FAA 118/119 TROPICAL FORESTS AND BIODIVERSITY ANALYSIS

DOMINICAN REPUBLIC

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EXECUTIVE SUMMARY

Over the past 20 years the Dominican Republic has made significant progress in reversing the trend of slash and burn agriculture for subsistence farming. Numerous projects in the country, such as mini-greenhouse construction, mini-hydroelectric generator plants, reforestation of previously farmed land on steep slopes, etc. are allowing individuals and communities to improve their lives and health while reducing the impact on the environment. The Quisqueya Verde Reforestation project, initiated in the previous decade, and a recently passed law ensuring landowners who reforest their land will be able to harvest the trees at a later date, have increased the amount of forested land in the country. Several people we encountered during the field visit commented that they once thought the forest was their enemy and needed to be cut down to grow their crops. These same people now realize that the forest is actually their friend and provides them with benefits such as clean drinking water, irrigation for their crops, and shade. A major threat to the gain in forest cover is the indiscriminate and illegal cutting of trees for cooking and heating, especially along the Dominican Republic and Haitian border.

The growth of the tourism and development industries has provided substantial benefits for local communities and employment opportunities for many individuals. However, its unregulated growth is also causing the destruction of the very reasons why people want to visit the Dominican Republic. Coral reefs, clean beaches with clear water for swimming, snorkeling and scuba-diving, and fishing are threatened by sedimentation from poorly planned and unmaintained roads constructed for tourism. Wildlife viewing that includes endangered sea turtles, humpback whales, dolphins, birds, and numerous other species that are found only on this island are decreasing due to conversion of the forested land and natural landscapes to private residences, hotels, and roads.

This report identified seven threats to biodiversity and provides specific recommendations to address them:

1) Non-native invasive species (NNIS) are a severe threat to native plants and animals. Global trade and transportation have allowed insects, plants, diseases, and animals to expand more rapidly to new geographic areas than ever before. Where once it would take weeks or months for cargo to be shipped across an ocean, it now takes only a few hours. This allows NNIS to be more likely to survive the voyage and become established in a new environment. Once an NNIS becomes established in the new host country it may not have any enemies to keep the population in check, as it did in its native land. The USAID/DR mission should assist Ministry of the Environment to develop a strategic NNIS plan that will:

- **Identify** existing NNIS in the country (see Appendix D);
- **Categorize** the threat to native species as high, moderate, or low;
- **Prevent** invasive species from entering the country;
- **Detect** new infestations and rapidly respond to contain them;
- **Control/Eradicate** existing infestations; and
- **Restore** native habitats and ecosystems

2) Illegal logging is a threat to biodiversity. Deforestation from illegal tree cutting occurs along the Haiti/Dominican Republic border with most of the illegal tree cutting done for charcoal production and firewood that is mostly transported into Haiti. Immigration, particularly illegal immigrants from Haiti related to the charcoal industry, is a concern that has created tensions between Haiti and the Dominican Republic over the years as well. The Ministry of Environment is implementing the Quisqueya Verde and Frontera Verde programs, which are reforestation programs on the Haiti/DR border. The mission is also assisting the Ministry of Environment along with the USA Forest Service.

3) Conversion of forest land and natural landscapes to other land uses. Although the agriculture sector gross domestic product (GDP) share has been declining [1] farming continues being a major influential activity nationwide, and uncontrolled forest fires caused by humans to clear forest land for agriculture and the use of pesticides continue to be a threat to conservation and biodiversity. USAID/DR Environmental Protection Program (EPP) has supported the Ministry of Environment efforts of establishing a fire surveillance system that will help keep forest fires under control minimizing the impact on biodiversity. Prescribed burning may be a tool that can be used to maintain fire dependent ecosystems but education is needed to reduce the amount of uncontrolled burns converting forest land to agricultural land. The USAID/DR mission through its Rural Economic Diversification is addressing forest land conversion by promoting the use of greenhouse agriculture that is less land intensive, and, at the same time, it is diversifying agricultural production, which has helped increase incomes and improved the management of pesticides and fertilizer use. The program has also promoted the use of environmentally friendly agricultural practices that minimize pesticide and fertilizer use and apply integrated pest management practices in agricultural clusters.

4) According to the Ministry of Environment (SEMARENA 2005), soil erosion and sedimentation has affected more than two thirds of the country, and they have been the result of deforestation, poor management of irrigation systems, cattle grazing, slash and burn and expanding and unsustainable agricultural practices. Soil erosion and sedimentation also has a negative impact on coral reefs. USAID/DR is addressing this threat by implementing sub-watershed restoration and improving agricultural practices.

5) Unregulated Tourism and Industrial Factory Development. Although tourism is viewed as the Dominican Republic's motor for growth in the future, that development poses environmental challenges. Much of the tourism and development is occurring in and immediately adjacent to the marine coastal ecosystem and protected areas. This development is converting forested land and other natural landscapes to roads, residences, and commercial businesses. Even though the sector is growing, there is a lack of basic services, such as solid waste disposal; inadequate infrastructure, including water and sewer systems. Coral reefs are already under "high" or "very high" risk; and the use of underground water from aquifers will cause increased levels of salinization. This along with the very limited enforcement of environmental laws is a threat that could be addressed with a more environmentally friendly development and improved enforcement. Solid waste disposal from the tourism and industrial development are a root cause of habitat loss.

[1] According to the Central Bank GDP statistics in 1991 chained RD$, Agriculture, which includes, rice, traditional exports, other crops and cattle raising, silviculture and fishing, accounted for 12.4 percent of GDP in 1991 compared to 7.7 percent of GDP in 2009.

USAID RENAEPA program is working with industries on clean production activities to reduce pollution in 3 main rivers in and around Santo Domingo. USAID EPP program through INTEC (a Dominican Republic private university) is working with industries on clean production and brown environment issues. The EPP program has also supported the Ministry of Environment to improve its system of environmental impact assessments, which include the tourism sector projects. The USAID/DR DSTA program has been promoting sustainable tourism through Green Globe certification, Blue Flag certification, and also performing zoning assessments in the Samana Bay area.

6) Illegal trading in forest plants and animals is considered the second largest threat, after loss of habitat, to the extinction of plants and animals. In the Dominican Republic the illegal trade concentrated on live birds and turtle products. USAID/DR, through the EPP program, has worked to reduce illegal trade of sea turtles, and along with the DR-CAFTA, under the regional program, has implemented parrot protection and commercialization and also reduced the illegal trade of turtle products.

7) The impacts of climate change on biodiversity will be felt by all countries around the world due to loss or habitat changes. In the case of the Dominican Republic, the level of vulnerability to climate change is high (DARA 2010), and interventions will be necessary to avoid habitat loss, weather disasters, health related impacts, and economic stress that will compound the effect of climate change on biodiversity and tropical forests. USAID/DR is focused on risks to agriculture and sustainable tourism and will carry out activities that fall under the adaptation component of the Global Climate Change Initiative. Under the EPP program, pilot watershed assessments will be conducted in 2011.

There are many interesting opportunities to weave conservation and climate change actions into the new USAID/DR Missions Strategy. In section 8, this report provides recommendations going forward, and in particular, in addressing the identified threats to biodiversity in the Dominican Republic.

1. INTRODUCTION

1.1 Purpose:

The purpose of this assessment is to help USAID/Dominican Republic comply with country analysis requirements described in the Foreign Assistance Act of 1961, as amended, Sections 118 (tropical forests) and 119 (biological diversity), enacted in 1987. Requirements for tropical forest analysis are set out by the Foreign Assistance Act (FAA) Section 118(e): "Country Analysis Requirements. -- Each country development strategy statement or other country plan prepared by the US Agency for International Development shall include an analysis of (1) The actions necessary in that country to achieve conservation and sustainable management of tropical forests, and (2) The extent to which the actions proposed for support by the Agency meet the needs thus identified." Similar language exists for biodiversity conservation in FAA Section 119(d): "Country Analysis Requirements. -- Each country development strategy statement or other country plan prepared by the US Agency for International Development shall include an analysis of (1) the actions necessary in that country to conserve biological diversity, and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified."[2]

This analysis will focus on explaining the changes that have occurred since the previous assessment prepared in 2001 by International Resources Group, Ltd. (IRG) and supplementary assessments written in 2002 (Pérez) and 2003 (Hernández).

1.2 Background:

The Dominican Republic is unique in that it is the only island in the world that is occupied by two countries. The country of Haiti shares the island of Hispaniola with the Dominican Republic.

The Dominican Republic has a wide variety of forest cover types from the dense mangrove swamps located along coastal areas near sea level to the forest surrounding Pico Duarte at over 10,000 feet above sea level. Broad-leaf humid and semi-humid forests, including high-elevation cloud forests, are found in the steeper and less accessible areas of the northern, central, and eastern parts of the Dominican Republic. Conifer forests are located in the highest elevations in the center of the country. Dry forests are in the south, southwest, eastern, and northwestern tips of the country. In contrast Haiti has very few forests with only one percent of land in forest cover.

The majority of land in the Dominican Republic has steep slopes and soils with the potential for forest cover. Forests that had once covered 70% of the Dominican Republic had been reduced to less than 12% by 1967. By 1980 forest cover had increased to nearly 20% and continued to increase to approximately 33% by the year 2003. Furthermore, 38% of the national territory is engaged in farming. Of all land uses and coverage, farming and forests are the most evenly distributed across the provinces (UNDP, 2008). The increase in forest cover is attributed to:

[2] More information on FAA 118/119 and other countries reports are availableat the following link, http://www.usaid.gov/locations/latin_america_caribbean/environment/118_119.html

- Economic policies that reduced taxes on the importation of low cost food commodities which, in turn, contributed to a reduction in steep slope subsistence agriculture.
- Subsidized bottled cooking gas which, in turn, had a direct impact on the dramatic reduction of the charcoal-making industry.
- Growth of the urban-based industrial (e.g., free zone manufacturing) and service (banking and tourism) sectors that helped fuel a migration of rural residents, especially hillside agriculturalists, to the cities.
- Government-sponsored reforestation and natural resource management programs.
- Natural regeneration of former agricultural hillside land.
- Expansion in the number and size of protected areas.
- Decrease in large scale monoculture export crop agriculture due to competition with other countries, leaving fallow land available for reforestation.

With continued efforts in reforestation, it is projected that up to 45% of the country could be in forest cover by 2015 (SEMARENA, 2007b)[3].

The tourism industry has brought in over 4 billion dollars (U.S.) to the Dominican Republic a year since 2007 (www.bancentral.gov.do). The dramatic growth of tourism over the past 2 decades has been a blessing for now but may turn into a curse over the long-term if steps are not taken to reduce the impacts, especially in the coastal marine ecosystem.

The ecological footprint of a population is the total amount of biologically productive land and water needed to produce the resources that the population consumes and to absorb the waste it generates (depending on the available technology), measured in acres per person. This measure is an indicator of the impact of the population on the territory, and on average, it does not account for inequalities in consumption. Only 1.6% of the land surface is inhabited with 63.6% of the population living in urban areas. This population has a pattern of consumption and waste management that has an impact on the entire national territory. In fact, the ecological footprint calculated for the Dominican Republic is 1.6 hectares per person, but the current ecological capacity, or carrying capacity, is only 0.8 hectares per person. This means that the Dominican Republic's ecological deficit is 0.8 hectares per person, meaning it would take twice the territory to sustain the current levels of consumption and production of waste of the population.[4] Although this figure conceals large disparities, it suggests the need to change consumption and waste patterns; otherwise the potential for human development in the Dominican Republic could be compromised. (UNDP, 2008) More information on the ecological footprint for other countries can be found in "The Living Planet Report 2008" published by the World Wildlife Fund for Nature located on the Global Footprint Network website (www.footprintnetwork.org) and a document published by the United Nations Development Program "Assessing Environment's Contribution to Poverty Reduction: Environment for the MDGs".

[3] In late 2009, the Dominican Republic Government switched from a Secretariat government system to a Ministerial gorvernment structure. The Secretaria de Medio Ambiente y Recursos Naturales became the Ministerio de Medio Ambiente y Recursos Naturales (Ministerio Ambiente). In this report, we refer to it as the Ministry of the Environment, and we will use SEMARENA only in the cases where we are referencing a publication that was printed under that name.

[4] During the revision of this report, the Ministry of Environment implemented a new policy of Sustainable Consumption and Production that if effectively enforced will help diminish the ecological footprint impact.

From September 15 through September 26, 2008, Glen Juergens, USDA Forest Service, was assigned on a detail to the Dominican Republic to gather information and assist in writing a revision to the 2001 assessment and 2002 amendment on the biological diversity and tropical forests in the country. Odalís Pérez, USAID Mission Environmental Officer, coordinated meetings and worked with Juergens interviewing representatives from government agencies, non-government organizations, and education facilities.

From Thursday, September 18, through Saturday, September 20, field visits and meetings were scheduled with various individuals in and near Jarabacoa, including the certified organic coffee cluster office and the agroforestry school, Universidad Agroforestal Fernando Arturo de Meriño. Later, the team travelled to Constanza, a city in a large agricultural valley and location of the tourism cluster office. The Jarabacoa-Constanza area, located in the Cordillera Central, is known as "Madre de las Aguas" or Mother of Waters because it is the birthplace of many of the rivers on the island of Hispaniola. The field visits also included:

1) Viewing the newly constructed park office at the entrance to Armando Bermúdez National Park;
2) Trip to Agua Blanca waterfall where a group of students were cleaning up litter along the trail and near the waterfall, as part of a national litter pick-up day;
3) Brief tour of an ecotourism lodge in Los Calabazos that is constructing a mini-greenhouse for vegetable production and a bio-gas digester;
4) Interviewing a coffee producer in Jarabacoa that is using the waste from the coffee manufacturing process to make organic fertilizer and methane gas;
5) Visiting a "retired" couple who have inspired a small mountain community by leading efforts to build a rural health clinic and to produce organic strawberries and organic shade-grown coffee that provide income for local families; and
6) Discussing tourism potential with a community leader and the tourism director in Constanza.

Throughout the interviews conducted during the visit, a major concern was the lack of enforcement of environmental laws passed by the legislature. In spite of efforts by the Ministry of the Environment and other entities, effective law enforcement is still an issue. Apparently the lack of enforcement of legislated laws is not limited to the environment. The United Nations Development Program report, "Human Development Report Dominican Republic 2008: Human Development, A Matter of Power" (UNDP 2008) cites several instances of laws that are not being properly followed or enforced that impact biodiversity, including:

• Law 14-1991 on the Civil Service and Public Administrative Career has existed for 18 years without full implementation. This law, if implemented, would provide consistency and institutional memory not only in the Ministry of the Environment but across all the Ministries and Public Administration entities in the Dominican Republic.
• The General Education Law 66-1997 was passed more than a decade ago, yet to date no government has complied with its mandate to spend at least 4% of the GDP or 16% of the national budget on investments in education. An increase in education resources would allow for environmental education.

• Law 166-2003 provides for an allocation of 10% of ordinary central government resources to the municipal councils; however, so far only 6% has been transferred from Santo Domingo to the municipalities. If municipalities had more resources, there could be more conservation implementation at the local level in forestry and biodiversity.
• The Organic Laws of the Armed Forces and the National Police are constantly violated, as military officers continue to be handled arbitrarily, and there continue to be illegal appointments and withdrawals of staff. A professional national police and armed forces that enforce the law, and in the case of the environment, laws that protect forests and biodiversity. In the case of the burning charcoal illegal informal industry in the border with Haiti, border control and improvement in policing of the illegal logging for charcoal would help address the issue of deforestation in those areas.
• There are laws that are either partially complied with or not complied with at all in the following areas: budgetary laws, the electoral law, the electricity law, laws on public bids for public works and purchases, on government supplies, public credit, capitalization of State enterprises, land use and urban planning (6232), regulation of buildings (346-98), the law that requires public officials and legislators to present an affidavit of assets when assuming and leaving office among others. Compliance with land use, urban planning and building codes would help diminish pressure on forestry areas and biodiversity.

2. LEGISLATIVE AND INSTITUTONAL STRUCTURE AFFECTING BIOLOGICAL RESOURCES

Chapter 9 of the 2001 IRG assessment describes much of the institutional structure and regulatory framework that still exists today. The general consensus of people we interviewed from government agencies, universities, and non-government organizations is that the existing environmental laws and regulations are adequate, but their enforcement is clearly inadequate.

The start of the third administration of President Leonel Fernandez in August 2008 placed a strong supporter of environmental laws, reforestation, and protected areas. Since assuming his position in September of 2008, the Minister of the Environment has enforced a series of existing environmental laws, including the destruction of illegal buildings in protected areas (e.g., on the Island of Saona which is part of the National Park del Este) and the closing of private firms that were illegally extracting construction materials from river beds. In addition, in October of 2008, the Ministry of the Environment advised merchants that on November 3, 2008 it would begin to confiscate all products derived from sea turtles.

Existing laws for water management are inadequate and the proposed new legal framework has been under discussion in Congress for more than a decade, making its definition an urgent and necessary task. The provision of potable water and sanitation in the country depends on a number of institutions, each with jurisdiction over a specific territorial area, but there are no planning or regulatory agencies to oversee these institutions (UNDP, 2008).

