to stewardship duties. Field staff work for 22 days and then take eight days off, which in addition to vacation days and national holidays, results in a lack of personnel at the guard posts on some occasions. All of the rangers receive their salaries and benefits from the University of San Carlos de Guatemala from CECON.

The biotope shares a CONAP designed five-year master plan for 1999-2003 with Laguna del Tigre National Park. Some components of the plan, such as those allowing human settlement and activities, are incompatible with conservation and go against the spirit of the Protected Areas laws. These problematic portions of the plan have kept it from being implemented. CECON is currently working on a master plan specifically for the biotope.

The master plan for the combined area of the National Park and the biotope (collectively called the Laguna del Tigre Management Entity) creates management zones within the areas. The biotope has three zones, the intangible zone, the special use zone, and the transition zone. The master plan does not provide the exact coordinates for these zones.

1. Intangible Zone

This zone occupies most of the biotope, except for two small portions of the northeast and the northwest. It is dedicated to protect natural ecosystems and their processes. Human modifications are not allowed; natural resource extraction, hunting, road construction, oil exploration, and human settlements are prohibited. Scientific research and low impact ecotourism are allowed in this zone.

2. Special Use Zone

Within the special use zone, human settlements already exist and the natural ecosystem is fragmented and degraded. The zone is located in the northwestern part of the biotope around the community of Buenos Aires. Its goal is to establish productive activities while halting their expansion, promote sustainable use of the resources, and promote activities compatible with ecosystem recuperation. Human presence is permitted in the special use zone, as long as agreements regarding their stay have been signed. Use of non-timber products, timber, and hunting are permitted in the zone. Agriculture and grazing are not explicitly prohibited or permitted. New human settlements are not allowed.

3. Transition Zone

Within the transition zone, human activities and settlements exist that threaten the continuity and function of the natural ecosystems. The transition zone is located in the northeastern portion of the biotope, in the areas of petroleum extraction. The objectives of the master plan seek to stop the degradation and revert the area to a use that is compatible with the objectives of the park. This may involve relocating the invaders.

The protection infrastructure of the biotope includes two scientific stations and an observation tower. The El Toro station was built in 2001 with funds from Conservation International and CECON. Located in the northeastern part of the biotope, the station is home to the area's administration and has a two-story building capable of housing between ten and fifteen people, including six park rangers. The Santa Marta station was created in 1979 to house specialists who came to the region to assess threats to the area and monitor the water quality of the Río San Pedro. It has four buildings and can house twenty people, including two of the park rangers. The station is located just outside the boundaries of the biotope in the small village of Santa Marta on the banks of the Río San Pedro. The Flor de Luna observation tower, in the northeastern part of the biotope, serves as a lookout for wildfires.

Field staff members have minimal equipment and lack some necessities essential to their duties. The park rangers do not carry arms and because of that, at times they conduct patrols with the National Police Nature Protection Service. Control over illegal activities is practically nonexistent over the entire biotope.

The 2003 budget is close to US \$ 15,000. Of this, US \$ 5,000 is designated for equipment costs and US \$ 10,000 for staff salaries. Distributed over the biotope, this amount assigned for protection is US \$ 0.33 per hectare, the lowest in the core zone of the Maya Biosphere Reserve.

Human Influence

The biotope is accessible by road or from river. In the northeast, the petroleum companies maintain a year-round road. The Río Escondido offers access from the southeast. A significant portion of the biotope is accessible through illegal footpaths. The extent of these paths makes controlling human access to the biotope difficult.

Two illegally settled communities, Buenos Aires and Río Escondido, exist in or around the park and pose significant threats. In 1997, CECON, with the help of the army, set out to

perform a census of Buenos Aires. The community fiercely resisted the survey to the extent that they refused to provide information and they threatened the lives of the CECON staff. CECON maintains that these permanent settlements are illegal, but, to date, nothing has been done to solve the problem. The lawlessness, invasive settlements, and land speculation is now completely out of control and the management of the biotope has significantly deteriorated. ParksWatch evaluations indicate that these settlements contribute to the fire risk for the area and that the land speculation may be driven by corrupt municipal authorities.

