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U.S. Agency for International Development

Dominican Republic

Biological Diversity Assessment

December, 1988

THE DOMINICAN REPUBLIC

Biological Diversity Assessment Report

December, 1988

PREFACE

This Biological Assessment Report was conducted in response to the U.S. Congress's amendment to Sections 118 and 119 of the Foreign Assistance Act which require Country Development Strategy Statements and other country plans to include analyses of (1) the actions necessary in that country to conserve biological diversity and tropical forests, and (2) the extent to which current or proposed AID actions meet these needs. Since the information necessary to respond to this requirement did not exist in the Dominican Republic, USAID/DR elected to conduct a background assessment of the country's forests and biological resources, and from this develop the information required by Amendments 118 and 119.

AID/W provided a general scope of work which USAID/DR subsequently modified to better fit the Dominican Republic's unique conditions. USAID/DR was assisted in this effort by a team of scientists from the Instituto Superior de Agricultura (Contract No. 517-0000-I-00-7167) to collect, analyze and synthesize the information needed, and provide USAID/DR with specific recommendations.

The completion of this report required the assistance of many people, both directly and indirectly. First, the team was required to pool their expertise and experience in order to write the various chapters of this report. Secondly, USAID/DR and the team are grateful to all those who provided the required information. Their dedication to natural resource conservation, in the face of much public indifference and lack of financial support, is encouraging. Dr. Wm. Kevin Darrow, forestry consultant for JACC/RD, helped the team express, in a language not their own, the ideas and facts collected in this study. Mrs. Maritza Diaz dedicated long hours to the final preparation of this manuscript.

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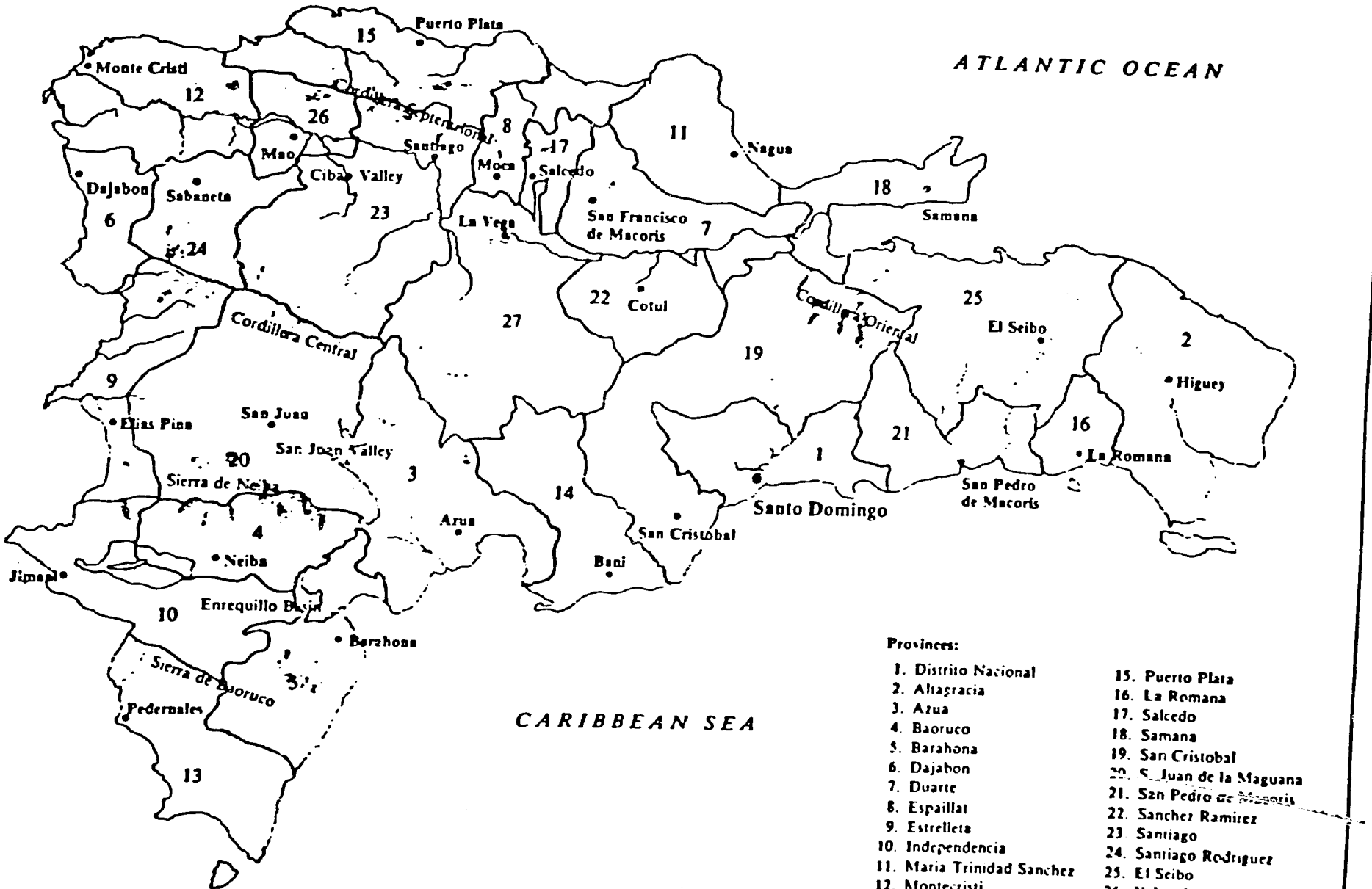
LIST OF ABBREVIATIONS USED

CIBIMA/UASD	:	Centro de Investigaciones de Biología Marina de la Universidad Autónoma de Santo Domingo (Marine Biology Research Center of Universidad Autónoma de Santo Domingo)
CONATEF	:	Comisión Nacional Técnica Forestal (National Technical Forestry Commission)
DGF	:	Dirección General Forestal (General Forestry Directorate)
DNP	:	Dirección Nacional de Parques (National Parks Directorate)
DRP/SEA	:	Departamento Recursos Pesqueros de SEA (Fishing Resources Department of SEA)
DVS/SEA	:	Departamento de Vida Silvestre de SEA (Wildlife Department of SEA)
FAO		Food and Agriculture Organization, United Nations
FIDA II	:	Fondo Internacional de Desarrollo Agropecuario (International Fund for Agricultural Development)
GTZ	:	Gemeinschaft fur technishe Zusammenarbeit Sociedad Alemana de Cooperación Técnica (German Society for Technical Cooperation)
IAD	:	Instituto Agrario Dominicano (Dominican Agrarian Institute)
INDRHI	:	Instituto Nacional de Recursos Hidràulicos (National Institute for Hydraulic Resources)
ISA	:	Instituto Superior de Agricultura (Higher Institute of Agriculture)
MAMMA	:	Fundación Dominicana Pro-Investigación y Conservación de los Recursos Marinos (Dominican Foundation for the Research and Conservation of Marine Resources)
MNHN	:	Museo Nacional de Historia Natural (National Museum of Natural History)
MGD	:	Marina de Guerra Dominicana (Dominican Navy)

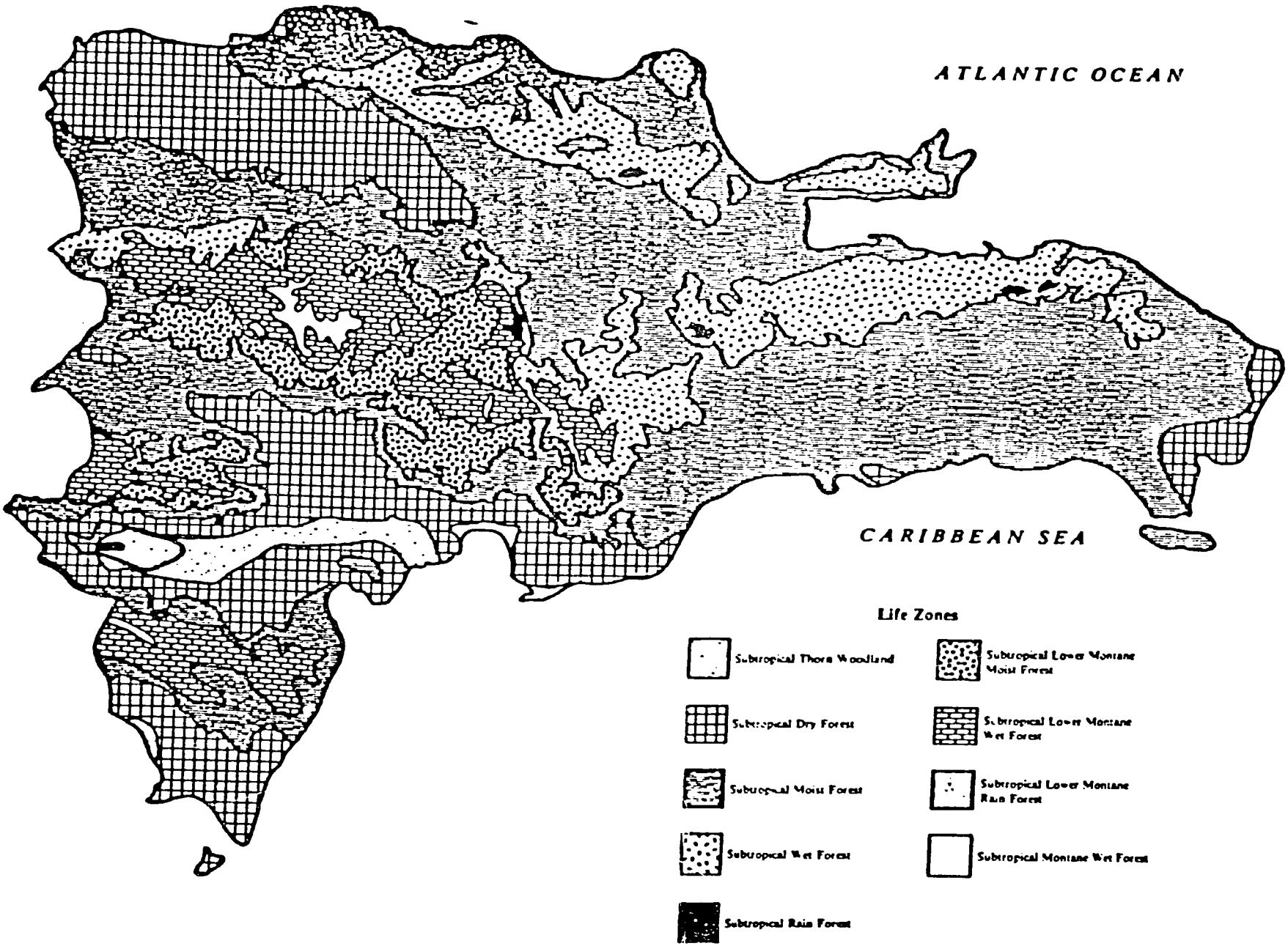
NMFS	:	National Marine Fisheries Service
OAS	:	Organization of American States
PROGRESSIO	:	Fundación para el Mejoramiento Humano (Foundation for Human Improvement)
PUCMM	:	Pontificia Universidad Católica Madre y Maestra (Catholic University, Santiago)
SEA	:	Secretaría de Estado de Agricultura (Secretariat of State for Agriculture)
SEOPC	:	Secretaría de Estado de Obras Públicas y Comunicaciones (Secretariat of State for Public Works)
SURENA	:	Subsecretaría de Estado de Recursos Naturales (Subsecretary of State for Natural Resources)
UASD	:	Universidad Autónoma de Santo Domingo (Autonomous University of Santo Domingo)
UNPHU	:	Universidad Nacional Pedro Henriquez Ureña (National University of Pedro Henriquez Ureña)
USAID/DR	:	U.S. Agency for International Development/Dominican Republic
USGS	:	United States Geological Survey
WWF	:	World Wildlife Foundation

Figure 1



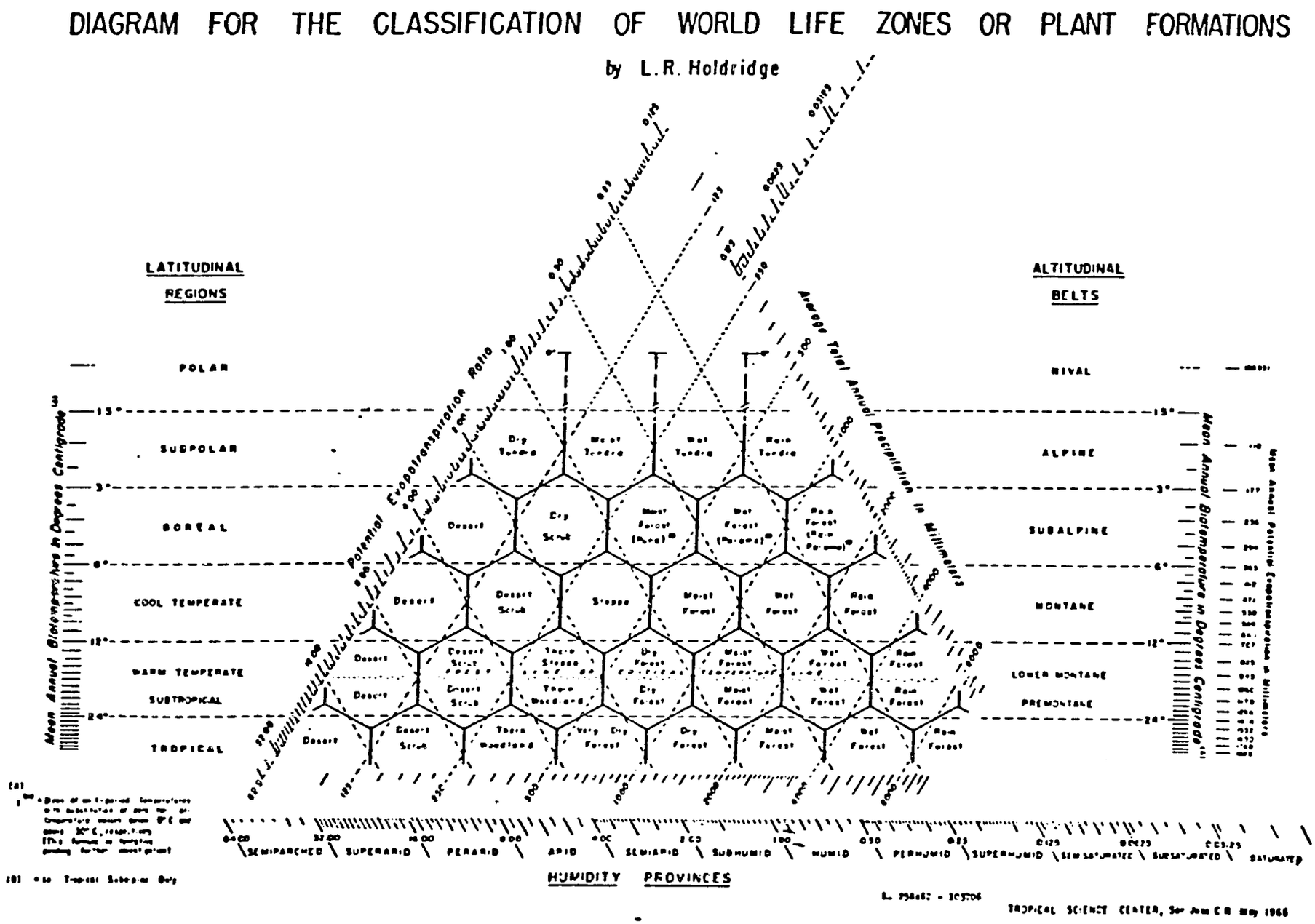
Political divisions and geographic features of the Dominican Republic.