2.1 The Government of Dominican Republic (GODR)

The GODR has achieved substantial progress in the legal framework concerning environmental matters. Law 202 of 2004 on protected areas increased the number of protected areas to 86, which cover approximately 22% of the land surface. Of these areas, 35 have personnel assigned for protection purposes, 29 have some type of infrastructure for visitation and public use, and 15 have approved management plans. The greatest shortcomings have been the application of the law and the failure to properly implement the management plans. Due to institutional weaknesses and a lack of resources allocated to institutions in charge of environmental affairs, the enforcement of existing environmental laws has been very weak. There exists a growing tension between the land developers in the tourism sector, which have used natural resources irresponsibly in many cases, and the environmental management institutions, which establish rules and regulations for the conservation of those resources (UNDP, 2008).

Revisions to strengthen some environmental laws and regulations, including draft bills for biosecurity and biodiversity, are currently being considered by the GODR congress.

The DR-Central American Free Trade Agreement (DR-CAFTA) with the United States came into force in the Dominican Republic on March 1, 2007. Chapter 17 of DR-CAFTA covers environmental law, procedures, protection, enforcement, and cooperation. This agreement recognizes the right of each country to establish its own levels of domestic environmental protection and environmental development policies and priorities, and to adopt or modify, as necessary, its environmental laws and policies. Each country agrees that its laws and policies will provide for high levels of environmental protection in their respective country.

The GODR ratified the Kyoto Climate Treaty on February 12, 2002 and previously ratified the binding treaty of the Protocol on Specially Protected Areas and Wildlife (SPAW). The SPAW Protocol is designed to protect species of marine fauna & flora, including all species of cetaceans (whales, dolphins and porpoises), sea turtles, mangroves and coral reefs. It covers an area from Florida, Mexico and the Bahamas south to Guyana and Suriname and eastward to the Eastern Caribbean.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was signed by the GODR on December 17, 1986 and entered into force on March 17, 1987. The objective of CITES is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. When a country's government decides that it will be bound by the provisions of CITES, it can join the Convention by making a formal declaration to this effect in writing. Once a document containing this declaration has been received, the Convention enters into force for the country concerned 90 days later. Today, CITES accords varying degrees of protection to more than 30,000 species of animals and plants, whether they are traded as live specimens, fur coats, or dried herbs.[5]

2.2 Non-government Organizations

Many civil society organizations in the Dominican Republic have formed to address the threats of uncontrolled and illegal building in protected areas, a rapidly growing population

[5] For more information visit http://www.cites.org

on over-pressured ecosystems, and the degradation of the country's natural resources. The USAID/DR works directly with many of these organizations. For a list of organizations and programs that receive support and funding from USAID/DR, see Appendix F.[6]

In the Dominican Republic, **The Nature Conservancy**'s Parks in Peril (PiP) program, was funded by USAID, but is no longer functioning.[7] During its existence, the PiP program strengthened key partner organizations that form the foundation of the Dominican civil-society conservation community.[8]

The **Fundación Moscoso Puello** (FMP) worked with The Nature Conservancy (TNC) and local organizations to classify and analyze freshwater systems and assess the health of natural resources and the effects of increased rural development and agriculture. Complementing this research, the FMP has been working to create a National Conservation Training Center to build a strong network of biological researchers and protected area managers. The organization worked with local communities, international scientific organizations, and education facilities including the National Geographic Society, the National Science Foundation, and the University of Tennessee. The FMP also was committed to the conservation and management in the Madre de las Aguas region, including the Valle Nuevo Scientific Reserve and the Armando Bermúdez National Park.[9]

Pronatura has been an important partner of TNC since the beginning of the Parks in Peril Program. It has successfully managed multifaceted projects and generated interest and support for its programs. In collaboration with other local organizations and government agencies, Pronatura worked to establish water quality and reef health monitoring programs and promote recommendations for a zoning plan for tourism and fisheries in the National Park del Este. These recommendations were complemented by community participation in park stewardship and locally based ecotourism activities. Currently, Pronatura is working with TNC under the Environmental Protection Program working on micro watershed restoration and an assessment of the seed bank

Grupo Jaragua[10], working primarily to protect the Jaragua-Bahoruco-Enriquillo Biosphere in the southwestern portion of the Dominican Republic, is involved in numerous initiatives aimed at preserving biodiversity and the environment. Every year Grupo Jaragua organizes a children's summer camp in Oviedo, Pedernales. The theme of the camp is nature preservation. Grupo Jaragua is interested that local people benefit from Jaragua's Natural Park's resources in a sustainable manner, particularly through nature tourism by training local youth as nature guides. The training program includes talks and trips that show them the most important natural, historic, and cultural resources of the area. Grupo Jaragua, in coordination with the Humane Society International (HSI) and the Ministry of the Environment, is implementing an educational campaign to educate Dominican society about the illegal parrot pet trade and sale of tortoise products. Currently Grupo Jaragua is involved with the Coalition for the Defense of Protected Areas, formed in April of 2004, to oppose the degradation of the national protected area system. They are also the main

[6] Based on 2008 data on international cooperation.
[7] The Parks in Peril program ended in 2004; thus, it is no longer implemented.
[8] For more information visit http://www.parksinperil.org/wherewework/caribbean/dominicanrepublic/index.html
[9] For more information visit their website at http://www.moscosopuello.org
[10] For more information visit their website at http://www.grupojaragua.org.do

partner with Birdlife International working on identification, monitoring, and protection of important bird areas in the Dominican Republic. Grupo Jaragua is also working with the EPP program and with DR-CAFTA regional program on sea turtle protection and reducing turtle products illegal trade.

The **Dominican Foundation of Marine Studies, Inc.** (Fundación Dominicana de Estudios Marinos, Inc. - FUNDEMAR) is dedicated to the sustainable development of the Dominican Republic through research, education and the protection of the marine environment and resources. One of their specific lines of actions is committed to the protection of marine mammals such as dolphins, whales and manatees (The Nature Conservancy, 2007). Senior staff of FUNDEMAR played a key role in creation of two important Marine Mammals Sanctuaries in the country and also in the establishment of Sisterhood National Agreement with Stellwagen Sanctuary in USA. This National Agreement aims to increase research and conservation of Humpback whales at both ends of their migration route in the Northern Atlantic Ocean. At present, they are working with EPP and Dominican Sustainable Tourism programs on biodiversity monitoring of marine mammals and tourism education respectively.

The mission of the **Punta Cana Ecological Foundation** (PCEF) is to protect and restore the natural resources of the Punta Cana region and contribute to the sustainable development of the Dominican Republic. PCEF, a non-profit organization, was established in 1994 by Grupo PUNTACANA as an instrument to protect and restore the natural resources of the region, to provide jobs, educational opportunities and healthy livelihoods for the local community, and to promote the vibrant cultural past and present of the Dominican Republic.[11] The Punta Cana Foundation is also working with the DSTA program to improve sustainable hotel tourism. Additionally, they are working with recycling, waste management and working on certification of beach areas under the Blue flag program.[12]

The **Hispaniolan Ornithological Society** (Sociedad Ornitológica de la Hispaniola-SOH) is a non-profit environmental organization dedicated to nature conservation, particularly of birds and their habitats, on the island of Hispaniola with a mission to "conserve Hispaniolan birds and their habitats through research, community education, and professional training". Established in the Dominican Republic in 2001, the SOH was founded by a group of bird watchers and biologists committed with the conservation of birds and their natural environments. Education programs include promoting bird watching as well as giving presentations on local birds in public schools, private schools, and in rural communities. This organization is working with USAID-DSTA and EPP in environmental education of biodiversity and forest habitat protection as well as control of invasive mammal species.

Reef Check, founded in 1996, is an international non-profit organization involved in research, education, and conservation of tropical coral reefs. In 2007, Reef Check Dominican Republic (RCDR) trained a total of 24 EcoDiver Trainers and 30 EcoDivers in using the Reef Check protocol to monitor reef health, allowing RCDR to implement a regular monitoring program at over 50 sites. RCDR has also participated in a number of community outreach activities. Six lectures for grade school and college students (80+

[11] For more information visit http://www.puntacana.org
[12] The Blue flag program certifies beaches that have met water quality pollution standards.

participants) about marine conservation and Reef Check were conducted. Three more presentations were given to Hotel staff from the Bayahibe areas (20 participants) about coastal marine ecosystems, marine conservation and current threats to the marine environment. Also, three snorkeling summer camps (40+ participants) for children were conducted with schools from the Santo Domingo and Jarabacoa areas. RCDR has partnered with dive centers around the country to sell both English and Spanish copies of the Reef Check Adventures children's book and the Caribbean Underwater Guide. Recently RCDR obtained co-management rights to support the management and protection of the La Caleta Marine Protected Area.[13] USAID funded IITF to train local fishers in alternative livelihoods (kayak tours) to decrease pressures on fish populations within the protected area.

The **Society for Ecological Rescue** (Sociedad Pro Rescate Ecológico, Inc. SOPROECO, Inc.-SAVAMACA) is a capacity building organization dedicated to assisting the communities of Sabana de la Mar, El Valle, Magua, and Las Cañitas. Current projects include:

- Establishing a small Medicinal Plants Enterprise (managed by local people), to reproduce and market different aromatic and medicinal plants, as well as to obtain essential oils.
- Educating community members to participate in decisions for natural resource management of the nearby National Park Los Haitises.
- Offer the services of the Green Brigade, a youth group trained in eco-tourism, to provide information and serve as guide to visitors to the Los Haitises National Park.
- Implement environmental health programs that will provide sources of employment for local youth in facility care and maintenance, as well as monitoring the mangrove reserve in Los Haitises National Park to help deter deterioration of the reserve
- Promote public awareness concerning the importance of preserving the biodiversity of Los Haitises National Park for the local communities and the Dominican Republic, through guided tours and presentations.

The **Ecological Society of Barahona** (Sociedad Ecológica de Barahona – SOEBA) founded in 1984 to conserve and protect nature in order to maintain life. The objectives of the society are to contribute to the environmental improvement of Barahona and the Enriquillo region and to stimulate the formation of new natural resource conservation groups. This group is part of the USAID DSTA tourism cluster on environmental education.

2.3 Bilateral - Other Donors and International Organizations

The Japan Agency for International Cooperation (JICA) [14] is working on solid waste management and sewage water treatment with large municipalities that would decrease

[13] For more information visit http://www.reefcheck.org/news/news_detail.php?id=286
[14] For more information visit http://www.jicadn.org/home.htm

impacts on coastal resource water and coral reef degradation. They are also addressing the threat of soil erosion and sedimentation on biodiversity by implementing watershed management actions in La Vega.

German Cooperation (GTZ) is supporting the Ministry of Environment by working on reforestation, water pollution and solid waste management to decrease threats of soil erosion and water pollution. They are working at the provincial level in environmental training and capacity building to implement the Ministry of Environment's efforts to decentralize environmental management, including forest management, at the local level.

The Spanish Agency for International Cooperation[15] (AECID) is working on the DR/Haiti border zone in park management and infrastructure. They are also supporting the Ministry of Environment in ecotourism management.

Future Latin America Foundation[16] located in Ecuador in 1993 facilitates the processes and transformations towards sustainable development. This organization works with various issues including petroleum, finances, climate change, biodiversity, and forests with a mission to promote constructive dialogue, strengthen citizen, political and institutional capacities, and articulate processes for sustainable development in Latin America.

The Center for the Conservation and Eco-Development of Samana Bay and its Surroundings (CEBSE)[17] is working with TNC in whale protection in Samana Bay to enforce boat operation regulations. They are also working on marine biodiversity education through the establishment of a museum. The Center also has a project focused on land and coastal resource zoning for coral reef protection and fisheries resource managament.

Columbia University is working with USAID on the Miches Project for sustainable coastal resource management and planning, and fisheries biodiversity.

Counterpart International-Monte Cristi[18] is working with USAID DSTA on marine habitat protection and sustainable fisheries.

The Dominican Enviromental Consortium (CAD)[19] is supporting bird conservation and forest habitat protection in conjunction with TNC and the Center for Ecostudies along the DR/Haiti border and in the central north mountain range.

Harvard University [20] is working with Punta Cana Foundation in research related to coastal biodiverity.

Indiana University (Romana – Bayahibe)[21] is working with USAID funds on coral reef protection and monitoring threatened corals. They are also establishing a new classification of marine protected areas based on shipwreck protection.

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[15] For more information visit http://www.aecid.es/
[16] For more information visit http://www.ffla.net
[17] For more information visit http://www.dlwap.de/cebse/body_cebse.html
[18] For more information visit http://www.counterpart.org/Default.aspx?tabid=296
[19] For more information visit http://www.accessinitiative.org/partner/cad
[20] For more information visit http://insectdatabases.oeb.harvard.edu/caribbean/aboutus.htm

Inter-American Development Bank (IDB)[22] has plans to work on reforestation within Haiti but will include forest management and reforestation along the border of the DR.

The World Bank[23] is supporting watershed management projects, including reforestation in the DR.

United Nations Food and Agriculture Organization (FAO) has been supporting reforestation at the local municipal level as well as sustainable agriculture activities. They have supported the Ministry of Environment in forest inventory mapping as well.

United Nations Development Program (UNDP)[24] has been supporting the Ministry of Environment in reforestation, climate change strategies and planning, and sustainable tourism at the local level.

Norweign Government (NORAD) is supporting the Ministry of Environment's "Green Frontier" reforestation program along the border of Haiti and the DR.

3. STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

Protected areas are reservoirs of life that contribute to the balance of ecosystems. The responsibility to preserve and ensure the sustainable use of protected areas rests with the GODR and the Ministry of the Environment. The Ministry of the Environment has oversight of The National System of Protected Areas (NSPA or SINAP - Sistema Nacional de Áreas Protegidas) and therefore is responsible for environmental land management in protected areas in the Dominican Republic.

Protected areas can be found in almost all provinces of the country and the delimitation of these zones has often been a source of conflict, affecting those living within them. A map of the protected areas in the Dominican Republic was recently provided by the Ministry of the environment, and we have included it in Appendix C of this paper.

Recently, the GODR has developed a policy for the co-management of protected areas, based on community participation. This policy represents an opportunity for the sustainable use of natural resources, coupled with human development. The Coalition for the Defense of Protected Areas (Coalición para la Defensa de las Áreas Protegidas) actively participates in national debates on the laws and regulations concerning the environment, which provides evidence for the strengthening the enforcement of environmental laws in the Dominican Republic. The rest of the country, outside of protected areas, is lacking management policies that ensure productive activities be sustainable and contribute to human development.

Conflicts around and within protected areas have resulted in the growth and cohesion among environmental groups, which are numerous and well organized in the country.

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[21] For more information visit http://www.indiana.edu/~r317doc/dr/
[22] For more information visit http://www.iadb.org/index.cfm?lang=en
[23] For more information visit The World Bank webpage
[24] For more information visit http://www.undp.org

Among the major conflicts are the methods of land ownership, the demarcation of protected areas, and the benefits some sectors derive from them. The rural conflict around protected areas has been relatively tense, depending on the circumstances and the timing. It has had its roots in the fact that there is no policy to guarantee human development and the protection of natural resources in these areas. To this is added the lack of mechanisms for the protection of biodiversity (UNDP, 2008).

The Parks in Peril Program (PiP) has provided a foundation for The Nature Conservancy's (TNC) Central Caribbean Program (CCP). PiP-funded successes have been incorporated into the history of the Dominican Republic's NSPA. The overall objective of influencing the NSPA's top-level management decision-making process has been achieved and closer relationships with key GODR agencies are now in place for future collaboration efforts.

Top priorities ranged from providing technical guidance for GODR agencies in achieving compliance with the Seventh Conference of the Parties (COP-7) Program of Work, to producing updated databases of biodiversity at the national scale, and implementing a variety of projects focused on conservation goals of several sites within the NSPA. Centered on four main conservation strategies - 1) Ecoregional Planning; 2) Conservation of Birds and Bird Habitat; 3) Conservation Policy; and 4) National Marine Conservation Priorities - the outcomes of the CCP have reached different levels of stakeholders in order to strengthen the NSPA. Among these outcomes are:

- A signed National Implementation Support Partnerships commitment;
- Commitment of the GODR to use the results of TNC's Gap Analysis to guide the decision process regarding the implementation of activities within the NSPA;
- Adoption of the Conservation Action Planning methodology as a new conservation tool; and
- Dissemination of two valuable conservation tools – Ecoregional Planning and the Gap Analysis – empowering both the GODR and NGOs with additional conservation tools that promote scientific and widely accepted approaches of assessing protected areas. (TNC, 2007)

Substantial information concerning the creation, management, and problems with protected areas is located in the United Nations Development Program forum document entitled "Protected Areas and Human Development: Why protect an iguana when there are malnourished children?" The document contains much useful information including interviews with various natural resource professionals in the Dominican Republic. (UNDP, 2008)

3.1 Existing Protected Areas

As stated above, currently there are 86 protected areas in the Dominican Republic. The 202-04 law established management categories according to categories and management objectives described by the International Union for Conservation of Nature (IUCN) found in the table below.

