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# Conservation Status of Yapacana National Park

## Special Report

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Source of cover photo: [www.zeko-venezuela.de](http://www.zeko-venezuela.de)

## Special Report– Venezuela Yapacana National Park

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<b>Location</b>	Amazonas State
<b>Year Created</b>	1978
<b>Area</b>	320.000 ha
<b>Ecoregions</b>	Tepuis, humid forests of Guiana
<b>Habitats</b>	Tropical moist forest



*Aerial view of Cerro Yapacana  
(Source: [www.gobiernoenlinea.ve](http://www.gobiernoenlinea.ve))*

## 1. Summary

### 1.1. Description

Yapacana National Park is located south of Venezuela in Amazonas state, on the region called “*Penillanura del Casiquiare – Alto Orinoco*”, east of the confluence of Ventuari and Orinoco rivers. The main natural element of the park is *Cerro Yapacana*, a sandstone mountain located close to its southwest limit, which has an altitude of 1,345 masl and the *mesa* or table-top shape that characterizes the *tepuyes* at the south of Venezuela.

### 1.2. Biodiversity

There are diverse vegetation types and an extraordinary richness of flora as a result of the diverse climate, altitude and soil conditions of the park. Vegetation types include: 1) seasonally flooded forests 2) montane and submontane forests of the top and slopes of *Cerro Yapacana*, where endemisms are frequent and 3) a peculiar type of open canopy forests, with trees that belong to the formation “*Caatinga del Río Negro*”, where the species *Pentaherista neotropica* can be found. This is the only species of the family Tetrameristaceae outside Malaysia. In relation to the fauna there are two endemic species: the Yapacana antbird (*Myrmeciza disjunta*) and the little red frog of Yapacana (*Dendrobates steyermarkii*). Threatened species of plants, amphibians, reptiles and mammals are present in this national park.

### 1.3. Illegal mining in Yapacana National Park

Since the 80s, illegal gold extraction is carried out around *Cerro Yapacana*, in areas with slopes from 15 to 30%, small extension (300 m) and next to the erosion slope of the mountain. The perturbed areas are composed by quartz sandstone that contains gold. Diverse governmental institutions such as the National Parks Institute, the Ministry of Environment, the National Guard, the *Fiscalía General de la República* and the *Defensoría del Pueblo* (the last two offices are for the defense of citizens, part of the *Poder Ciudadano*), have taken disciplinary actions to eradicate illegal mining activities, but the lack of vigilance allows the miners to go back to the park.

## 2. Description

### 2.1. Geography

Yapacana National Park is located south of Venezuela in Amazonas state, on the region called “*Penillanura del Casiquiare – Alto Orinoco*”, east of the confluence of Ventuari and Orinoco rivers (MARNR 1992). A large section of this protected area is composed by lowland landscapes, called *penillanuras* because they are a transition between hills and plains, with elevations between 100 and 300 masl (Huber 1995a).

The main natural element of the park is *Cerro Yapacana*, a sandstone mountain located close to its southwest limit, at 40 km of the confluence of Orinoco and Ventuari rivers. It has an altitude of 1,345 masl and the *mesa* or table-top shape that characterizes *tepuyes* at the south of Venezuela (MARNR 1992, Huber 1995a, Holt 1933). *Cerro Yapacana* has a slope area between 10.5 km<sup>2</sup> and 38 km<sup>2</sup> (Huber 1995a).

As the rest of Guiana Shield, it has an igneous - metamorphic plinth formed in the Archean and Proterozoic eras; it has a large variety of rocks, especially granites, gneiss and rhyolites (Huber 1995a, Mendoza 1977, Schubert & Huber 1990, MARNR-ORSTOM 1988). Approximately between 1,600 and 1,000 million years ago, this plinth was covered by sand layers that probably came from surrounding highlands of Gondwana, located towards the east. The main sand layer was compressed and compacted with silica during many successive thermal events, reaching a thickness of several hundred meters. The resultant sandstone and quartzite rocks are known nowadays as Roraima Group (Huber 1995a, Briceño & col. 1990).

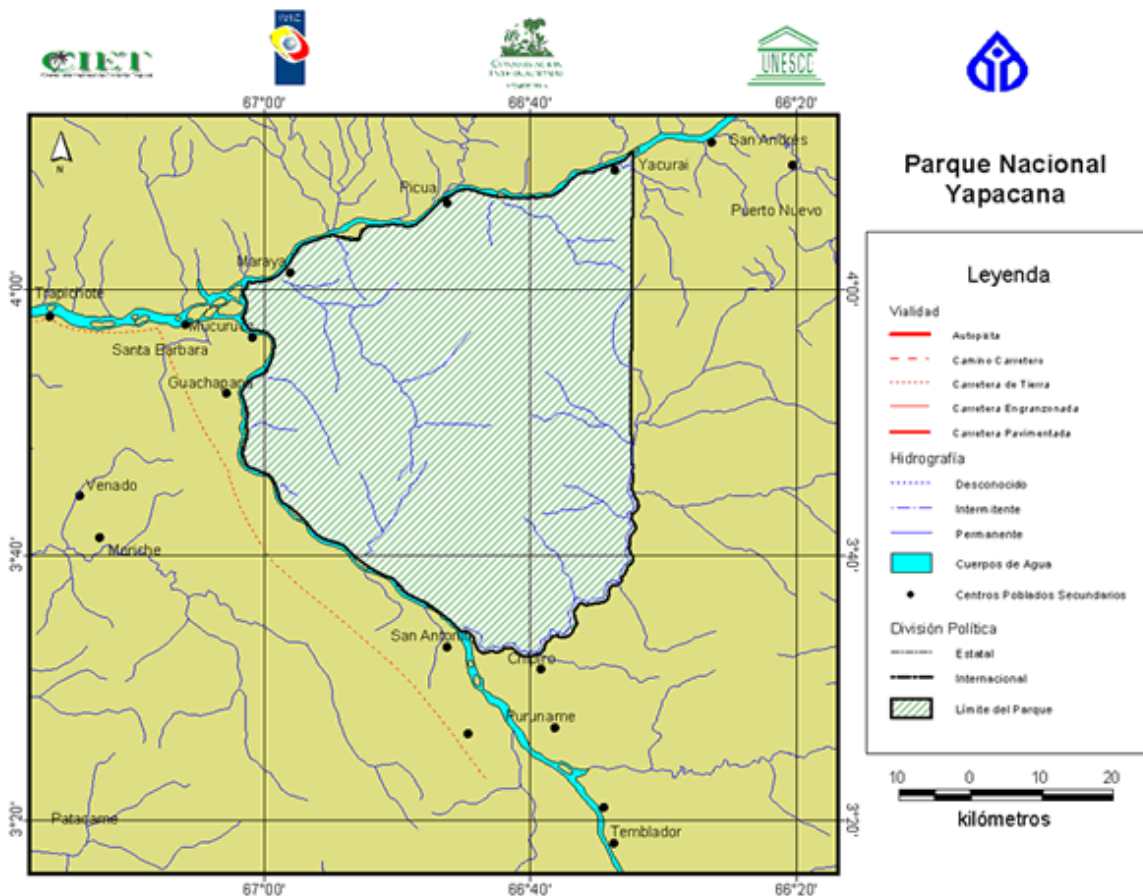
At the confluence of Orinoco and Ventuari rivers, the most common rocks are gneiss, granite and rhyolite from the Archeozoic and Proterozoic and proterozoic quartzites, among others (MARNR-ORSTOM 1988, Weibezahn 1990).