Figure 2



Holdridge Life Zones in the Dominican Republic. (From: OAS, 1967).

Figure 3



Life Zone diagram for the Holdridge Classification of World Plant Formations. (Courtesy of Tropical Science Center, San José, Costa Rica.)

EXECUTIVE SUMMARY

1.0 INTRODUCTION

The execution of this report was handicapped by the lack of reliable and adequate information concerning the country's biological resources and efforts to conserve them. The Government agencies responsible for these resources failed to implement most of their planned conservation programs, and kept poor records of those they did manage to execute. This problem stems from a lack of professionalism and continuity within these agencies, and has made this assessment focus more on the institutional problems as they impact the country's biological resources rather on the resources themselves.

2.0 LEGISLATIVE AND INSTITUTIONAL STRUCTURES AFFECTING BIOLOGICAL RESOURCES

The Dominican Government issued its first decree to conserve natural resources in 1884. Since then more than 126 legal actions have been promulgated to protect and regulate the use of the country's natural resources. The Government has established a National Park Directorate (DNP), a National Forest Directorate (DGF), a National Technical Forestry Commission (CONATEF), a fisheries service (DRP/SEA), and a wildlife service (DVS/SEA), and given these agencies adequate legislative powers to carry out their assigned functions. Unfortunately many of their assigned powers and responsibilities overlap those of other government agencies causing confusion as to who is in charge of what. For example, the DGF is responsible for forested lands within the national parks. Other government agencies, such as the Agrarian Reform Institute (IAD), the Banco Agricola and the National Institute for Hydraulic Resources (INDRHI), often implement projects which result in the exploitation of protected areas and the clearing of forestlands, and whose impact is contrary to conservation and protection efforts. These problems arise from the absence of a comprehensive Government policy to protect and conserve the country's unique biological resources, as well as the lack of any mechanism for agencies to coordinate their activities and resolve conflicting interests.

The above agencies with responsibilities to protect and manage the country's biological resources are hampered by lack of funds and a staffing system based on political patronage rather than technical or managerial qualifications. The Government budget allocations for these agencies total less than 1% of the entire national budget. Of these funds, more than 70% are spent on personnel costs leaving little for actual programs. The political patronage system staffs many positions with persons deficient in both professional training and experience, and virtually eliminates all opportunities for promotions based on merit. The staff changes that occur with each change in political leadership has produced a lack of continuity within these agencies and their programs.

3.0 STATUS AND MANAGEMENT OF PROTECTED AREAS

The Government has created a network of nine national parks, including one marine park, and five scientific reserves to protect representative areas of the country's ecosystems. These areas cover 568,900 hectares or 11.8% of the country's land mass. In addition to these areas, tracts of Government land still covered by forest are nominally under the protection of the DGF.

The Government has failed to match the creation of the parks and reserves with the necessary structures to administer and protect these areas from illegal entry and exploitation. Park guards do exist, but they are underpaid and inadequately trained, and commonly influenced by persons desiring to exploit park resources. Programs to study these areas are hampered by the DNP's lack of funds, inadequately trained professional staff, and poor organization. The Jardin Botánico and some universities have conducted a few limited surveys of these areas.

The Government has no specific plans to manage these areas except to protect their representative ecosystems and flora and fauna. Plans were written for two national parks, but the DNP's limited resources, both financial and physical, has prevented their implementation.

Compounding these problems, other Government agencies often implement programs which foster the invasion of parks and reserves by farmers. These type of problems continue in the absence of a system for coordinating protection and development programs and for resolving interagency conflicts.

4.0 STATUS AND PROTECTION OF ENDANGERED SPECIES

The devastation of natural habitats for agricultural, livestock and charcoal production is the major factor causing the elimination of the country's flora and fauna, both outside and within protected areas. As a result, virtually all native plant and animal species are threatened.

Limited efforts are being made to study and conserve some of the native flora and fauna, but mostly by non government organizations. The notable exceptions have been DVS/SEA's enforcement of the CITES covenant which controls the export of protected species, and their efforts, through the Park Ranger Corps, to control hunting within national park boundaries. The DNP, with assistance from the German Society for Technical Cooperation (GTZ) is attempting to identify new areas which could be declared protected areas. The Jardín Botánico is developing a catalog of Dominican flora.

5.0 CONSERVATION OUTSIDE PROTECTED AREAS

The Government has attempted, through bans and regulations, to control the exploitation of biological resources outside protected areas. For example, they banned the sale of hunting weapons to protect wildlife, banned the cutting of trees and the export of native plants to slow forest destruction, and enacted specific seasons for the capture of certain fish and marine animals. However, there is inadequate enforcement of these bans and controls which result in the the continued destruction of the country's ecosystems and their flora and fauna.

6.0 CONSERVATION OF ECONOMICALLY IMPORTANT NATIVE SPECIES AND GERMPLASM

Private seed companies and universities have made some efforts to conserve germplasm of commercial crop and animal varieties. However, no organization has attempted to conserve germplasm of native flora and fauna. None of the known commercially valuable forest tree species have been scientifically studied nor collections made of their seeds. The DGF has neither the interest nor the capacity to collect and preserve seeds from these species, and the existing cutting ban prevents the commercial interests from becoming involved.

7.0 MAJOR ISSUES REGARDING BIOLOGICAL DIVERSITY AND FOREST CONSERVATION

The major issues affecting efforts to protect the country's biological diversity result from Government institutional problems, the unrestricted development of lands for tourism and agriculture, and an overall lack of consciousness among the Dominican people concerning the importance of these resources.

The Government institutional problems have been outlined above. In summary, many Government agencies have been created to manage and protect the country's biological resources. Their responsibilities overlap, they have few fiscal and physical resources, their staffs are inadequately trained and change frequently, and they all suffer from poor organization. These conditions prevent them from developing and implementing realistic programs to protect the country's biological resources.

The country's coastlines and forested lands face virtually unrestricted development for tourism and agriculture. Coastal developments for tourism are eliminating many mangrove forests which are essential for maintaining the productivity of the country's artisinal and pelagic fisheries. The construction of tourist facilities on beaches used by marine turtles for laying eggs will impact these species populations. Furthermore, inadequate planning by these developments for the treatment and disposal of waste will eliminate many of the country's near shore reefs in the future.

While tree cutting bans eliminate any opportunities for sustainable forestry development, the Government is promoting the clearing of forestlands for agricultural development. Furthermore, the Government has built and is building large hydroelectric and irrigation dams with little thought to protecting the watersheds above them.

Finally, the Dominican people demonstrate little awareness of the importance these resources hold for their future development. The influential urban dwellers demonstrate little knowledge of, nor interest in, their country's natural environments. Until influential Dominicans develop a sense of environmental consciousness, and join forces to precipitate a change in the Government's policies and priorities, few real efforts will be made by the Government agencies to protect and conserve the country's biological resources.

8.0 RECOMMENDATIONS

Since Government agencies are themselves one of the major agents causing the destruction of the country's biological resources, future support from international donors to address natural resource issues should go to those Dominican organizations, both semipublic and private, that have demonstrated an interest and ability to effectivley implement such programs. These could include local private voluntary organizations, development associations, private universities, the Jardin Botánico, and some ecological societies.

All major international loans for agricultural, irrigation and hydroelectric development should include conditions and funding to protect the watersheds above the areas they impact and the biological resources they contain.

The Agency for International Development should continue to promote the rationalization of Government forestry policies, and the reorganization of those agencies responsible for conserving forest resources. **AID and the Technical Secretariat of the President should earmark at least 10% of the local currencies generated under the ESF and PL-480 programs for projects which address biological resource conservation problems.**

A list of proposed projects to assist in the research and conservation of the biological diversity of the Dominican Republic is included.

1.0 INTRODUCTION

1.1 Overview

The execution of this report was handicapped by the lack of reliable and adequate information about efforts to conserve the Dominican Republic's biological resources. Much of the difficulty in obtaining the facts necessary for a proper evaluation of present and past efforts in conservation is caused by the lack of professionalism and continuity in those Government agencies responsible for this work. The Government agencies keep incomplete records of their activities, and a whole panoply of international and non-government assistance organizations have left few records of their activities, nor assured for adequate follow-on once their projects terminated. These factors have made the assembly of a coherent picture of the status of the conservation efforts in the Dominican Republic very difficult. This report, then, is a summary of what can be pieced together from various published sources, interviews with representatives of government, non-government, and international donor agencies, and private individuals.

1.2 Information Used in this Report

The team reviewed research materials available in the offices of the U.S. Agency for International Development/Dominican Republic (USAID/DR), and at the Higher Institute of Agriculture (ISA) in Santiago, as well as documents from personal libraries. Documentation on natural resources programs and projects was obtained from some Government and several non-government organizations.

The staff interviewed many Government officials and researchers. They made field visits to various locations around the country to determine if the projects said to be underway actually existed and what progress had been made. The team visited various governmental institutions. These included: the Department of Fishing Resources of the Secretariat of Agriculture (DRP/SEA); the National Parks Directorate (DNP); Dominican Navy (MGD); Secretariat of State for Tourism; and the Secretariat of State for Public Works and Communications (SEOPC). Other organizations were contacted by letter to obtain more detailed information about their personnel, budgets, past and present activities and future plans.

Most of the marine sector information was derived from the Country Environmental Profile and the fishing sector study conducted by Dominican Institute of Industrial Technology. The team reviewed project and consultancy reports financed by the Interamerican Development Bank, Instituto de Crédito Cooperativo, Food and Agriculture Organization of the United Nations (FAO), German Technical Cooperation Agency (GTZ), Chinese Agricultural Technical Mission from Taiwan, and the Organization of American States (OAS). Recent research by the National Marine Fisheries Service (NMFS) of the U.S. Department of Commerce, and the Department of Marine Sciences of the University of Puerto Rico, Mayaguez was reviewed.

1.3 Information Gaps

The team was unable to quantitively compare much of the information reviewed. Many of the institutions involved in the study, protection and management of the country's biological resources never work together, and have never developed uniform evaluation and reporting criteria. Each institution has their own methods for collecting, analyzing and reporting data which made it very difficult to obtain a clear assessment of the country's biological resources and their diversity. The general trend is toward a degradation of the environment by uncontrolled and improper land use. How rapidly this destruction is taking place and what species are most endangered is very difficult to determine.

Almost no inventory of the country's animal and plant populations exists apart from a few studies of pine (*Pinus occidentalis*) forests. Some information is available on land use patterns and populations within the national parks, sanctuaries and scientific reserves. Information about land use patterns outside these declared conservation areas is virtually nonexistent. No information or evidence could be found concerning the conservation of germplasm of economically important native plant and animal species.

2.0 LEGISLATIVE AND INSTITUTIONAL STRUCTURE AFFECTING BIOLOGICAL RESOURCES

On paper, an adequate legislative and institutional framework exists for the effective protection and conservation of the country's biological resources. A multitude of Government organizations are responsible for the study, protection and management of the country's native flora and fauna. These organizations have undertaken a number of projects to define critical areas and habitats, and to protect certain areas for their unique characteristics.

In spite of these efforts, the country's ecosystems and their flora and fauna face continued pressure and destruction. Government agencies responsible for their protection have virtually no plans for how they will carry out their responsibilities. The laws protecting areas, plants and animals are not observed. Government organizations fight for control of funds while failing to carry out meaningful action. The persons in charge of these agencies lack the professional skills, knowledge and dedication to implement their organizations' responsibilities.

2.1 Legislative Basis for Protection and Management of Biological Resources

From the discovery of Hispañola by the Spaniards in 1492 until almost the end of the 19th century, the Government took no actions to regulate the use of or conserve the Dominican Republic's biological resources.

The first documented attempt to legislate or regulate natural resources appeared in 1884 with President Gregorio Billini's decree No. 2295. Summarized, it states that: the felling and clearing system practiced by most our farmers in total absence of order or method is extremely bad because it is based simply on the general uprooting of forests and woods which, in the long run, will cause soil sterility as observed in many other countries. This decree banned, under penalty, clearing practices near river beds and springs and demanded that every farmer keep 5 percent of his property in forest. This law is in effect 104 years later.

Although important as a first step toward a policy of conservation, the decree demonstrates how the Government blamed farmers for clearing the forests. Historical data show that political and economic power groups use decrees to foster antagonism between the rural population and natural environment while being the principal culprits for much of the forest clearing.

Since 1884, more than 126 laws, decrees, resolutions and regulations have been enacted to regulate and/or protect the country's biological resources. This report discusses only the most relevant ones. The vast majority of the laws, decrees, and resolutions related to biological resources, prohibit negative activities rather than promote the idea of protecting these resources. These acts do not promote the rational development nor conservation and protection of biological resources, but rather stimulate illegal actions. In some cases, the worst violators of these laws and decrees are Government agencies and their representatives.

2.1.1 Legislation Regulating Forestry

Law No. 5856, of 1962, for the conservation of forest and fruit trees. This law regulates the conservation, restoration, promotion and utilization of the forest trees, and the transportation and utilization of forest products. It created the General Directorate of Forests (DGF), and defined its role in national forest management. The law includes ecological (conservation), economic (promotion and utilization) and institutional (national forestry management service) components. It demonstrates that the Government understood what measures to take for forestry development. Only the forest protection aspects of this law have been implemented.

In 1967, the Government passed Law 211 to check the rapid deforestation of the country's pine forests. This law closed all operating sawmills, prohibited any further harvesting of trees, and placed a tax on imported wood. Although promulgated to halt the rapid deforestation underway, the law eliminated all incentives among private landowners to plant trees. The Government waited 15 years before attempting to correct this discrepancy.

