

# Forests of Hope

Avoiding deforestation and combating climate change

## Site profile

### The Maya Forest: Calakmul Region, Mexico

Just north of the Mexico-Guatemala border, covering almost 20 % of the state of Campeche, lies the Calakmul Region, a 2.5 million-hectare area that includes the Calakmul Biosphere Reserve and the Balam-Kin and Balam-Ku State Reserves. Slightly larger than the US state of Delaware, Calakmul harbours the largest tracts of tropical forest in Mexico. The region is vital to conservation efforts in the region as it forms part of the more than 2 million-hectare Maya Forest which extends into Guatemala and Belize.

The photograph shows part of this magnificent site: the ancient Mayan City of Calakmul surrounded by the Maya Forest.



## ■ Basic information

**Country:** Mexico

**Site name:** Calakmul Region

**Location:** In the Yucatan Peninsula of SE Mexico: Campeche State, bordering with Guatemala's Petén Region and Belize. Calakmul is one of numerous IBAs in the Maya Forest, but is one of the largest and most important.

**Site area:** 1 million hectares

## ■ Biodiversity and current status

At 2.5 million hectares, the Maya Forest is one of the world's largest remaining blocks of tropical forest, and the largest in Latin America outside the Amazon Basin. The Calakmul Biosphere Reserve forms the heart of the Maya Forest in Mexico, and is a keystone of Mexico's biodiversity conservation.

The ecological importance of the Reserve is truly astonishing. More than 375 plant species found in the Reserve are found nowhere else on Earth. Its old-growth forests, seasonally inundated lowland forests and wetlands provide refuge for rare and endangered species. More than 350 species of resident and migratory birds have been observed in the Reserve. The Reserve and the broader Maya Forest region are a haven for neotropical migrant birds, with 127 species either resident in or migrating through this region every winter.

The Reserve's forests provide habitat to as many as 1/3 of the three to five billion migratory birds wintering in the Yucatán. These birds travel across diverse terrains and impressive distances to make their homes in the Reserve, where they find high quality habitat for the wintering months.

Numerous neotropical bird species on the 2004 Partners in Flight (PIF) Watch List are documented as occurring in the Reserve, many with significant populations because of the large size of the area and habitat types found there.

The Reserve is considered a priority stopover and wintering habitat site for migratory birds by both Mexican and U.S. experts. It lies within CONABIO's (Mexico's National Commission for the Knowledge and Use of Biodiversity) priority areas and is an IBA based on the presence of restricted-range and threatened bird species. The reserve is also part of the World Bank Mesoamerican Corridor Program in Mexico, where the Calakmul-Sian Ka'an corridor is a focal area.

## ■ Current legal status and site governance

The Calakmul region is located within the municipality of Calakmul. About 90% of the region is protected either by a state or federal reserve. Land tenure is mostly communal. The population is around 20,000 located in more than 80 communities. The region's current population dates largely from the 1940s: immigration from 23 different Mexican states and some Guatemalans have shaped a complex ethnic and cultural mosaic.

Although protected by legal decrees, the region's natural resources are under heavy pressure. Local communities, organized in ejidos, have certain land use rights. For the most part, the ejidos respect the restrictions within the core zones of the reserves, but agriculture and cattle ranching are increasingly entering protected areas. The municipality has legal jurisdiction on land use and land zoning.

The Calakmul Biosphere Reserve is managed by the National Commission on Natural Protected Areas and has a director and a staff of park rangers. The Secretariat of Ecology manages the state reserves, but has few re-



King Vulture, one of the spectacular species of the Calakmul Region avifauna (photo: Paul Wood)

sources to support the area. The reserves have no on-site staff, and all management issues are concentrated in their Campeche offices.

## ■ Threats

**The Maya Forest is a threatened ecosystem.** Many processes are affecting the biodiversity and ecology of the Maya Forest. Some of those cause deforestation directly. Agriculture and cattle farming are the main sources of subsistence for local people; both are shifting methods and as such they promote the clearing of the forest. Because of poor soil and lack of weed control, agricultural fields are abandoned after one or two years, and a new area is cleared. The north-eastern part of the property is the most vulnerable area to land cover change.

The population of the area has fluctuated, but has been experiencing rapid growth since the 1980s, when 60 communities were established; 18 more developed in the early 1990s. The population is now growing rapidly as a result of both immigration and high birth-rates. As a result, human pressure on the area has risen remarkably, especially in the form of agriculture and ranching.