The climate of this national park is tropical rainy according to Köopen classification, or humid megathermic following Thornthwaite (Mattié & col. 2006), with an annual average temperature above 24°C and an annual average rainfall of 2,360 mm (MARNR 1992). Climate varies with latitude. In the *penillanura*, there is high rainfall and evaporation, especially during the short dry season from December to February. On the other hand, at the slopes and the top of *Cerro Yapacana* the climate is submontane with an annual temperature between 18°C and 24°C and a dry season that does not exceed two months (Huber 1995a).

The Orinoco River, the most important in Venezuela, limits the park on the south and west. It is a white water river with a high turbidity and a white grayish color, with a high content of suspended solids (19 mg/L), mainly fine sand and clays,

resulting in low transparency (60 cm), rich in nutrients and neutral pH (Huber 1995a, Mora & col. 2006). Another river, the Ventuari, limits the park on the north. Although many of its tributaries are black water rivers, it is a clear water river that contains low quantities of suspended solids (11 mg/L), with a color from yellow to brown and sometimes emerald green, high transparency (100 cm), low content in nutrients and moderated acidity (Huber 1995a, Mora & col. 2006).

The *Caño Yagua*, a small black water river approximately 100 km long, drains in a plain area of 3,320 km<sup>2</sup> east and south of *Cerro Yapacana*, setting part of the park boundaries. A small lagoon (called frequently *Laguna Yapacana*), is located 30 km east of *Cerro Yapacana*, and it is one of the few lagoons in the lowlands of the Venezuelan Amazon (Huber 1995a).



Map of Yapacana National Park (Source: Zambrano & col. 2004)

## 2.2. Biodiversity



Pastures of *Schoenocephalum cuculatum* (Rapateaceae)  
(Photo © Rafael García)

There are diverse vegetation types and an extraordinary richness of flora as a result of the diverse climate, altitude and soil conditions of the park, especially in the savannas and submontane forests at the top of *Cerro Yapacana* (Huber 1995b). Another interesting issue is the ecological adaptations of some species, showing the floristic connections between the new and old world tropic (MARNR 1992).

In the park, the high evergreen seasonally flooded forests are dominant. They reach an altitude from 30 to 40 m, with a dense and rounded canopy. In these forests the families Apocynaceae (*Aspidosperma*), Fabaceae (*Pterocarpus*), Mimosaceae (*Parkia*), Lecythidaceae, Myrtaceae and Sapotaceae are frequent. They generally have a high richness of palms, especially of the genera *Mauritia*, *Euterpe* and *Manicaria* (Huber 1995b).

*Cerro Yapacana* is considered a *tepuy* with a forested top (Fundación Terramar 1993, Huber 1995b) that has two types of montane forests: 1) submontane forests, tall, dense, evergreen, located at the slopes between 200 and 800 masl, and 2) montane (cloud) forests, short (up to 15 m), dense, evergreen, located at the top between 1,000 and 1,300 masl (Huber 1995b). The latter is a humid forest that has about eight endemic species dominated by *Tepuianthus yapacanensis* (Tepuianthaceae), of small yellow and narrow flowers, together with *Bonnetia tristyla* (Theaceae), *Symplocos yapacanensis* (Symplocaceae) and *Gongylolepis yapacana* (Asteraceae) (Huber 1995b). As a consequence of habitat destruction for the development of illegal mining, the species *Tepuianthus yapacanensis* is critically endangered (Llamozas & col. 2003).





General aspect of pastures and forests  
(Photo © Rafael García)

The vegetation at *Cerro Yapacana* foot is very particular as a result of a sandy and quartzite soil, with high levels of acidity, extremely poor in nutrients and frequently badly drained in spite of its sandy texture. Flooded wide leaf bushy pastures, also known as white sand savannas, grow above this substrate, possibly being the ecosystems with the highest number of species per area in the Guiana lowlands. Similar plant communities are known in other parts of the Guiana Shield: Guiana, Brazil and Colombia, but they have not reached such a high level of differentiation as in the south of Venezuela (Huber 1995b).

Plant cover is extremely variable on this vegetation type, from a few little isolated plants up to dense pastures one meter tall. The species *Schoenocephalum cuculatum* (Rapateaceae) is the main herbaceous component. On these pastures, other frequently found genera of this family include: *Monotrema*, *Cephalostemon* and the endemic species *Guacamaya superba*, which grows together with other species of Xyridaceae (*Xyris*, *Abolboda*), Eriocaulaceae (*Syngonanthus*, *Paepalanthus*, *Eriocaulon*) and Cyperaceae (*Bulbostylis*, *Rhynchospora*, *Lagenocarpus*). Grasses are rare, only some species of *Panicum* and *Axonopus*, as well as the bambusoid *Steyermarkochloa angustifolia* are found (Huber 1985, 1995b).

These pastures usually have a rich and highly specialized bush flora. There are numerous endemic species that belong to the genera *Ouratea* (Ochnaceae), *Ochthocosmus* (Ixonanthaceae), *Lasiadenia* (Thymelaeaceae), *Simaba* (Simaroubaceae), *Ecclinusa* (Sapotaceae), *Macrolobium* (Caesalpiniaceae), *Tepuianthus* (Tepuianthaceae), *Archytaea* (Theaceae), among others. Several of these ligneous plants have developed root swelling to accumulate water, which is the case of some species of *Mabea* (Euphorbiaceae), *Tetrapterys* (Malpighiaceae), *Dulacia* (Olacaceae) and *Ouratea* (Ochnaceae). Generally, bushes have leaves in



low proportion and separated, or thick and coriaceous leaves are densely aggregated at the branch end, as in *Terminalia yapacana* (Combretaceae) and *Pachira sordida* (Bombacaceae). Many of the bushes of *alto Orinoco* pastures have beautiful yellow, white or red flowers. When they flower together with the Rapateaceae and the Xyridaceae, an extremely colorful pasture can be observed (Huber 1995b).