In 1982, Law 705 was enacted which established the National Technical Forestry Commission (CONATEF) to develop national forest policies and oversee the development of the forestry sector. This law required the Government to develop a plan for managing and protecting the nation's forests. It closed all existing (but tolerated) sawmills, while providing an opportunity for renewed forest harvesting with the development and acceptance [by the CONATEF] of forest management plans.

Law No. 295 of 1985 declared of "high national interest" the preservation of natural resources, and required all public and private education programs from preschool through adult education to include instruction in natural resource conservation topics.

Law 290 of 1985 established specific incentives for forestry investments. It is one of the country's most important laws to encourage private investment in forestry enterprises. Unfortunately, several paragraphs, either by mistake or purpose, were omitted from the bill's final language. These omissions changed the spirit of the law, and mismatched it with other private sector investment incentive laws. As a result, anticipated results have failed to materialize. In 1988 the Congress approved a bill amending Law 290 to match its incentives with legislation for tourism and industrial development. This amendment provides:

a) Tax exemption for forestry corporations chartering and/or increasing their capital;

b) Exemption from national and municipal licensing taxes for the sale of forestry products encouraged by this law;

c) 100 percent tax exemptions on the items and materials needed for forestry operations and not available from domestic manufacturers such as: seed; equipment for planting, felling, pruning, and milling; any other materials needed and approved by CONATEF and endorsed by the President;

d) 100 percent exemption on all rural real estate property taxes either presently in force or to be enacted; and

e) 100 percent deduction of total net income in each fiscal year provided it is reinvested in forestry or agroforestry ventures.

Although the Congress approved this amendment, the President still has not signed these changes into law. Experts believe these changes will stimulate the development of commercial forestry and fuelwood plantations and reduce pressure on the country's remaining natural forests.

The President signed Decree No. 25 (1987) to halt the rapid destruction of the country's dry forests. This Decree required the CONATEF to designate commercial firewood and charcoal zones. Demarcation restricts the production of charcoal to areas where it is a traditional industry and where the forest is already so degraded that it cannot be protected. The decree has had little impact on the illegal production and trafficking of charcoal. It has restricted the *legal* cutting of trees for non charcoal purposes outside the zoned areas.

2.1.2 Legislation for National Parks

The DNP was created by Law No. 67 in 1974. This autonomous institution is responsible for developing, managing, regulating and protecting a system of recreational, historical, natural and indigenous areas to preserve and perpetuate the country's natural and human heritage. Law 67 stipulates that "Recreational Areas" include national recreational parks, zoological gardens, aquariums and panoramic highways, and that "Historical Areas" include national monuments, botanical gardens and natural scientific reserves.

The law requires that proposed parks and reserves possess national importance because of their scientific, cultural, scenic, historical, prehistoric, archeological or indigenous value, or have a great potential to furnish open-air recreational opportunities to a great number of visitors. Furthermore, areas must be big enough to preserve complete natural formations and individual species of flora and fauna.

The country has nine National Parks. All have suffered various forms of exploitation by illegal charcoal dealers, migratory farmers, and Government agencies. For example, in the Los Haitises National Park, the President issued Decree No. 176 in 1988 which required the Secretariat of State for Armed Forces to take whatever measures necessary for effective and strict protection of the Park. This decree required other Government agencies to avoid agricultural and forest exploitation in the park. It suspended all agrarian settlements planned or being implemented by the Dominican Agrarian Institute (IAD) on lands belonging to State Sugar Council adjoining the Park, and suspended DGF authorizations to cut trees in Los Haitises for production of beams, posts and cross-ties It instructed the Secretariat of State for Agriculture (SEA), the IAD, the Agricultural Bank and the Price Stabilization Institute to abstain from encouraging farmers to plant crops such as yautia within park boundaries, while allowing the harvest of crops already planted. The decree ordered the eviction of an estimated 3,000 farmers residing in the Park as soon as their crops are harvested.

This decree demonstrates the strong contradictions wherein some Government agencies use park resources (trees for posts and cross-ties), while others encourage the invasion of park lands by farmers through credit and special marketing programs. This contradiction repeats itself in many of the country's national parks. It results from the lack of well defined national policies regarding the use and management of protected areas and a lack of coordination between Government agencies.

2.1.3 Legislation to Protect Wildlife

Law No. 85, of 1931, marked the first attempt to regulate wildlife hunting in the Dominican Republic. Laws 114 (of 1975) and 456 (of 1976) created the National Zoo and Botanical Garden, respectively, with responsibilities to study and preserve the Dominican fauna and flora. Law No. 421 (1978) assigned operation of the Botanical Garden to the Dominican Pro-Flora Foundation.

Over the years other decrees have been issued to regulate wildlife hunting during specified seasons or to protect individual species. These provisions are rarely enforced by the responsible institutions. In response to specific problems, the President has created several working commissions to study the situation and make recommendations for solving them. Rarely have these commissions changed or resolved the problems which they were created to address. Generally the Government creates a commission to demonstrate action to solve a problem in response to political and public pressures. For example, Decree No. 3278 (1978) created the Consejo Nacional de Fauna Silvestre, whose purpose was to establish regulations for the hunting, inventory, preservation and promotion of rare and endangered species. It is unknown whether the Commission ever functioned and, if so, for how long. There exists no evidence that it accomplished anything.

2.1.4 Legislation to Protect Marine Resources

Law 3342 of 1952 first defined the country's territorial waters and established the territorial limit of three nautical miles from the coasts. Law No. 5914 of 1962 marked the first attempt to regulate fishing in the Dominican Republic. This law assigned responsibility to manage fishery resources to the DRP/SEA. Some 15 decrees complement it. Law 3003 gives the MGD the power to control any water and coastal activity up to 500 meters from the maximum high tide. Decree 303/87, specifically protects the mangrove forests, but considers them forests and empowers their management to the DGF and the Wildlife Division of SEA (DVS/SEA).

Several other resolutions and decrees regulate fishing seasons and establish control over other activities that effect coastlines and fisheries. These actions control licenses to export fish and shellfish, the loading and and export marine products, harbor control and port affairs, and grant permits for the construction of residential structures in coastal zones. They require environmental impact assessments for all coastal development projects. However, developers can obtain permits to construct hotels and condominiums without the required impact assessments, and even when done, are rarely written or reviewed by qualified professionals.

2.2 Government Institutions Responsible for the Protection and Management of Biological Resources

Various Government agencies are responsible for implementing laws which protect and regulate the use of the country's biological resources. Many other Government institutions such as the Agricultural Bank and the IAD have indirect and often negative impacts on conservation and protection through their efforts to develop projects and resettlement schemes within park boundaries.

2.2.1 Agencies Responsible for Forest Resources The CONATEF, DGF and DNP are the institutions most responsible for the protection and management of the country's forests. From 1983 to 1987, official funding for these agencies amounted to 0.3 percent of the Government's total budget.

a. **National Technical Forestry Commission (CONATEF):** CONATEF was created by Law 705 (1982) to develop and oversee national forestry development policies, and advise the President on forestry issues. Its functions were expanded in 1986 by Regulation No. 658. Its present responsibilities include: (1) oversee the preservation and development of existing forest resources; (2) formulate national forestry policies, (3) coordinate and supervise the various public and private forest management plans and projects; and (4) prepare plans for the institutional strengthening of the Commission, and its executive body, the DGF.

Regulation 658 requires public institutions to submit annual work plans to CONATEF for review to assure compliance with the country's forestry policies.

b. **General Directorate of Forests (DGF):** The DGF was created by law No. 5856 in 1962. Although established initially under SEA, it was transferred to the Dominican Air Force six years later by law 206. It is difficult to judge whether this change was correct in light of the political currents in the Dominican Republic at the time. It did result in greater military involvement in the civilian population's activities. There has been much criticism of the military control of the DGF which according to some has fostered inappropriate economic activities among military officers, who have no real interest in forest conservation. The DGF's responsibilities are:

1) management of public forests lands;
2) organization and standardization of the national registry of forest property;
3) surveillance of forests;
4) inventory of forest resources;
5) forestry research;
6) demarcation of forest reservations;
7) reforestation development;
8) sale of state forest products; and
9) national forest planning.

Together with CONATEF, the DGF controls the approval for the felling, extraction and transportation of all forest products.

DGF has a staff of 2,100, people of which 1,200 are forest guards. DGF has one trained BS forester, 45 forest technicians, and some administrative and support staff. The 1988 budget appropriation was RD$10,822,865, of which more than 85 percent was used for staff salaries. This left few funds for actual management, protection and reforestation work. The DGF operates a forestry technician school, the National Forestry School in Jarabacoa to train forest guards.

From its inception through 1985, DGF has reforested about 126,000 tareas (7,855 hectares). However, the DGF conducts few follow-up evaluations of its reforestation projects to measure survival and growth. Peña (1988) estimates survival for all DGF plantations averages 65 percent. DGF has used *Pinus caribea var. hondurensis* in most of its reforestastion projects regardless of site because of the unavailability of native pine seed. DGF is implementing ten reforestation projects in the watersheds of several major hydroelectric and water supply dams constructed or under construction. These include projects near Constanza, Villa Altagracia, Restauración, Jarabacoa, and San Juan de la Maguana. DGF's chronic shortage of funds will keep many of these projects from ever being completed and properly maintained. DGF faces strong political pressure from environmental groups and other Government offices which limits its management of these areas once established.

None of country's large dam projects, whose values run into the hundreds of millions of dollars, have ever included components or funding for the reforestation and conservation of the watersheds above these dams. DGF almost alone is responsible for these watersheds, although it receives no resources to accomplish the task.

Confusion exists among the various Government agencies with responsibilities to protect the watersheds. The National Institute for Hydraulic Resources (INDHRI) receives funds to build and manage the dams and irrigation canals, but rarely incorporates measures to protect the projects' watersheds. Conversely, SEA's Subsecretary for Natural Resources and the DGF are responsible for soil conservation and reforestation programs yet receive no additional funds to carry out these functions. To resolve these organizational problems, FAO and the United Nation's Development Programme recommended a complete reorganization of all agencies involved in watershed management (FAO, 1988). Although the concept of a "forestry institute" has been accepted, the political changes it implies preclude implementation.

c. **National Parks Directorate (DNP):** The DNP was established in 1974 under the office of the Administrative Secretary of the President to manage the country's National Parks. It has four sections: park management and environmental education; environmental interpretation, administration and legal counsel. Its 1988 budget was RD$2,408,496, of which 70 percent went for salaries with little remaining for the actual management, protection, and improvement of the national parks and scientific reserves.

The DNP's Head Office staff consists of 7 professionals (1 agricultural engineer, 1 BA in environmental education, 4 BAs in Biology and 1 agronomist). The national parks and scientific reserves, with the exception of Parque Nacional de Monte Cristi are administered by agricultural technicians (4 agricultural engineers and 1 BA in agronomy). Because their educational background is primarily agriculture, they receive additional training in wildlife management, park management, and ecology.

2.2.2 Agencies Responsible for Wildlife Resources

The DVS/SEA is responsible for the protection and management of the country's wildlife. It was established in 1978 by Resolution No. 44 as the Department of Wildlife and Environmental Protection, and a year later renamed the Department of Wildlife. Its functions include:

1) carry out inventories of native fauna;
2) establish provisions for their sustained utilization;
3) suggest laws for environmental protection;
4) regulate hunting seasons;
5) watch over the various types of hunting and commercial exploitation of the fauna;
6) control vertebrate pest species;
7) restore, conserve and develop the rare and endangered native animal species and semi-wild species for special programs;
8) recommend boundaries for wildlife sanctuaries and organize and operate a system for protecting them once established;
9) present educative material pertinent to the utilization of wildlife resources and coordinate with public and private institutions in whatever activities pertain to wildlife.

The DVS/SEA staff of 21 includes the director (an architect), one MS agricultural engineer, 3 BS for agricultural engineers, one BS in agronomist, 3 BA's in education, one BA in administration, one MS in biology, 8 BA's in biology, one biological technician, one lawyer and one BA in information and public relations. Their annual operating budget for the period from 1985 to 1988 averaged RD$2,250,044.

2.2.3 Agencies Responsible for Marine Resources

The existing legislation defines specific powers and distributes functions among the many institutions and organizations dealing with marine affairs. However two organizations predominate, the MGD and DRP/SEA.

a. Dominican Navy (MGD): The MGD dominates the management of ocean fisheries because of its policing powers, its military organization, and its established network of command posts.

b. Department of Fisheries Resources of SEA (DRP/SEA): The DRP/SEA was created in the 1950's as a section of SEA, and in 1962 formally established as the DRP/SEA. Its initial duties were to manage the aquaculture station built by FAO. With U.S. Government support, it began a program to introduce exotic fishes. Until 1982, directors for the DRP/SEA were named from among the military officers of the MGD. This fostered favoritism among former and retired military personnel, who once their military careers were completed, requested appointments as inspectors to look after "fishing matters", and established a system for filling office vacancies that persists today.

The DRP/SEA supervises fresh water fishing, aquaculture and efforts to conserve the manatee, sea turtles, and the country's coastal zones, rivers, estuaries, lakes and swamps. The DRP/SEA, together with INDRHI and the MGD, grants permits for aquaculture and freshwater fishing. The DRP/SEA is attempting to regionalize its technical staff to better manage the fishery resources and to enforce conservation laws.

c. Center for Research in Marine Biology of the Autonomous University of Santo Domingo (CIBIMA/UASD): CIBIMA/UASD carries out studies in marine biology, aquaculture and water quality, and inventories of aquatic flora and fauna.

2.3 Non-Governmental Organizations Involved in Efforts to Conserve Biological Resources

Due to the deteriorated state of the country's biological resources, several non-government institutions have emerged in the past few years with interests in reforestation and the conservation of marine resources.

The most prominent, forestry oriented, organizations include: non profit, Foundation for Human Improvement, Development Association of San José de Ocoa, and Plan Sierra; and universities, ISA and the National University Pedro Henriquez Ureña (UNPHU). Although their efforts have been noble, they have had a minimal impact, in terms of affecting government legislation and slowing deforestation. Their combined reforestation efforts total less than 5% of the forested areas cleared each year for agriculture or fuelwood. Only one non profit organization has emerged to advocate the protection and conservation of marine resources. This is the Foundation for the Research and Conservation of Marine Resources (MAMMA).