Table 1. Protected Area Categories and Management Objectives

IUCN Management Categories	Law 202-04 Management Categories	IUCN Management Objectives
Protected Areas: a) Natural Reserves b) Wildlife Areas	Protected Areas: a) Scientific Reserves b) Marine Mammal Sanctuaries	Strict protection
National Parks	National Parks: a) National Park b) National Submarine Park	Protection and conservation of ecosystems
Natural Monument	Natural Monument: a) Natural Monument b) Cultural Monument	Conservation of natural features
Habitat/Species Management Areas	Habitat/Species Management Areas: a) Wildlife Refuges	Conservation with active management
Land and Marine Protected Landscapes	Natural Reserves: a) Forest Reserves b) Model Forest c) Private Reserves	Conservation, recreation, and sustainable use of natural resources.
Resource Management Protected Areas	Protected Landscapes: a) Panoramic Views b) Ecologic Corridors c) National Recreation Areas	

Source: UNDP 2008

Following is a list of the national public protected areas[25] and their category:

Scientific Reserves
1. Ebano Verde
2. Las Neblinas
3. Loma Guaconejo
4. Loma La Barbacoa
5. Loma Quita Espuela
6. Villa Elisa

National Parks
11. Armando Bermúdez
12. Cabo Cabrón
13. Del Este
14. El Morro
15. Humedales del Ozama

Marine Mammal Sanctuary
7. Bancos de La Plata y La Navidad
8. Estero Honda

National Submarine Park
9. Submarino La Caleta
10. Submarino Montecristi

Natural Monument
30. Bosque Húmedo de Río San Juan
31. Cabo Francés Viejo
32. Cabo Samaná
33. Cerro de San Francisco
34. Hoyo Claro

[25] The Ministry of Environment has a total of 31 new protected areas. The maps of the protected areas listed here and the 31 new protected areas are included in the appendix.

16. Jaragua
17. José del Carmen Ramírez
18. Lago Enriquillo e Isla Cabritos
19. Los Haitises
20. Manglares del Bajo Yuna
21. Manglares de Estero Balsa
22. Montaña La Humeadora
23. Nalga de Maco
24. Sierra de Bahoruco
25. Sierra Martín García
26. Sierra de Neiba
27. Valle Nuevo
28. Litoral Sur de Santo Domingo
29. Litoral de Puerto Plata
35. Isla Catalina
36. Lagunas Cabrete y Goleta
37. Las Caobas
38. Las Dunas de Las Calderas
39. Loma Isabel de Torres
40. Loma La Altagracia o la Enea
41. Los Cacheos
42. Pico Diego de Ocampo
43. Reserva Antropológica Cuevas de Borbón
44. Río Cumayasa y Cueva de Las Maravillas
45. Salto El Limón
46. Salto de La Damajagua

Wildlife Refuges

47. Bahía de Luperón
48. Cayos Siete Hermanos
49. Cueva de Los Tres Ojos de Santo Domingo
50. Humedales del Bajo Yuna Sur
51. La Gran Laguna o Perucho
52. Laguna de Bávaro and El Caletón
53. Laguna Cabral o Rincón
54. Lagunas Redonda y Limón
55. Laguna Saladilla
56. Manglar de la Jina
57. Manglares de Puerto Viejo
58. Miguel Domingo Fuertes
59. Río Chaucey
60. Río Maimón
61. Río Soco

Forest Reserves

62. Alto Bao
63. Alto Mao
64. Arroyo Cano
65. Barrero
66. Cabeza de Toro
67. Cayuco
68. Cerros de Bocanigua
69. Cerros de Chacuey
70. Guanito
71. Hatillo
72. Las Matas
73. Loma El 20
74. Loma Novillero
75. Río Cana
76. Villarpando

Protected Landscapes – Panoramic Views

77. Carretera El Abanico-Constanza
78. Carretera Santiago-La Cumbre-Puerto Plata
79. Carretera Nagua-Sánchez y Nagua-Cabrera
80. Carretera Bayacanes-Jarabacoa
81. Carretera Cabral-Polo
82. Entrada de Mao
83. Mirador del Atlántico
84. Mirador del Paraíso
85. Vía Panorámica Costa Azul

National Recreation Areas

86. Cabo Rojo – Bahía de las Aguilas
87. Guaiguí
88. Guaraguao – Punta Catuano

Source: 1) Ministry of the Environment (www.medioambiente.gov.do)

The southwestern province Pedernales leads the country in the amount of land in protected areas with 68.1 percent representing 13.5 percent of all the protected area lands (UNDP 2008). Of these, 35 have personnel assigned for protection purposes, 29 have some type of infrastructure for visitation and public use, and 15 have approved management plans. Threats to the protection of these areas and strategies to minimize impacts are analyzed and discussed in several conservation plans and evaluations of protected areas that have been published recently. They also include much valuable information concerning the flora and fauna of the Dominican Republic. (Silva et al, 2006; Guerrero and McPherson, 2002; Almonte et al, 2007; Nuñez et al 2006)

Dominican Republic received the designation of its first Biosphere Reserve (Jaragua-Bahoruco-Enriquillo) on November 6, 2002. This public biosphere reserve contains a total 476,700 hectares including 900 hectares of marine area ranging in altitude of 40 meters below sea level to 2,370 meters above sea level. The reserve is characterized by dry forests, consisting mostly of *Prosopis juliflora*, *Acacia macracantha*, *Bursera simarouba*, *Pilosocereus polygonus* and *Ziziphus rignoni*; Deciduous evergreen forests including cloud forests (dominated by *Schefflera tremula*, *Podocarpus aristulatus* and *Brunellia comocladifolia*), humid forests, semi-humid forests and riverine forests; pine forests dominated by *Pinus occidentalis*; wetlands with *Conocarpus erectus*, *Typha domingensis*, *Batis maritima* and *Sesuvium portulacastrum*; coastal, marine habitats including seagrasses, coral reefs and mangroves with *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, and *Coconarpus erectus*. It has a considerable diversity of fresh and salt-water fishes, including the largest Cyprinodon, *Cyprinodon nichollsi.* In addition the biosphere reserve boasts having[26]:

- The highest amphibian diversity of the Dominican Republic, as well as a great variety of reptiles.
- The most densely populated aggregation of juvenile hawksbill sea turtles (*Eretmochelys imbricata*) documented in the world.
- Other threatened sea turtles, such as leatherback (*Dermochelys coriacea*) and green sea turtles (*Chelonya mydas*).
- The largest existing population of rhinoceros iguana (*Cyclura cornuta*).
- The remaining populations of Ricord's iguana (*Cyclura ricordi*), a critically endangered species.
- The largest known population of the endangered snake (*Alsophis anomalus*).
- The smallest known amniote vertebrate in the world: the gekko *Sphaerodactylus ariasae* or "salamanquejita de Jaragua".
- The only remaining population of the American crocodile (*Crocodylus acutus*) in Hispaniola.
- Within the reserve, all endemic bird species of Hispaniola are found, including nine that are endangered. Among these are: the bay-breasted cuckoo (*Hyetornis rufigularis*), La Selle's Thrush (*Turdus swalesi*), the chat tanager (*Calyptophilus frugivorus*), the tanager (*Calyptophilus tertius*) and the white-winged warbler (*Xenoligea montana*). Also represented are numerous migratory birds, such Bicknell's thrush (*Catharus bicknelli*). There are also historical records of the endemic Ridgway's hawk (*Buteo ridgwayi*), although no recent sightings have been

[26] Source: Grupo Jaragua website http://www.grupojaragua.org.do/reserva_english.html#Antecedentes. This website was accessed on October 17, 2008.

documented. Numerous aquatic and marine birds are present, including flamingoes, spoonbills, ibises and egrets, among others.

- The largest breeding colony of the sooty tern (*Sterna fuscata*) and the largest breeding aggregations of the white crowned pigeon (*Patagioenas leucocephala*) in the Caribbean.
- Extensive seagrass beds that support the West Indian manatee (*Trichechus manatus manatus*) as well as important populations of queen conch (*Strombus gigas*) and spiny lobsters (*Panulirus argus*).
- Important populations of two endemic mammals: the extremely rare Hispaniolan solenodon (*Solenodon paradoxus*) and the banana rat (*Plagiodontia aedium*).
- Recent discoveries of new cave species, grasshoppers (*Jaragua oviedensis* and *Acridurus robustus)*, and scorpions such as *Centuroides jaragua*.
- High plant diversity, with high endemism. Noteworthy species include 19 species of economic importance and 48 threatened species. Some of these species have a reduced distribution, such as the aromatic Jaragua's canelilla (*Pimenta haitiensis*), endemic palms, such as *Cocothrinax ekmanii* and an extensive forest of the butttonwood mangrove *Conocarpus erectus*. It also supports the best genetic representation of the native pine (*Pinus occidentalis*) and the highest density of cacti in Hispaniola.
- In total, 72 endangered animals, including some that are critically endangered.

In addition to the national public protected areas, private reserves include the PUNTACANA Ecological Reserve and the Indigenous Eyes Ecological Reserve. These reserves are owned and managed by the PUNTACANA Ecological Foundation. See Section 6.3 for more information about the PUNTACANA Ecological Foundation.

3.2 Endangered, Threatened, and Rare Species

The International Union for the Conservation of Nature has developed a "Red List" that ranks the risk of global extinction for each species. The 2008 IUCN "Red List" of species in the Dominican Republic includes 22 species as "critically endangered", 41 species as "endangered", 61 species as "vulnerable", and 36 species as "near threatened".[27]

To be listed as endangered or threatened, evidence must exist that: (1) populations are dwindling, (2) the range is shrinking, or (3) a species must be vulnerable to exploitation and historically rare. Below is a table listing species that are considered to be endangered or threatened in the Dominican Republic.

[27] For more information on the threatened species please visit http://www.iucnredlist.org/search

Table 2. Endangered and Threatened Species in the Dominican Republic

Scientific Name	Common Name	Life form	Status	Origin
Amazona ventralis	Hispaniolan parrot	Bird	Threatened	Endemic
Aratinga chloroptera	Hispaniolan parakeet	Bird	Threatened	Endemic
Asio stygius	Stygian owl	Bird	Endangered	Native
Buteo ridgwayi	Ridgway"s hawk	Bird	Endangered	Endemic
Calyptophilus frugivorus	chat-tanager	Bird	Threatened	Endemic
Calyptophilus frugivorus neibae	chat-tanager	Bird	Threatened	Endemic
Columba inornata	plain pigeon	Bird	Threatened	Native
Corvus leucognaphlus	white-necked crow	Bird	Threatened	Endemic
Corvus palmarum	Hispaniolan palm crow	Bird	Threatened	Endemic
Egretta rufescens	reddish egret	Bird	Threatened	Native
Euphonia musica	Antillean euphonia	Bird	Threatened	Native
Geotrygon caniceps	gray-headed quail dove	Bird	Threatened	Native
Haematopus palliatus	American oystercatcher	Bird	Threatened	Native
Hyetornis rufigularis	bay-breasted cuckoo	Bird	Endangered	Endemic
Loxia megaplaga	Hispaniolan white-winged crossbill	Bird	Endangered	Endemic
Mycteria americana	wood stork	Bird	Threatened	Native
Nesoctites micromegas	Antillean piculet	Bird	Threatened	Endemic
Nyctibius jamaicensis	Northern potoo, giant goatsucker	Bird	Threatened	Endemic
Priotelus roseigaster	Hispaniolan trogon	Bird	Threatened	Endemic
Pterodroma hasitata	Black-capped petrel	Bird	Endangered	Native
Siphonorhis brewsteri	least pauraque, least poorwill	Bird	Threatened	Endemic
Todus angustirostris	narrow-billed tody	Bird	Threatened	Endemic
Turdus swalesi	La Selle thrush	Bird	Endangered	Endemic
Lasiurus borealis minor	a race of red bat	Mammal	Endangered	Native
Plagiodontia aedium aedium	Hispaniolian hutia	Mammal	Endangered	Endemic
Plagiodontia aedium hylaeum	Hispaniolian hutia	Mammal	Endangered	Endemic
Solenodon marcanoi	Solenodon	Mammal	Endangered	Endemic
Solenodon paradoxus	Solenodon	Mammal	Endangered	Endemic
Trichechus manatus manatus	manatee	Mammal	Threatened	Native
Alsophis melanichnus	a racer snake	Reptile	Endangered	Endemic
Caretta caretta	loggerhead turtle	Reptile	Endangered	Native
Chelonia mydas	green sea turtle	Reptile	Endangered	Native
Cocodrilo americano	American crocodile	Reptile	Endangered	Native
Cyclura cornuta	rhinoceros iguana	Reptile	Threatened	Native
Cyclura ricordii	Ricord's iguana	Reptile	Endangered	Endemic
Dermochelys coriacea	leatherback turtle	Reptile	Endangered	Native
Diploglossus anelpistus	a large galliwasp	Reptile	Endangered	Endemic
Diploglossus carraui	another galliwasp	Reptile	Endangered	Endemic
Eretmochelys imbricata	hawksbill turtle	Reptile	Endangered	Native
Ialtris agyrtes	a snake	Reptile	Threatened	Endemic
Ialtris dorsalis	a snake	Reptile	Threatened	Endemic
Mabuya lineolata	a skink (lizard)	Reptile	Threatened	Endemic
Mabuya mabouya	a skink (lizard)	Reptile	Threatened	Native
Mabuya mabouya sloanei	slippery back skink	Reptile	Threatened	Native
Scientific Name	**Common Name**	**Life form**	**Status**	**Origin**
Cichlasoma haitiensis	a cichlid	Fish	Threatened	Endemic
Gambusia hispaniolae	a mosquitofish	Fish	Threatened	Endemic
Limia versicolor		Fish	Threatened	Endemic

Limia zonata		Fish	Threatened	Endemic
Poecillia elegans	a guppy	Fish	Threatened	Endemic
Rivulus roloffi	a neotropical killifish	Fish	Threatened	Endemic
Sphyrna mokarran	great hammerhead	Fish	Endangered	Native
Arcoa gonavensis	Tamarind	Tree	Endangered	Endemic
Caesalpinia barahonensis	Brasil	Tree	Endangered	Endemic
Ceiba pentandra	white silk-cotton tree	Tree	Endangered	Native
Cnidoscolus acrandus	milkdrop		Endangered	Endemic
Cojoba bahorucensis	silk tree	Tree	Endangered	Endemic
Hispaniella henekeni	cacatica		Endangered	Endemic
Melocactus pedernalensis	spiny melon	Cactus	Endangered	Endemic
Melocactus praerupticola	spiny melon	Cactus	Endangered	Endemic
Melicoccus jimenezii	cotoperí		Endangered	Endemic
Myrcia majaguitana			Endangered	Endemic
Pereskia marcanoi	rosa de banica	Cactus	Endangered	Endemic
Pereskia portulacifolia	red camelia	Cactus	Endangered	Endemic
Pereskia quisqueyana	Bayahibe rose	Cactus	Endangered	Endemic
Pseudophoenix ekmanii	cacheo	Palm Tree	Endangered	Endemic
Reinhardtia paiewonskiana	coquito cimarrón	Palm Tree	Endangered	Endemic
Sthalia monosperma	cahobanilla, cobana negra	Tree	Endangered	Native

Source: International Union for the Conservation of Nature ―Red List" (IUCN 2008).

Only plants considered ―endangered" are listed in the table above. According to the Ministry of the Environment list there are 192 endemic plant species and 45 native plant species on the ―threatened" list. Most of the threatened plant species are in the orchid family.

The critically endangered status of the Ridgway's Hawk is based on its population size of no more than 250 individuals and limited current distribution. Realistically, this number may be much less. Its current distribution appears to be restricted to forests, secondary vegetation, and forest fragments surrounding the 460 mi^2 (1,200 km^2) Los Haitises National Park in northeastern Dominican Republic. The park is characterized by undulating limestone hills and valleys, and a subtropical broad-leaf forest which has been highly modified by a long history of agricultural activity. The loss of habitat, along with direct human persecution, appears to be the most significant cause for the extreme rarity of the Ridgway's Hawk. Surveys in 2000 located as many Ridgway's Hawks as possible to establish a population baseline from which conservation intervention could be developed and measured. In 2002 nine breeding pairs were found, 30 pairs in 2003, 72 pairs in 2004, and 74 pairs in 2005, all in Los Haitises National Park (LHNP) and a few forest fragments bordering the park. In 2006, Jesús Almonte of Fundación Moscoso Puello, Inc. and Samuel Balbuena de la Rosa of Dirección Nacional de Parques-Los Haitises recorded 241 Ridgway's Hawks in the LHNP and surrounding region, which included 114 territorial pairs and 13 single birds. Ninety pairs attempted nesting and 53 pairs were successful in producing 83 fledglings. Two of the three radio-tagged juveniles from the 2005 breeding season were still present within a few kilometers of their nests. One juvenile from 2006 was radio-tagged and is being tracked and observed along with two juveniles from 2005 in an ongoing study to understand dispersal and survival of young. (www.peregrinefund.org)

The population restoration of endangered parrot species through translocations and reintroductions of captive-reared individuals has been studied. In 1997 and 1998, 49 Hispaniolan Parrots (*Amazona ventralis*), reared at aviary facilities in Puerto Rico, were translocated, radio-tagged, and released in National Park del Este, a coastal limestone forested area in the Dominican Republic (White et al, 2005). An e-mail exchange with Dr. Thomas White, Jr. (U.S. Fish & Wildlife Service) on October 26, 2008 revealed there has not been any follow-up with the parrot release. However, a pair of parrots was seen approximately 3 years after the release.