In some areas of the park there is a peculiar open canopy forest, with trees that have long stems and small leaves, which belong to the formation “Caatinga del Río Negro”. This type of forest is associated to sandy soils, very low in nutrients and in areas frequently flooded. It grows in areas with high rainfall and low seasonality; even a few days of drought might cause an important hydric stress in the vegetation, due to the low retention capacity of sandy soils (Medina 1983, Medina & col. 1990). These forests have one or two layers of trees which are 25-30 m tall, with small and thin stems and open canopy. The foliage of these tree species is coriaceous and grayish green; from the air it resembles a deciduous forest (Huber 1995b).

Although they are comparatively poor in species, these forests have a relatively high number of endemic species for lowlands and contain very interesting families from the botanic point of view, such as the Lissocarpaceae (*Lissocarpa benthamii*) and the Tetrameristaceae (*Pentamerista neotropica*), because this family has species only in Venezuela and Malaysia. The dominant trees belong to the families Caesalpiniaceae (*Eperua leucantha*), Euphorbiaceae (*Hevea pauciflora*, *Micrandra spruceana*, *M. sprucei*), Sapotaceae (*Manilkara* spp., *Pradosia schomburgkiana*), Rubiaceae (*Calycophyllum obovatum*, *Retiniphyllum* sp., *Pagamea coriacea*), Clusiaceae (*Clusia* spp.), Aquifoliaceae (*Ilex* spp.), Annonaceae and Myristicaceae. Because of the favorable light conditions, the underbrush is relatively well developed, while the lianas and epiphytes are almost absent (Huber 1995b).

The high and evergreen forests grow over the elevated shores of Orinoco and Ventuari rivers and they can be flooded eventually. The genera *Campsandra* (Caesalpiniaceae) is the most frequent, together with other species such as *Pterocarpus amazonica* (Fabaceae), *Tabebuia barbata* (Bignoniaceae), *Ceiba pentandra* (Bombacaceae), *Buchenavia tetraphylla* (Combretaceae), *Myrciaria dubia* and *Calycolpus calophyllum* (Myrtaceae) and *Gustavia hexapetala* (Lecythidaceae) (Huber 1995b).

Recent flora inventories at the confluence of Orinoco and Ventuari rivers, have reported 357 vascular plant species (16 are endemic to Amazonas state) in the flooded forests (Rodríguez & col. 2006) and 285 species in the mainland forests of low and middle Ventuari river. From the latter, two species are new for science (*Coccoloba* sp. and *Rudgea* sp.) and there are seven new registers for Venezuela flora (Aymard & col. 2006).

In the following table, a group of endemic species of Amazonas state are shown. They were collected in several rivers of the park, in areas of flooded vegetation:

Species	Environment
<i>Aspidosperma pachypterum</i>	Bush
<i>Capsiandra guayanensis</i>	Riparian Forest
<i>Capsiandra macrocarpa</i> var. <i>macrocarpa</i>	Riparian Forest
<i>Dolioscarpus carnevaliorum</i>	Bush
<i>Ilex spruceana</i>	Bush
<i>Marlierea suborbicularis</i>	Bush
<i>Ouratea evoluta</i>	Riparian Forest
<i>Sauvagesia linearifolia</i> subsp. <i>linearifolia</i>	Bush
<i>Stachyarrena reticulata</i>	Riparian Forest
<i>Turnera argentea</i>	Bush

Source: Rodríguez & col. (2006)

There are no inventories of mammals but it is known that the following species live in the park from poaching records: deer (*Mazama* sp., *Odocoileus virginianus*), pacas and agouties (*Agouti paca*, *Dasyprocta* sp.), armadillos (*Dasyproctidae*), peccaries (*Pecari tajacu*, *Tayassu pecari*), monkeys (*Cebidae*), capybaras (*Hydrochoerus hydrochaeris*) and tapirs (*Tapirus terrestris*) (León-Mata & col. 2006).

This park is considered an Important Bird Area (IBA), because the following bird species are present: Blackpoll Warbler (*Dendroica striata*), Northern Waterthrush (*Seiurus noveboracensis*), Black Curassow (*Crax alector*), Tawny-tufted Toucanet (*Selenidera nattereri*), Yellow-billed Jacamar (*Galbula albirostris*), Yapacana Antbird (*Myrmeciza disjuncta*) and the migratory Yellow-billed Cuckoo (*Coccyzus americanus*) (BirdLife International 2007).

The most recent studies on the biodiversity of Yapacana National Park have been made at the confluence of Orinoco and Ventuari rivers, which also included areas outside the protected area. About 200 bird species have been found, a relatively low number. Within these species the highlights are the Yapacana Antbird and two new subspecies records for Venezuela: Brown-throated Parakeet (*Aratinga pertinax chrysogenys*) and the Dusky-billed Parrotlet (*Forpus sclateri sclateri*) (Lentino 2006).

Regarding the herpetofauna, 51 reptile species and 29 amphibian species have been reported. The little red frog of Yapacana (*Minyobates steyermarki*, synonym of *Dendrobates steyermarkii*) is endemic and exclusive of Cerro Yapacana slopes. There are oral records of the Orinoco crocodile presence (*Crocodylus intermedius*), a threatened species (Señaris y Rivas 2006). Through poaching records it is known that the spectacled caiman (*Caiman crocodilus*), the dwarf caiman (*Paleosuchus* sp.), the red-spotted river turtle (*Podocnemis erythrocephala*) and the big headed Amazon River turtle (*Peltocephalus dumerilianus*) live in the park (León-Mata & col. 2006).



Little red frog of Yapacana  
(Source: [www.fpolar.org.ve](http://www.fpolar.org.ve))

These are the main results of other biodiversity inventories:

- Benthonic macroinvertebrates: 42 families, total richness above 50 species and includes aquatic insects, mollusks, annelids, planarians and crustaceans (Pereira & col. 2006).
- Crustaceans: 14 decapod and two parasite isopod species, among others (Pereira & García 2006).
- Fishes: 245 species, being the dominant group the Characiformes order with 147 species, followed by the Siluriformes with 50 species (Lasso & col. 2006b).

