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## **DEFORESTATION IN PROTECTED AREAS: CASE STUDY OF LOS HAITISES NATIONAL PARK**

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### **SUMMARY**

Los Haitises national park is one of the main natural areas considered in the conservation policies of the National Parks Directorate and has also represented a national challenge in the search for combined solutions in order to preserve it from social, economic, and environmental conflicts that have surrounded it for over two decades.

The area enclosed by this national park, its limits and management category have changed over the past 24 years. From 1968 to 1976 it had an area of 20,800 ha and was classified as a forest reserve. After 1976 the same area, still much smaller than the Los Haitises karstic formation, was designated a national park, acquiring the consequent management specificities. In 1993 the protected area was enlarged by a presidential decree to 1,600 km<sup>2</sup>. The worsening of the impacts in the park in the last 10 years, its social and economic origin, its isolation, and its cultural and biological significance forced the National Parks Directorate to take the necessary steps towards a Management Plan elaboration. Negotiations with different sponsoring organizations yielded a cooperative agreement between the Dominican Republic and Spain in order to establish new administrative measures as well as specific conservation projects.

### **1 INTRODUCTION**

Los Haitises national park is located in the northwest region of the Dominican Republic in an area exposed to the alisios winds with a high orographic rainfall (2,700 mm per year). The average wind speed ranges from 0.7 to 1.0 km/hour. The average days of rain in the year is the highest in the country: 45% of the days in the year. The average temperature of Los Haitises ranges from 25.5 to 32.5°C, and the humidity from 70 to 75%. There are no significant seasonal variations, although between daytime and nighttime there exists an 8 to 10°C difference.

From the hydrographic point of view, Los Haitises and its influence area has two drainage basins: Yuma, with an area of 5,495 km<sup>2</sup>, is more than 200 km long; and in Los Haitises, Sabana de la Mar y Miches, the underground currents and streams that flow from the limestone floor of the karst, form important aquifers that run to the bay and favour the growth of the mangroves in its coastal area (98 km<sup>2</sup>).

Geomorphologically speaking, its main territory consists of a limestone massive with a very particular topography and elevation, which give way to numerous cave processes, constant underground water flow, a very special coastal profile, and also great ecological fragility.

The vegetation of Los Haitises national park is one of its biggest natural assets. In it has been detected the highest biological diversity index in plants from the Dominican Republic as well as the Caribbean. This has been reflected in the high endemism rates and an inventory which comprises more than 700 vascular plants within the park.

The plant cover in Los Haitises is formed by different plant associations that extend from altitudes of 40 to 380 meters, composed of tropical rain forest (at sea level) and second-growth forest. There can also be found some coastal rock associations like: rocky shore, key and cliff vegetation, mangroves, and sea grasses.

Among the animal species present in the park's territory, many are important because of their endemism or endangered status, such as the solenodon (*Solenodon paradoxus*), manatee (*Trichechus manatus*), dominican parrot (*Amazona ventralis*), Ridgway's hawk (*Buteo ridgwayi*) and green turtle (*Chelonia mydas*).

## **2 CONFLICTS AND IMPACT**

The area of Los Haitises, because of its isolation and difficult access, had been an undisturbed natural region until the 1940's. The first agricultural and cattle-raising settlements appeared in the 1970's located in the surroundings of the protected area.

These first settlements are a consequence of migratory processes, especially from the eastern part of the country where the structure of land ownership made it hard to have access to it, and also because of the isolation of the Los Haitises region. Nevertheless, this small-scale subsistence migration did not produce major environmental damages until the 1980's. At this time the development and encouragement of the growing of yautía (a locally grown tuber) for commercial purposes originated a production system that commanded constant clearing of forest areas of the park in order to keep a minimum productivity.

It is estimated that the transformation of the original vegetation by 1989 reached over 80% of the park's territory, and that between 1984 and 1989 25% of the original vegetation had been lost.

Thus, the National Parks Directorship, responsible for the conservation of protected areas and the farmers with commercial purposes in Los Haitises (not the subsistence farmers) entered into a conflict around the use of the park and its ecological transformation which demanded for its solving a deep knowledge of the processes involved. These processes comprise economic and social problems as well as very intricate institutions that far exceeded the domain of the National Parks Direction.

## **3 MEASURES AND INSTITUTIONAL PROTECTION POLICIES IN LOS HAITISES**

For the past ten years, the National Parks Directorship made use of the resources and measures that from the legal and institutional standpoint were within its reach in order to stop the impact levels and ensure this exceptional national park's protection, but with little effectiveness as can be seen by the results.

### **3.1 The 1980's - Adoption of protection measures and education programs**

In the 1980's different protection measures were adopted, especially in education around the surrounding communities. Also some measures were taken for control and surveillance.