2.3.1 Non Profit Organizations

a. Foundation for Human Improvement (PROGRESSIO): PROGRESSIO is implementing its *Alliance between Farmers and Trees* which distributes free tree seedlings to hillside farmers in the Nizao river watershed. Since its inception in 1984, it has distributed about 4 million fast growing tree seedlings to participating peasant farmers. They now have the capacity to produce and distribute one million trees per year. This program could eventually reduce pressure on natural forests and indirectly affect the conservation of biological resources. PROGRESSIO sponsors field day events and publishes books and articles on the country's forestry situation to heighten national awareness of the deforestation problem.

b. Development Association of San José de Ocoa: This organization is implementing several programs to assist peasant farmers in the Ocoa River watershed. These include soil conservation and reforestation efforts. Most areas assisted are greatly deforested and seriously eroded. They have implemented various small scale reforestation projects using fruit trees, exotic eucalypts and pine. While the Asociación does not deal directly with the conservation of local flora and fauna, these reforestation efforts could indirectly benefit native plant and animal populations by reducing pressure on the watersheds pockets remaining natural forest.

c. Plan Sierra: Plan Sierra is an integrated rural development project begun in 1979 by the Government and the Development Association of Santiago. It now operates as an independent organization. Plan Sierra's efforts are concentrated in the Yaque del Norte and Bao river watersheds, and include components dealing with soil conservation and hillside agriculture problems, reforestation, and commercial forestry. It promotes reforestation on private farms utilizing native pine (*Pinus occidentalis*) to encourage growth of other native plant and animal species and to help reestablish the area's original forest ecosystem. Plan Sierra has produced about 25 million forest and fruit trees, of which it planted about 5 million and donated the remaining 20 million to participating farmers.

d. Foundation for the Research and Conservation of Marine Resources (MAMMA): MAMMA has conducted studies and inventories of marine ecosystems in the Dominican Republic. They were instrumental in the creation of the two marine reserves, La Caleta Underwater Park and the Silver Banks Marine Sanctuary.

Several other organizations say they are implementing reforestation projects, but can provide little information on their specific activities. The Development Institute of the Southwest is developing a plan for the management of the dry forest zone. The Development Institute of the Northwest is reforesting the watersheds of the Masacre river (Dajabón) and Chaquey river (Monte Cristi) as well as Loma de Cabrera.

2.3.2 Universities

a. Higher Institute of Agriculture (ISA): ISA is a private university with a scientifically well-managed ecological reserve. The University possesses a 1,000 hectare dry forest farm in Mao, which is dedicated exclusively to forestry research. The forest contains 72 tree species, some of which are endangered. ISA, with support from AID and the Dominican Government, has studied methods for managing this dry forest. However, these studies ceased in 1987 when AID funding for this activity terminated, and additional local currencies were not forthcoming.

b. National University Pedro Henriquez Ureña (UNPHU): UNPHU possesses an experimental farm at Nigua where it has conducted research on the growth characteristics of *Leucaena*. The farm includes a coastal marine reserve.

c. Other Universities Involved in Natural Resources: Four other universities offer courses in forestry, natural resource and/or fisheries management and conservation. These are the Technology Institute of the Eastern Cibao, the Santiago Univeristy of Technology, the Central Univeristy of the East, and the Catholic University (PUCMM).

2.4 Activities by International Organizations

Over the years various international organizations have collaborated with the Dominican Republic in the management of its natural resources. Very few of the projects have dealt with the conservation of biological diversity. The most important activities carried out by international organizations include:

1) Inventory of the country's natural resources by the OAS in 1967.
2) Inventory of the country's forest by the FAO in 1970.
3) Environmental Profile of the Dominican Republic by AID in 1980.
4) Management plans for two national parks, National Park of the East and the Jaragua National Park by the World Wildlife Foundation (WWF), in 1979 and 1986 respectively.
5) Study of the management of the dry forest near Azua by the GTZ.
6) AID/CODR Natural Resources Management Project which updated the country's aerial photo base, drafted a National Forestry Management plan, developed resource inventories of 7 watersheds and two forested zones, and developed a national environmental education program.

These activities represent a very small percentage of the funds the Dominican Republic has received, both loans and donations, over the last 25 years. International donors, reacting to Government apathy towards the country's biological resources, have refrained from becoming involved in programs to protect and conserve biological resources, even in relation to the loans made for the construction of large hydroelectric and irrigation dams. As a result, very large investments in rural infrastructure (dams, irrigation canals and roads) operate at less than their planned capacity and require much greater investments in maintenance than planned. These same projects have encouraged deterioration of the country's biological resources by improving access to remote areas, changing hydrologic drainage patterns, and promoting the drainage of wetlands for intensive agriculture.

3.0 STATUS AND MANAGEMENT OF PROTECTED AREAS

Beginning in 1950 until 1974 the Government established six national parks. Since 1974 and the creation of the DNP, the Government has established seven more national parks, five scientific reserves, one panoramic highway, and is now constructing a national aquarium. Together the national parks, scientific reserves and panoramic highway occupy 5,689 km^2 (11.75 percent) of the national territory. Table 1 provides a summary of the country's parks and reserves, and Figure 1 shows their location.

3.1 National Parks

3.1.1 J. Armando Bermudez and José del Carmen Ramírez National Parks

These two adjacent national parks were established in 1956 and 1959 respectively to protect the boreal vegetation and fauna of the highlands which are unique in the Caribbean Basin. They cover 153,000 hectares, and include the Caribbean's highest mountain, Pico Duarte (3,087m).

Vegetation: The low-lying zones are covered by mixed coniferous woods and broad-leaved forests, while highlands are covered by *Pinus occidentalis* and elements of colder temperate-type (boreal) flora. *Pinus occidentalis* is the island's only indigenous pine species.

Situation: A great portion of these national parks in the low-lying zones has been destroyed or altered by farming and cattle ranching. The families who lived within the park's boundaries were evicted following in 1979. The vegetation in the highlands is still in its natural state.

Difficulties: The people who live in adjoining areas use them for farming and livestock. This hinders the recovery and natural succession of lowland areas. There are no management or research plans, nor in-depth studies of vegetation. The DNP did not conduct studies on those areas affected by Hurricane David (1979), and consequently missed an opportunity to observe natural plant succession.

Effectiveness of Protection: These parks are relatively well protected due to their remoteness, and the efforts of their 52 forest rangers. They are as important reserves of native species, and contain approximately 84 percent of the remaining stands of *Pinus occidentalis*, and 36 percent of the existing mixed hardwood forests (FAO, 1971). They contain many patches of boreal type vegetation. The parks serve as important watersheds for the country's two principal rivers, the Yaque del Norte and Yaque del Sur.

3.1.2 Isla Cabritos National Park

Isla Cabritos was designated a park in 1974 to protect the crocodile, flamingo and iguana populations of Lake Enriquillo. The park covers 2,600 hectares.

Vegetation: The lake's island vegetation was severely degraded from over grazing by goats. Since 1979, when all domestic animals were removed, there has been a good recuperation of the natural vegetation. According to Holdrige's system, the island contains subtropical dry forest and subtropical scrub forest life zones. Only some areas actually reflect these vegetation types. Edaphic influences and microclimates have created halophytic savannas, as well as humid climate plant formations near the lake's shore.

Animal Life: The island contains 48 species of water fowl distributed into 12 families. The lake and surrounding lands provide habitat for crocodiles (*Crocodylus acutus*), and two species of native iguanas (*Cyclura cornuta* and *Cyclura ricordi*). Tilapia fish (*Tilapia mossambica*) were introduced in 1954 and have become established and commercially exploited. Its abundance has helped the population growth of *Crocodylus acutus*. However, it has partially displaced native fish species such as *Cyprinodon bondi*, *Gambusia hispaniolae*, *Limia sp.* and *Chicilasoma haitiensis*.

Although access to Isla Cabritos is difficult, people visit occasionally. They introduced the common cockroach, which has established a large monospecific population. This in turn, has sustained the population growth of the native scorpions which prey on the cockroach.

Situation: The park's natural vegetation is recuperating well since the removal of domestic animals in 1979.

Difficulties: Studies conducted by DVS/SEA (Hernández, 1985) report that areas surrounding Lake Enriquillo contain 100,000 inhabitants which depend upon agriculture, fishing, and the sale of firewood and charcoal for their livelihood. The intense use of area resources is so high that areas neighboring Lake Enriquillo are rapidly becoming desert.

Effectiveness of Protection: The park has six rangers. However, their equipment and boats are in poor repair which limits their ability to protect the park's resources. The park is only partially effective at protecting the ecosystems represented by Lake Enriquillo and its neighboring zones. Areas surrounding the lake are not protected at all. The diversion of inflowing rivers and springs for agriculture irrigation has lead to increased salinity of the lake. Occasionally, the lake's salinity level becomes too high causing fishkills, subsequently affecting the crocodile population. The local residents and visitors to the area continue to hunt crocodiles. Without the protection of the zones surrounding Lake Enriquillo, the rare flora and fauna of Isla Cabritos National Park cannot be fully protected. The long term protection of the park is doubtful unless park boundaries are extended and a management plan developed for the entire area.

3.1.3 National Park of the East

The National Park of the East was founded in 1975 and covers 42,000 hectares. It comprises the southeastern corner of the Dominican Republic, Saona Island and the coastal waters in-between. The park was established to protect the area's marine and land flora and fauna.

Vegetation: The park contains the subtropical humid forest and subtropical dry forest. The southern coast of this park is swampy with a predominance of mangroves.

Animal Life: The Park constitutes a natural refuge for a great number of native flora and fauna species because of its varied landscape and diverse habitat. The Park provides habitat for 112 bird species, eight of which are endemic to the area, and 11 endemic to the Caribbean (DNP, 1979); the endangered mammal solenodonte (*Solenodon paradoxus*); seven frog species; two turtle species; six snake species; and 10 species of lizards. The swampy areas provide habitat for crabs, *Cardiosma guanhumi*, *Gecarcinus ruricola* and *G. lateralis*. In 1946, the fish species *Rivulus roloffi*, was discovered in fresh water springs on Saona Island, the only location where this fish species is found.

Water resources: The marine portion of the park has one of the most interesting and productive ecosystems. It is a refuge for Caribbean pelagic species. The Catuan passage and the western portion of its beach system are valuable for recreational purposes, as well as sport and scientific diving. CIBIMA/UASD, the U. S. Geological Survey's Natural Resources Department of Puerto Rico, the MGD, and the National Museum of Natural History (MNHN) have conducted studies of the area's marine geomorphology and biological characteristics.

Situation: The Park's western coast has been altered by agricultural activities (coconut plantations) and charcoal production. The park's predominantly shrub vegetation serves as an excellent sanctuary for the wildlife.

Difficulties: Approximately 470 persons presently live within the park's boundaries, of which 370 inhabit Saona Island. These farmers practice slash and burn agriculture, realizing only three or four crops on a cleared plot before clearing a new area. This practice has dramatically altered the park's forest vegetation. Commercial fishermen heavily fish the park's waters between the Hispaniola and Saona Islands.

Effectiveness of Protection: The twelve rangers assigned to the park only marginally protect it. In 1979, WWF assisted DNP develop a management plan. DNP's lack of financial resources has hindered implementation. The plan does not address the problem of the people living within the park's boundaries.

3.1.4 Los Haitises National Park

Los Haitises National Park was created in 1968 as a forest reserve. In 1976, it was declared a National Park to protect the karstic hills and the region's native humid subtropical vegetation and wildlife. It covers 20,800 hectares.

Vegetation: Los Haitises is composed of small karstic hills of marine origin, 30 - 50 meters high which support subtropical humid forest. These particular formations are rare. The park contains pockets of mangroves forests along the coast.

Fauna: Various authors have identified 78 endemic and 32 migratory bird species which inhabit the park. Thirteen resident species are endemic to the park zone only (Bautista et al, 1986). Among these, the most important are: *Asio stygius*, *Amazona ventralis*, *Buteo ridgwayi* and *Helmitheros vermivorus*. Between 1975-1977 the National Zoological Garden received 15 specimens of *Solenodon paradoxus* and *Plagiodontia aedium* from this area (Bautista et al., 1986). Many species of bats live in the park due to its great number of caves.

Water Resources: The marine coast is composed of coastal reefs of karstic origin. Its waters are nutrient rich and very productive due to the outflow from the Barracote and Yuna rivers which support a high concentration of phytoplankton. The park's waters possess ideal nursery conditions to sustain large populations of highly valuable commercial species, like shrimp (*Penaeus schmitti*), oysters (*Crassostrea rizophora*) and fish such as mullet, sabalo, and jack or scad sardines. These waters are considered one of the most important marine nurseries in the Caribbean. The Marine Biology and Limnology Dept. of MNHN studied the park in 1979, and recommended the DNP extend the park's limits to include the complete estuaries of the Yuna and Barracote rivers and their adjoining mangrove areas.

Situation: Only 20% of the park's 20,800 hectares remain in a natural state. The rest has been destroyed by farmers practicing slash and burn agricultural (Bautista et al, 1986).

Difficulties: More than 3,000 people live within the parks limits. In recent years, numerous families moved into the park to take advantage of a possible government relocation program. Agriculture has reduced the park's remaining natural forests significantly, and if continued will soon eliminate these forests completely. According to farmers living within the national parks, four large farms operating under loans from the Banco Agricola have planted one thousand tareas (62 hectares) of yautia.

Effectiveness of Protection: The park is not protected, in spite of the 17 rangers assigned to protect it. Only 20% of its area remains in a natural state. To preserve even this portion requires immediate action by the Government.

3.1.5 Monte Cristi National Park:

Monte Cristi National Park was created in 1985 to protect a representative area of the country's northwestern dry forest and coastal zones. It covers 55,000 hectares, and includes the Morro and Siete Hermanos keys as well as their surrounding waters. The proposal to create this park was jointly written by technicians from DRP, DNP and MNHN.

Vegetation: The park's vegetation is predominantly subtropical dryeforest with some mangrove forest along the coastal shores. Alba and Garcia (1985) found 148 different tree species in the park. Twenty percent of these species are endemic, 75 percent native to the Dominican Republic, and 5 percent are naturalized.

Difficulties: The park's mangrove forests are being cleared for charcoal production. Several commercial operations such as salt evaporators, aquaculture farms, nautical clubs and tourist hotels, representing large investments, are located withing the park's boundaries.

Effectiveness of Protection: This park is a protected area in name only. No rangers are assigned to it, nor have efforts been made to develop a plan for managing its resources.

3.1.6 Bahoruco National Park:

This park was created in 1985 to protect the southwest's remaining *Pinus occidentalis* and lower montane hardwood forests, and their wildlife. It covers 60,000 hectares.