The following table summarizes the threatened flora and fauna species that live in the park and its category of threat, both in Venezuela and internationally:

Common name	Scientific name	Category of threat in Venezuela	Category of threat international
<b>Plants</b>			
-	<i>Pentamerista neotropica</i>	Vulnerable	-
-	<i>Tepuianthus yapacanensis</i>	Critically endangered	-
<b>Amphibians</b>			
Little red frog of Yapacana	<i>Dendrobates steyermarki</i> ( <i>Minyobates steyermarki</i> )	Least concern	Critically endangered
<b>Reptiles</b>			
Orinoco crocodile	<i>Crocodylus intermedius</i>	Endangered	Vulnerable
Red-spotted river turtle	<i>Podocnemis erythrocephala</i>	Vulnerable	Vulnerable
Big headed Amazon River turtle	<i>Peltocephalus dumerilianus</i>	Least concern	-
<b>Mammals</b>			
White tailed deer	<i>Odocoileus virginianus</i>	Least concern	Least concern
Peccary	<i>Tayassu pecari</i>	Least concern	Least concern
Capybara	<i>Hydrochoerus</i>	Least concern	Least concern

	<i>hydrochaeris</i>		
Tapir	<i>Tapirus terrestris</i>	Vulnerable	Vulnerable
Paca	<i>Agouti paca</i>	Least concern	Least concern

Sources: IUCN (2006), Rodríguez & Rojas-Suárez (1999), Llamozas & col. (2003)

### 2.3. Management

Yapacana National Park was created on December 12, 1978 to protect areas with valuable scenic and scientific resources, including important phytogeographic and savannas with specialized pioneer vegetation, a testimony of the evolution of the vegetation of the floristic connections between the palaeotropic and the neotropic (República de Venezuela 1979). Its administration and management belongs to the National Parks Institute (*Instituto Nacional de Parques*, INPARQUES). Nevertheless, authorizations to carry out activities will be given by the Planning Department of the Ministry of Environment (*Dirección General Sectorial de Planificación y Ordenación del Ambiente del Ministerio del Poder Popular para el Ambiente*), with the previous opinion of the National Commission for *Tepuy* Protection (*Comisión Nacional de Protección a los Tepuyes*) and INPARQUES (República de Venezuela 1991).

The national park area is estimated in 320,000 ha (MARNR 1992) and its limits are described through geographic references on the parks' decree of creation (República de Venezuela 1979). INPARQUES has the responsibility to demarcate the limits on the ground, but this activity has not been carried out yet.

There are many restrictions because it is a national park, being forbidden activities: Sport and commercial hunting, introduction and raise of domestic animals, massive sport or leisure events, bearing of firearms, extraction of flora and fauna species and mining activities. Allowed activities include excursionism and scientific research. Yapacana does not have its own Ordering Plan and Use Regulations, so the previously mentioned regulations are established by the Regulations of Administration and Management of National Parks and Natural Monuments (República de Venezuela 1989a).

Currently Yapacana National Park does not have either infrastructure for vigilance and control or permanent personnel assigned to the area.

## 2.4. Human influence



House at the indigenous community of Cárida  
(Source: [www.focus.it](http://www.focus.it))

The areas close to *Cerro Yapacana* have never had permanent human settlements. The first reference comes from Alejandro de Humboldt, who visited the area in 1800 through the Orinoco River. He refers to the navigation from *La Esmeralda* to the mouth of Atabapo River as an “arid enumeration of vacated rivers”. On the other hand, according to data collected by García (1987), the researcher Otto Huber did not find any indigenous community living in this area in 1976. Diverse records agree on that permanent human occupation close to *Cerro Yapacana* started with the mining activity in the 80s (García 1987, Romero 2004).

Nevertheless, Yapacana National Park has been referred as part of the traditional distribution area of Piaroas (MARN 2001) and other indigenous groups such as the Maco, Puinave and Baniva are also found (Bevilacqua & col. 2006). These are the number of inhabitants for each indigenous group:

Indigenous Group	1982	1992	2001
Piaroa	215	161	124
Maco (subgroup Piaroa)	27	32	37
Puinave, Baniva	0	7	9

Source: Bevilacqua & col. (2006)

According to the National Statistics Institute (*Instituto Nacional de Estadística*) data the population density for the Atabapo Municipality is very low, which can be observed in the data of some of the towns located within or around the protected area:

Town	Number of inhabitants
Maraya*	31
Kanaripó*	1
Picúa*	57
Piedras Blancas*	6
Macuruco	117
Manaka	16
Santa Bárbara	7
Merey	17
Cocuy	32

\*Within the park  
Source: INE (2001)

At the confluence of Orinoco and Ventuari rivers, both indigenous and *criollo* populations use natural resources for food. The speckled pavon (*Cichla temensis*) accounts for 87% of the fish resources for local indigenous consumption and to be sold to illegal gold miners. The tetra (*Brycon* spp.), the piranha (*Serrasalmus manueli*), the payara (*Hydrolycus* sp.), the trahira (*Hoplias malabaricus*), the sorubim (*Pseudoplatystoma* sp.) and the pellona (*Pellona* sp.) are other fished species (León-Mata & col. 2006).

Among poached animals are deer, pacas, agouties, armadillos, peccaries, monkeys, capybaras, tapirs, spectacled caimans, dwarf caimans, red-spotted river turtles and big headed Amazon River turtles. They comprise 67% of the domestic and economic consumption of indigenous communities. Bird poaching activity varies throughout the year: Curassows (Cracidae) and tinamous (Tinamidae) are poached from April to December, while Spix's Guan (*Penelope jacquacu*), parrots (Psittacidae) and toucans (Ramphastidae) are poached from May to October (León-Mata & col. 2006).

On shifting cultivation plots the main crops are yucca, yam, plantain and banana; sometimes the crops are corn, pineapple, and sugar cane (León-Mata & col. 2006).

## 2.5. Tourism

The rivers of Yapacana National Park are within the areas of Amazonas state where tourism activities are allowed but under regulations that seek to protect the environment and to respect the indigenous communities (República de Venezuela 1990). Both the National Constitution (República Bolivariana de Venezuela 1999) and the Organic Law for Indigenous Communities (República Bolivariana de Venezuela 2005), establish that every activity to be developed in territories where indigenous communities live requires that tourism operators have the approval of its members.

The tourist attractions of this park are the valleys formed in the lowlands of *Cerro Yapacana*, the *caño Rita* because it is a good place for birdwatching, the beaches of Orinoco and Ventuari rivers and the dwarf palm forests. It can be reached

through Orinoco and Ventuari rivers and by plane from *Santa Bárbara del Orinoco* (Quintero s/f, CNTI 2007). Nevertheless, visits are not recommended because the presence of illegal gold miners makes the park an unsafe place.

An activity that is growing in Ventuari River, on the northern limit of Yapacana, is sport fishing of speckled pavon because of the size and weight of the fishes, and the fishing effort (León-Mata & col. 2006).