### Drivers of deforestation

**'Slash-and-burn' agriculture.** This impacts particularly on semi-deciduous forest because it is in this vegetation type that the majority of human activities take place. This forest represents one of the most important resources and it is being destroyed and burned to clear land for cultivation. The yields are low because of poor soil quality and erosion with subsequent soil loss, and as a result land is finally transferred from agriculture to intensive ranching. Current agricultural methods lead to forest fires which are a serious threat to the area. Slash and burn cultivation is modifying the connectivity between the north and south zones of the area. Moreover, the use of herbicides and insecticides as part of intensive agricultural practices also has negative effects on the flora and fauna.

**Livestock farming.** Although cattle farming in the area is practiced less than agriculture, it is a very deep-rooted practice, since it provides extra income for the local population. It affects fauna populations because it transforms the habitat of many species. Related problems include introduction of exotic pastures, annual burning, excessive use of agrochemicals, and direct persecution (killing) of jaguars and pumas which are considered a threat to livestock.

**Timber extraction.** The historic extraction of cedar (*Cedrela odorata*) and mahogany (*Swietenia macrophylla*) affected the structure and the composition of the

forest, as well as regeneration ability. Timber extraction now exerts a constant pressure: a great part of the site has suffered and continues to suffer changes in its forest structure. In addition to the direct impacts that the extraction causes, poorly planned construction of roads and gullies contributes to erosion and sedimentation. Forest camps generate garbage and wild animal hunting.

### Unplanned development and expansion of highways.

The construction and expansion of highways, aqueducts, human settlements and tourist infrastructure without planning, bring as disorganized colonization, fragmentation of the forest cover and modification of the water balance. In the area, 99,247 ha (around 1000 km<sup>2</sup>) have been cleared within 2.5 km of the principal highways. Likewise, the fragmentation of the habitat affects the ecological connectivity and the free flow of the fauna. Vehicle transit impacts some fauna directly, as many individuals die, knocked down by cars.

**Fire** Natural fires caused by flammable material accumulation after hurricanes are a natural part of the distur-



The endemic Yucatan Nightjar (Photo: Paul Wood)

bance dynamics of the area; however, deliberately started fires also occur. Only the Calakmul Biosphere Reserve has a Management Plan that deals with fire.