The topography of Los Haitises, the lack of surveillance posts in the areas of major penetration, the scarce personnel and means to keep the required control were not enough to hold back the pressure of the communities and the incentive to create yautia production on a commercial scale and exportation.

In 1988 and 1989 with the aid of the Spanish Agency for International Cooperation, a rural development project was elaborated that included production activities, courses in domestic animal raising, and implementation of high-yield crops in areas outside the park. This did not obtain the desired results due to the incentives the farmers received from long-cycle crops, which had excellent market prices and ensured demand.

### 3.2 Management failures and response

In 1990 the environmental deterioration of Los Haitises showed some alarming signs of activities totally incompatible with the park, such as cattle ranching within its boundaries and crops in an industrial scale of yautía, cocoa bean, corn, beans, and coffee. More than 200 families were established inside the park and more than 300 in its surroundings but still profiting from the park's lands for agriculture and cattle ranching.

The surveillance mechanisms from the Forest Directorship had shown their inefficacy in keeping the required protection, causing at the same time numerous social conflicts that they were unable to handle.

### 3.3 National leadership: an Inter-institutional Commission

In 1992, by a decision of the President taken after many inter-institutional meetings around the case of Los Haitises, the area of the park had to be occupied by the military forces, who conducted a census of all the inhabitants and properties in order to establish the basis for the necessary equilibrium between the park's conservation and the socio-economic situation of the farmers that lived in or profited from it.

To achieve this equilibrium of social well-being and conservation, a decree created an Inter-institutional Commission consisting of the head representatives of:

- National Parks Directorship
- Forest Directorship
- Dominican Ministry of Agriculture
- Dominican Agrarian Institute
- Public Constructions Ministry
- Farmers from Los Haitises Association

The National Parks Directorship proposed a decree project to limit once again Los Haitises National Park from the management plan and with the purpose of giving maximum protection to the territory of Los Haitises, comprising the marine areas, mangrove forests, sea grasses, caves, and karstic platform (1,600 km<sup>2</sup>), making it the biggest of the Caribbean region.

The Commission, based on the census of the houses and population, programmed the following actions:

- Acquisition of State land for distribution among the families that would be evicted from within the park.
- Construction of 800 housings, of which 700 have already been distributed.
- Construction of a clinic and a school.
- Providing of health and education equipment.
- Banning of productive agricultural and cattle ranching activities, and designation of food compensation until all the projects are achieved. This food compensation has represented a fiscal sacrifice of a million pesos per day.
- Agricultural extension activities destined to make attractive alternative crops, land uses, and irrigation in those areas destined for agricultural activities.

## 4 CONCLUSION: SPECIFIC CONSERVATION MEASURES

Los Haitises has made the National Parks Directorship profoundly revise its conservation policies, with a bigger participation of the park's neighboring communities and their leaders, farmers and fishermen's associations, local authorities, etc.

For the regeneration of the vegetation cover in Los Haitises, a reforestation plan in which species from other areas would be introduced was rejected in order to maintain its natural biological diversity. Due to our experience in other disturbed areas, we decided that the vegetation could recover without our interventions, as was the case for the coastal rain forest.

Before taking any reforestation measures that could affect the biological diversity, we are waiting for the results of studies from Cornell and Indiana Universities which deal with vegetable succession in parcels at Trepada Alta and Los Limones, in order to measure its regeneration capacities before introducing any foreign vegetation.

In the literal area, new fishing regulations have been established to eliminate some non-discriminating techniques through meetings with fishermen's associations in order to control the use of San Lorenzo Bay and to allow sustainable fishing and regulated ecotourism as well as protection and surveillance of the mangrove and mogote forests.

The strengthening of the relations between the National Parks Directorship and the neighbouring communities has taken different approaches: meetings, conferences, training courses, and support to the surrounding socio-economic infrastructures, as well as technical assistance and development of fisheries and agricultural projects.

The surveillance infrastructure, so desperately needed in the interior and literal areas of the park, will be constructed this year as well as the park's boundaries. New guardposts will be built and sufficient personnel will be assigned with the collaboration of the Forest Directorship.

As far as equipment is concerned, a radio communication system that will link different areas will be installed in order to complement the boats from the coastal area and increase surveillance.

This whole process, unique in our country, isn't over yet, so we cannot analyze its results. Nevertheless, with the specific measures taken, the sustainability policies that have taken hold with a strong political will and at a very high economic cost could potentially lead to a model solution for conservation, ensuring living standards for a population even in the case of an endangered protected area with very big social conflicts.