## 2.6. Conservation and research

There are only a few research studies in this protected area (Carlsen 1999). The first expedition to *Cerro Yapacana* was made by the National Geographic Society on the 1930 decade (Holt 1933). Later, two important botanic expeditions to *Cerro Yapacana* were made by Bassett Maguire, Richard Cowan and John Wurdack in 1951 (they also explored the wide leaf pastures) and by Julian Steyermark and George Bunting in 1970. However, no information of the vegetation types of this interesting mountain has ever been published and what is known comes from collected specimen data (Huber 1982, 1995b), so more research is needed.

At the end of the 1970 decade, Otto Huber carried out several studies on wide leaf pastures on the low and middle watershed of Ventuari River (Huber 1982, 1985, 1995b). The highest numbers of plant specimens used to describe new species for science has been found in these white sand savannas (Huber *personal communication*).

On 2003, a biodiversity assessment of aquatic ecosystems was performed at the confluence of Orinoco and Ventuari rivers, including areas of Yapacana National Park. This scientific activity was supported by Conservation International and *Fundación Cisneros*, with the collaboration of professionals from *Fundación Terra Parima*, *Fundación La Salle de Ciencias Naturales*, *Universidad Central de Venezuela* and *Colección Ornitológica Phelps*. Among the main results are 18 new records for Venezuela and at least 14 new species for science (Lasso & col. 2006a).

One of the research priorities should be on pastures ecology, because the high level of endemism requires modern and more sophisticated methods to explain this phenomenon. Phytosociological and palaeoecological studies would also help understanding evolution processes. In addition, studies of the fauna are needed because little is knowm about its ecology (Riina & Huber 2003).





A view of Cerro Yapacana from Orinoco River  
(Source: [www.focus.it](http://www.focus.it))

### 3. Illegal mining in Yapacana National Park

#### 3.1. Documental and historic description of illegal mining and its impact

- INPARQUES Expedition Report (García 1987)

*Date:* March 13 – 17, 1987.

*Background:* After receiving denounces formulated at the International Meeting “National Parks towards the Third Millenium”, INPARQUES carried out an expedition led by Rafael García, who was INPARQUES Regional Director of Amazonas state.

*Exploitation sites:* Miners’ camp was at the south of *Cerro Yapacana*.

*Impacts:* The miners’ camp had 104 people, mainly indigenous communities of Piaroa, Guajibo and Curripaco, together with some *criollos* and foreigners. A microwatershed was destroyed and during the airplane flight a clandestine airport was detected in a savanna, where the airplanes with gold buyers land, paying the miners Bs. 150 (US\$10) per gram.



Gold exploitation site  
(Photo © Rafael García)

- INPARQUES Expedition Report (García 1988)

*Date:* September 21 – 27, 1987.

*Exploitation sites:* The following are both active and abandoned exploitation sites close to *Cerro Yapacana*:

- Mina Nueva (south).
- Caño Rita, Caño San Andrés, Guedenjake (west).
- Platanillal (north).
- Cocina (northeast).

The extension of each camp varies between 0.5 and 2 ha. From a geomorphological point of view, they are in the contour of *Cerro Yapacana*, in areas of short extension (300 m.), with slopes from 15 to 30% and next to the erosion slope of the mountain.

The perturbed areas are composed by quartz sandstone that contains gold with a superficial layer of organic soil. Gold is sold or exchanged for food and liquors in these areas and in *San Fernando de Atabapo*, *Puerto Ayacucho* and *Puerto Inárida*.

*Exploitation system:* Illegal logging and rock movement to extract the subyacent sand where the mineral is. When miners cannot move the rocks, they open caves under them; later the material is transported for washing and meshing. In *Mina Nueva* they use mercury.

*Impacts:* Furrows and cavities of variable depth, modification of water bodies and formation of new ones by discharge of water with many sediment which increases water turbidity.



*River flow deflection and pollution  
(Photo © Rafael García)*

- *Ministry of Environment (Ministerio del Ambiente y de los Recursos Naturales Renovables) Report on the problems caused by mining exploitation (MARNR 1988)*

*Date:* February 2, 1988.

*Exploitation system:* Criollo and foreigner (Colombians and Brazilians) miners practice mining with tools and mechanic implements such as power pumps, cranes and electrical plants and in some cases they use mercury. Gold is either exchanged or sold: The exchange of gold for appliances is done in *San Fernando de Atabapo*, while gold is sold *Puerto Ayacucho*, *San Fernando de Atabapo* and other places, with prices from Bs. 100 to 250 (US\$ 7 to 17) per gram.



*Gold from Yapacana  
(Source: [www.focus.it](http://www.focus.it))*

- Ministry of Environment (Ministerio del Ambiente y de los Recursos Naturales Renovables) Report (Baloa 1989)

*Date:* June 1989.

*Summary:* Approximately 1,500 people are involved in this activity in Amazonas state, 50% of them are indigenous communities (Guajibo, Piaroa, Curripaco), 25% are *criollos* and 25% are foreigners (Colombians, Dominicans and others). Since 1983, the activity turned more aggressive but is still under control.

*Exploitation system:* Both rudimentary and technified methods, they use dynamite and firearms. The vegetal layer is removed; land and rocks of different sizes are moved, causing river flow deflection. Mercury and large amounts of water are used. Most of the mineral exploited goes to Colombia.

*Impacts:* River flow deflection, high level of sediments on rivers, deforestation of large areas. Mercury pollution affects all food chain, mainly the aquatic fauna, which becomes a pollution agent because it accumulates mercury that is later consumed by humans. On exploitation sites, endemic illnesses are frequent (malaria, diarrhea, vomit, fever, among others).

- Press article (Torres 1990)

*Date:* November 12, 1990.

*Summary:* Describes an operation carried out on September 1990 by the *Destacamento de Fronteras N° 61* of the *Guardia Nacional*. It is pointed out that this is not the first operation for *Cerro Yapacana* and the “Yapacana mines are as old as the laziness of authorities”.

*Impacts:* Deforestation, excavations, river flow deflection, logging and fires, construction of huts.

- SADA - Amazonas Report (Silva 1995)

*Exploitation sites:* On *Cerro Yapacana* slope: *Mina Platanilla*, *La Cocina*, *Caño Rita*, *Caño Bocón*, *Caño Jabón*, and *Mina Nueva*. In savanna areas with non flooded bushy pastures: *Maraya*, *Piedras Blancas*, *Moyo*, and other areas with unknown names. In other areas: *Yagua* and *Caño Cotúa*.

*Location of miners' camps:* At two kilometers of the exploitation area to avoid being found by authorities at night.

*Population:* *Criollos*, indigenous communities and foreigners in fluctuating numbers, with a higher population during dry season and lower during the rains. In

*Maraya* about 2,000 people were permanent residents, but some left the place because of bad living conditions and others (mainly Colombians) because there was news of other places with more quantity of gold. Among indigenous peoples are Puinabis, Curripacos and Guajibos, the majority from Colombia, and also Piaroas, Macos and other groups from Venezuela. Their job is to hunt and fish to provide food and supplies for miners.