Conservation and Research

Currently, there are no research activities in the Laguna del Tigre Río Escondido Protected Biotope.

Threats

Laguna del Tigre Río Escondido Protected Biotope is **critically threatened**, which means that there is a high risk that in the immediate future the park will fail to protect and maintain biological diversity, unless urgent intervention actions are taken. The main threats include lawlessness, the near complete lack of institutional control in the area, human invasions and new settlements, advancing agricultural and ranching frontier, forest fires, logging, unsustainable use of non-timber forest resources, and petroleum mining. No master plan exists specifically for the biotope, but the plan for the Laguna del Tigre Management Entity allows certain activities in certain parts of the park, such as ranching, agriculture, hunting, and commercial logging. This could aggravate the problems and cause a breakdown in the law. Petroleum mining activities threaten the area through contamination and as sources of settlement and agricultural expansion. The biotope lacks a sufficient number of park rangers to control such a large, difficult, and often dangerous area. Organized groups have appropriated some parts of the biotope for drug cultivation and trafficking.

Current Threats

Lawlessness

The conservation workers in Laguna del Tigre Río Escondido Protected Biotope agree that the area is lawless (Ruiz, 2003, pers. com.). CONAP must confront an overwhelming suite of problems, including drug cultivation and trafficking, illegal immigrant trafficking, and the presence of armed bandits that have taken control in some areas. ParksWatch is sometimes unable to visit the El Toro research station because of the enormous lack of security. The biotope's administrators only venture into the area in large groups with excessive caution (Barrios, 2003, pers.com.).

Organized groups, some lead by corrupt politicians and local mayors and dedicated to the usurpation and speculation of governmental lands, are completely out of control, except for in the interior. Lawlessness causes the protected biotope to fail to reach its objectives. Groups in favor of the economic development argue that these conditions are a function of the lack of infrastructure and access in the area.

The incursions in the area have reached such a state of normalcy that parts of the biotope have been marked out for sale. The biotope is in such a state of chaos that it is difficult to envision a solution or image a greater threat.

Human settlements and invasions

Another serious threat to the biotope is the uncontrolled invasion of settlers into the area in the northeast and south. Agriculture and grazing are expanding and their fires are destroying expanses of the protected area. In 1994, CECON performed a census and found 14 families in the community of Río Escondido in the south. No definite count is known, but today that number is much higher. 28 families live in the community of Buenos Aires, in the northeast. Authorities show no interest in dealing with this threat and the biotope remains seriously threatened.

Fires

Fires are a serious threat to the biotope. In 1998, approximately 75% of the biotope burned and in 2003, fires returned, burning 60% of the total area (CEMEC/CONAP, 1999b, 2003). Images of the fires from the Center for Monitoring and Evaluation (CEMEC) at CONAP indicate that the fires repeat year after year (CEMEC/CONAP, 2000d, 2001a). Apparently, the fires have created less heterogeneous vegetation. This is particularly noticeable in the savannahs, where jimbal (*Bambusa longifolia*) is dominant (Méndez, *et al.*, 1998). Faunal diversity has also been affected. Studies on Morelet's crocodile (*Crocodylus moreletii*) in the Petén suggest that fires in the jimbal disrupt their reproduction and nesting (Casteñada, 1998). The fires affect other species of birds and reptiles, as well.

The fires have multiple causes, all of which are peripherally or directly related to uncontrolled human activity. Agriculture, grazing, and hunting are often precursors to fire. Sabotage occurs as well, with the intention of degrading the protected area and opening it up to economic development (Albacete, 2003a).