The bay-breasted cuckoo (*Coccyzus rufigularis*, Syn. *Hyetornis rufigularis*), a species endemic to the island of Hispaniola, is considered Endangered by IUCN because it has recently been recorded from only two small areas where there is ongoing habitat loss and hunting. Conservation action is urgently required to effectively protect known locations and locate additional populations. A study begun in 2006 near the Sierra de Bahorucos National Park monitored 11 territorial pairs and four active nests. One nest failed during incubation due to disturbance by Haitians living illegally within the forest. The forest at the study site is in danger of being cut for the extension of an avocado plantation. The remaining forest is also becoming highly degraded due to uncontrolled cutting of ~~"d~~ead wood" for fence posts (see Figure 1), charcoal production, grazing of cattle within the forest (see Figure 2), and the encampment of illegal Haitian immigrants within the forest. (Woolaver et al, 2007)

Figure 1. Dead Wood Removed from Forest

~~"D~~ead wood" removed from forest for fence posts.
Photos by D. Mejia and J. Vetter.

Figure 2. Cattle Grazing in the Forest

Cattle living in the forest.
Photos by D. Mejia and J. Vetter.

Sea turtles have a long history of use by humans in the Dominican Republic rooted in the beliefs and traditions of the Taíno culture. This use of sea turtle meat, eggs, and shells has continued to this day. Dominican as well as other Caribbean and Latin American societies considers certain sea turtle products, including the blood, fat/oil, and heart, to have magical and medicinal attributes. The meat and eggs of the internationally recognized endangered hawksbill turtle (*Eretmochelys imbricate*) are considered to be very nutritious, as well as providing mental and physical fortitude. A survey of 20 souvenir shops in the colonial district of Santo Domingo revealed 85% of them had tortoise shell items for sale (Mota and León, 2006). The sale of tortoiseshell products is illegal in the Dominican Republic. In the past, enforcement of selling turtle products was lacking. However, the Secretary of the Environment recently informed business owners that all illegal turtle products would be confiscated after November 2, 2008.[28]
Within the marine realm, the four species of sea turtles that inhabit Dominican waters and sandy beaches, are currently Endangered and Critically Endangered under IUCN's Red List for 2006 (IUCN, 2006). Also, the unique species of Antillean Manatee has not yet seen the recovery of its once numerous populations that inhabited coast lines and coastal lagoons throughout the Dominican Republic.

Amphibians and reptiles in the Dominican Republic face multiple threats. Some may have become extinct recently, substantial populations of others have been extirpated, some have greatly reduced numbers, and others appear to be rare or have restricted ranges. Most of the species listed are vulnerable to human exploitation or introduced predators, and/or have limited distributions and specific habitat requirements. In addition, extensive portions of the habitats of these species have been severely altered. The size and habits of the listed snakes render them vulnerable to predation by the introduced mongoose and to decimation by humans who fear or dislike snakes (Powell et al 2001).

The increase in hotel and housing construction along coastal areas where turtles nest is contributing to the decline of sea turtle nesting success by destroying potential nesting habitat and reducing the number of turtles that may reach the ocean. Typically when the

[28] For the news link, please visit http://www.diariolibre.com/noticias_det.php?id=173523

sea turtle eggs hatch the young turtles are drawn to the light of the moon over the ocean. However, with the electric lighting associated with hotels and houses, the young turtles head inland toward the night lights of the buildings and are more likely to be preyed upon by birds, animals, and humans. Some of this construction has occurred illegally within protected areas. The Ministry of the Environment has recently informed the businesses and individuals with hotels or residences constructed within protected areas, that they will be demolished.

4. STATUS AND MANAGEMENT OF FOREST RESOURCES

Reforestation projects during 1996- 2010 have accounted for much of the increase in forest cover. In 1972 over 3 million trees were planted on 1, 996 hectares throughout the country. By 2003 over 114 million trees had been planted on 71,807 hectares. Almost 65 per cent of these were planted with the assistance of the Ministry of the Environment, the major contributor to the reforestation effort. However, the majority of the reforestation effort has been with non-native species. In 2003, over 66 per cent of the trees planted were non-native. Most of the non-native trees planted are *Pinus caribaea* instead of the native pine *Pinus occidentalis*. According to a tree nursery manager, seeds of the non-native pine are easier to collect because the branches with the cones break off and the non-native pine are also more susceptible to wind throw during wind storms. Local campesinos collect these cones and sell them to the nurseries. Since it is illegal to cut native trees, the cones/seeds from the native pine trees are not as easy to gather.

Another tree that has been used in some reforestation projects is *Acacia mangium* (common name is zamorano or black wattle). This non-native tree is fast-growing and highly invasive, especially after forest fires. This tree should not be included in any reforestation program in the Dominican Repbublic.

Some natural regeneration is occurring as the population becomes more urban. Rural areas once used for subsistence agriculture are returning to forested land. A recent study of an abandoned field that had been farmed for about 60 years, in the Cordillera Central of the Dominican Republic, found a 40 year old second growth forest had developed with similar canopy height and stem density to an old growth forest. However, the basal area was 27 per cent lower in the second growth forest and 20 percent of the tree species were non-native. In addition, life-form diversity was much higher in the old growth forest in that arbore scent ferns, palm species, orchids, and bryophytes were much more abundant (Martin et al, 2004). A key point of the study revealed the rapid recovery potential of tropical forests.

Different measurements indicate an increase in forest cover. In 1967, according to the OAS, the country had barely 5,625 km2 of forest cover (approximately 12% of the national territory). In 1980, forest cover had increased to 9,500 km2 (almost 20% of the territory) and by 1998, it was estimated at 13,266 km2 (approximately 27.5% of the territory).

Data on forest cover from SEMARENA from 2004 indicated forest coverage of approximately 33% of the territory. Forests are distributed throughout the national territory. The dry forests are mostly second growth forests in a regeneration process. The broad-

leafed rain forests are present in mountainous areas in the country. The following table shows the amount of forest cover type in the Dominican Republic.

Table 3. Amount and Percent of Forest Cover by Forest Type in the Dominican Republic

Distribution of Forest Cover by Forest Type		
Forest Type	**Km2**	**% of Total**
Dense Conifer Forest	2,422.2	5.0
Open Conifer Forest	360.9	0.8
Broadleaf Cloud Forest	1,569.3	3.3
Broadleaf Humid Forest	4,669.8	9.3
Broadleaf Semi-humid Forest	2,058.1	4.3
Dry Forest	4,437.6	9.2
Mangrove Forest (salt water)	294.0	0.6
Mangrove Forest (fresh water)	40.8	0.1
Total	15,852.6	32.9

Source: SEMARENA 2004

As the population continues to grow and urban areas expand, the land use cover type continues to change. The following table 4 shows the percent of land use type by province.

Table 4. Land Use Cover Type by Province in the Dominican Republic

Province	Land Use Type							
	Agriculture	Forest	Scarce vegetation	Wetlands	Brush	Pasture	Dams	Populated Areas
Azua	26.4%	38.7%	2.2%	0.0%	31.2%	0.9%	0.0%	0.5%
Bahoruco	36.7%	21.0%	6.1%	1.5%	32.7%	1.4%	0.0%	0.6%
Barahona	25.3%	35.1%	2.3%	0.1%	28.9%	7.0%	0.0%	1.2%
Dajabón	46.1%	27.2%	0.0%	0.1%	18.8%	7.5%	0.1%	0.5%
Distrito Nacional	1.8%	5.9%	0.0%	0.1%	0.1%	1.5%	0.0%	90.4%
Duarte	60.9%	22.4%	0.4%	0.2%	2.1%	12.2%	0.0%	1.1%
El Seibo	54.9%	26.3%	0.1%	0.8%	1.2%	16.0%	0.0%	0.2%
Elias Piña	37.8%	31.1%	0.0%	0.0%	28.8%	2.0%	0.0%	0.2%
Espaillat	45.9%	27.9%	0.0%	0.9%	11.3%	12.6%	0.0%	1.6%
Hato Mayor	44.1%	34.1%	0.0%	0.9%	6.2%	12.9%	0.0%	0.6%
Independencia	18.4%	36.2%	3.7%	2.2%	38.5%	0.6%	0.0%	0.4%
La Altagracia	25.0%	27.9%	0.0%	0.9%	20.5%	20.8%	0.0%	1.0%
La Romana	45.6%	23.6%	0.4%	0.2%	14.2%	12.1%	0.0%	3.7%
La Vega	30.9%	49.2%	0.0%	0.1%	14.7%	4.3%	0.1%	0.8%
María Trinidad Sánchez	46.2%	22.3%	0.4%	0.9%	0.4%	28.9%	0.0%	0.6%
Monseñor Nouel	34.8%	51.1%	0.9%	0.4%	7.4%	4.1%	0.3%	1.4%
Monte Cristi	51.2%	17.7%	1.6%	5.7%	19.9%	3.1%	0.1%	0.6%
Monte Plata	51.2%	31.1%	0.0%	0.1%	4.8%	10.6%	0.0%	0.2%
Pedernales	13.5%	49.4%	6.3%	1.1%	26.1%	3.1%	0.0%	0.1%
Peravia	53.9%	22.9%	9.9%	0.8%	7.6%	2.1%	0.6%	1.4%
Puerto Plata	40.8%	32.9%	0.0%	0.6%	11.3%	12.7%	0.0%	1.6%
Salcedo	55.0%	26.1%	0.0%	0.0%	12.4%	4.9%	0.0%	1.5%
Samaná	37.5%	43.3%	0.1%	7.9%	3.3%	5.7%	0.0%	0.4%
San Cristóbal	37.6%	42.7%	0.6%	0.6%	3.5%	11.7%	0.5%	2.7%
San José de Ocoa	35.6%	53.0%	0.3%	0.6%	5.6%	4.5%	0.4%	0.4%
San Juan	34.5%	38.3%	0.1%	0.0%	25.8%	0.9%	0.0%	0.4%
San Pedro de Macorís	71.4%	11.7%	0.2%	0.5%	6.8%	7.5%	0.0%	1.8%
Sánchez Ramírez	39.6%	27.9%	0.0%	0.0%	2.5%	27.0%	2.2%	0.7%
Santiago	27.4%	46.8%	0.0%	0.7%	16.9%	4.1%	0.7%	3.7%
Santiago Rodríguez	30.9%	40.5%	0.0%	0.9%	22.7%	4.5%	0.9%	0.4%
Santo Domingo	51.8%	20.1%	0.1%	0.0%	6.7%	5.9%	0.0%	14.9%
Valverde	61.1%	22.5%	0.3%	0.0%	12.2%	1.8%	0.0%	2.1%
	38.4%	33.4%	1.1%	0.9%	16.1%	7.9%	0.2%	1.6%

Source: United Nations Development Program, Human Development Report – Dominican Republic 2008.

5. CONSERVATION OUTSIDE OF PROTECTED AREAS

5.1 Managed Natural Ecosystems

5.1.1 – Forest Resources

The pine forests of Hispaniola Island are located on slopes with shallow soils and higher elevations of the mountain systems located primarily in the central Dominican mountain range. The climate of this ecoregion is varied, depending on altitude (from low montane to montane) and precipitation (from wet to very wet). These forests usually develop in shallow, carbonate, lateritic, low-producing soils, located primarily on land with rugged topography. The natural vegetation of the ecoregion consists of pine trees. The pino criollo, cuaba , or "pin" (*Pinus occidentalis*), the only native pine of Hispaniola, has an altitudinal range of 200 to 3,175 m (the highest point in the Caribbean), and can be found in mixed populations with latifoliate trees, below elevations of 2,100 meters or pure populations, above elevations of 2,100 meters. In the lowlands, *P. occidentalis* develops particularly on lateritic soils in a very wet climate. These trees have the ability to grow in acidic, shallow infertile soils because they establish ectomycorrhizal symbioses with types of fungi. Other conifer species found particularly on the slopes of the central mountain range are the sabina (*Juniperus gracilior*), endemic sabina (*J. ekmanii*) and *Podocarpus buchii*.

The pine forests are intermixed with wet montane forests as a result of the degradation of the latter. The undergrowth in the pine groves is rather poor in species richness and varies in composition depending on the substrate. The native species of this ecoregion easily regenerate naturally and have moderate growth due to an adequate amount of moisture and available nutrients in the soil. However, reforestation efforts in this area focus primarily on planting the non-native Caribbean pine (*Pinus caribaea*), native to Central America, western Cuba, and the Bahamas instead of the native, endemic *P. occidentalis.*

The principal broad-leaf species include *Garrya fadyenii* and *Vaccinium cubense*, which are specific to the area located close to Constanza and the Sierra de Bahoruco; *Rapanea ferruginea*, is common on the slopes of the northern section of the central mountain range, close to Jarabacoa and San José de las Matas; and *Buddleia domingensis* is in the central mountain range. The forests of the mountain steppe are more open than those of the low montane steppe and are usually accompanied by "cara de hombre" (*Lyonia* spp.), "abey" (*Pithecellobium arboreum*), "yaya fina" (*Oxandra lanceolata*), "pajón" (*Danthonia dominguensis*), *Verbena domingensis* and *Wienmannia pinnata*.

The wet forests of Hispaniola maintain exceptionally distinct insular flora and fauna, with many unique species. Many of the species that survive in these forests are extinct on the nearby continents. The status of conservation of this ecoregion is endangered in that it has gone from representing more than half of the island's original vegetation to less than 15% at present. The major threats include illegal harvesting, migratory agricultural expansion, gathering of firewood, grazing, and illegal hunting. In this ecoregion, ecological conditions are the result of a complicated climate system, influenced primarily by the presence of subtropical anticyclones, the direction of the trade winds that predominate for most of the year, as well as altitudinal conditions. The period of most frequent rainfall is from April to December, varying in intensity. The topography of this ecoregion is also varied, ranging

from flatlands to valleys to rugged land on neutral or somewhat alkaline soil (calcareous) and on acid soil. Moist forests are classified according to their altitude, from lowland to montane and the precipitation they receive, from wet to rainforest. The principal indicator species that help to identify this ecoregion in the lowlands are *Catalpa longissima*, particularly in well-drained lands, and mahogany (*Swietenia mahagoni*). In places where the soil comes from calcareous rocks, royal palm is common (*Roystonea hispaniolana*).

Rainforests, with greater precipitation, consist of trees covered by parasitic and epiphytic plants. The principal indicator species include arboreal ferns (*Cyathea* spp.) and orchids (*Linociera* spp.). At higher elevations, characteristic species are "temblón" or "palo de viento" (*Didymopanax tremulu*), ebony (*Diospyros ebenaster*), almond (*Prunus occidentalis), Garrya fadyenii*, *Weinmannia pinnata*, *Oreopanax capitatum*, and *Brunellia comocladifolia*, as well as "pino criollo" (*Pinus occidentalis*) and arboreal ferns.

The vegetation of the small secondary stands located scattered throughout the country consists primarily of a mixture of native and non native species of "Juan Primero" (*Simaruba glauca*), "anón de majagua" (*Lonchocarpus pentaphyllus*) and "jagua" (*Genipa americana*). Other species are black olive, "guaraguao" or "grigrí" (*Bucida buceras*), West Indian lancewood or "yaya" (*Oxandra lanceolata*) and "amacey" (*Tetragastris balsamifera*). The species of isolated trees are primarily fustic (*Chlorophora tinctoria*), logwood or "campeche" (*Haematoxylon campechianum*), iris (*Hippeastrum puniceum*), "caracolí" (*Pithecellobium glaucum*), West Indian elm or "guácima" (*Guazuma ulmifolia*), "palo de leche" (*Rauwolfia nitida*), fiddleword or "penda" (*Citharexylum fruticosum*) and "córbano" (*Pithecellobium berterianum*).

The vegetation on the savannahs (resulting from the degradation of the forest) and lands with superficial soils is characterized by the presence of trees such as the sandpaper tree or "peralejo" (*Curatella americana*), sea grape or "hojancha" (*Coccoloba pubescens*), Florida trema or "memiso" (*Trema micrantha*) and oak (*Tabebuia* spp.).