*Exploitation system:* The extractive activity starts with manual deforestation (axe or power saw) and the soil is cut progressively using tip and shovel, until they reach the gold. This layer is separated from the rest of the soil and the gold is separated by the concentration method, based on specific weight differences of materials, or by washing with water using mesh and power pumps or manually.

*Miners' transportation:* People and supplies are transported in different ways:

*Fluvial:* Access to the park is gained by several rivers, which are afluent of Orinoco or Ventuari rivers. There are also clandestine trails, to avoid *Guardia Nacional* mobile posts (*alcabalas*). Supplies transport is made during rainy season mainly, because the water level of rivers raises, making navigation more favorable.

*Terrestrial:* Some trails penetrate the forest between *Caño Pimichin* up to Orinoco River to gain access to the park. This route is commonly used by foreigners.

*Aerial:* Small airplanes that come from Colombia perform low level flights and throw packages with dry supplies in agreed places; usually in the route of *Caño San Miguel*.

- *Vicariato Apostólico de Puerto Ayacucho Report* (Oficina de Derechos Humanos 1998)

One of the main mining places in Amazonas is still located in the area *Yapacana – Maraya*.

- *Defensoría del Pueblo Report* (Defensoría del Pueblo 2003)

*Date:* May 14 - 17, 2003.

*Background:* The Regional Office of *Defensoria del Pueblo* (*Defensoría Delegada* of Amazonas state, an office for the defense of citizens' human rights), received several denunces from indigenous communities of Atabapo Municipality, on illegal mining and its consequences in areas of Yapacana National Park. Several denunces were made to the *Destacamento N° 94* of the *Guardia Nacional* in *San Fernando de Atabapo*, and no answer was received. The denuncers indicate that the *Guardia Nacional* is an accomplice in the illegal gold mining activity, which is allowed in exchange of benefits, including gold. The inspection was made together with the Amazon and Environmental Prosecutors (*Fiscalía Superior del estado*



*Amazonas and Fiscalía Nacional con Competencia Ambiental*), the Main Custom of Puerto Ayacucho (*Aduana Principal de Puerto Ayacucho*), the Environmental Guard of the National Guard (*Guardia Nacional*) and the Ministry of Environment.

*Exploitation site*: Plain area on the limits of *Cerro Yapacana* slope.

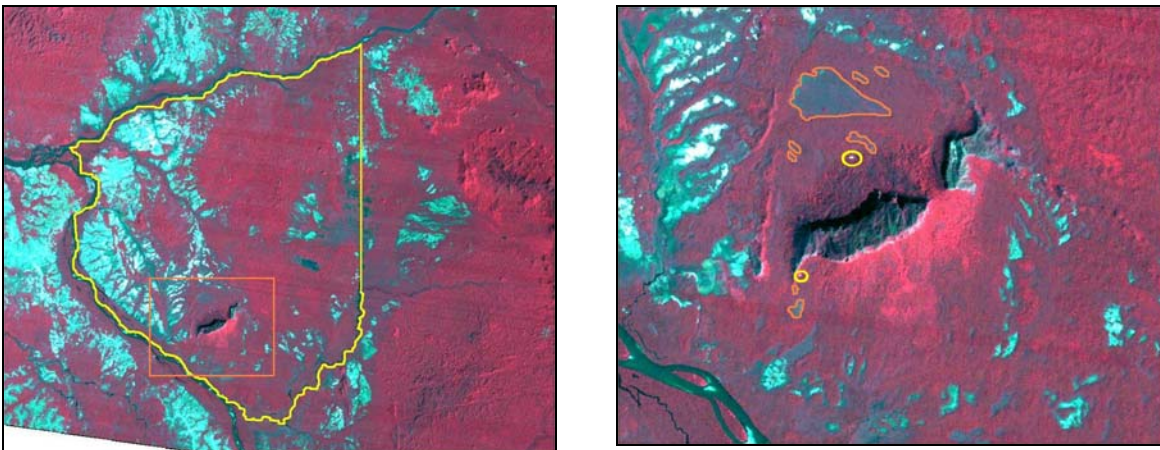
*Impacts*: In *Mina Nueva* about 5 ha. were deforested in a dense high forest area with trees over 25 m. Soil removal, river flow deflection, solid waste accumulation (including mercury). Deforestation favors erosion and desertification.

- *Biodiversity evaluation in Orinoco and Ventuari rivers* (Lasso & col. 2006a)

Some indications on illegal mining were observed in rivers close to the confluence of Ventuari – Orinoco Rivers and close to Yapacana National Park. Highly toxic chemical compounds used for mining (such as mercury) could affect the water physical chemistry and the composition of biological communities that live in these aquatic ecosystems (Mora & col. 2006).

### 3.2. Descriptive and historic analysis of vegetation cover and land use with Landsat (1991 and 2000) and Aster (2007) satellite images

The main changes observed on satellite image patterns are around *Cerro Yapacana* and apparently they could be related to the presence of mining activity. In the following infrared images, the red color shows forested areas that have dense vegetation, while the areas with bluish and white color show areas with lower density such as pastures and savannas.



*Landsat Images of Yapacana National Park (left) and Cerro Yapacana (right) 1991*

On the 1991 infrared images two small white areas can be observed. This color indicates that there is no vegetation on this area, so it could mean deforested areas where there is extense gold exploitation. These areas are highlighted with

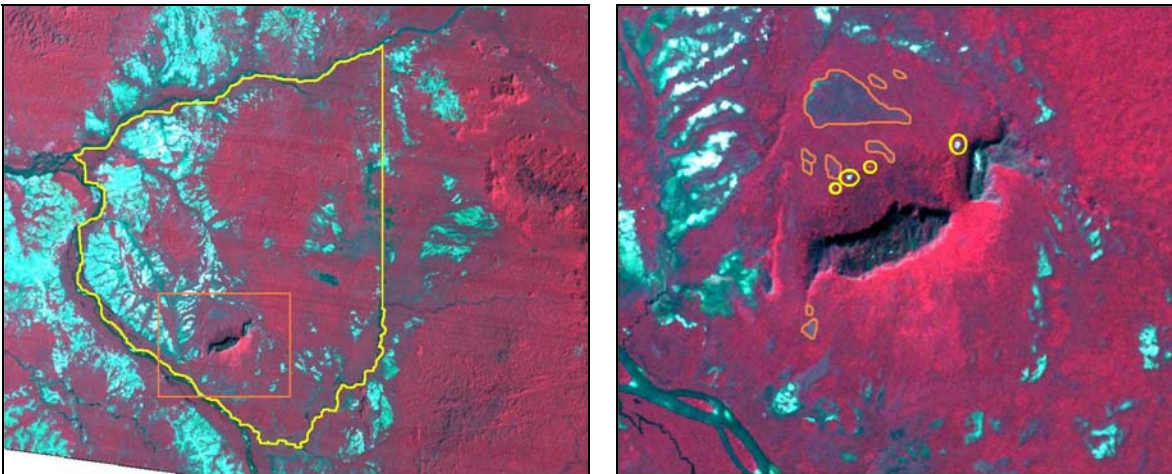
yellow circles on the images; one is located north of *Cerro Yapacana* and the other to the southwest. The latter matches the description of the miners' camp reported by García (1987).