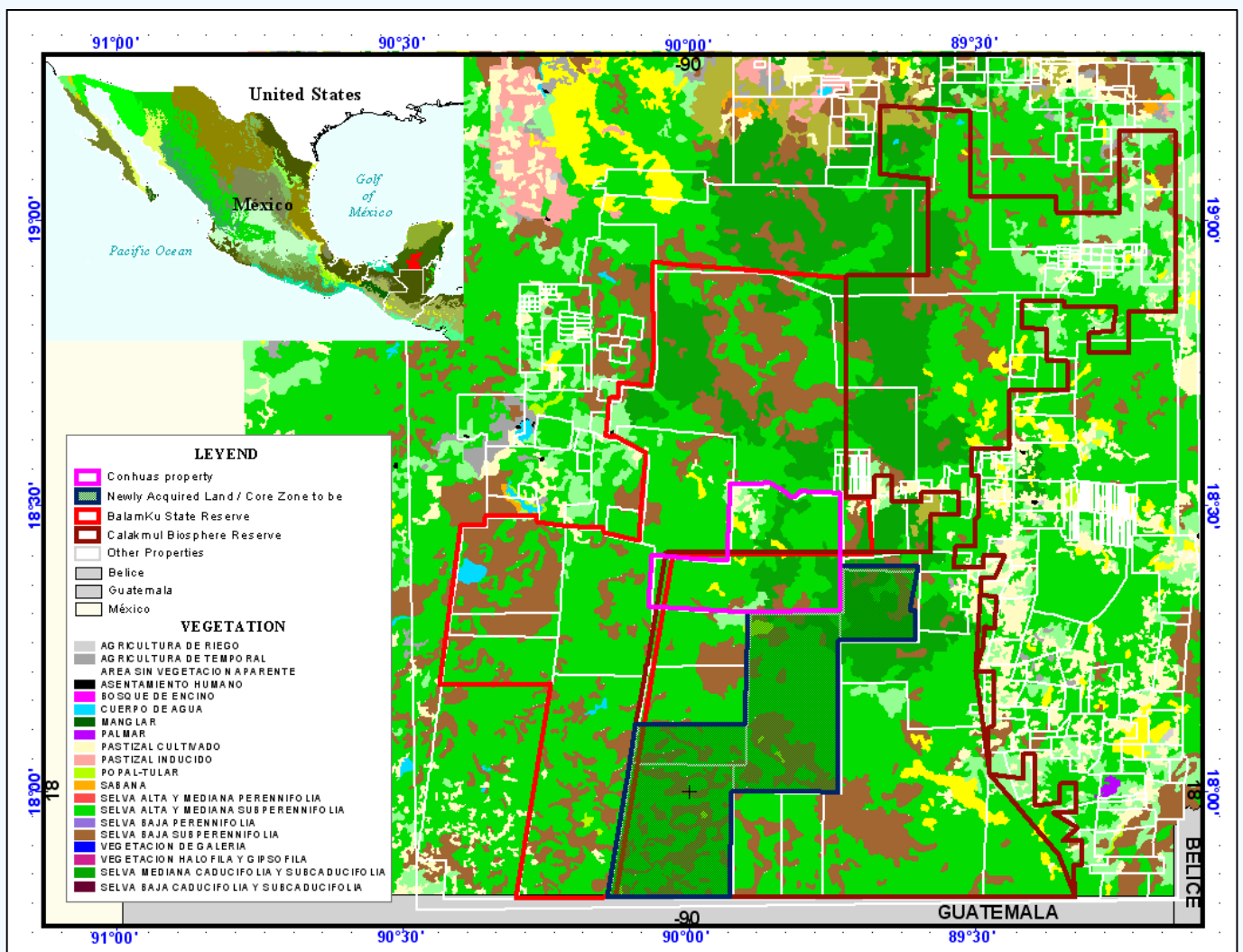
**Other pressures**

**Subsistence hunting and poaching.** The inhabitants of the region have practiced subsistence hunting since they arrived to colonize the forest. This activity is increasingly impacting the wildlife due to population growth. Eighty percent of the hunting by the communities is for their own consumption, while the rest represents sport hunting or poaching.

**Water extraction and modification of hydrology.** Water extraction, dam sediment and agrochemicals, affects both quantity and quality of water, affecting fish, amphibians and aquatic invertebrates. Extraction for human consumption is the main threat for the large water bodies; near human settlements, this is currently uncon-

trolled. Highway building has affected hydrological connectivity, and this is liable to increase, particularly affecting tapir and peccary populations. Many animals are affected by human presence in water bodies, and increased disturbance is likely to disrupt animal movements and lower water tables.

**Lack of coordination between conservation and development organizations.** Activities involving monitoring, human use, and the management of the reserve's natural resources are often in conflict with the conservation of its biodiversity. Some programs permit activities that are incompatible with soil conservation, for example a programme that pays farmers who can demonstrate that they have planted corn or created pastures creates incentives to clear the land. Many government and non-governmental organizations do not collaborate or share information, resulting in ineffective or inefficient programmes, and sometimes duplication of efforts.



**Map of the Calakmul region.** The Calakmul Biosphere Reserve is outlined in brown, and the Balam-Ku State Reserve in red. The red area on the inset shows the location in Central America.



White-fronted Parrot (Photo: Paul Wood)

**Introduction of exotic species.** Exotic species like Tilapia fish, pigs, cows and turkeys (among others) are potential vectors of diseases for wild fauna. In addition, exotic pastures have been established for cattle ranching.

#### ■ History and capacity of the BirdLife Partner

The early efforts to protect the archeological remains of Calakmul were accomplished thanks to the research of the National Institute of Anthropology and History and the Center for Social History Research at the National Autonomous University of Mexico in Campeche. Pronatura (BirdLife in Mexico) had its first contact with the reserve in 1990 through small projects and its research will focus on filling gaps in the basic information about the region and promoting the creation of associated reserves.

As 49% of the mature forests are within communal land (ejidos), these are the key stakeholders to be worked with. In Alliance with The Nature Conservancy, Pronatura began working in the Parks in Peril Project (PiP) Calakmul in 1991. The reserve had no staff, infrastructure or funding for conservation activities. The borders of the reserve crossed private and ejidal lands, resulting in little support for the creation of the reserve. The nearest reserve authorities were located 150 miles away and environmental regulations were difficult to enforce. With PiP funding, however, signs and guard stations were soon installed and radio communications and vehicles were provided for a total of 20 newly hired reserve staff.

PiP revived Calakmul's Technical Advisory Committee (TAC), an organization designed to bring stakeholders and communities together. Today, the TAC — represented by over 70 percent of the local population and members of 43 governmental, academic, social and non-governmental organizations — supports community-

based projects and ensures on-site management at Calakmul.

Pronatura, through its regional representative office Pronatura Península de Yucatán, has created research alliances with national and international organizations, which now support on-going conservation research and monitoring. With PiP support, the TAC analyzed the threats to the reserve by incorporating socioeconomic and land tenure variables as well as wildlife indicators in a mapping project.