The zones that have marginal soils and precipitation close to the dry subtropical forest are characterized by the presence of cashew or "cajuil" (*Anacardium occidentale*). In wetter forests, we find yellow olivier or "guaraguao" (*Buchenavia capitata*), and generally "sablito" (*Didymopanax morototoni*), "peralejo" or "madroño" (*Byrsonima spicata*) and "aguacatillo" (*Alchornea latifolia*). Also found in these areas are myrtle laurelcherry, "membrillo" or "almendrito" (*Prunus myrtifolia*), "mara" or "baría" (*Calophyllum brasiliense*), "cocuyo" (*Hirtella triandra*), American muskwood or "cabirma" (*Guarea guidonia*), "palo de yagua" (*Casearia arborea*), locust (*Hymenea courbaril*), "balatá" (*Manilkara domingensis*) and sierra or "manacla" palm (*Prestoea montana*).

http://www.worldwildlife.org/wildworld/profiles/terrestrial

5.1.2 – Aquatic/Wetland Resources

The Dominican Republic has seven major drainage basins. Five of these rise in the Cordillera Central and a sixth, in the Sierra de Yamasá. The seventh drainage system flows into the Lago Enriquillo (Lake Enriquillo) from the Sierra de Neiba to the north and from the Sierra de Baoruco to the south. In general, other rivers are either short or intermittent. The Yaque del Norte is the most significant river in the country. Some 296 kilometers

long, with a basin area of 7,044 square kilometers, it rises near Pico Duarte at an altitude of 2,580 meters in the Cordillera Central. It empties into the Bahía de Monte Cristi on the northwest coast, where it forms a delta. The Yaque del Sur is the most important river on the southern coast. It rises at an altitude of 2,707 meters in the southern slopes of the Cordillera Central. Its upper course through the mountains constitutes 75 percent of its total length of some 183 kilometers. The basin area is 4,972 square kilometers. The river forms a delta near its mouth in the Bahía de Neiba.

The Lake Enriquillo lies in the western part of the Hoya de Enriquillo. Its drainage basin includes ten minor river systems and covers an area of more than 3,000 square kilometers. The northern rivers of the system rise in the Sierra de Neiba and are perennial, while the southern rivers rise in the Sierra de Baoruco and are intermittent, flowing only after heavy rainfall. The Lake Enriquillo itself covers some 265 square kilometers. Its water level varies because of the high evaporation rate, yet on the average it is forty meters below sea level. The water in the lake is saline.[29]

Water management of the aquatic and wetland resources is of concern. The availability of water resources per capita in the Dominican Republic can be considered adequate, but not abundant, and regional imbalances exist. Groundwater represents 60% of available fresh water and half of it is currently being exploited.

Geographical reality compels the Dominican Republic, as a half-island, to take Haiti into account in the management and use of water resources, as there are three basins along the border (Masacre, Artibonito, and Pedernales) plus the Hoya Enriquillo (including the Las Damas River basin). Other relevant issues related to demographic pressure and poverty in Haiti, and the additional demands of the more than 3 million tourists who visit the Dominican Republic each year, will continue to pose challenges in terms of access to water resources for people on the island as a whole. The situation becomes more worrying when the effect of climate change is taken into account.

Access to adequate sanitation is still low and is unevenly distributed in the territory, with a poor capacity in sewage and wastewater processing prior to discharge, which is a source of pollution of rivers and coasts. However, the main problem in water management is efficiency. If the current loss of water in the system were avoided, the needs of almost three times the current number of users could be met through the systems of potable water and irrigation. (UNDP, 2008)

The 2001 DR Assessment by IRG extensively describes the aquatic resources along with the concerns and environmental impacts of excessive irrigation and salinization of soils. The table below expands on Table 3.5 (Major Irrigation Storage Reservoirs in the Dominican Republic) by including dams/water storage areas of other purposes including irrigation.

[29] For more information, please visit http://countrystudies.us/dominican-republic

Table 5. Dams and Hydroelectric Power Stations in the Dominican Republic

Dam	Dam Height (m)	River	Storage Capacity (millions of m^3)	Area irrigated (hectares)	Purpose
Las Barias	22	Nizao	6.1	5,268	Irrigation
Jiguey	110	Nizao	167.97		Electricity
Aguacate	41	Nizao	4.3		Electricity
Valdesia	78	Nizao	187	12,262	Multiple
Sabana Yegua	76	Yaque del Sur	354.2	20,505	Irrigation
Sabaneta	70	San Juan	66.3	4,860	Multiple
Hatillo	50	Yuna	710	17,718	Multiple
Rincon	54	Jima	75.5	2,000	Multiple
Tavera	80	Yaque del Norte	170	26,745	Multiple
Bao	110	Bao	244		Multiple
López Angostura	21	Bao	4.4		Multiple
Baiguaque	3	Baiguaque	.0015		Electricity
Monción	119	Mao	370	8	Multiple
Con. Monción	28	Mao	7.49		Multiple
Chacuey	31	Chacuey	13.7	1,050	Irrigation
Maguaca	25	Maguaca	15.6	900	Irrigation
Cabeza de Caballo	17	Cabeza de Caballo	0.6	600	Irrigation
Mijo	18	Mijo	2.3	800	Irrigation
Guanajuma	19	Guanajuma	2	150	Irrigation
Rio Blanco	43	Blanco	0.73		Electricity
Jimenoa	14.5	Jimenoa	0.4		Electricity
El Salto	5	Constanza	0.011		Electricity
Las Damas	15	Las Damas	0.04		Electricity
Los Toros		Canal Ysura			Electricity
Nizao Najayo		Canal Nizao Najayo			Electricity
Los Anones		Canal Nizao Najayo			Electricity
Pinos del Eden					Electricity
Guaguí (under construction)	70	Camú y Guaguí	47.5		Multiple
San José (in planning stage)	46	Guayabín			

Source: Taveras, 2004

5.1.3 – Coastal Marine Resources

The coastal areas of the Dominican Republic contain a regionally unique complex of marine ecosystems with unusual features. The local marine ecosystem is a part of the Greater Antillean Marine ecoregion that includes the Bahamas, Cayman Islands, Cuba, Dominican Republic, Haiti, Jamaica, Puerto Rico, Turks and Caicos Islands. Fish in decline include Stoplight parrotfish (*Sparisoma viride*), Clown wrasse (*Halichoeres maculipinna*), Cherub fish (*Centropye argi*), Nassau grouper (*Epinephalus striatus*), and the Spotted drum (*Equetus punctatus*). Other species include Conch (*Strombus gigas*), White-tailed tropicbird (*Phaethon lepturus*), and the Black-capped petrel (*Pterodroma hasitata*). In addition to being a breeding ground for the Humpback whale (*Megaptera novaeangliae*), the region also makes excellent habitat for the endangered American crocodile (*Crocodylus acutus*).

Severe industrial development pressures, such as large scale tourism resort development, and industrial agricultural activities especially from sugar cane mills and food-processing plants, have led to intensive and unplanned land use, loss of mangroves, over exploitation of coral reef resources, degradation of water quality, anoxia, fish kills, coral bleaching, and,

in some cases, pollution induced diseases. Dredge-and-fill operations, fishing with bottom trawls, and oil spills are further threats that have taken their toll on important habitats, including sea grass beds and their associated fish nurseries.[30]

The northern waters of the Dominican Republic are known to be internationally important breeding sites for humpback whales, in particular Samana Bay. Recent sightings by Proyecto Amigos de los Delfines (Friends of the Dolphin Project) in 2005 and by persons in route to the Las Americas airport from Santo Domingo in 2008, indicate the humpback whales also utilize the southern waters near the Eastern National Park of the Dominican Republic.

The Friends of the Dolphins is a collaborative project utilizing scientists and students from academic bodies in the Dominican Republic, the United Kingdom, and the United States of America, non-governmental organizations, local community groups, tourism bodies, and government officials. The Project was established in 2004 with the aim of conducting baseline research on and promoting conservation of cetaceans in the waters of the Dominican Republic.

At one point during the 2005 survey, there were seven speedboats within 500 meters of whales, including several within 100 meters, in addition to the research boat and a stationary fishing boat that happened to be in the path of the whales. Although some speedboats maintained their distance in response to the shouted requests of the survey team, several would accelerate aggressively to bring their tourist passengers as close to the whales as possible whenever they would surface. The details of these sightings, the actions of the tourist boats, and the known history of encounters with humpback whales in this area prompted members of the Friends of the Dolphins Project to contact the Undersecretary of Protected Areas and Biodiversity in the Ministry of the Environment, to express concerns about the conservation and protection of humpback whales in southern waters of the Dominican Republic.

The Ministry of the Environment took note of the issue and arranged a meeting with various tourism operators working in the region of the National Park del Este, which was held on 16 November 2005. At this workshop, members of the Friends of the Dolphins presented a –Guide to Good Practices for the Conservation of Marine Mammals". This guide was developed with the input of scientists, government officials, members of the tourism sector, and with the support of local communities in whale watching areas. The government endorsed the use of whale watching codes of conduct to reduce the impacts of tourism activities on whales in the southern waters of the Dominican Republic. Hopefully, the guide will become nationally recognized.

The workshop was followed by a training program, supported by the Dominican government, for boat owners and operators, as well as other related members of the tourism sector, to emphasize codes of conduct and best practices for responsible whale watching. Additionally, a second workshop was held in April, 2006 to further increase public awareness about the guide, the rationale for it and ecotourism in general. Participants included representatives from tour operators and others with commercial interests (such as

[30] http://www.panda.org/about_wwf/where_we_work/ecoregions/greater_antillean_marine.cfm

the merchant navy), GODR (including the navy and environmental police), and local tour guides and operators. (Whaley et al, 2007)

5.1.4 – Rangeland Resources

Table 2 above, indicates nearly 8 percent of the land cover in the Dominican Republic is in pasture. Much of this land is on steep hillside slopes causing compacted soils and erosion. Cattle trails on the steep hillsides are evident throughout the country.

Some parts of the country, especially in the eastern part have seen an increase in the amount of cattle grazing. A major concern, where rangeland is not fenced, is cattle entering forested lands and streams, especially in protected areas. The cattle eat the native herbaceous forest vegetation and deposit their waste products in streams causing health concerns for local communities and stream sedimentation.

5.1.5 – Agricultural Systems

Agriculture in the Dominican Republic has declined dramatically during the latter half of the twentieth century from employing 6 out of 10 Dominicans in the 1960s to less than 2 in 10 by the turn of the century. One of the factors driving the Dominican labor force away from the countryside and into the cities is the grossly uneven distribution of land and the nature of land tenure. A 1985 study found that, 85 percent of landowners had less than 5 hectares, and cumulatively these comprised only 12 percent of the agricultural land, while 15 percent of owned 88 percent of the land. A significant proportion of people growing crops are sharecroppers or squatters on government land (FESS 2005).

The sharpest decline in agricultural production has been in sugar. The share of sugar in agricultural exports fell from 52.2 percent to 13.3 percent over the last two decades of the twentieth century. The shift away from sugar production has been accompanied by an intensification of production of staples for the growing Dominican urban population and of specialty crops for tourist consumption. The domestic production of staples such as plantains, rice, and beans has increased (FESS, 2005).

Constanza, a major agricultural town in the Dominican Republic, is located in a valley approximately 1,100 meters above sea level. The valley and surrounding area is in the business of growing flowers for export and vegetable crops such as garlic, onions, lettuce, cabbage, broccoli, potatoes, and strawberries. About 1,500 hectares are cultivated in the valley and 900 hectares in the surrounding mountains.

The increased production of food crops has been accomplished by expanding the agricultural frontier into marginal areas; the increased, and often improper, use of insecticides; and utilization of inefficient irrigation systems. Agriculture under irrigation uses 85 percent of the country's water, but the hydrology of the country does not easily accommodate the production of water-intensive crops like rice and beans. Along with wasteful and damaging irrigation practices, deforestation and hillside farming are major components of an unsustainable agricultural production system.

Past government administrations have encouraged the growing of beans on land that would be better suited to forestry or other agricultural activities, thus damaging the soil and watersheds. Not only do these practices promote soil erosion, they aggravate the water supply problem. The river Nigua, once a major stream, now is a mere trickle of water. That is the situation of most rivers in the Dominican Republic today (FESS, 2005). Irrigation from the Rio Grande is decreasing the flow and may affect potential hydroelectric production in the future (Taveras 2004).

5.2 Impacts of USAID/ DR Development Projects

Working directly with the Ministry of Environment, USAID/DR assisted the Dominican government to create, implement, and enforce environmental policies for sustained environmental protection. USAID/DR works jointly with the Ministry of the Environment to:

1) prepare environmental sub-sector laws and implementing regulations;
2) prepare and implement environmental standards and norms;
3) strengthen protected area management;
4) promote clean production technologies;
5) strengthen municipal environmental units;
6) provide training to national, regional and municipal staff; and
7) enhance civil society participation in protecting the environment and protected areas.

USAID - Improving Policies for Environmental Protection Program (IPEP) and partners have held several environmental training courses for both public and private sectors, such as the successful training session for 48 participants on environmental enforcement training in March, 2007. Course content included:

USAID-IPEP also provided an 8-day workshop on thematic biodiversity interpretation during September, 2008. This session provided additional training and practical experience to the team of local technicians, who have received previous training, in order to provide an in-country technical group that can provide advanced thematic biodiversity interpretation in national parks and protected areas. One key result of this intervention is that this team is now able to provide valuable training and implementation inputs for eco-tourism components of the USAID-DR long-term environmental strategy.

The GODR requested assistance in policy to set the stage for effective management of biodiversity resources. The Ministry of the Environment specifically requested assistance in drafting sectoral laws, as required by the general environmental law, and with implementation regulations. The impact of the program was to improve the regulatory regime in protecting biodiversity by providing the government with an enforcement framework including mechanisms for sanctioning violations and training of officials.

Considerable progress was made in the policy sector with respect to the implementation of environmental direction for CITES (sea turtle products, Hispaniola parrot conservation, and

other endangered species trafficking) and Environmental Impact Assessment processes under the DR-CAFTA program[31]. Also progress was made in the area of environmental regulation at municipal levels and with the private sector and other segments of civil society.

USAID-IPEP participated in the writing of the Vision for Coastal and Marine Resources Regulation, working closely with public and private sector counterparts in preparing this important document for publication. (USAID, 2007)

During the field visit several USAID sponsored projects including mini-hydroelectric power plants and mini-greenhouses were observed. The mini-greenhouses allow local villagers to utilize less steep land and fewer hectares for their agricultural crops which will allow more land to be reforested.

A bio-gas digester being constructed by an eco-lodge will utilize the sewage from the local village to produce methane gas. The other bio-gas digester was built by a coffee cooperative and is utilizing the waste from the coffee bean shells through a fermentation process to produce methane gas. The shells are then used to produce composting material to fertilize the coffee plantations. In the following paragraphs, we include brief descriptions of current and future program activities in USAID/DR that will have an environmental impact on biodiversity and tropical forest. We cannot make the direct impact link, but the activities will surely have a positive impact on these two areas.
Under the current USAID Environmental Protection Program (EPP), implemented by TNC, activities geared towards helping with restoration of ecosystems are and will be carried out in support of the Ministry of the Environment strategy. The activities involve 1) design of pilot projects of ecological micro-watershed restoration at the National Park Valle Nuevo. 2) Improve management effectiveness at the park by providing technical and financial assistance; 3) Define the national forest inventory evaluation methodology; 4) Assess the challenges of the marketing of forest products and regulation on transportation of wood in the country; 5) Develop a national forest strategy for the Dominican Republic; And 6) Provide Support to the Forest Vice-Ministry in implementing the national strategy to manage forest fires.

Under the activity item 5 above, the program has sought to develop a national forest strategy, and a plan for a national program for native and endemic plants has been developed. The project has involved collecting about 10,000 seeds of endemic and native forest plants, which are being treated for conservation in the seed bank of the National Botanic Garden. Under the same activity, the program is also providing training against forest fires in the border communities of Sabana Real, Capotillo and Tilory, where 29, 40 and 43 reforestation brigade members were trained along with other members of the communities.

In the area of biodiversity, the EPP program will be working in finalizing the ―Red List" of endangered species of the Dominican Republic, which entails verifying the status of the list, translating and adapting to UICN terminology, working on justification of the species,

[31] The Dominican Republic became a member of the Dominican Republic – Central America Free Trade Agreement with the United States of America, which under Chapter XVII includes environmental requirements to be met by all signatories of the treaty. The chapter promotes fair trade competition through the application of the same environmental regulations, safeguards and laws by the public and private sectors,

preparing scopes of work for experts, hiring experts to prepare information on species, evaluating status of certain species, and proposing mechanisms for updating it. EPP will also work on developing and implementing a national sea turtle management plan. In improving the protected areas management, the program will develop a training program on environmental executive leadership and institutional strengthening for civil society; Strengthen conservation partners using TNC's institutional Self-Assessment Tool as guide, with the goal to establish a formal alliance with the target institutions, so that efforts can be aligned towards common goals in the Bay of Samana; Develop and implement a training program on protected areas management for park guards and protected area managers to facilitate in situ biodiversity conservation; Design and implement an invasive species management plan for Catalina Island, which will entail evaluation of impacts associated to alien invasive species in the island, improve habitat for native and endemic species with the implementation of an invasive alien species control program.

In support of the Ministry of the Environment, and in collaboration with GTZ, USAID/EPP will carry-out trainings and seminars on environmental payment programs, and the development of policy instruments and legislation required for effective implementation of a national program for environmental services. Among some of the activities, TNC will support a regional summit on sustainable financing of protected areas, where topics such as debt for nature swaps, environmental funds operations and business plans, payment for ecosystems services and other financial mechanisms will be dealt with by regional representatives and subject experts.