**Appendix 1. Territorial Organization.**Population nucleus

Administrative posts

Nucleus linked to protected area

Nucleus surrounding the protected area

Roads

Interior roads

Nearness roads

Surrounding roads

Activities and uses

Rain forest

Forest regeneration

Controlled agroforestry

Cattle ranching

Mangrove

Wetlands

Rice fields

**Appendix 2. Soil Uses in the Los Haitises National Park in 1984**

	km <sup>2</sup>	%
NATURAL AREAS WITHOUT TRANSFORMATION	320.36	24.11
Forest areas	185.56	13.97
Mangroves	96.90	7.30
Wetlands	37.90	2.83
IMPACTED AREAS	176.23	13.26
Cleared forest for migratory agriculture	18.06	1.36
Cleared forest mixed with fallows and regenerating forest	54.68	4.12
Natural regeneration areas	94.69	7.13
Eroded and degraded areas	8.90	0.67
AGRICULTURAL AND CATTLE RANCHING AREAS	616.51	46.39
Crop areas	22.53	1.70
Fallow areas	50.25	3.79
Crop areas with different uses	186.27	14.02
Pastures and migratory agriculture	193.12	14.54
Impacted areas under different uses	164.34	12.37
STABLE CROP AREAS	215.95	16.25
Rice fields	159.95	12.03
Sugar cane fields	35.34	2.67
Cocoa bean fields	19.85	1.50
Coconut fields	0.81	0.06
TOTAL	1,328.83	100.00

**Appendix 3. Soil Uses in the Los Haitises National Park in 1989**

	km <sup>2</sup>	%
NATURAL AREAS WITHOUT TRANSFORMATION	270.13	20.84
Forest areas	135.63	10.25
Mangroves	97.00	7.33
Wetlands	37.50	2.83
IMPACTED AREAS	199.13	15.04
Cleared forest for migratory agriculture	78.50	5.93
Cleared forest mixed with fallows and regenerating forest	42.00	3.17
Natural regeneration areas	69.60	5.26
Eroded and degraded areas	8.90	0.67
AGRICULTURAL AND CATTLE RANCHING AREAS	638.23	48.23
Crop areas	21.36	1.61
Fallow areas	34.15	2.58
Crop areas with different uses	173.26	13.09
Pastures and migratory agriculture	227.21	17.16
Impacted areas under different uses	182.25	13.77
STABLE CROP AREAS	215.95	16.32
Rice fields	159.95	12.08
Sugar cane fields	35.34	2.67
Cocoa bean fields	19.85	1.50
Coconut fields	0.81	0.06
TOTAL	1,323.31	100.00

**Appendix 4. Comparative Chart of Land Use (1984-1989)**

	1984		1989		Variat %
	km <sup>2</sup>	%	km <sup>2</sup>	%	
NATURAL AREAS WITHOUT TRANSFORMATION	320.26	24.11	270.13	20.04	- 15.68
Forest areas	185.56	13.97	135.63	10.25	- 26.99
Mangroves	96.90	7.30	97.00	7.33	0.00
Wetlands	37.90	2.83	37.50	2.83	0.00
IMPACTED AREAS	176.23	13.26	199.00	15.04	+12.92
Cleared forest for migratory agriculture	18.06	1.36	78.50	5.93	+334.60
Cleared forest mixed with fallows and regenerating forest	54.68	4.12	42.00	3.17	- 23.19
Natural regeneration areas	94.69	7.13	69.60	5.26	- 26.50
Eroded and degraded areas	8.90	0.67	8.90	0.67	0.00
AGRICULTURAL AND CATTLE RANCHING AREAS	616.51	46.39	638.23	48.23	+3.52
Crop areas	22.53	1.70	21.36	1.61	- 1.61
Fallow areas	50.25	3.79	34.15	2.58	- 32.04
Crop areas with different uses	186.27	14.02	173.26	13.09	- 6.98
Pastures and migratory agriculture	193.12	14.54	227.21	17.16	+17.65
Impacted areas under different uses	164.34	12.37	182.25	13.77	+10.90
STABLE CROP AREAS	215.95	16.25	215.95	16.32	0.00
Rice fields	159.95	12.03	159.95	12.08	0.00
Sugar cane fields	35.34	2.67	35.34	2.67	0.00
Cocoa bean fields	19.85	1.50	19.85	1.50	0.00
Coconut fields	0.81	0.06	0.81	0.06	0.00
TOTAL	1328.83	100.00	1,323.3	100.00	1,323.3

$$\% \text{ Variation} = \frac{\text{km}^2 84 - \text{km}^2 89 \times 100}{\text{km}^2 84}$$

\*Difference in extension due to small adjustments of space

Source: Elaborated from interpretation of aerial photographs made by the Natural Resource Inventory Department, Dominican Ministry of Agriculture.