García (1988) reports other exploitation sites (active and abandoned) for that year:

- Mina Nueva (south).
- Caño Rita, Caño San Andrés, Guedenjake (west).
- Platanillal (north).
- Cocina (northeast).

However, the absence of geographic data has not allowed locating these sites on the satellite image. On the other hand, a deforested area needs to have an extension of at least one hectare to be detected on satellite images.

On 1991 image, areas with a slightly different color to the matrix that surrounds it (demarcated in orange) can also be observed. They are close to gold exploitation sites, so they could mean an alteration of the original vegetation by human activities (selective logging, small scale mining). Nevertheless, it could also mean that these are areas with less dense vegetation, so a field visit is needed to be sure about the vegetation type and land use.



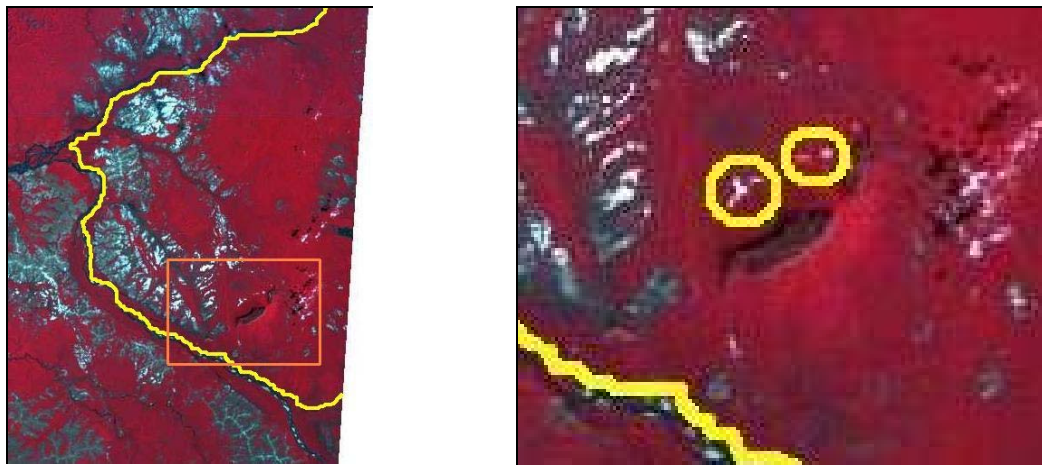
*Landsat Images of Yapacana National Park (left) and Cerro Yapacana (right) 2000*

In 2000, there are new areas without vegetation and one of them has expanded in the north of *Cerro Yapacana*. The report made by Silva (1995) points out different exploitation sites:

- In *Cerro Yapacana*: Mina Platanillal, La Cocina, Caño Rita, Caño Bocón, Caño Jabón, Mina Nueva.
- In non-flooded bushy pasture areas: Maraya, Piedras Blancas, Moyo, and other places with unknown names.
- In other areas: Yagua and Caño Cotúa.



Neither the size of perturbed areas nor its geographic coordinates are reported, so they cannot be located on satellite images. On the other hand, the exploitation sites on pastures can be masked by the white sand soils where this vegetation type grows.



*Aster Images of Yapacana National Park (left) and Cerro Yapacana (right) 2007*

On 2007 Aster images, the white areas at the north of *Cerro Yapacana* are larger, even some of them have fused. The complete image sequence shows a cumulative impact evidenced by vegetation changes, mainly at the north of *Cerro Yapacana*. Nevertheless, exploitation sites can be observed on the images when they are larger than one hectare and when there is previous information about its location. For these reasons it is important to carry out a comprehensive field visit that will allow:

- To detect mining areas under one hectare.
- To detect small scale mining that could be occurring under forest canopy.
- To differentiate areas with perturbed vegetation from areas with low density natural vegetation.

### 3.3. Governmental actions taken in relation to illegal mining

- Ministry of Environment (Ministerio del Ambiente y de los Recursos Naturales Renovables) (MARNR 1988)

A commission integrated by the Ministry of Environment, the Ministry of Energy and Mines (*Ministerio de Energía y Minas*), the Ministry of Defense and INPARQUES, carried out a preliminary diagnose and made a workplan to adopt preventive and disciplinary measures about the situation of three national parks of Amazonas, including Yapacana.

- Presidencia de la República (República de Venezuela 1989b)

The President signed a decree to prohibit mining in Amazonas Federal Territory, as well as suspending any mining activity that was carried out at that moment.

- Guardia Nacional (Torres 1990)

Date: September 7, 1990.

*Summary:* Capture and eviction of illegal miners carried out by *Guardia Nacional*. Venezuelan and Colombian miners were reoffenders but were set free almost immediately. It seems that miners signed an agreement committing to not going back to work on mining activity at *Cerro Yapacana*, but in a flight made by *El Nacional* reporters it was observed that the slopes of the mountain were invaded again.

- Guardia Nacional (Silva 1995)

*Summary:* Workers of the *Destacamento de Fronteras Nº 61* of the *Guardia Nacional* arrested an unspecified number of miners.

- Defensoría del Pueblo, Ministerio Público and others (Defensoría del Pueblo 2003, Rivero & Escalona 2003)

*Summary:* Although authorities were received with shots by miners, 24 people were arrested: Nine Venezuelans, fourteen Colombians and one Brazilian; no indigenous communities were found. Two firearms, one electric plant, five “soak up” machines (“chupadoras”), three power pumps and 80 grams of gold were confiscated. The 60 houses of *Mina Nueva* shantytown, three bars, markets, restaurants and brothels built with wood and palms from the deforested area were burned-out.

- Guardia Nacional (Romero 2004)

*Summary:* On routine operations performed by *Guardia Nacional* between February 1, 2004 and August 19, 2004, a total of 32 Venezuelans, 69 Colombians and 44 Brazilians were arrested, together with a large amount of equipment and supplies. The *Operación Yapacana 01-2004* was a special operation carried out between August 19 and 24, and one Venezuelan, four Colombians and six Brazilians were arrested, 44 miners’ camps were destroyed and equipment and supplies were confiscated. The small number of arrested people suggests that miners had the technology to monitor *Guardia Nacional* movements or that they were informed before the operation was carried out.