When PiP began working with the reserve, the program was the reserve's only source of funding. Upon site consolidation in 1999, Calakmul was receiving federal funds and support from multiple organizations.

In 2002, ProNatura, in close alliance with The Nature Conservancy and CONANP, initiated the purchase and long-term protection of 240,000 ha of communally owned, uninhabited lands in and around the reserve. In November 2004, 150,000 ha of threatened tropical forest in Calakmul were permanently protected under a historic land deal between the Mexican federal government, the Campeche state government, Pronatura Península de Yucatán, four local communities and The Nature Conservancy. The transfer occurred after a complex two-year process that continues with efforts to negotiate and fundraise for the transfer of an additional 90,000 ha in Balam-Ku, a neighbouring State Reserve.

#### Managing Fire

To reduce the threats from uncontrollable fires, and with the guidance of The Nature Conservancy, a Fire Management Plan for the reserve was developed with the participation of Pronatura Península de Yucatán and allies. The plan outlines key activities in fire prevention, fire control, community outreach and education that will equip reserve staff and local communities to protect their forest resources.

In our first year and a half, Pronatura Península de Yucatán have set up a new control and communication center in the Calakmul Biosphere Reserve offices, operated in coordination with municipal, federal and NGO participation. A fire expert has overseen the development of a multi-year training program to build a local fire management team with expertise in wild fire control and ecological fire management.

#### Protecting forests

Pronatura and its allies are working to halt deforestation on private land in and around Calakmul. To do this, they are:

- developing sustainable ecotourism activities
- implementing a forest fire management plan for the reserve
- establishing conservation easements, and
- acquiring critically threatened private land.

### Government–NGO Partnership

Both the National Commission on Natural Protected Areas and the Secretariat of Ecology are joining efforts with municipal authorities and NGOs to mitigate or eliminate the causes of deforestation in the region. There is, however, some politically and socially driven agriculture and development projects that are promoting deforestation.

Important strategies for the region are:

- work with municipal, state, and federal authorities to establish a joint agenda that promotes sustainable resource use and biodiversity conservation.
- apply land protection strategies to reduce habitat fragmentation in priority areas, and ensure effective long term management of this habitat.
- promote changes in forestry practices to reduce negative impacts to forest habitat and provide alternative production opportunities to community landowners.
- promote changes in agricultural and cattle practices to reduce the use of fire and agrochemicals, and reduce soil exhaustion.

### ■ Detailed knowledge of the forest

#### The knowledge base

Archaeological exploration started in the area around the 1950s. Since then, numerous studies have been published about the biodiversity of the region, first to describe the ancient Mayan sites, then specifically for conservation purposes. The federal reserve was established in 1989, and a management plan was published in 2000. The vegetation, land use and its changes through time have been extensively documented. There are studies for many groups of flora and fauna, as well as forestry ac-

tivities, social development and other human activities. Specifically for birds, several studies are now available, starting with the fieldwork carried out in the Calakmul Biosphere Reserve by Mauro Berlanga and Paul Wood from 1989-1993, for Pronatura. Other workers such as the Peregrine Fund, Javier Salgado (University of Michoacán), Andrea Smith (Queen's University), Rafael Herrera (University of Tamaulipas), Griselda Escalona (University of Campeche), and Sophie Calmé (Ecosur) have made further important contributions to our knowledge of the birds of Calakmul.

#### Carbon value of the forest

The rich biodiversity of the Calakmul region gives it immense value, and the large forest area makes it a vast carbon storehouse. Preventing the ongoing deforestation and forest degradation would therefore be a source of major emissions reductions. These have not yet been quantified but there is consensus among experts of the high value for carbon sequestration of the Calakmul forests; an analysis in 1996 reported at least 88% (over 15,000 km<sup>2</sup>) of the total Calakmul area to be mature forest.

#### Other economic values of the forest

One of the main environmental services provided by the forests is water. As the Yucatan Peninsula has no surface water bodies (rivers or lakes), the only source of water is rainfall, with an annual average of 1,076 mm. In a flat, karstic (limestone) environment, Calakmul contains the highest point in the Peninsula, at 350 m. Most of the rainfall percolates through the limestone and provides for water supply for the 5 million inhabitants of Yucatan, through a complex hydrological system. Protecting this "water factory" is essential for places as far away as Cancun, Merida or Campeche.

#### Sustainable financing potential

Recent funding sources for the region include support from the national forest commission (CONAFOR), the native peoples development commission (CDI), the agriculture ministry (SAGARPA) and the Mesoamerican Biological Corridor. Some development has been achieved by introducing nature tourism.

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