Vegetation: The park's low elevation areas are covered by subtropical dry forests, while the highlands are covered by stands of *Pinus occidentalis* with scattered pockets of broadleaf forest.

Situation: This region's isolation has protected it from excessive encroachment by man. However, forest fires have reduced the stocking of the mature pine forests and limited natural regeneration in some areas.

Difficulties: The Park's boundaries, as established, overlap the IDEAL-Dominicana Company's (previously ALCOA) bauxite mining concession, as well as areas traditionally used by local charcoal makers, hunters and subsistence farmers. By establishing the Park's boundaries in areas already being exploited for other purposes, the Government has created conflicts between itself and the various local user groups.

Effectiveness of Protection: The park has an administrator and five park rangers. All the rangers are stationed in the highland areas to control the illegal cutting of pine forests. The presence of these guards, and the area's limited access have protected it relatively well. The dry forest has been modified significantly by mining, charcoal making and farming activities.

3.1.7 Jaragua National Park

The Jaragua National Park was created in 1983 to protect the land coastal and marine environments of the southwest. It covers 140,000 hectares, and includes the Oviedo lagoon and Beata and Alto Velo Islands.

Vegetation: The park contains 12 vegetation types including dry forests, halophytic savannas, beaches, dunes, and mangrove forests. Preliminary studies have invencoried over 400 plant species. Most are regionally endemic, such as *Thoninidium inaequilaterum* trees and *Haitiella ekmanii* palm trees (DNP, 1986).

Animal Life: Inventories of the Park's wildlife list 130 bird species (76 form resident populations within in the park and 10 are endemic of the island of Hispañola), 54 reptile species (36 of which are locally endemic), mammals such as *Solenodon paradoxus* and *Plagiodontia aedium*, and 14 species of turtles. Marine turtles use the park's extensive beaches for laying their eggs. The park's coastal waters contain abundant populations of fish.

Situation: Difficult access has limited damaging impact on the area. However, access to the region is being improved to promote tourism development which could alter the situation dramatically. Due to its size and the diversity of its formations, the park is an important reserve to protect the region's native flora and fauna. The DRP/SEA/GTZ PROPESCAR-SUR project is evaluating the region's marine fisheries and socio-economic conditions of its fishermen. This project will develop a plan for managing the areas's fisheries. In 1986, WWF assisted DNP to develop a management plan for the park. WWF has received partial funding from AID to assist the DNP and local interest groups begin implementing this plan.

Difficulties: The local population subsists on farming, fishing, rearing livestock, and charcoal production. These activities have produced irreversible effects on the zones near the park and some areas within park limits. Conflicts exist between the fishermen and Government authorities over the trapping of crabs and turtles in the park's coastal waters and swamps. In the light of the diminishing resources outside the park's boundaries, and the area's rapid population growth, the pressures on the park's flora and fauna are predicted to increase.

Effectiveness of Protection: The park has eight rangers. So far its remoteness and difficult access have limited damage to its native plant and animal populations. This could change rapidly with the development of a tourist industry in the area.

3.1.8 La Caleta National Underwater Park

This park was proposed in a study conducted by the Underwater Research Group of the MNHN, and supported by the biological research and inventories conducted by the Marine Sciences Department of University of Puerto Rico, and the USGS/PR between 1979 and 1982. Its objective is to protect the area's reef terraces and their marine flora and fauna. This is the country's only underwater marine park. It receives numerous visits by scientists, swimmers and scuba divers.

The Park's popularity arises from its proximity to Santo Domingo and its optimal conditions for scuba diving. The park area includes the insular platform to 100 meter depth, and from the Cueva de los Golondrinos to Punta Caucedo. It includes deep reefs with good coral but sparse fish populations.

In spite of its national park status, commercial fishing continues within the Park's boundaries. The DRP/SEA encourages fishing through the World Bank's FIDA II project by granting credits through the Agricultural Bank. The DRP/SEA studied the conflicting use of the Park's resources and recommended relocating the fishermen to other fishing regions within the country. This recommendation will be difficult to implement since these fishermen are traditional users of the area. Fishermen have voluntarily limited their use of spear guns, but continue to fish with nets and lines within the park's boundaries.

3.1.9 Other National Parks

Three other national parks exist, but due to their urban nature are managed by the respective cities in which they are located with some assistance from DNP. These are the Cape Francés Viejo (near Cabrera), the coastal shore of Santo Domingo, and the coastal shore of Puerto Plata.

3.2 Marine Sanctuary In 1986, the Dominican Republic established the Silver Banks Marine Sanctuary, located approximately 140 km northeast of Puerto Plata, to protect a traditional breeding and calving area for the Atlantic Humpback whales. It comprises an area of 3,740 km^2, and is located at 20° 12' N latitude and 69° 21' W longitude. This sanctuary is the responsibility of a joint commission composed of DRP, DNP, MNHN, MAMMA, MGD, CIBIMA/UASD and the Puerto Plata authorities.

The designation of the Silver Banks as a Humpback Whale Sanctuary has stirred great interest in the ocean and its inhabitants. This interest has reached international scientific and protection agencies. The Center for Environmental Education of Washington, D. C., together with CIBIMA/UASD support research in this area. MAMMA has led various expeditions to census the whale populations in conjunction with the MNHN and MGD According to the 1987 census, the whale population is estimated to be 8,000 animals.

The area is virtually unprotected except for occasional visits by MGD ships. The area's shallow waters are heavily fished by Dominican fishermen, but these activities pose little problem for the whales.

3.3 Scientific Reserves: Natural Scientific Reserves were created to preserve areas for scientific study. Some universities, the MNHN and the DVS/SEA have conducted isolated studies, but no area has had a detailed inventory taken of its plant and animal populations. The areas exist primarily on paper; their boundaries are not marked, nor have guards or rangers been assigned to protect them.

3.3.1 Dr. Orlando Cruz Franco Scientific Reserve (previously named Villa Elisa) was established in 1976 to protect the rare orchid species, Oncidium henekenii. It covers 14 hectares.

3.3.2 Valle Nuevo Reserve was created in 1983, and covers 40,900 hectares . It contains flora adapted to temperate (boreal) climates, and is the headwaters of the Rio Grande del Medio river, an important river for both irrigation and hydroelectric uses.

3.3.3 Rincón or Cabral Lagoon Reserve is located in the Cul de Sac, and covers 4,000 hectares. It was established in 1983 to protect its natural fisheries and serve as refuge for wildlife, mainly aquatic birds. It is an important component of the Neiba valley's hydrological cycle.

3.3.4 Redonda and Limón Lagoons Reserve were designated scientific reserves in 1984, and are located along the country's northeastern coast near Miches. These two lagoons cover 10,100 hectares and possess high primary biological productivity. They contribute many nutrients to the neighboring marine ecosystem which helps maintain the region's productive fishery. IAD recently settled the lands around the reserve and encouraged the farmers to cultivate rice. This settlement may cause future impact on the reserve plant and animal communities.

3.3.5 Isabel de Torres Reserve was created in 1983, and covers 2,200 hectares. It serves as the main watershed for the city of Puerto Plata. The area contains an extraordinary number of locally endemic orchids.

3.4 Panoramic Highway: The has one designated panoramic highway called the Carretera Aceitillar Cabo Rojo and is between Cabo Rojo and the summit of the Bahoruco mountains.

3.5 National Aquarium: The GODR is constructing a national aquarium for recreational, scientific and educational purposes. The aquarium will be in Santo Domingo under the supervision of the Presidency, and will be the legal responsibility of the DNP.

3.6 Importance of Protected Areas for the Economy of the Country

The J. Armando Bermudez, José del Carmen Ramírez and Sierra de Bahoruco national parks protect watersheds which supply the important agricultural regions of the Azua, Neiba and Cibao valleys. The parks possess large quantities of timber which could be used for lumber and other wood products. Finally, the national parks attract tourists which augment local and foreign currency receipts, and help improve the economies of the communities located near park entrances.

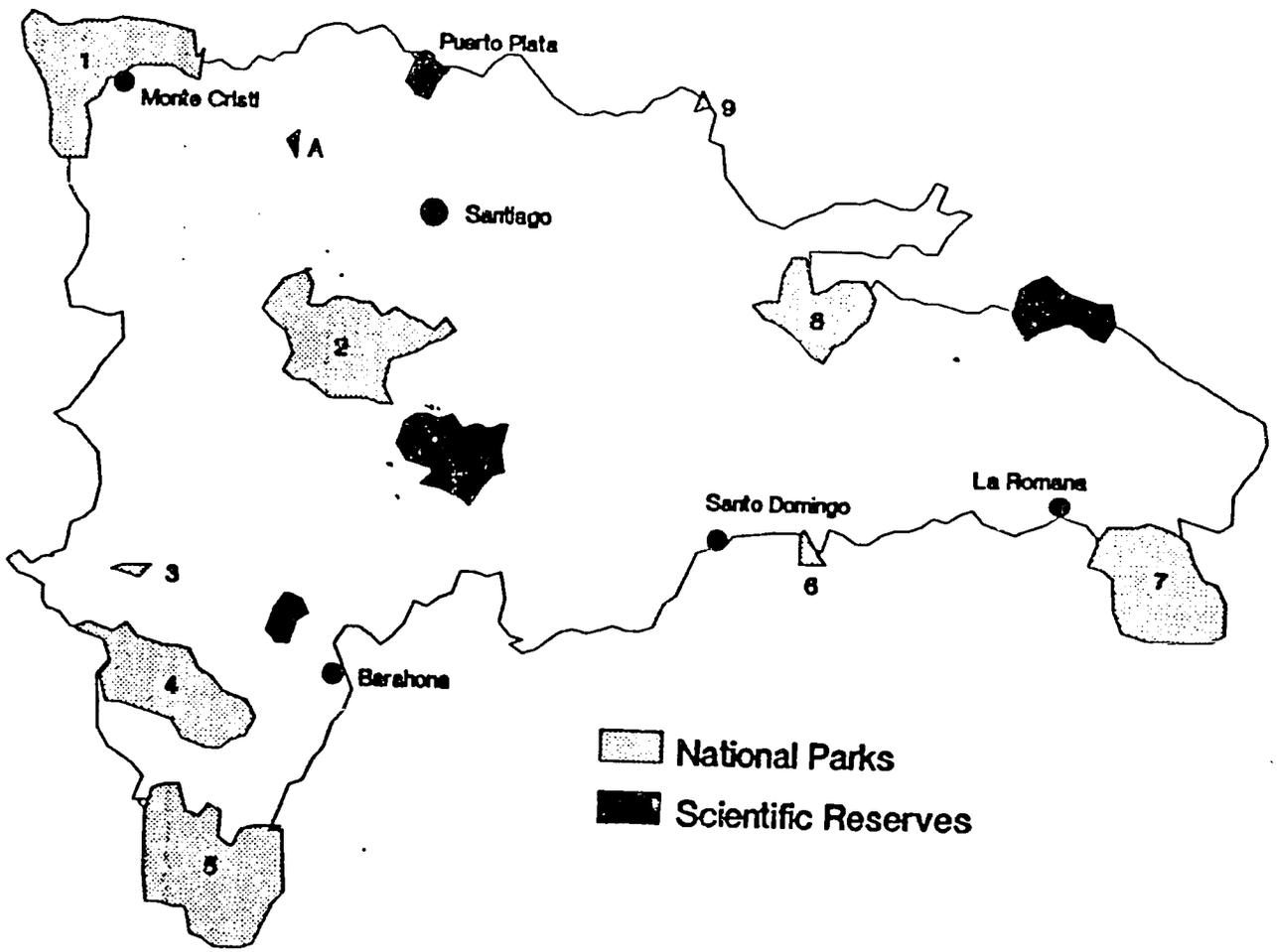
TABLE 1

List of the National Parks and Scientific Reserves of the Dominican Republic

National Parks	Surface Area	Created by	Date	Mgt. Plan	Number Employees
J. Armando Bermúdez N.P.	76,600	Law 4389	19/02/56	no	26
José del C. Ramírez N.P.	76,400	Law 5060	24/12/59	no	26
Isla Cabritos N.P.	2,600	Law 6646	14/05/74	no	6
N.P. of the East	43,000	Decree 1311	16/09/75	yes (1979)	12
Los Haitises N.P.	20,800	Law 409	03/06/76	no	17
Monte Cristi N.P.	55,000	Decree 1315	11/08/83	no	0
Sierra de Bahoruco N.P.	60,000	Decree 1315/ Amend. 155-86	11/08/83 26/2/86	no	6
Jaragua N.P.	140,000	Decree 1315 Amend. 157-86	11/08/83 26/2/86	yes (1986)	8
La Caleta Underwater N.P.		Decree 249	25/09/86	no	7
Reserves					
Dr. Orlando Cruz Franco	14		1979	no	0
Valle Nuevo	40,900		1983	no	0
Rincón Lagoon	4,000		1983	no	0
Redondo & Limón Lagoons	10,100		1984	no	0
Isabel de Torres	2,200		1983	no	0

Figure 1

NATIONAL PARKS AND SCIENTIFIC RESERVES

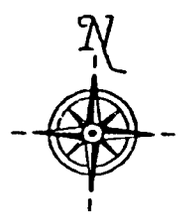


National Parks

1: P.N. Monte Cristi
2: J. Armando Bermudez & J. del Carmen Ramirez
3: Isla Cabritos
4: Sierra de Bahoruco
5: Jaragua
6: La Caleta
7: P.N. del Este
8: P.N. Los Haitises
9: Cabo Frances Viejo

Scientific Reserves

A: Dr. Orlando Cruz Franco
B: Pico Isabel de Torres
C: Laguna de Rincon
D: Valle Nuevo
E: Laguna Redonda & Limon



4.0 STATUS AND PROTECTION OF ENDANGERED SPECIES

4.1 Species in Danger of Extinction

The DVS/SEA, the Botanical Garden, and the MNHN report many animal and plant species need protection to avoid disappearance from the island. Annexes 1 and 2 contain listings of endangered and threatened species. However, such listings are always incomplete because it is the ecosystems that support these species that are really endangered. Factors like the intensive production of charcoal, forest fires, land clearing for agriculture and livestock, and urbanization all contribute to the degradation of the country's ecosystems. The relatively low priority given by the Government to the protection of endangered species and their habitats exacerbates this situation.

4.1.1 Plant Species

Among the endangered plant species, examples such as the endemic Canelillo (*Cryptorriza haitiensis*) and the Palma Cacheo (*Pseudophoenix ekmanii*) are being eliminated for their commercial value. The Canelillo is sold as a seasoning and tea in supermarkets throughout the country while the Palma Cacheo is harvested and sold commercially to the refreshment industry as well as being used as a source of drinking water by charcoal producers.