The USAID regional program has also coordinated with the USAID bilateral missions in strengthening the lab systems to monitor residual water quality to contribute in the protection of rivers and lakes in the region. In June 2010, USAID/DR through its Environmental Protection Program (EPP), implemented by the Nature Conservancy, coordinated efforts to provide technical capacity to five local laboratories: El Instituto Nacional de Agua Potable y Alcantarillado (INAPA), la Corporación del Acueducto y Alcantarillado de Santo Domingo (CAASD), la Universidad Autónoma de Santo Domingo (UASD), el Instituto Dominicano de Investigaciones Agropecuarias y Forestales (IDIAF), el Instituto Nacional de Recursos Hidráulicos (INDRHI) y la Corporación del Acueducto y Alcantarillado de Puerto Plata (CORAAPLATA). This training also had the support and participation of representatives of the Ministry of the Environment interested in monitoring water quality in the DR.

Under the DR CAFTA regional Enviromental and Labor Excellence (ELE) Program, the mission has been involved in efforts to diminish the negative environmental impacts by the private sector. The program aimed at engaging the private sector with technical assistance in the adoption of clean production practices, environmental management systems and environmental auditing. The program's goal was for the private sector to internalize good environmental practices from the operational management perspective by increasing competitiveness and ensuring compliance with environmental regulations under chapter XVII of CAFTA-DR. Furthermore, the project included technical capacity building in areas of thermal energy efficiency with the objective of reducing fossil fuel consumption; training on quick diagnosis in clean production or Eco efficiency. Under this latter activity a diagnostic was performed in 8 hotels that identified areas of improvement in decreasing pollution, which is helping management to optimize the use of inputs and resources.

The CAFTA-DR ELE project has also developed an undergraduate program in clean production and environmental management systems with INTEC and UASD, two universities in the Dominican Republic. This is in line with the objective of increasing the local professionals in the areas and practice of clean production. The programs include courses in pollution prevention, energy efficiency, waste management and clean technology production. This university program will support the movement towards the adoption of better private sector environmental practices.

In 2009, USAID signed the Sustainable Fisheries in Miches cooperative agreement with Columbia University. One of the objectives of the project was to enhance local marine biodiversity and create a sustainable fisheries economy. The collapse of Miches's fisheries had an impact on the community and increased the damage to the environment. In year 1 of the cooperative agreement, the Center for Environment, Economy, and Society (CEES) from Columbia University focused its activities in gathering baseline biodiversity, social, and economic data that would be used to design the sustainable fisheries plan. The baseline included carrying out reef survey data collection and consulting with local Dominican fishers and government entities like the Consejo Dominicano de Pesca y Acuicultura (CODOPESCA) and the Ministry of the Environment. By September 2010, CEES had already conducted three sets of baseline reef surveys; began planning and organizing a net exchange program that ensures the use of proper and legal sized nets; hosted the first meeting of the Bahia de Samana Sustainable Fisheries Working Group, an information sharing exchange involving most relevant local community groups, NGOs, government ministries, and private sector stakeholders; began planning for sustainable land and fisheries management in the protected areas in the Municipality of Miches in collaboration with the Ministry of the Environment; and completed the planning phase and began implementation of the lobster house pilot project, which will help make lobster fisheries sustainable and lucrative and, at the same time, reduce fishing pressure on the reefs.

As part of the project, a basic fisheries stock assessment by CODOPESCA and CEES is being carried out using the CODOPESCA daily capture data. CEES started compiling the daily fisheries capture data collected in each of the eight communities in Miches. The data collected by CODOPESCA contains information that is divided into classes based on economic value, rather than by the species of fish or their sizes. Although the CODOPESCA data are constrained in value, they will be used as one important baseline data sources, as it will allow comparison between the catch rate in the future with that of the past to determine the ecological effects of the Sustainable Fisheries Plan. It is expected that higher economic classes of the CODOPESCA data will increase relative to earlier values. CODOPESCA has provided the information, and CEES has received CODOPESCA fisheries collection data from each of the focal fishing communities, which covered the time from January 2009 through September 2010, and the process of gathering more of these data has been taking place, so that CEES will have a multi-year longitudinal series of data across the watershed.

Columbia University closer collaboration with the Ministry of the Environment has also resulted in restarting a project to control the invasive freshwater plant Hydrilla Verticillata in Laguna Limon. This invasive plant has caused the decimation of fisheries and biodiversity in this lagoon. A strategy to control hydrilla has been created and the process of creating the containment netting for this activity is already ongoing.

USAID Dominican Republic has also implemented a program with Indiana University, the Living Museums in the Sea project. This activity was designed to protect endangered corals and other marine biodiversity through the establishment of Special Marine Protected Areas. Indiana University designed the project as a model for the protection and preservation of significant submerged cultural and associated biological resources featuring the recently discovered remains of the 1699 Cara Merchant vessel belonging to the renowned British pirate, Captain Kidd. The underwater archaeological preserves include three additional sites with cultural and biological characteristics: the 1724 Guadalupe Preserve, the Guaraguao Reef 18th Century Cannons, and the St. George Artificial Reef. The four sites together present a variety of cultural resources and reef environments, and provide a unique opportunity to promote sustainable tourism while promoting environmental protection to coral reefs and biodiversity. The Living Museums model is serving as a tool for the protection of biodiversity through the recruitment of fish, corals, and various marine invertebrates.

The Living Museums in the Sea project monitors biodiversity by analyzing the condition of the corals within the project site. The corals Acropora palmata and Dendrogyra cylindricus were monitored at the outset of the work, and this monitoring has continued yearly. If the yearly monitoring reveals damage to the corals, the principal investigators have the option of reducing access to a dive site through mooring buoy removal in no-anchor areas in order to relieve the site of the pressures imposed by divers. Baseline data and photos are serving as tools for future monitoring and impact assessment. The baseline data collected by the Indiana University (IU) team encountered anchor damage to the corals and the IU team employed Reef Medic techniques to mend the corals and photographed coral growth at multi-month intervals to determine coral health. This technique was successful as determined by coral skeletal and tissue growth over the repaired site. Photos of corals were also taken at the 1724 Guadalupe site to establish baseline documentation; the names and linear dimensions of corals were recorded for future analyses. The U.S. Forest Service Agreement's indicators include the number of environmental interpretation sign site plans developed within protected areas and the number of environmental interpretation ecotourism materials developed for the USAID sponsored tourist clusters. The monitoring for effectiveness of these interpretative messages to change and/or manage tourist behavior and impacts on the biodiversity within the visited Protected Areas will not be conducted by the Project as it is limited to a two-year period and is focused on providing technical assistance; the implementation and monitoring is a task of the USAID-supported tourism clusters under the Dominican Sustainable Tourism Alliance.

The Miches Project and the Living Museums in the Sea Project being implemented both focus on the protection of coastal and marine resource biodiversity through environmental education training of local community leaders, preparation of environmental management plans for priority areas (Miches and La Romana areas), inventories and monitoring of coral and fish, and implementation of technologies such as mooring buoys and regulation of net mesh size. The end goal of these projects is to prevent the loss of the marine biodiversity base for increased community livelihood through sustainable fishing and tourism.

Under the USAID/DR Health project of Improving Maternal & Child Care/Health Systems, it is intended to create Health Centers of Excellence within the public health system of the Dominican Republic that will function as model users of biosafety, infection control and

proper treatment and disposition of medical waste. Under this project, training and technical assistance is and will be provided to the Ministry of Health staff ensuring that hazardous materials and medical waste are properly handled and disposed. The project goes beyond the hospitals internal procedures for proper medical waste disposal by involving municipalities to ensure the final appropriate disposition of medical waste.

In order to comply with the USAID Environmental Mitigation Standards, Abt Associates, the implementing entity, has carried out trainings for proper handling and disposal of medical waste and hazardous materials, ensured universal standards compliance, and implemented a three bin disposal system for needles and hazardous materials. The hospitals intervened by the project are required to implement measures to mitigate the impact of their activities on the environment and comply with waste management and disposal standards. The project staff assists intervened hospitals and municipalities to establish a system that ensures proper final disposal of medical waste. The USAID Health project also contemplates linking with the USAID Environmental Protection Program (USAID/EPP) and the National Institute of Technology (INTEC) to explore opportunities of collaboration with ~~"b~~rown" environmental issues. The Diagram below depicts the components of the USAID/Health project integrating preservation of the environment.

During 2010, the health project has engaged in technical capacity building in the intervened hospitals, and a list of activities is provided below

- 20 tutors were trained, who will ensure the implementation and follow up of internal training and monitoring of biosafety standards.
- 50 trainings on Managing biosafety risk and Management of hospital waste
- 10 Plans for Medical Waste and Biosafety were elaborated.
- 10 Standard guidelines for implementation and compliance of biosafety behavior by biosafety tutors and committees
- 10 marked routes for waste disposal
- 10 Biosafety Committees established, one for each hospital
- 1,794 people were given technical capacity in the area of risk Management, biosafety and proper handling of medical waste. The people trained included doctors, nurses, technical and administrative personnel, and cleaning crews.

Under the USAID/DR Economic Growth portfolio, the USAID/Rural Economic Diversification (RED) program has supported the agricultural sector promoting the sustainable management of natural resources and developing strategies ensuring sustainability by providing technical assistance in organic production. USAID/RED has not only engaged proactively with growers associations helping improve produce quality and diversification of output as a way to increase farmers' incomes in organic farming, but it has also engaged promoting and ensuring best and environmentally sustainable practices in the non-organic farming sector. The program has supported agricultural associations and cooperatives throughout the country. These groups have included coffee growers, which as mentioned earlier in this report, have benefited from the construction of infrastructure that has helped in lowering the environmental impact of the coffee associations targeted by the program.

In the case of wood, the USAID/RED program has donated equipment that maximizes wood cutting, which has increased the productivity of the sawing mill and decreased pressure on the forest being managed; the donated equipment has also helped with the proper drying of the wood, which has increased the value of the wood and has provided incentives for expansion and improvements in the management of the renewable natural resource. In San Jose de las Matas, USAID/RED constructed and rehabilitated wood drying equipment and provided sawing machines that replaced inefficient ¼ of inch circular saws that produced a great deal of saw dust, leading to unnecessary waste.

Figure 3. San Jose de las Matas Wood Support Project

Source: USAID/RED project: Increasing productivity and quality of wood in San Jose de las Matas.

The USAID/RED program has also supported small cattle ranchers associations that have improved the quality of their milk with the use of proper milking building stations donated by the program, and these milking stations have adequate flooring that allows for a better management of the cattle liquid and solid waste, thus, minimizing their negative environmental impacts. The project has built a total of 50 milking stations within the Dajabon municipality and has provided trainings for improving grass pastures, maximizing available pasture land for cattle. In the short and long term this helps decrease the need for conversion of forests into cattle ranch pastures, which has been described to be one of the seven treats to biodiversity and tropical forest in the Dominican Republic.

Figure 4. Small Cattle Ranchers Project Supported by USAID/RED

Source: USAID/RED.

We have described in the last paragraphs some of the examples of how the USAID/RED program has had a positive impact on the environment, but the program in general implements projects with clusters to increase productivity, reduce costs, improve quality of products with environmentally friendly technologies in agricultural production and processing practices that are developed in cooperation with agricultural research institutions in the DR. Micro, small and medium enterprises (MSME) are trained to use improved competitive production technologies; improved post-harvest handling systems; Several of those MSME have achieved specific certifications, such as GLOBALGAP, Organic label, Fair Trade, Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), and others. The USAID/RED program has also been involved in systems for Sanitary and Phytosanitary (SPS) management and compliance. In addition, the USAID/RED project has prepared a comprehensive pesticide PERSUAP to minimize the potential negative impacts to flora, fauna, water sources, and human health during the implementation of their agriculture activities. The PERSUAP promotes the use of Integrated Pest Management.

In summary, the past and present activities of USAID/DR have had an overall positive impact on the environment, biodiversity, and natural tropical forests by implementing innovative technologies, supporting the GODR in the establishment and implementation of national environmental regulations, training on environmental management and monitoring, and facilitating the sharing of environmental technologies. Projects that have potential to have a negative impact on the environment (such as the infrastructure and small scale microenterprise development of the DSTA, Batey, and MLB projects), have implemented environmental safeguards such as the use of the Environmental Mitigation Plan and Report that identifies potential environmental impacts (including impacts to biodiversity and forests) and implementation and monitoring of necessary mitigation measures.

5.3 Other non USAID Current and Planned Conservation Efforts and Projects

The Nature Conservancy's Central Caribbean Program (TNC CCP) maintains an ongoing collaboration with the Instituto Tecnologico de Santo Domingo (INTEC) in order to identify turtle nesting sites within the National Park del Este. These efforts are oriented towards the first National Center for the Conservation and Ecotourism of Sea Turtles in the Dominican Republic. As a strong supporter of increasing natural manatee populations in the country, the TNC CCP has financed the following steps towards achieving that goal:

1) Top level training courses and an internship for local marine experts and students;
2) The preliminary scientific research of the Scientific Reserve "Estero Hondo Manatee Sanctuary" in the northern coast of the DR; and
3) A full time internship on Manatee Scientific Research (carried out in Belize) for a Dominican marine expert, in order to build capacity for future research.

Among marine mammals, the CCP has also provided both technical and financial support to elaborate an Action Plan for the Sisterhood Agreement between the DR and the US. Currently a total of four projects are being implemented in this current fiscal year. Another important step has been the identification of potential spawning aggregations of reef fish in the northern and south coast of the country. This scientific research is currently ongoing and aims to provide evidence and confirmation of spawning sites and events, for the purposes of providing guidance in their management and regulations. Finally, on a broader approach, TNC will be working on the improvement at site level management effectiveness at the Samaná Bay with the Project "*Ecosystem-Based Marine Zoning in Samaná Bay: A New Vision for Governing Marine Resources among Multiple User Groups in the Dominican Republic"*. This project will be partially funded by the Packard Foundation and therefore opens a major opportunity for the Caribbean Region.

As part of the USAID-Dominican Sustainable Tourism Alliance (DSTA) Program, TNC's CCP together with the Ministry of the Environment and local partners, is creating Conservation Action Plans for Los Haitises National Park, Manglares del Bajo Yuna National Park and Estero Hondo Marine Mammals Sanctuary, as a necessary base for the development of sustainable tourism activities inside and around those protected areas. In addition TNC will evaluate Limits of Acceptable change for tourism related activities for the mentioned areas, as well as for National Park del Este. TNC will also assist the Ministry of the Environment and tourist clusters in the development of co-management agreements and business plans for selected protected areas.

In September 2002 a biological survey began investigating insects, plants, and other organisms from mountain forests on Hispaniola (Dominican Republic, Haiti), including some of the most threatened natural habitats on earth[32]. A high percentage of animal and plant species is endemic to these habitats, found nowhere else.

Destruction of montane habitats is occurring at an alarming rate and many species are threatened with extinction, including many which provide information essential for

[32] This survey was carried out under the project "Understanding Vanishing Endemism: Survey of the Invertebrates and Plants of Threatened Montane Habitats in Hispaniola." More information can be obtained at http://iz.carnegiemnh.org/inverts/hispanio.html

understanding biological aspects of related species elsewhere in the New World. Plants of Hispaniola are the least known of any island in the Antilles.

An estimated 80% of invertebrate species in mountainous regions is uncollected and unknown to the scientific community. More than 6,720 plants, 219,600 invertebrate specimens, and DNA samples of both will circulate to more than 160 cooperating specialists worldwide for identification, research, and publication on diverse Caribbean lineages. The project will:

1. Collect, prepare, and circulate specimens for research.
2. Discover and publish on previously unknown organisms.
3. Document spatial and temporal occurrence of species and their associates.
4. Communicate biological information over the World Wide Web.
5. Apply survey findings to urgent problems in resource management.

The findings from this project have significance for scientific research, including systematics, evolution, ecology, and conservation. This is a multi-institutional and international effort based at Carnegie Museum of Natural History (Pittsburgh)[33] collaborating with The Smithsonian Institute, Harvard University, staff from key institutions in DR (Jardín Botánico Nacional, Museo Nacional de Historia Natural, State), government agencies (Dirección General de Vida Silvestre y Biodiversidad), and private foundations (Fundación Moscoso Puello). This Project will provide the most complete biotic documentation of Hispaniolan habitats available anywhere, will be essential to preservation and management of endangered montane habitats, and will be a model for future multinational, multi-institutional biotic inventories in the Caribbean and beyond.