A view of an area burned by the wildfires of 2003

Advance of the agricultural and grazing frontier

The advancing agricultural and grazing frontier occurs mostly in the northeast and south of Laguna del Tigre Río Escondido Protected Biotope. Similar to incursions into Laguna del Tigre National Park, the landscape directly affected from these activities is not excessive. Satellite imagery shows the total area fragmented by development is about one quarter of the total preserve. The rate of deforestation is not known as of 2003, but visits to the area and fly-overs conducted by ParksWatch indicate that the deforestation and fires continue to be a problem in settled areas and that large threats exist to the east and west of the biotope.

Petroleum

In 1985, the government of Guatemala signed a petroleum contract for 10,190.34 hectares of land in the center of Laguna del Tigre National Park and in the northeast corner of Laguna del Tigre Río Escondido Protected Biotope (Ramsar, 1998). The biotope is being directly and indirectly affected by this action.

Several bodies of water in the biotope have been found to contain residues of aromatic hydrocarbons, indicating contamination from petroleum (Theodorakis and Bickham, 2000). This contamination could be affecting other bodies of water, as well (CONAP, sf). Scientific evidence suggests that the hydrocarbons stress and damage the DNA of fish found adjacent to extraction platforms (Theodorakis and Bickham, *ibid.*). Other damages include air and soil contamination, and destruction associated with the construction of the platforms and access roads (Ramsar, 1998). Méndez et al (1998) encountered an abnormal reduction in bird records at a sample site one kilometer from a platform, suggesting negative impacts on bird populations.

The indirect impacts of petroleum activities have been immense for the protected area. Petroleum mining has played a fundamental role in threatening the area by facilitating human settlement (Albacete, 1998). The opening of access routes in the north has brought with it the destruction, burning, and fragmentation of the forest. Another access route to the park is the Río San Pedro (the southern boundary of the Laguna del Tigre National Park). To cross the Río San Pedro, the petroleum companies built a ferry that is now completely uncontrolled. The ferry now carries a daily cargo of illegally harvested timber, drugs, illegal immigrants, and cattle. The company that operates in the area takes no responsibility for these activities and operates without restrictions.



An a previously unknown area of oaks (Quercus) next to a petroleum platform.



Petroleum extraction puts the area at great risk. The photo above shows one of the pipelines used to transport petroleum within the biotope.

Illegal logging and hunting

Similar to other areas of the Maya Biosphere Reserve, illegal timber harvesting and hunting are difficult to control because of the multitude of access points and the lack of park rangers. Though repeatedly denounced by the park rangers, there is little they can do to stop the timber harvesting besides the occasional patrol with the police. Illegal hunting and fishing are the order of the day, particularly near populated areas. Vulnerable species include the white-lipped peccary (*Tayasu pecari*), due to its migration route, and the paca (*Agouti paca*),

Morelet's crocodile (*Crocodylus moreletii*), and the great curassow (*Crax rubra*), due to their low reproductive capabilities (Castañeda, 1998).

Lack of personnel and budget

The protected area is in a precarious position with regards to personnel and budget. As previously outlined, eight park rangers divide their time between two stations. With 22-day rotations and vacation and sick days, it is infrequent that all eight are ever all working at the same time. Sometimes, as few as two personnel are at work. Counting all the personnel, each park ranger corresponds to approximately 5,600 hectares, offering limited patrolling. The conflicts in the area and its proximity to the Mexican border make it impossible to control the biotope with such a low number of staff. With funding of \$0.33 US per hectare, the budget for the area is the lowest of all the core zones of the Maya Biosphere Reserve (Albacete, 2003b.)

Conflicts with the Master Plan

Conflicts exist within the CONAP designed five-year master plan for 1999-2003 for Laguna del Tigre National Park and Biotope. None of the prescribed measures have been completed. Furthermore, the plan does not correspond with the needs of the area. CECON is composing a new plan, but as of this publication, it has not been finalized. The fact that the master plan permits human settlements and activities inside one of the core zones of the Maya Biosphere Reserve is of questionable legality and goes against the spirit of the Protected Areas Law (Decree 4-89) and the Law Creating the Maya Biosphere Reserve (Decree 5-90). Even still, it would be acceptable to consider management measures that, over a reasonable time span, restore the park to its previous state.