Experts from the Botanical Garden discovered the *Acacia cocuyo* and a new species of Mimosaceae, named *Uboinga zanonia* after its discoverer Dr. Zanoni, which only grow on the Loma Maria Garcia. These species are threatened by local charcoal producers. Similarly the Caobanilla (*Stahlia monosperma*), which only grows along the eastern banks of the Soco River and a few other locations around Higuey, is being cut by charcoal producers. It does not regenerate nor reseed easily, and thus may disappear in the near future.

4.1.2 Marine and Aquatic Species

The use of compressors for extended underwater spear fishing and the collection of corals and shellfish is depleting marine plant and animal populations. Approximately 7,800 fishermen distributed among the 72 commercial fishing ports fish the country's 1,437 km of shoreline.

The coastal and marine regions most severely exploited are: the Banco de la Plata, Banco Monchoir, Arrecife Buen Hombre, the zones around Cabarete and Nagua, the Bahia de Samanà, and along the north shore of the Samanà peninsula around Las Terrenas. Other areas include Sabana de la Mar and Miches, the bays of Cabeza de Toro and Punta Cana, Catuan, Caballo Blanco and the Bajos de Catalina.

4.1.3 Animal Species

Many animal species suffer extreme pressure and overexploitation. Species such as manatee, turtle, tortoise, and crocodile are captured illegally in Dominican waters. The American crocodile (*Crocodilus acutus*), an endemic species of the Caribbean, inhabits only two places in the Dominican Republic, Manzanillo Bay and the Lake Enriquillo. The number of animals has declined in recent years, and is currently estimated at 300. The International Covenant on the Commercialization of Endangered Species (CITES) includes this species in its Appendix I (Extreme Danger). The crocodile is under extreme pressure from indiscriminate hunting for its meat and for use as an aphrodisiac, the plundering of eggs from its nests, and the use of nets when fishing in these areas' waters. Its habitat suffers from the increasing salinity of Lake Enriquillo, and the clearing of mangroves and lake shore vegetation for charcoal production and agriculture.

4.2 Factors Which Impede Efforts to Protect Endangered Species and Designated Natural Areas

The Government is unable to enforce existing laws and park boundaries. Part of the problem results from the lack of resources available to those Government agencies responsible for the protection and management of designated parks and reserves. However, other institutional problems exist within the Government agencies which preclude protection even if sufficient resources were available. For example, Government offices fill jobs through political patronage which prevents any long-term planning and implementation of natural resources conservation programs and projects. Plans and programs initiated by one administration are subsequently discarded. The system creates poorly defined internal lines of communication and authority.

Employees within Government agencies responsible for enforcing the laws face many disincentives to performing their jobs satisfactorily. They are inadequately trained, their salaries are extremely low, and they receive almost no logistical support. Park guards may sell plants or animals to supplement their incomes and allow influential people to hunt and fish within the parks.

In several cases, the Government has delineated national park boundaries to include areas traditionally used by local residents for farming, hunting, fishing, or charcoal making, and has included entire existing communities. The Government has made little effort to incorporate these people into park management plans, or educate them about why the area was set-aside and how they fit into its overall management.

The communities of Los Naranjos in the Los Haitises National Park and La Cueva in the Jaragua Park, demonstrate this situation. These communities are integral to their regions' economies because they are centers of agriculture and fishing respectively. In 1986, La Cueva sold 53,083 kg of fresh fish. The Government created a direct conflict between itself and the local residents when it defined park boundaries to include the existing communities' traditional use areas. This complicates the management of the area, and creates further distrust among local residents toward their Government and Government representatives.

The virtual unrestricted use of agricultural chemicals may be damaging the country's estuarian and coastal ecosystems. To date there are no studies nor plans to study the impact of agricultural chemicals on the country's terrestrial and marine ecosystems. Since no information exists, a definitive statement cannot be made regarding the magnitude of this impact. However, high pesticide residue levels found in the soils of intensively farmed areas implies a potential impact on estuarian and coastal systems.

4.3 Actions by Government and Non-Government Organizations

4.3.1 Actions by Government Organizations

The Government has banned the sale of hunting weapons and their possession to protect endangered animals. Furthermore, various Government agencies have developed and issued brochures, bulletins, decals and magazines to create a national awareness on the need for conservation. They have published monographs on the need to protect the American Crocodile (*Crocodilus acutus*), the Flamingo (*Phoenicopterus ruber*) and the Iguanas (*Cyclura cornuta*) and (*Cyclura ricordi*). These actions have created a conservation consciousness among the wealthier, predominantly urban residents, but have had little effect on the rural populations who hunt these species for their livelihoods.

The Government created a Park Ranger Corps to protect the national parks and reserves. The Corps contains 120 forest guards and 28 supervisors. In 1987, the Corps, under the supervision of SEA/DVS, seized 65 birds and prosecuted 33 violations of park laws.

The Dominican Republic's 1987 affiliation to the CITES Covenant is another step toward protecting endangered species. For example, six iguanas which were illegally exported to Europe were repossessed and returned. The DVS/SEA is responsible for implementing the CITES Covenant. In 1987, it issued 125 permits to export protected species. It granted eight certificates to import mammals for scientific purposes.

The SEA/DVS together with the DNP and other institutions is attempting to classify the country's endangered plants. Since 1978, they have classified more than 5,000 plant species. With assistance from the GTZ, the DNP is attempting to identify additional areas which could be set aside to protect unique plant and animal habitats and species. They are studying the biotic and abiotic components of the Loma Quita Espuelas located near San Francisco de Macoris and Maria Trinidad Sanchez.

4.3.2 Actions by Non Government Organizations

Various non government institutions have become involved in protecting areas and endangered species. MNHN has 41 volunteers who study ecology, taxonomy, and other fields, at no cost to the Government. WWF and the National Zoo are training 2,700 teachers in the northeastern zone of the country in environmental education.

The Botanical Garden, in association with different international universities and institutions, has developed the necessary experience and cooperation to prepare a catalogue on Dominican flora. Lack of funds forced them to stop this work, and restricting field studies which result in the identification of new plant species.

5.0 CONSERVATION EFFORTS OUTSIDE PROTECTED PARKS AND RESERVES

No efforts have been undertaken to conserve areas outside the existing system of National Parks and Scientific Reserves. These areas have been severely altered from their original condition. The indiscriminate clearing of land for commercial and migratory agriculture and illegal harvesting of trees for charcoal and wood has contributed greatly to the destruction of the country's forests.

The OAS (1967), FAO (1971) and AID (1980) measured the country's forests, using aerial or satellite photos, and ground reconnaissance. Unfortunately, none of these in-depth studies used comparable methodologies and classification systems. Therefore, no measure can be made of forest loss over the time period they represent.

Russell (1988) attempted to measure the rate of deforestation occurring in the western half of the country by comparing satellite images taken in 1972, 1979, and 1986 (Table 2). Russell estimates a 32 percent decrease in that region's forested area since 1972. The productive forests, which covered 28 percent of the area studied in 1972 (665,800 ha), declined to 19 percent in 1986. During this period, 211,500 ha of hardwood and pine forests disappeared. This translates into an annual deforestation rate of 14,180 hectares/year, and does not include the subtropical dry and subtropical thorn forests in the study area. The dry forests were cleared at a rate of 10,600 ha/year during the same period, for a combined deforestation rate of 24,780 ha/year.

This widespread clearing of forestland for agriculture, lumber and charcoal has destroyed the habitats and food sources of many plant and animal species. Some plant and animal species adapt. Others do not. This is causing the loss, or imminent loss, of a large number of native plant and animal species. This sad panorama of destruction has drastically affected the future of the Dominican flora and fauna, and caused the genetic impoverishment and actual extinction of many species. In addition to the destruction of their habitats, the hunting and gathering of animals and plants exacerbates the pressures on the country's fauna. Although legal mechanisms exist to end this situation, the Government has no definite plans to initiate conservation efforts outside the established National Parks and Scientific Reserves.

Table 4
Land Use Changes in the western Dominican Republic
between 1972 - 1986

(Russell, 1988)

Land Cover Class	<--- Area(Km^2)------> 1972	1979	1986	<---- Percent Change ---> '72-79	'79-86	'72-86
Bare soil	216	283	201	31	(29)	(7)
Agriculture	853	1,225	1309	44	7	53
Pasture	2,231	2,388	2,775	7	16	24
Shrub *	2,944	2,651	2,581	(10)	(3)	(12)
Forest	1,630	1,033	1,011	(18)	(24)	(4)
Others**	3,916	3,914	3,913			
TOTAL	11,790	11,790	11,790			

* Dry forest, thorny vegetation and cactus.
** Water (11 percent), clouds (23 percent) and unclassified pixels.

6.0 CONSERVATION OF ECONOMICALLY IMPORTANT NATIVE SPECIES AND GERMPLASM

The economy of the Dominican Republic has long depended on the export of agricultural crops of exotic origin. Apart from the exploitation of the native mahogany, guayacan and pine forests, very few native plant or animal species have played important roles in the national economy.

Because most native plants and animals have had little or no economic value, there have never been any studies of their ecological diversity, genetic variability, nor their requirements for survival. Even the economically valuable tree species were largely eradicated before ecological consciousness developed in the Dominican Republic. The enactment of severely protectionist conservation laws has removed private sector interest in developing industries based on these tree species, thus eliminating any incentive to their study or obtaining seed collections. DGF does not possess the technical capability to conduct research on forest tree species, or even understand the necessity of such work. Similarly, no wildlife are considered of economic value, apart from their tourist attraction. Therefore, no special programs have been instituted to protect or study the country's fauna. This complete failure by the Government to recognize the value of the country's native plants and animals, or the need to preserve them for future generations has resulted in virtually no collection or preservation of native plant and animal germplasm.

A number of potentially important forest tree species do exist. Their productivity and value would benefit greatly from studies of their diversity and collection of their germplasm. They include the small-leaf mahogany ((*Swietenia mahogani*), Caribbean oak (*Catalpa longissima*), cedar (*Cedrela odorata*, Dominican pine (*Pinus occidentalis*), Corazon de paloma (*Colubrina arborescens*), savin juniper (*Juniperus gracilior*), green ebony (*Magnolia pallescens*), ebony (*Diospyrus revoluta*), cabirma (*Guarea guidonia*), mera (*Calophyllum calaba*), and the mangroves (*Rhizophora mangle* and *Conocarpus erectus*).

7.0 MAJOR ISSUES IN BIOLOGICAL DIVERSITY AND FOREST CONSERVATION

There are numerous problems that impede efforts to conserve the Dominican Republic's biological resources. These problems can be divided into three groupings depending on their causes. Some stem from the Government's policies and priorities, its organizational structure and budget priorities. Others result from unrestricted and unplanned development for agriculture and tourism. Finally, certain social and cultural biases exist which hinder efforts to protect and conserve the country's biological resources.

7.1 Issues Related to Government Policies and Activities

The Government's policies have never promoted the rational development, conservation and protection of the country's natural and biological resources. In spite of its expressed interest in conserving the country's remaining forests, the present Government allocated more than six times the budgetary resources to construct the Columbus Lighthouse than to the DGF, DNP and CONATEF combined, for forest management and protection activities. The Government has constructed, and is constructing, large hydroelectric and irrigation dams with no plans for managing, conserving or protecting the watersheds which supply them. Protecting the watersheds above these dams requires a long term effort, offering few opportunities for political reward. This lack of political support and the DGF's and DNP's limited funds results in virtually nothing being done to protect these areas. As a consequence, the lakes created behind these dams are silting at more than twice the anticipated rate and the dams and canals operate at less than 50 percent of their planned capacity.

The Government's staffing system based on political patronage causes staff changes both at the start of each presidential term and many times during the term, and precludes the development of professional, qualified staff with real interest in the formulation and implementation of conservation and protection programs and policies. As a result, the DGF, DNP, CONATEF and other responsible agencies are unable to develop and implement long term programs to protect, conserve and manage the resources and areas under their jurisdiction.

The absence of a comprehensive Government policy to conserve the country's natural resources allows other Government agencies, such as the IAD, Banco Agricola, and SEA to develop and implement programs which encourage the exploitation of protected areas. The inability of the DNP and DGF to protect these areas from clearing by farmers, charcoal producers and wood extractors demonstrates a lack of commitment by the Government to protect and conserve these resources, and the futility of attempting programs with these institutions until this policy changes.

7.2 Unrestricted Development Issues

The unrestricted development of coastal regions for tourism is rapidly changing many of the country's coastlines and coastal ecosystems. The rapid pace of development will preclude the establishment of new conservation areas or policies to protect these zones in a few years. By clearing the mangrove forests, and altering the beaches, these developments impact both fisheries and turtle populations. The developments rarely have adequate waste treatment and disposal facilities, and either dump the waste on surrounding lands or in the ocean. Experience suggests this practice will ultimately destroy the nearshore reefs thereby altering the conditions which attracted the tourists and affecting both the artisinal and pelagic fisheries dependent on these environments. Since many government officials, or their families, actively participate in these tourist projects, it is unlikely that any strong actions will be taken to modify existing and future development plans.

The IAD's highly politicized agricultural resettlement program has had little impact on reducing migratory "slash and burn" agriculture in the mountains. It has has resulted in the clearing of lowland dry forest for agriculture. Most IAD settlements have failed for lack of technical support, credit, marketing, and by the outright distribution of land titles to political favorites. Many recipients of agrarian reform parcels subsequently sell or abandon them, and move back from whence they came or into the cities.

Increasing markets for beef and beef products, both local and in the U.S. have encouraged the conversion of forestlands to pasture. In response to these increasing markets, many Dominican cattle producers have expanded their beef production through deforestation rather than feedlots and supplementary feeding programs. For example, Russell (1988) found that forestland cleared for pasture accounted for 78% of the forests cleared between 1972 and 1986 in the western half of the Dominican Republic.

7.3 Cultural Issues

The Dominican people demonstrate little awareness of their country's natural resources, and the importance these resources have for their future development. The Government has planned several programs to incorporate nature conservation and awareness topics into school curricula, but has failed to implement these plans. Among the people, there exists an almost cultural bias toward urban areas, particularly among the educated and influential upper class. These people only visit the country when travelling to their farms. They demonstrate little interest in nature, rarely go camping, hiking, backpacking, birdwatching or any other activity that takes them into natural areas. Alternatively, the people who live in rural areas are generally poor, subsistence farmers, fishermen and charcoal producers, with little political influence. The people who can influence Government policy have little interest in biological resources, while the people most dependent on the biological resources have little political influence.