In 2004, the Punta Cana Ecological Foundation (PCEF) launched the Coastal Marine Project for the Punta Cana region in Novemebr 2004. As the fastest growing destination in the Caribbean and a site of important marine ecosystems, including one of the largest barrier reefs in the Dominican Republic and critical breeding ground for pelagic and reef fish, PCEF is trying to create a model for sustainable coastal development. The Ecological Foundation works with national and international partners in the implementation of this project, including the following areas of action:

- Water quality monitoring (residual, potable, and coastal waters)
- Implementation of national norms and regulations
- Environmental permits and certifications
- Coral reef monitoring and restoration
- Beach stabilization and nourishment
- Legal Status and policy implementation
- Long-term research and monitoring
- Golf Course Environmental Oversight
- Design and construction
- Water quality and use management
- Nutrient management

[33] www.iz.carnegiemnh.org/inverts/hispanio

The PUNTACANA Center for Sustainability was established in 1999 as a research and education facility devoted to creating solutions for the sustainable development of the Caribbean. The Center was originally created through a pioneering partnership between the PUNTACANA Ecological Foundation, Grupo PUNTACANA and Cornell University and has since been expanded to include a diverse and growing coalition of national and international institutions. The Center is guided by the following goals:

- Develop and implement solutions to global environmental challenges
- Influence and contribute to the development of sustainable destinations through the rational use of natural resources
- Develop leadership training (community, corporate, environmental, social) in order to create responsible global citizens

The Indigenous Eyes Ecological Reserve is 1,500 acres of forest preserve owned and managed by PUNTACANA Ecological Foundation. The reserve is a part of a lowland subtropical tropical forest decorated with eleven freshwater lagoons. Historians have discovered that the Taino Indians, the pre-Columbian inhabitants of the island, referred to the lagoons as —yes" because of their distinctive shape.

In the country, the Universidad Agroforestal Fernando Arturo de Meriño at Jarabacoa and the National Botanic Garden in Santo Domingo (NBC-SD) have seed banks. According to Ramón Díaz, the NBC-SD seed bank is inadequate due to the lack of humidity control in the storage area. The NBC-SD, encompassing 2 million square meters, was formed in 1976 and contains numerous gardens of endemic plants, including orchids, a Japanese garden, clock garden, central plaza garden, and numerous walking trails.

The National Zoological Park (founded on July 5, 1975) in Santo Domingo, contains 1.5 million square meters, making it one of the largest zoos in the world. Many of the animals in the zoo are displayed in open areas. The open-air aviary, approximately 1 acre in size, was one of the first of its kind but has fallen in disrepair. A visit to the open aviary in the zoo on Sunday, September 24, 2008 revealed mostly domestic ducks and chickens in the open-air section with a cockatoo, parrot, and macaw in individual small cages. There is potential to expand and improve the aviary if funding becomes available. A veterinary clinic is located within the zoological park.

The National Aquarium opened in 1990 with a modern, open-air design overlooking the Caribbean. Approximately 250 species of marine life can be seen. The aquarium provides for the study, promotion, and protection, of both marine and freshwater plant and animal.

6. THREATS TO TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

In terms of biodiversity, tropical forests contain some of the richest terrestrial ecosystems. Like all other types of forests, they have been used by humans since time immemorial, providing a range of goods, such as wood, foods, and medicines. Wood has been used for construction, tools, and as a vital source of energy. In the modern world, the roles and the perceptions of forests are different and more complex. In addition to the commercial products forests can provide, people are interested in conserving forests for soil

stabilization that provides water quality as well as quantity; for aesthetic, cultural, and spiritual values; and for conserving biodiversity to maintain healthy ecosystems. The following processes are characterized as direct threats to tropical forests and biodiversity. Ongoing processes that threaten forest biodiversity include:

- Non-native invasive species threatening ecosystems and reducing habitats of native species.
- Illegal logging.
- Soil erosion/sedimentation.
- Forest fires.
- Unregulated tourism and industrial factories development (impacting river and coastal marine ecosystems).
- Conversion of forest land and natural landscapes to other land uses.
- Illegal trading in forest plants and animals.
- Climate change.

As indicated before in this report, there have been severe development pressures from the tourism and industrial sectors and population related issues that have led to intensive and unplanned land use, loss of mangroves, over exploitation of coral reef resources, degradation of water quality, anoxia, fish kills, coral bleaching, and, in some cases, pollution induced diseases; thus, creating a clear and present treat to marine habitats and human health. Forest management and conservation are continuously evolving as scientists attempt to understand, address, and mitigate these threats to forests and biodiversity while accommodating the needs and rights of people who live in and around forests (FAO, 2008).

6.1 Non-native invasive species (NNIS)

Appendix D contains comprehensive lists, compiled by the Ministry of the Environment, of NNIS found in the Dominican Republic. Many of the species on these lists, such as the chicken, pig, dog, and goat, are naturalized and are currently found in the majority of countries throughout the world. Some of the plant species, such as *Acacia mangium*, are invasive and represent a threat to the native forest ecosystems by outcompeting native trees for space, light, nutrients, and moisture. Other introduced species, such as the domestic or feral cat and the mongoose, threaten native bird, mammal, and reptile species by preying on them.

A non-native species not listed in the tables in Appendix D is the lionfish (*Pterois volitans*). Sightings were first confirmed near the Bahamas in 2004 and it has recently been found off the coast of the Dominican Republic. This species is popular among aquarium owners because of its color and exotic markings. It is originally from the Indo-Pacific seas and they appear to like shallow, warm waters commonly found in the Caribbean. They feed on younger fish, such as snapper, grouper, and other fish that are important for food and export. Since the younger fish that are preyed upon by the lionfish may not be ready to reproduce, the potential for lowering the populations of native fish is substantial. Conservationists believe that the lionfish was introduced into the Caribbean by aquarium owners who dump the contents of their aquariums into the ocean when they no longer want

to care for the fish in their aquariums. Lionfish have spines that are poisonous (though not fatal to humans) that protect them from predators.

6.2 Ilegal timber cutting

An increase of deforestation from illegal tree cutting is occurring along the Haiti/Dominican Republic border. Most of the illegal tree cutting is done for charcoal production and firewood with the majority of the products transported into Haiti. Immigration (resulting partly from environmental devastation in Haiti) and natural resources, especially trees, are at the center of Haitian-Dominican tensions today. There is a direct link in the form of Haitian incursions into Dominican lands in order to obtain wood to produce charcoal, vital to the survival of the population of Haiti. The depressed state and governmental neglect of the border fuels emigration. Some Dominicans fear that depopulation of the border is leaving a vacuum that could be filled by Haitians who will cut the remaining forests (FESS, 2005).

The headwaters of the Artibonite River, the main source of water for crucial rice cultivation in Haiti, are in the Dominican Republic. Deforestation on the Dominican side threatens to dry up this vital resource for a desperately poor nation. The construction of dams on the Dominican side could also diminish the flow of water into Haiti. One of the more hopeful recent developments is the collaboration of Dominican environmentalists and civil society groups with Haitian partners in a variety of modest projects, including reforestation efforts. Some Dominicans see the environment as an issue that could produce rare common ground between sectors of Dominican and Haitian society. Such efforts, which are encouraged by international donors, are still incipient (FESS, 2005)

6.3 Soil Erosion/Sedimentation

Soil compaction, erosion, and sedimentation resulting from deforestation, slash and burn agriculture, poor use and over use of irrigation systems, as well as cattle grazing on steep slopes, poorly planned and maintained roads, and intensive agriculture practices are contributing to diminished soil productivity. Desertification resulting from poor use and management of the soil resource has resulted in 70% of the country being partially affected. (SEMARENA, 2007c). The increased production of food crops as already mentioned before has been accomplished by expanding the agricultural frontier into marginal areas. That along with the increased and improper use of insecticides, pesticides and fertilizers increases the treat to biodiversity. Agriculture under irrigation uses 85 percent of the country's water, but the hydrology of the country does not easily accommodate the production of water-intensive crops like rice and beans. Along with wasteful and damaging irrigation practices, deforestation and hillside farming are major components of an unsustainable agricultural production system.

6.4 Forest Fires

Although forest fires can start any month of the year in the Dominican Republic, most occur during the months of March and April. Approximately 85% of the forest fires begin

from slash and burn agriculture practices, 5% from arson, 5% from hunters, 3% from electrical malfunctions, and 2% from other causes (SEMARENA, 2007a). In the Caribbean, only the Dominican Republic, Cuba, and Trinidad/Tobago monitor the number and size of fires (United Nations, 2007). From 1972 through 2003, approximately 1,919 fires burned over 1,915,500 tareas of land. In 1975 the most area of land was burned (approximately 348,214 tareas in 23 fires). The largest number of fires occurred in 1997 (234 fires burned 207,885 tareas). In only 3 years, during this timeframe, did the amount of land burned in a year exceed 200,000 tareas (16 tareas = 1 hectare). However, research by the University of Tennessee has concluded that there is a long-term natural history of fire in the pine and savannah ecosystems. Vegetation types that are affected by fire include pine forests, savannas, mixed pine-broadleaved forests, and cloud forests. The pine forests and savannahs are dependent on fire; the mixed pine-broadleaved forest is an artifact of a changing fire regime; the cloud forest is fire sensitive. Fires originating in the pine and savanna ecosystems are important in determining the distribution and extent of cloud forest and tropical broadleaved forest vegetation, i.e. fire plays a role in these ecosystems and may be important in creating certain habitats and determining the relative abundance of species (TNC 2004).

The Dominican Republic has developed an effective wild land fire suppression system that depends upon the rapid mobilization of local communities to put out human-caused fires. This system works well even in the most remote regions of the country. It is presently illegal to start fires of any type within protected natural areas. Governmental decision-makers need to understand the importance of fire in maintaining pine forest ecosystems, particularly their watershed qualities. Government support will be the key to instituting fire management in the pine forests found throughout the country. However, public outreach and education are also needed. (TNC, 2002)

Warmer ocean temperatures due to global warming are contributing to unpredictable weather events such as unseasonable heavy rain and floods in the Dominican Republic. At the same time, the Caribbean Centre for Climate Change (CCCC) predicts that over the longer run, the basin countries will be drier by the 2080's. A drier climate could bring an **increased risk of forest fires**, particularly under scenarios of less rainfall. Further ahead in this report, we include a section on climate change drawing from the results of a study of projected impacts on the Dominican Republic and the Mesoamerican region from a recent publication.

6.5 Unregulated Tourism and Industrial Factory Development/Land Conversion

While the biodiversity and natural attractions of the Dominican Republic would allow the country to promote ecotourism and adventure tourism successfully, there are serious structural impediments to ensuring that tourist development is environmentally sustainable. The tourism sector is widely seen as the DR's motor for growth for the foreseeable future, but there also are major environmental challenges for this industry. Much of the tourism and industrial factory development is occurring in and immediately adjacent to the river and marine coastal ecosystems and protected areas. This development is converting forested land and other natural landscapes to roads, residences, and commercial businesses, as well as polluting water resouces through poor solid waste disposal methods.

• The tourist and factory industries are plagued by a lack of basic services, such as solid waste disposal; inadequate infrastructure, including water and sewer systems and very limited enforcement of environmental laws. This has led to coral reefs under ―high" or ―very high" risk levels; shrinking underground aquifers threatened by salinization; and pollution of river and coastal waters decreasing biodiversity of these ecosystems.

• The emphasis on high volume tourism implies significant environmental degradation that over time may destroy the industry. With no clear strategy to achieve a higher-valued added and more environmentally sound model for the long run, the Dominican Republic may benefit temporarily from an increasing volume of tourism, while undermining the long-term viability of the industry.

• Rapid growth of tourism has outpaced the development of infrastructure, policies, and services. One example is that the Environmental Police, charged with enforcing environmental laws, has almost no presence in the main tourist areas of the east.

• The current business model for tourism, ―slash and burn" tourism tends to destroy the aesthetic, environmental, and natural resource base upon which it depends. Scarcity of water may impose environmental and economic limits on the current tourism model.

• Changing the tourism model is difficult because the industry is dominated by foreign hotel operators whose profits depend on a high volume of inexpensive tourism; no environmentally sustainable strategic plan for tourism has yet been developed.

• Recent experience indicates the tourism sector is woefully unprepared even for recurring natural disasters such as hurricanes.

• Tourism has brought with it increasing vulnerability to social conflicts. Tourism has become the new employer for Haitians, who are used as construction and maintenance labor but are underpaid and not sheltered or fed during natural disasters (FESS, 2005)

The Dominican government is caught in a delicate balancing act. The state has an interest in maximizing tourism revenue, but it also faces criticism from domestic and international sources when it is seen as colluding with the tourist sector in ignoring or circumventing environmental standards**.** Without a strong governmental role and considerable political will, the situation is not likely to improve. For many tourism operators, the environment is an externality that can be ignored and used until it is exhausted. According to this mindset, tourism development means building new rooms regardless of the long-range impact (FESS, 2005). Concerns have already been raised on the treat to marine life and habitat, including unprotected and already protected areas, as in the case of the humpback whales.

Given these contending forces, the participation of civil society and international actors could have a major impact. Although environmental consciousness is not yet a mass phenomenon in the Dominican Republic, the country has a significant number of NGOs

who advocate for the environment through activism and the media. The country's tourism industry is affected by its image internationally, a fact that potentially gives Dominican advocates for sustainable development considerably more leverage than they might otherwise have. However, windows of opportunity for addressing many of these problems will not remain open indefinitely (FESS, 2005).

6.6 Ilegal Trade of Plants and Animals

The second largest threat, after loss of habitat, to the extinction of plants and animals is illegal trade. Driving the problem of illegal trade are consumers who feel they need or desire certain foods, pets, medicines, and other products. Illegal trade involves hundreds of millions of wild plants and animals from tens of thousands of species. To provide a glimpse of the scale of illegal trade, there are records of over 100 million tonnes of fish, 1.5 million live birds, and 440,000 tonnes of medicinal plants in trade in just one year.[34]

Much of the illegal trade in the Dominican Republic is in live birds and turtle products. A recent survey conducted in the Colonial City and Mercado Modelo areas in Santo Domingo revealed turtle product items were sold in 85 percent of the shops surveyed. These items included hair combs, rings, handbags, jewelry boxes, earrings, and bracelets (Mota and León, 2006).

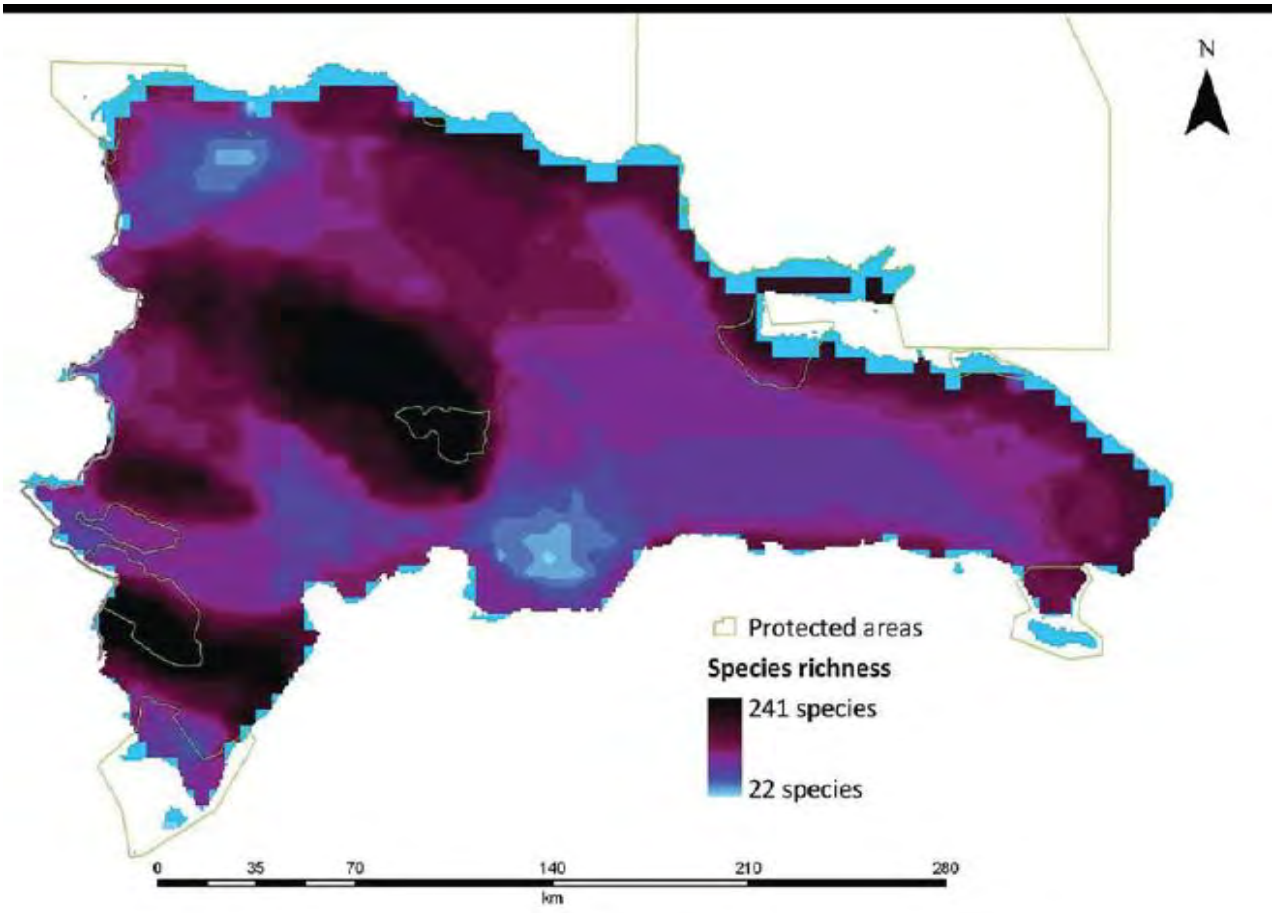
6.7 Climate Change

A study conducted in 2008 by the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) and supported by USAID through the Global Development Alliance program, the U.S. National Aeronautics and Space Administration (NASA), the University of Alabama-Huntsville (UAH), and the Environmental Systems Research Institute (ESRI) assessed the potential impacts of climate change on biodiversity in the Dominican Republic, Central American countries, Mexico and Panama. The study identified critical biodiversity areas that were projected to be most greatly affected by climate change. The analysis took into account species richness in geographical areas as a measure of biodiversity and changes in the levels of comfort zones for species in their ecosystems due to climate change.