In actuality, the majority of the measures proposed to reduce the threats to Laguna del Tigre are failing. Thus far, there has been no removal of illegal settlers, no monitoring of petroleum mining, and no end to the creation of new agricultural and grazing lands. Site visits and fly-overs performed by ParksWatch staff, in addition to official statistics, show that the biotope continues to lose its forest cover. Land conversion and human settlement are out of control. In light of this, it is evident that the measures proposed in the master plan are not effective. Additionally, unless they further the area's conservation objectives, it is totally unjustifiable to permit extractive industry in the biotope. In the nearly five years since the master plan was approved, the biotope has been further degraded, specifically because of permanent human presence.

Future Threats

The future threats to the park all stem from the possibility that the current threats continue at their current rate or increase. Without immediate solutions, it is probable that the biotope will begin to fail at protecting biodiversity, even before the damage is visible through larger patches of deforestation and larger forest fires.

Recommended Solutions

Some of the area's problems are solvable with increased patrols, vigilance, and enforcement of the law. This is particularly true for illegal hunting, settlements, and resource harvesting. As it stands, even the most minor infractions cannot be controlled without a significant increase in the number of National Police stationed in the area.

Ideally, the biotope will double the number of park rangers on staff, to one per 3,000 hectares, organized into teams that rotate every 22 days. ParksWatch found this ratio and schedule to be sufficient in Tikal National Park (even though it confronts different pressures). Personnel should also be given the ability to carry arms and make arrests. Together, these would be significant measures against lawlessness in the area.



*Another transitional forest habitat. A permanent wetland occupies the center of the photograph, with forest in the background and sawgrass (*Cladium jamaicensis*) in the foreground.*

Reestablishing compliance with the law is absolutely imperative. Despite the permissive atmosphere that has existed since 1997 and the great difficulty such an undertaking would be, this is the only way of recovering control over the area.

Lawlessness

The most urgent threat facing the Laguna del Tigre Río Escondido Protected Biotope is fragmentation brought on by the lawless atmosphere of the park and the surrounding communities. The situation is so grave that CONAP is pursuing the assistance of the military to reestablish order in the biotope. Even this may prove insufficient (Castellanos, 2003, pers. com.). Representatives from CONAP in the Petén have a strategic plan, but neither the funding nor the political will exist to implement it. Without permanent authority enacted for conservation, order and the rule of law will not persist in the area.

It is imperative that CONAP and CECON impose clear rules on the petroleum companies and settlers occupying the park. Illegal actions must be denounced, beginning with the settlers who are appropriating the largest parcels of land.

Permanent Human Settlement

There are two strategies for confronting the settlement of Laguna del Tigre Río Escondido Protected Biotope: either modify the limits of the biotope, excluding those areas with human settlement, or radically change the way the problem of human settlements are handled. The second strategy considers short-term goals like holding the communities within and around the biotope to strictest interpretation of laws, agreements, and rules governing the area;

punishing violators to the fullest extent of the law; confronting armed settlers; and voluntary or forced relocation. These radical strategies are bound to encounter strong opposition, but maintaining the status quo will compromise and destroy the biological character of the biotope at some point in the near future.

The major benefit of modifying the biotope boundaries is that institutional control could be established and part of the park could be saved. The situation in the biotope and Laguna del Tigre National Park is not comparable that of Sierra del Lacandón National Park, where settlements existed prior to the creation of the park (ParksWatch, 2003b). In Laguna del Tigre parks, as with most of the Maya Biosphere Reserve, all the settlers are illegal invaders who settled the area after the parks were created. A major drawback of redrawing the borders is the possibility that the precedent will undermine the entire protected areas system. Similarly, by redrawing the limits, the government concedes that the area is ungovernable and lawless. This solution would require a new community-park relationship, with applied and enforced laws and zero tolerance for illegal activities within park limits.