- Circuito Judicial Penal del Estado Amazonas (Poder Judicial 2005)

*Summary:* Environmental prevention measures were ratified and extended:

- To prohibit the pass of heavy extraction machinery such as dredges, horizontal machinery and power pumps, as well as its accessories.
  - To make a request to the *Defensoría del Pueblo* to control the power pumps and hoses used by indigenous communities.
  - To disseminate the problem of illegal mining in Amazonas state at the national level.
  - To request *Universidad de Los Andes* for support of students specialized on forest and watershed management.
  - To request INPARQUES a short term environmental improvement study for the mining areas located on Yapacana National Park and other areas of Amazonas state.
  - To request ONIDEX (Venezuela's Identification Office) to maintain a photographic archive of people arrested on illegal mining activities.
- *Inspection: Guardia Nacional and other institutions* (Camacho 2005)

*Inspection:* Carried out on May by the *Guardia Nacional, Circuito Judicial Penal, Fiscalía, Defensoría del Pueblo, Asamblea Nacional* and Ministry of Environment. There were no miners and all illegal mining activity was stopped.

*Visited sites:* Approximately 10,000 hectares. Landing on the exploitation sites *Platanillal, Caño Rita* and *Cacique*. Later, the indigenous community of *Cárida* was visited.

### 3.4. Current situation

It is not clear and evident that mining activity has stopped in Yapacana. Some witnesses indicate that it is still active on *Caño Maraya* area, where environmental damage such as mercury pollution continues. Atabapo's inhabitants point out that during dry season the mining activity is higher than in rainy season, as it was observed in the last inspection of May 2005. On the other hand, the *Comunidad de Religiosas Salesianas de Atabapo* has received declarations from indigenous communities that continue working in the Yapacana (Camacho 2005).

### 3.5. Other threats to biodiversity protection

Illegal gold mining at the surrounding forests and savannas of *Cerro Yapacana*, has caused an important impact as a result of constant burning and excessive poaching (Huber 1995b). Sometimes fires have climbed up the southwestern slopes, where secondary bushes have replaced the original forest. The forest at the top of *Cerro Yapacana* is apparently still pristine (Rodríguez & col. 2006).

Although aquatic environments show little or no perturbation, it seems that the most imminent threat is commercial and sport fishing without regulations (Pereira & García 2006). In fact, there is competition for fishing resources between the demand to feed shore communities and miners' camps, and sport fishing that is growing mainly on Ventuari River (León-Mata & col. 2006). The speckled pavon (*Cichla temensis*) is the main fished species both for indigenous local consumption and to be sold at illegal gold mining camps (León-Mata & col. 2006). The indigenous communities have moved mainly to provide food and supplies to the miners (Silva 1995).

Some signs of human influence have been detected on places such as *Caño Moyo* (affluent of Orinoco), probably as a result of the extraction of *Attalea racemosa* leaves, used to build the roofs of local houses (Rodríguez & col. 2006).

#### 4. Conclusions and recommendations

Illegal gold mining activity on Yapacana National Park is more than 20 years old. Throughout these years several reports have described the situation by indicating exploitation sites, penetration and circulation routes within the park, presence of airstrips, periods when the activity is more intense and when supplies are transported, as well as other relevant information for authorities.

So far the illegal mining activity in this national park has been fought through operatives carried out by several governmental institutions: *INPARQUES*, *Ministerio del Ambiente*, *Guardia Nacional*, *Fiscalía General de la República* and *Defensoría del Pueblo*, among others. Disciplinary actions have been taken and some people have been arrested, including indigenous peoples, *criollos* and foreigners.

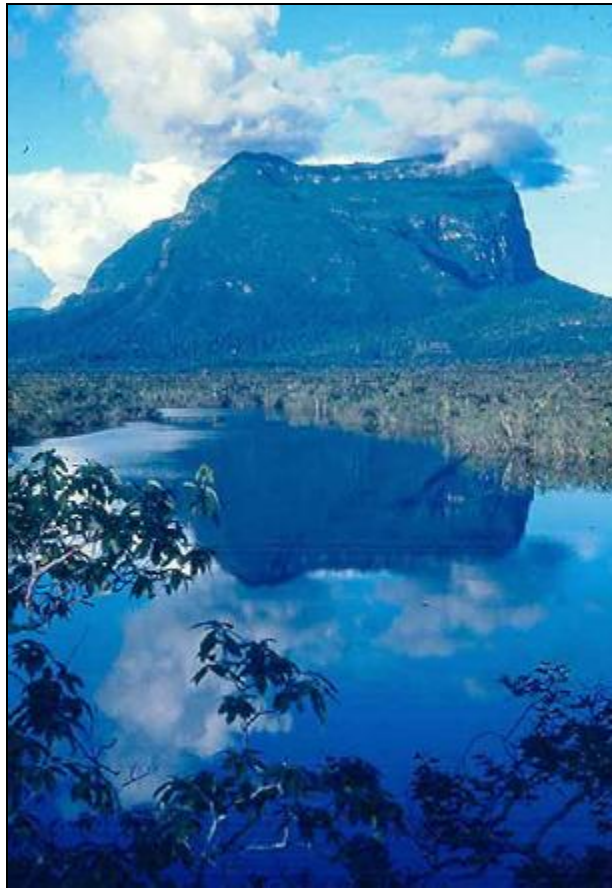
These actions also need to be preventive to avoid penetration of illegal miners and camps. Reports have produced enough data to establish a vigilance and control plan where *INPARQUES* and the *Guardia Nacional*, the Army component in charge of Environmental Guard, should be involved.

Since Yapacana National Park is located in remote areas at the south of the country, it is vital to have a large budget to provide transport equipment, materials and personnel to perform the vigilance and control of the area. It is important to maintain guard posts on strategic sites at Orinoco River, which most miners use to penetrate the park. Funds should be increased to provide personnel and equipment to the *Guardia Nacional* post in *Santa Bárbara del Orinoco* and another post is needed in *San Antonio*, to the south of the park on the Orinoco River shore.

The impact caused by mining on Yapacana ecosystems needs a deep evaluation, because perturbations such as river flow deflection, mercury use, deforestation,

soil removal and increase of poaching and illegal fishing to feed the miners have been detected.

If illegal gold mining continues, social effects on indigenous communities and environmental damage on fragile ecosystems will mean a large cost for Venezuela. This national park has endemic species which are not well studied, so more research is needed.



*Cerro Yapacana*  
(Photo © Otto Huber)

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