Neither the public nor private sectors demonstrate interest in studying the country's biological resources. Little information exists regarding the country's ecosystems, and the plants and animals they support. A multitude of "diagnosticos" (studies of present conditions) have been written on the country's flora and fauna, but these are based on very little actual research. For example, the the country's only native pine, *Pinus occidentalis*, once had great commercial value, and would be of major importance to any future reforestation schemes. Yet what little is known about its ecology and silviculture is derived from studies done in Haiti more than 40 years ago. It is doubtful any of these studies have been translated. No other work of any scientific or forestry value has been carried out on this species in the Dominican Republic.

8.0 RECOMMENDATIONS AND PROPOSED ACTIONS

8.1 Recommendations

The conservation of biological diversity in the Dominican Republic is made extremely difficult by the fact that the Government, the legal guardian of the natural resources of the country, is one of the major agents in their destruction. The Government has created a sufficient body of laws, and has established, on paper, a series of national parks and scientific reserves sufficiently diverse and large to protect the country's biological diversity. However, it has failed to allocate the financial and administrative resources necessary to adequately implement the laws and truly protect the parks and reserves. Therefore, it is difficult to recommend new actions to enhance the Government's ability to conserve the country's biological resources. Its inefficiency, lack of direction and, and in many cases, conflicting motives of government officials effectively subvert whatever conservation efforts are attempted. An analysis of past efforts to assist Government organizations reveals the futility of providing them with funding or training since they possess no permanent staff nor the ability to plan and implement any long term programs.

1. A more advisable strategy is to direct funds and assistance efforts to non government organizations to implement projects which will either fill the existing information gaps about the country's biological resources, promote the conservation of biological resources at the local level, or at the national level increase the awareness and interest of the Dominican people in the conservation of their country's biological resources. Only when the government is pressured by Dominican public opinion will it seriously dedicate itself to conservation efforts.

2. International development and lending agencies should require environmental impact assessments from impartial international and Dominican conservation groups on any new dam, irrigation or tourist development project they plan to finance. Their project designs should incorporate the findings of these studies, and include components to reduce the project's environmental impact. A percentage of the project's funds should be allocated to *improving* the impacted area's natural environment (i.e. reforestation) with the specific amount to be allocated based on the environmental impact assessment's recommendations. USAID/DR and the Technical Secretariat to the Presedency should allocate at least 10 percent of the PL-480 and ESF generated program local currencies to finance programs which conserve, protect or study the country's biological resources.

3. Since most destruction of the country's native forests is caused by clearing of mountain and forest zones for agriculture, livestock, and charcoal production, USAID/DR and other international development agencies should: (a) develop more rural development projects which promote improved sustainable hillside agriculture technologies and agroforestry; (b) develop sustainable livestock rearing projects; and (c) continue operation of the fuelwood development project.

4. USAID/DR should condition its ESF assistance program on the modification of the forestry laws to allow for rational forest management. It should also make long term funds available to stimulate the commercial development of energy farms and forest plantations to produce both charcoal and roundwood products.

5. The Peace Corps should assign more volunteers to the Dominican Republic with natural science and natural resource/conservation backgrounds. These volunteers should be assigned to strengthen the country's environmental education programs for rural teachers and assist non government organizations to conduct detailed studies of the country's ecosystems and their environment problems.

6. The USAID/DR and other international organizations should use their influence and resources to encourage those qualified Dominican persons and organizations to design and implement programs to conserve the country's native flora and fauna, as well as urge the Government to comply with internationally accepted standards for protecting those native ecosystems which are being affected by large infrastructure construction projects. These organizations should encourage the Government to improve and professionalize its natural resource management agencies, and condition monetary assistance to these agencies on specific organizational changes which will aid efforts to protect the country's biological resources.

8.2 Proposed Projects

This section lists projects considered both important and feasible for the development and study of biological resources in the Dominican Republic. The purpose, duration, cost and recommended implementing institution are listed for each project . All proposed institutions should be evaluated to determine their ability to carry out such work. In some cases, the projects should be contracted with non profit organizations or private consulting firms.

Name of Project	Location	Duration (years)	Total Cost (RD$000)	Proposed Institution	Brief Description
1. Management of experimental dry forest	Mao	7	10,500	ISA	Continue study of the ecology and management of the dry forest.
2. Center for Germplasm Conservation and seed studies	Santiago/ Santo Domingo	5	3,590	ISA/Jardín Botànico	Expand and improve ISA's and the Jardín Botànico's seed storage facilities to enable them to store and conserve genetic material from endangered plant species.
3. Restauration of native flora and fauna	entire country	7	8,000	ZOODOM/Jardín Botànico	Establish centers in each major ecological zone to multiply and release endangered plants and animals into protected areas.
4. Inventory of national parks	national parks	10	30,000	Contract	Collect baseline information on each park and reserve's plant and animal populations and their ecological zones.
5. Technical training in ecology and conservation	Santiago Santo Domingo	5	10,000	ISA/Jardín Botànico/ ZOODOM	Specialized training in field field ecology and conservation, especially in ecological zone mapping and the propagation of endangered species.
6. Ecological studies of marine and coastal ecosystems	entire country	10	33,000	contract	Study and quantify changes in the country's marine and coastal ecosystems.
7. Commercial development of native flora	entire country	10	24,000	contract	Study commercial uses of native plants.

9.0 APPENDICES

9.1 Biographical Sketches of Team Members

Franklin A. Reynoso, MS Forester: Mr. Reynoso has an M.S. degree with specialization in natural resources management from the University of Florida, United States. A professor-researcher at ISA, and has directed the ISA/COENER/AID Woodfuels Development Program for Development since 1983. Mr. Reynoso was the team leader for this project, and responsible for collecting, organizing and analyzing the information presented in Section 2, *Legislative and Institutional Structures Affecting Biological Resources*.

Helmut Dotzauer, Forester: Mr. Dotzauer has a degree in forestry engineering from the University of Weihenstephan, Germany. A full-time professor and researcher at ISA, Mr. Dotzauer has experience in national parks development. Mr. Dotzauer was the assistant team leader, and responsible for collecting, organizing and analyzing the information presented in Section 3, *Status and Management of Protected Areas*.

Humberto Checo Herrera, Agricultural Engineer: Mr. Checo Herrera is a specialist in Natural Resources Administration. He has worked as a researcher in the ISA/COENER/AID Woodfuels Development Program since 1985. Mr. Checo was responsible for collecting and organizing information presented in Section 4, *Status and Protection of Endangered Species*.

José Rigoberto García, Forestry Technician: Mr. García has a Forest Management degree from the National School of Forestry Sciences, Honduras. He was responsible for collecting and organizing the information presented in Section 5, *Conservation Outside of Protection Areas*.

Alberto A. Rodríguez, Crop Scientist: Dr. Rodríguez has a PhD from Ohio State University in Seed Technology and Physiology. He is a professor and researcher at ISA, and was responsible for collecting, organizing and analysing the information presented in Section 6, *Conservation of Economically Important Native Species and Germplasm*.

Francisco X. Geraldes, MS Fisheries and Aquaculture: Mr. Geraldes is a specialist in aquaculture and marine biology. He obtained an MS in Fisheries from the University of Auburn, Alabama. He was a former Director of DRP/SEA and before that the founding Director of the Museo Nacional de Historia Natural. Mr. Geraldes was responsible for collecting, organizing and analyzing all information related to marine and fisheries resources.

Delbert McCluskey, USAID/DR Coordinator: Mr. McCluskey is a specialist in forestry, and serves as the Mission's natural resources advisor. He has BS and MS degrees in forest management from Oregon State University and University of Florida respectively. He joined AID in 1983, and has served with USAID/DR since 1984. Besides coordinating this work, Mr. McCluskey helped organize and edit the final report.

9.2 Published Sources of Background Information

AGROHORTI, S.A. 1988. Estudio Integrado de Recursos Naturales de la Cuenca del R.o Nizao. Final Report. Secretaría de Estado de Agricultura, Oficina de Manejo de Recursos, MARENA Project. Santo Domingo.

Armstrong, R. Com. pers. 1988. Satellite images interpretation specialist, Departamento de Ciencias Marinas, Universidad de Puerto Rico, Mayaguez. Puerto Rico.

Bautista, M., Emilia, A. et al. 1986. Informe sobre estudio básico de la fauna y consideraciones ecológicas del "Parque Nacional Los Haitises," propuesta para la elaboración del plan de manejo, SEA. Santo Domingo.

Bonnelly de Calventi, I. 1986. Los Recursos Marinos Dominicanos y su Protección. Contribución No. 73, CIBIMA, UASD. Santo Domingo.

Bonelly de Calventi, I. and García de Geraldes, M. 1980. Inventario Cartográfico de los Cuerpos de Aguas Lentas de la República Dominicana, CIBIMA, UASD. Santo Domingo.

Briones, R. and Delgado, M. 1988. Areas Marinas del Parque de Monte Cristi. Fundación Dominicana Pro-Investigación y Conservación de los Recursos Marinos, MAMMA. Santo Domingo.

Bunkley, L. and Williams, E. 1988. Coral Reef Bleaching, Sea Frontiers. March/April.

De Moya, José R. Los Sistemas de Producción de Autoconsumo de la Zona Sierra en la República Dominicana. Problemática y Elementos para Desarrollar una Tecnología Estabilizadora. San José de las Matas, Dominican Republic, 1986.

Dirección General Forestal. 1987. Programa de Reforestación y Manejo, 1987-1991. Santo Domingo.

Dirección Nacional de Parques. 1979. Parque Nacional del Este. Plan de Manejo. Santo Domingo.

Dirección Nacional de Parques. 1986. Parque Nacional Jaragua. Plan de Manejo y Conservación. Santo Domingo.

DOD, A. S. 1987. Aves de la República Dominicana. Museo Nacional de Historia Natural. Santo Domingo.

DOD, A. S. 1981. Guía de Campo para las Aves de la República Dominicana. Editora Horizontes, 2nd. edition. Santo Domingo.

Fisheries Development, Ltd. 1980. Desarrollo Pesquero en la República Dominicana. INDOTEC. Santo Domingo.

Food and Agriculture Organiztion/United Nations Development Programme/CONATEF. 1987. Plan de Acción Forestal de la República Dominicana. Project DOM/86/002. Preliminary version. Santo Domingo.

Food and Agriculture Organiztion, United Nations. 1984. Conservación de los Recursos Genéticos de los Peces: Problemas y Recomendaciones. Report of the Export Group Meeting on Genetic Resources of Fish. Doc. Tec. Pesca (217). 42 pp. Fao.

Fournier, L. and Russell, F. A. 1987. Uso del Suelo y Degradación Ambiental en la zona occidental de la República Dominicana. Seminario sobre Teledetección Sistemas Agrarios y Degradación Ambiental. PUCMM. Universidad de Sherbrook, Puerto Plata, Dominican Republic.

Fundación Natura Dominicana. 1986. Proyecto de Maricultura Rápida de Centolla. Discussion Paper. Santo Domingo.

Fundación para el Mejoramiento Humano (PROGRESSIO). 1987. Memoria de Programas y Actividades. Santo Domingo.

Geraldes, F. X. 1987. Estado Actual de la Pesca y Acuacultura en la República Dominicana y el Potencial para la Inversión en el Sector. Presented at the Conferencia Regional del Caribe de Acuacultura, San Juan Convention Center, San Juan, Puerto Rico.

Geraldes, F. X. 1987. La Educación y el Entrenamiento Técnico-acuícola en la Repúblia Dominicana. Caribbean Aquaculture and Trade Expo'87, San Juan Convention Center. San Juan.

Geraldes, F. X. 1985. Ecosistemas Acuáticos en la República Dominicana. Conferencia Museo Nacional de Historia Natural. Santo Domingo.

Hartshorn, G., et al. 1981. The Dominican Republic. Country Environmental Profile. McLean, Virginia, U.S.A.

Hatch, U. and Phelps, R. P. 1983. Economic Evaluation of Semi-subsistence Aquaculture as Promoted by the Servicio Social de Iglesias Dominicanas. International Center for Aquaculture. Auburn University.

Herasme, Manuel E. 1988. Diagnóstico Educacional Forestal. Seminario Educación. Forestal. Consejo Nacional de Educación Superior. Jarabacoa, Dominican Republic.

Heredia, F. and Delancer, V. H. 1986. Ecología y Ambiente en República Dominicana. Colección Ambiente y Sociedad No. 1. Editora Universitaria UASD. Santo Domingo.

Hernández, Cecilia. 1985. Contribuciones para Nuevo Concepto de Conservación en el Area del Lago Enriquillo. SEA, Santo Domingo.

Instituto para el Desarrollo del Noroeste. 1987. Logros y Experiencias en el Desarrollo Rural Integrado. Mao, Dominican Republic.

Instituto para el Desarrollo del Suroeste. 1988. Proyecto Manejo Racional de Bosque Seco y Proyecto de Reforestación de la Sierra de Neyba y Bahoruco. Azua, Dominican Republic.

Instituto Superior de Agricultura. 1985. La Destrucción del Bosque Comienza desde la Colonia. Hoy, page 2, 20 June. Santo Domingo.

Jardín Botánico Dr. Rafael M. Moscoso. 1986. Memoria Anual. Santo Domingo.

Jardín Botánico Dr. Rafael M. Moscoso. 1987. Memoria Anual. Santo Domingo.

Ledesma, B., et al. 1985. Sinopsis de Leyes, reglamentos y Decretos del Subsector de Recursos Naturales. Subsecretaría de Recursos Naturales. Secretaría de Estado de Agricultura. Santo Domingo.

Marine System Laboratory. 1985. Caribbean Economic Statistics, (draft). Smithsonian Institute. Washington, D.C.

Misión Técnica Agrícola, China. 1988. Presentación de folleto Proyecto: Desarrollo del Cultivo de Ostiones en la Bahía de Samaná. Departamento de Recursos Pesqueros, SEA. Santo Domingo.

Moya Pons, Frank. 1987. Manual de Historia Dominicana. PUCMM. Santiago, Dominican Republic.

Muller, F. E. and Valera, R. 1988. Variabilidad de la Biomasa del Fitoplancton en el mar Caribe. Presented to the Conferencia sobre Desarrollo Pesquero del Caribe. Fundación La Salle, Venezuela.

Oficina Nacional de Estadística. 1987. República Dominicana en Cifras. Santo Domingo.

Olivo Veras, Julio G. 1984. Situación Legal en Torno al Problema Forestal. Seminario Forestal Alternativa de Desarrollo, PUCMM/Plan Sierra/ISA. Santiago, Dominican Republic.