Establishing a new way of relating to the community will certainly bring about conflict. Strong political will is essential. In order to soften this approach, a land buy-out scheme could be implemented targeting degraded lands in order to slowly recuperate the park. Lack of funding limits this approach - there is little money to support control and vigilance activities, much less buy land. These solutions, though difficult, would send a clear signal that the capacity and will to conserve protected areas exists in Guatemala.

Oil drilling

The petroleum operations should be exhaustively, strictly, and independently monitored. Any indication of contamination or indirect impacts should be denounced to the corresponding authorities and pursued according to the law. CONAP should establish precise rules regarding oil extraction in the biotope and persecute any lack of compliance. These rules should establish fees to cover the cost of monitoring and restoring the ecosystems impacted by the operations. The value of the operations should be evaluated in terms of the short-term financial gains and the long-term impacts of the activities on the ecosystem.



An access route to the biotope. The wall on the right surrounds a major petroleum operation active in the preserve.

Conflicts with the Master Plan

The master plan for the combined Laguna del Tigre Management Entity delineated management boundaries within the park, but these have had no effect in preventing new settlements or controlling illegal activity. When legally questionable methods like this prove futile, they only serve to undermine the state of the whole area. The master plan should carry out the objectives established for a national park and be in line with the Maya Biosphere Reserve's overall master plan. At this time, Laguna del Tigre's master plan does not do either, and therefore needs to be urgently modified. The new plan should establish clear, verifiable goals and it should provide justification for any permissible extractive activity. It must clearly show how permissible extractive activities will contribute to the overall conservation of the area and/or how they will help minimize human impacts and it must specify the goals of such permissible activities. Moreover, adaptive monitoring programs of permissible activities are needed to identify problems and then prescribe solutions.

Conclusions

Laguna del Tigre Río Escondido Protected Biotope is of utmost importance because of its unique biophysical characteristics within the Maya Biosphere Reserve Core Zone. It is not too late to reverse, at least in part of the park, the threats caused by humans both within and around its borders. With immediate intervention and continued efforts, biological diversity and integrity of the park can be saved. Biological studies and records indicate that the protected area is home to potentially stable populations of threatened species, yet there is not enough information in these records to indicate the amount of pressure being placed on those populations.

Because of human pressure, the protected biotope is **critically threatened**; there is an extremely high risk that the protected area will fail to protect and maintain biological diversity in the immediate future, unless urgent solutions are prescribed and implemented. Updating the master plan and resolving the problems caused by human settlements within and around the biotope are critical to removing the threats.

ParksWatch field visits suggest that the biotope suffers from acute human pressure and needs urgent actions. The biggest threats include lawlessness and the impacts of agriculture and ranching, settlements, forest fires, and petroleum drilling. The lack of personnel is significant, especially in the face of the enormity of the conflicts within the zone. Two priorities exist: first, the lawlessness of the area must be decisively confronted. CONAP and CECON should promote this action at the highest level of government and enforcing the full extent of the law will be essential—including denouncing officials, invaders, and communities that try to act against the protected area and following through with punishment. Second, a decision must be made regarding what to do about the human settlements within the park and new relationship must be established with the local communities before their relocation. Additionally, once actions have been initiated to confront the lawlessness and the impacts of human settlements, the petroleum drilling in the park must be addressed with respect to the law. The ferry over the Río San Pedro must be controlled to restrict access to the biotope. The current situation is not sustainable; the administrators already know this and they know it needs urgent attention.

The new master plan for the Laguna del Tigre Management Entity should establish clear objectives and methods that are achievable, measurable, and adaptable. The permissiveness of the current master plan is not acceptable, as it fails to justify its means for conservation, establish goals, or measure its success or failure. Furthermore, it fails to address the changing management needs of a park under pressure. The actions called for in the original plan to confront the major threats to the biotope are failing; authorities must retake control of the biotope.

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