Pedini, M. 1988. Diagnóstico del Sector Agropecuario y Agricultura en la República Dominicana (Draft). Informe Misión Fondo Preinversión FAO-BID. Subsecretaria de Planificación, Secretaría de Estado de Agricultura. Santo Domingo.

Peguero B., Salazar J. 1986. Estudio Ecoflorístico del Parque Nacional del Este en la Tierra Firme. Grade thesis, UASD. Santo Domingo.

Peña, José Miguel de. 1988. Informe Tecnico del Día de Campo Forestal, December 11, 1988, Fundación Miguel L. de Peña Garcia, Inc. Santo Domingo.

Phelps, R. P. 1983. Project review. Servicio Social de Iglesias Dominicanas. Aquaculture Program II. International Center for Aquaculture, Auburn University.

Presidencia de la República. 1988. Decretos, Leyes, Regulaciones y Reglamentos Relacionados con los Recursos Naturales. Santiago, Dominican Republic.

Propescar-Sur 1988. Perfil del proyecto. Departamento de Recursos Pesqueros, GTZ.

Pugibet, E. 1986. Lista Preliminar de Leyes, Decretos y Resoluciones para la Protección de la Fauna y la Flora Costera-marinas de la República Dominicana. Contribución No. 74 CIBIMA, UASD.

Pujals, N., J.P. 1988. Discursos y Ponencias sobre los Aspectos de Conservación y Protección de los Recursos Naturales Renovables en República Dominicana, SEA. Santo Domingo.

Reynoso, F. A. 1988. Planes, Investigaciones y Resultados en Fincas Energéticas. Instituto Superior de Agricultura. II Seminario de Fincas Energéticas. Santo Domingo.

Rodriguez Demorizi, E. 1975. Derrotero de la Isla de Santo Domingo. Sociedad Dominicana de Geografía, Vol. X, Edición Educativa. Santo Domingo.

Rubino, M. 1985. Preliminary Economic Feasibility Study of Mithrax Mariculture (Caribbean King Crab). Report to Marine Systems Laboratory. Smithsonian Institute. Traverse Group, Inc.

Russell A., Fernando. 1988. Pontificia Universidad Católica Madre y Maestra. "Uso del Suelo y Degradación Ambiental en la Zona Occidental de la República Dominicana Durante el Periodo 1972-1986: Una Evaluación Cuantitativa de las Variaciones de la Cobertura Vegetal con la Ayuda de Imágenes de Satélites Landsat." Santiago, Dominican Republic.

Ryan, P. R. Editor. 1987. Oceanus Magazines. Caribbean Marine Sciences. Oceanus Vol. 30 (4), Winter 1987-1988. Woods Hole Oceanographic Institution.

Secretaría de Estado de Agricultura. 1984. Proyecto de Desarrollo de la Agroacuacultura. Subsecretaría Técnica de Planificación Sectorial, Secretaría de Estado de Agricultura.

Secretaría de Estado de Agricultura. 1984. Plan Nacional de Ordenamiento Forestal. Proyecto Manejo de Recursos Naturales. (MARENA). Santo Domingo.

Secretaría de Estado de Agricultura. 1985. Los Suelos de la República Dominicana, Ordenes Según la Taxonomía de Suelos. Preliminary version. Proyecto Manejo de Recursos Naturales (MARENA). Santo Domingo.

Secretaría de Estado de Agricultura. 1985. Características Agrofísicas de la Región Este. Proyecto Manejo de Recursos Naturales (MARENA). Santo Domingo.

Secretaría de Estado de Agricultura. 1985. Animales Protegidos. Departamento de Divulgación Técnica. Santo Domingo.

Secretaría de Estado de Agricultura. 1986. Investigación Sobre Sistemas Agrícolas de Laderas. Proyecto Manejo de Recursos Naturales (MARENA), Departamento de Investigaciones Agropecuarias. San José de Ocoa, Dominican Republic.

Secretaría de Estado de Agricultura. 1986. Zonificación Agrícola Cuenca Río Ocoa. Proyecto Manejo de Recursos Naturales (MARENA). Santo Domingo.

Secretaría de Estado de Agricultura. 1987. Análisis Agroeconómico Cuenca del Río Las Cuevas. Proyecto Manejo de Recursos Naturales (MARENA), Departamento de Inventario y Ordenamiento de Recursos Naturales. Santo Domingo.

Secretaría de Estado de Agricultura. 1987. Clasificación y Aptitudes para Uso de los Suelos en la Cuenca del Río Las Cuevas. Proyecto Manejo de Recursos Naturales (MARENA). Santo Domingo.

Secretaría de Estado de Agricultura. 1987. Marco Institucional de la Política Agropecuaria, Plan Operativo 1987. Subsecretaría de Planificación Agrícola, Departamento de Planificación. Santo Domingo.

Secretaría de Estado de Agricultura. 1987. Memorias del Departamento de Recursos Pesqueros. Subsecretaría de Recursos Naturales. Santo Domingo.

Secretaría de Estado de Agricultura. 1988. Resumen Ejecutivo del Proyecto Manejo de Recursos Naturales (MARENA) y sus Principales Logros. Santo Domingo.

Secretaría de Estados de Obras Públicas y Comunicaciones. 1987. Estudio de Evaluación de los Recursos Naturales en la Región Cibao-Sur. Final report. Santo Domingo.

Smith, R. O. and Ramsey, P. 1980. Status of Fisheries Development in the Dominican Republic, with Conclusions and Recommendations, USOM-Dom. Rep. United States International Cooperation Administration. AID Historical and Technical Reference Library.

Snedaker, S. C. and Getter, C. D. 1985. Costas: Pautas para el Manejo de los Recursos Costeros. National Park Service. UDS/USAID.

Weidner, D. M. 1988. World Shrimp Culture Industry (draft). Office of International Affairs, Foreign Fisheries Analysis Branch. NMFS/NOAA.

Zobel, B. J., Givan, W. Y. R. and Stahl, P. 1987. Growing Exotic Forests. John Wiley & Sons. New York, U.S.A.

9.3 List of Persons Interviewed

Organization	Name/Title
Government Organizations	
Secretaría de Agricultura/Subsecretaría de Recursos Naturales	
Departamento de Tierras y Aguas	Raúl Méndez Cruz, Director
Departamento de Vida Silvestre	Federico Peña Emilio Bautista, Director Gloria Santana Dominga Polanco Cecilia Hernández Dr. Johannes Neger
Departamento de Recursos Pesqueros	Gilberto Grullón, Director
Departamento de Inventario	Lourdes Rojas José Martínez, Director
Oficina de Manejo de Recursos	Ramón Ovidio Sánchez José Alarcón Mella, Director
Instituto Nacional de Recursos Hidráulicos Hydrometry Section	Guaroa de la Cruz, Head
Dirección Nacional de Parques	José Manuel Mateo Gabriel Valdez
Dirección General Forestal Project Division Hydrographic Watersheds Unit	Ramón Rodríguez, Head Servio Sosa, Head
Universidad Autónoma de Santo Domingo/CIBIMA	Dr. José Ferreiras, Director Osvaldo Vásquez Venecia Alvarez
Museo Nacional de Historia Natural	Juan Carlos José Infante
Parque Zoológico Nacional	José Delio Báez
Jardín Botánico	Cristiana Cruz Minier Dayal Castillo José Espinal
Non Government Organizations	
Plan Sierra	Inmaculada Adames, Exe. Director José R. Domínguez, Manager
Fundación Natura	Francisco Arnoman, Director
Fundación Dominicana Pro-Investigación y Conservación de los Recursos Marinos	Mario Delgado M., Director
GIS/Arquitectura del Sol, S. A. (Principal Contractor, National Aquarium Project)	Pedro Borrel, President

9.4 List of Endangered Endemic Plants

Abavaceae:
Agave intermixta

Cactaceae:
Neobbotia paniculata

Cupressaceae:
Juniperus gracilior

Campanulaceae
Lobelia salicina

Compositae:
Chaptalia eggersii
Chaptalia vegaensis
Erigeron dominguensis
Erigeron fuertesis
Erigeron ocaensis
Erigeron psilocaulis
Erigeron subalpinus
Erigeron tuerkheimii
Erigeron vegaensis
Eupatorium constanzae
Eupatorium heteros-quameum
Granaphalium rosillense
Gundlachia dominguensis
Gundlachia ocoana
Heterodonta haitiensis
Heterodonta mikanioides
Heterodonta alinii
Peltophorum berteroanum
*Stabilia monosperma**

Cucurbitaceae:
Melothria dominguensis
Penelopeia suburceolata

Euphorbiaceae:
Acidotun microphyllus

Myrtaceae:
Gyptorhiza haitiensis

Leguminosea (Mimosaceae):
Acacia barahonensis
Calliandra nervosa
Mimosa azuensis
Mimosa farissi
Pithecellobium abbottii
Pithecellobium micranthum
*Obolinga zanonia**

Leguminosae (Caesalpinaceae):
Caesalpinia anachantha
Caesalpinia barahonensis
Caesalpinia dominguensis
Cassia angustisili
Mora abbottii

Leguminosae (Papiilonaideae):
Aeschynomehe pleuvonervia
Calopogonium dominguensis

Malvaceae:
Ulbrichia beatensis

Palmae
Acrocomia quisqueyana
Bactris plumeriana
Haitiella sargenti
Haitiella ekmanii
Pseudophoenix sargentii
*Pseudophoenix ekmanii**

Melastomataceae:
Mecranium ovatum
Miconia fuertesii

Myrsinaceae:
Wallenia apiculata
Wallenia urbaniana

Theophrastaceae:
Jaequinia conosa
Jaequinia eggersii

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* Recently identified as endangered.

9.5 Some Protected Endangered Wildlife Species in the Dominican Republic

Common name	Scientific Name	Comments
Birds (Inland Wetlands Habitat)		
Tigua	Tachibaptus dominicus	
Grebe	Podilymbaptus poceps	
Garcilote or Garzon ceniza	Ardea Herodias	
Heron or Cra-Cra	Biotorides striatus	
Blue heron	Egretta caerulea	
Redish heron	Egretta rufescens	
Royal heron	Casmerodius albus	
River heron	Egretta tula	
Turkish duck	Aythya affinis	
Thorny duck	Oxyura jamaicensis	
Creole duck	Oxyura dominica	
Osprey	Pandion haliaetus	
Mangrove chicken or Canta Marea	Rallus longirostris	
Yellow cock	Porzana flaviventer	
Blue bald coot	Porphyrula martinica	
Red Beaked coot	Gallinula chloropus	
White Beaked coot	Fulica caribaea	
Martín García or heron	Ixobrychus exilys	
Pheasant or coco	Mycteria americana	
Black coco	Plegadis falcinellus	
White coco	Eudocimus albus	
Flamingo	Phoenicopterus ruber	
Tree duck	Dendrocygna arborea	
Coast Duck	Anas bahamensis	
Florida Duck	Anas discors	
Long-neck duck	Anas acuta	
Duck moniblanco	Anas americana	
Serrano duck	Anas cruca	
Big-headed duck	Aythya collaris	
Water cock	Jacana spinosa	
Birds (Semi-arid Habitat)		
Guinea hen	Numidia meleagris	
White-winged turtledove	Zenaida asitica	
Rolita	Columbina passerina	
Cucù	Athene cumucularia	
Torico	Siphonorhis brewsteri	
Rabiche turtledove	Zenaida macroura	
Birds (Humid Broadleaf and Mixed Broadleaf-Coniferous Forests Habitat)		
Carrao	Aramus guarauna	
Selle Thrush	Turdus swalesis	
Bruja or Don Juan Grande	Nyctibeis griseus	
Lechuza Orejita	Asio flammeus	
Taco Grande	Hyetornis rutigulacis	
Pájaro Bobo	Saurothera longirostris	
Birds (Coastal Habitat)		
Alcatraz or pelican	Pelecanus occidentalis	
Diablotin	Pterodroma hasitata	
Bubi	Sula leucogaster	
Scissortail	Fregata magnifecens	
Osprey	Pandion haligetus	
White Heron	Egretta tricolor	
Yabos or Rey Congo	Nyeticorax violaceus	
Spoonbill	Ajaija ajaja	

Birds (Pine Forest Habitat)	
Sierra red tailed hawk	Accipiter striatus
Red-tailed hawk	Buteo jamaicensis
Sparrow Hawk	Buteo ridgwayi
White-headed partridge	Geotrygoncaniceps
Red Partridge	Geotrygon montana
Cockatoo	Amazona ventralis
Parekeet	Aratinga chloroptera
Parrot	Priotelius roseigaster
Barrancolí	Todus angustitoatris
Tilguero	Myadestes genibarbis
Chirri	Calyptophilus frugivorus
Turquesa or Pico cruzado	Loxia lemoptura
Paloma ceniza	Columba inornata
Birds (Open Field Habitat)	
Common Owl	Tyto alba
Tinosa or maura	Cathartes aura
Cigua Palmera	Dulus dominicus
Cuyaya or Cernícalo	Falco sparverius
Rolon turco	Zenaida aurita
Querebebe	Chrysoaetites gundlachii
Sabana owl	Asio flammeus
Fish and Crustaceans	
Fresh water mullet	Agnostomus monticola
Moron	Agnostomus rivicola
Titile	Limia spp.
Crayfish	Epilobocera haitiensis
Shrimp	Machrobranchium carcinus
Shrimp	Machrobranchium acanthurus
Shrimp	Athia spp.
Amphibians	
Bull frog	Rana castebeiana
Pempen toad	Bufo marinus
Small toad	Bufo guntheri
Lucia frog	Diploglossus spp.
Reptiles	
American crocodile	Crocodylus acutus
Rhinoceros iguana	Cyclura cornuta
Ricord iguana	Cyclura ricordii
Lizard	Mabuya mabouya
Snake	Alsophis anomalus
Snake	Alsophis melanichrus
Sabanera snake	Darlingtonia haetiana
Hawksbill turtle	Caretta caretta
Sea turtle	Chelonia mydas
Leatherback turtle	Dermochelys coriacea
Green turtle	Eretmochelys imbricata
Hicotea	Chysemis decorata
Hicotea	Chysemis decussata
Mammals	
Wild Rabbit	Orictolagus cumculus
Hutia	Plagiodontia aedium
Soledononte	Soledonon poradoxus

Sources:
SEA, 1984. Animales Protegidos
SEA, 1986, 1987. Memorias Anuales
CIBIMA/UASD, 1980. Inventario Cartográfico de los Cuerpos de Aguas Lenticas. (García y Bonelly)
AID, 1981. Environmental Profile
DVS/SEA/DGF/1988. Personal interviews.