We present in this section CATHALAC's species richness mappings for the country in Figure 5. As pointed out in the report, the isolation of islands has had an effect on mammal species richness in the Dominican Republic, where there are only around 50 mammal species compared to over 850 species in Mexico and Central America; the report recommends prioritizing preservation of mammal diversity in the DR when planning for species preservation. In the case of bird species, the report states that the Hispaniola has over 280 bird species and climate change is expected to negatively affect migratory animals.

[34] http://www.panda.org/about_wwf/what_we_do/species/problems/illegal_trade/index.cfm

Figure 5. Dominican Republic Species Richness

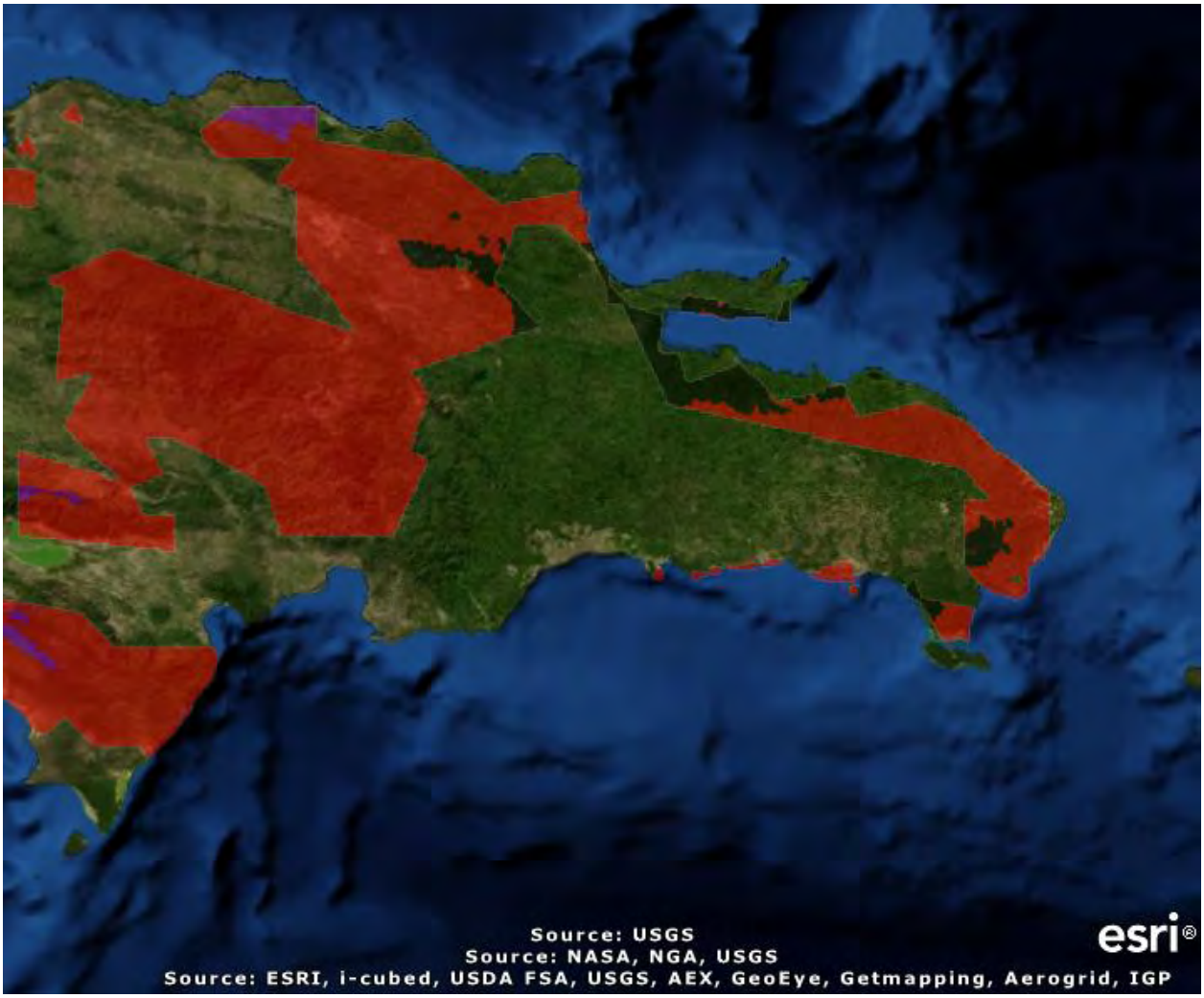


Source: Anderson E.R. et.al (2008) CATHALAC.

Overall the Dominican Republic has species richness areas with up to 241 species concentrated in those rich areas. Figure 6 identifies in red, the ecosystems of the Dominican Republic with high species richness areas and climatic changes that have been estimated that will be outside comfort zones as defined by the report. The black shaded areas on figure 6 are species rich, where the climatic change will be far outside the comfort zone; thus they are considered the most extreme critical areas. It is of special concern to the Dominican Republic that the most critical areas are around the Samana Bay. [35]

[35] The scenarios by Anderson E. R. et.al (2008) are using models that cover a period up to the year 2050.

Figure 6. High Species Richness and Climate Change



Source: High Species Richness and Climate change GIS mapping was provided by Anderson E.R. et.al (2008) CATHALAC. Background map ESRI, USGS, NASA, NGA, USGS

In terms of precipitation, CATHALAC's report stresses the difficulty in projecting rainfall; however, their models agree that areas in the Dominican Republic will receive less rain annually with the changes ranging from approaching significant changes to significant changes towards the 2020s. On the other hand, The Dominican Republic has been classified as having high vulnerability to extreme weather by the Development Assistant Research Associates (DARA 2011), an independent organization involved in assessing effectiveness of humanitarian assistance and climate change. DARA has noted that flooding may become more prevalent and severe due to climate change in the Dominican Republic; thus, flooding may account for a large part to climate related extreme weather damages in the country.

The impacts of climate change are not restricted to the Dominican Republic. Climate change has the potential to amplify existing economic, political, and humanitarian stresses. It may compound existing water scarcity problems, increase the number of people suffering water stress, and reduce access to safe drinking water. The prospective impact on rain-fed

agriculture, could affect cropping patterns, international production, and trade. Reducing the effects of climate change requires all countries, developed and developing, to work together to reduce the amount of greenhouse gas emissions by 50 percent by the year 2050.[36] USAID's focus on Global Climate Change will be on reducing the impacts and risks to agriculture production and tourism. The work of the USAID EPP project in watershed management, protected area management planning, and establishment of a national seed bank for reforestation are positive efforts in minimizing risks to potential climate change impacts in the DR. However, given the latest reports on the high vulnerability of the Dominican Republic to climate change, the need for a more integrated approach by the public, private and international donor community is needed in the country in the areas of mitigation and adaptation.

7. RECOMMENDATIONS AND PROPOSED ACTIONS

USAID/DR will be planning a new country strategy in 2011 for the next 5 year period (2012-2017). Opportunities exist for USAID/DR to work together with USAID/Haiti on protection of tropical forests and biodiversity along the border in support of the existing reforestation efforts being implemented by the DR Ministry of Environment, NORAD, UNEP-Haiti, and other groups. Providing economic opportunities to border communities would complement the physical reforestation efforts as well as decrease pressures on exiting forests along the upper watersheds on the border.

Sections 118 and 119 of the Foreign Assistance Act specifically call for the identification of actions necessary to achieve conservation and sustainable management of tropical forests and/or biodiversity. The following actions are recommended:

1) Invasive Species: Control or eliminate non-native invasive species. Among the plants and animals that are negatively impacted by exotics are threatened and endangered species that already have a precarious existence and may not be able to compete with more aggressive invasive species for space and resources. Globally, invasive species have caused the extinction of at least 109 vertebrate species (Cox 1993). By managing habitats specifically for native wildlife, native species may be better able to cope with the many threats presented by non-natives. This is especially important in the Dominican Republic due to the high number of endemic species. Develop a handbook or guide with photographs, descriptions, and control methods of non-native invasive species as an educational tool for government staff and public groups that can be organized to assist in NNIS control.

   Provide training on the control methods including hand-pulling, digging, pesticide use, and prescribed burning to reduce or eliminate non-native invasive plants. Develop a pesticide certification program to train and certify professional resource managers on the proper use of pesticides. A permanent training program for inspectors at entry ports and airports is needed as well as policies that facilitate coordination of all offices connected to the control and eradication of alien invasive

[36] More information is available at the United Nations Development Program website http://hdr.undp.org/en/.

species. The country will also benefit from developing learning experiences thru pilot projects to implement measures of control and eradication in protected areas and secondary forests where NNIS are a threat.
The USAID/DR mission should assist Ministry of the Environment to develop a strategic NNIS plan that will:

- **Identify** existing NNIS in the country (see Appendix D);
- **Categorize** the threat to native species as high, moderate, or low;
- **Prevent** invasive species from entering the country;
- **Detect** new infestations and rapidly respond to contain them;
- **Control/Eradicate** existing infestations; and
- **Restore** native habitats and ecosystems

The Dominican Republic needs more consistent biodiversity data. There is no consistent information on critical and endangered endemic or native species. The Ministry of the Environment should lead a coordinated effort to promote the development of projects to fill this information gap and integrate science teams that incorporate NGOs, academic institutions, and research centers to study priority sites and species of concern.

Support the Ministry of the Environment in conducting a broadleaf cover inventory at the country and site specific project areas to identify key areas for protection and for sustainable forest management. Develop sampling methods and protocols to inventory native and non-native plant and animal species in order to establish baseline data, particularly in the protected area system. The USDA Forest Service Forest Inventory Analysis Team may be useful in developing an inventory database and providing training for inventory sampling methods and protocols. Train professional natural resource specialists in accepted inventory methods and utilize college students and Peace Corps volunteers to assist in the inventories. Implement a long-term monitoring program by collecting inventory data at regular periodic intervals to measure changes in the quantity of native and non-native plant and animal species.

2) Illegal Logging and Impacts to Tropical Forest Cover: Continue with reforestation projects and work with Peace Corps in cooperation with national and international NGOs in the DR and Haiti to encourage long-term reforestation projects for sustainable use. Support Ministry of the Environment Forest Sector to establish National Forests for sustainable management of forests. Utilize the Quisqueya Verde example for reforestation projects. Work with landowners to develop long-term management plans that utilize forest products from plantations on a sustainable basis.

   Collect seed from the native pine and hardwood trees. Train a few natural resource managers in both the private and public sectors to become certified tree climbers. The certified tree climbers can assist in the collection of native tree seeds to avoid or minimize the practice of cutting trees to collect the seed. Certified tree climbing instructors could be provided by the USDA Forest Service.

Encourage national and private tree nurseries to grow more native tree species for planting. Improve and expand the seed storage banks at the national botanic gardens in Santo Domingo and the agro forestry school in Jarabacoa, or utilize existing seed storage bank facilities through a cooperative agreement with the forestry schools in the region (i.e. forestry school in Honduras) and with further cooperation with the USDA Forest Service.

3) Soil Erosion and Sedimentation. Reforestation projects also should aim to restore micro-watershed vegetation coverage and riparian vegetation in order to reduce soil erosion, sedimentation, and degradation of aquatic habitats.

   Encourage the planting of native forest trees instead of non-native trees. When purposely planting non-native species, such as *Pinus caribaea,* consideration should be given to the potential long-term negative consequences that these species may eventually have on native communities. Non-native invasive plants can pose a threat to forest health and biodiversity. Invasive plants can invade and alter natural ecosystems by displacing native species, changing habitats and community structure, and damaging soil and water resources (Westbrooks 1998). Non-native species can out-compete native species, especially when ecosystem health is stressed by factors such as resource over utilization, grazing, fire, and other disturbances (USDA FS 2004).

4) Forest Fires. Continue to involve government agencies to train farmers in techniques to contain agricultural fires. Develop integrated fire management plans for key conservation areas. Provide education and prevention programs including the preparation of literature, posters, etc. Organize and train local volunteer fire brigades. Conduct a prescribed fire training course and a workshop on fire management planning including the Incident Command System (ICS) utilized by the USDA Forest Service. Training courses are available through the USDA Forest Service International Programs. The ICS training can also be used for other emergency service personnel to coordinate resources during other natural disasters such as hurricanes.

5) Unregulated Tourism and Industrial Development: Improve the capacity of the GODR to stop, reduce, or reverse environmental degradation to manage natural resources on a sustainable basis by: a) Supplementing and refocusing current USAID environmental programs aimed at strengthening government institutions and civil society organizations with an emphasis on land use planning, environmental impact assessments, environmental ordinances, and sustainable tourism; b) Helping to accelerate the development of land use policies, watershed management, and coastal and marine protection at the national, provincial, and municipal levels; and c) Supporting the Ministry of the Environment efforts to coordinate and mainstream environmental policies among key ministries and agencies of the Dominican Republic, including tourism, finance, and transportation. (FESS, 2005)

   To address the loss of rich biodiversity ecosystems, establish an Integrated Resource Project that promotes sustainable development through conservation practices along the Haitian border area that would address deforestation, illegal logging, wood

product's needs, watershed management/conservation, and sustainable small businesses.

Enforce existing environmental laws and create new municipal environmental ordinances to strengthen national laws and provide local enforcement. Develop and implement steps to provide technical assistance to strengthen the Ministry of the Environment, National Network of Private Enterprise Support for Environmental Protection (RENAEPA), and the Municipal Units for Environmental Management (UGAMs) for the strict compliance with DR-CAFTA's Chapter 17 on Environment in collaboration with The Nature Conservancy, INTEC and other universities, Dominican environmental NGOs, and U.S. Departments and Agencies such as the Environmental Protection Agency, the Department of Interior, and the USDA Forest Service. Provide GODR Environmental Police with environmental protection and enforcement training. In addition, support the improvement of current governmental environmental impact assessment and audits, through staff training courses.

Support information exchange related to biodiversity and conservation of tropical forests through workshops focused on the development of Best Management Practices in ecotourism, tropical forest management/reforestation, T&E species conservation Plans, coastal resource management, and sustainable agriculture.

Solidify bird ecotourism and related businesses in this cluster as a competitive niche. Develop partnership opportunities to promote the protection of migratory bird habitats through environmental awareness, habitat rehabilitation and ecotourism with organizations such as Birdlife International. The USDA Forest Service International Programs Office works with Birdlife International, to support partners in Latin America and the Caribbean. Currently, Birdlife International is working to identify the important bird areas in the Dominican Republic which might further identify specific partnership opportunities based on particular migratory species.

Develop a standardized data collection form for natural resource specialists, university graduate students, and tour groups to use so the data collected will be consistent and more easily compiled by the Ministry of the Environment. Use trained professional natural resource specialists to guide tourists on wildlife tours, document the wildlife seen during the tour, and compile the information into an annual monitoring report for the Ministry of the Environment. Numerous groups come to the Dominican Republic to view wildlife. These tourist groups could be utilized to assist in the monitoring and documentation of wildlife and plants. A birding tour, organized by Victor Emmanuel Nature Tours, Inc. in the spring of 2007, documented the results of their visit (Wallace, 2007).
Utilize existing wildlife related grants to fund the data collection. Continue to support NGO efforts in sustainable tourism and conservation efforts related to tourism such as the PUNTACANA CENTER, PCEF, etc..

The Dominican Republic could change the structure of a key growth industry from a model based on unsustainable mass tourism that produces major adverse environmental impacts (particularly in fragile coastal areas) to a model based on more diversified tourism (including cultural tourism, adventure tourism, hiking,

mountain climbing, and scuba diving), higher expenditures per tourist, and an increased in the number of visitors to an optimal level that does not have a negative effect on environmental sustainability of land and marine ecosystems (Haussman, et. al, 2011)[37]. Under this aspect, the Dominican Republic could become established as a model example of sustainable tourism development, "the Costa Rica of the Caribbean." (FESS, 2005). Towards this objective, market-based conservation tools can lead the way as they also represent a key component of the DR-CAFTA. Market-based conservation tools rely on the use of economic and marketplace principals to achieve beneficial environment outcomes (DR-CAFTA). There is also room to support the establishment of community managed marine protected areas in key areas where sea grass and fisheries are still intact and/or adjacent to tourist areas.

However, the GODR is currently not prepared to immediately change the actual model for an environmentally sound one since it lacks the capacity, infrastructure and resources that are needed to implement the sustainability element in the tourism industry. The model conversion is a process that will take time, strategic planning, determined policy making and a strong political compromise. In the meantime, the conservation of the natural capital in the DR, especially in/adjacent to protected areas and in the marine coastal ecosystem, should ensure that tourism and development activities pursue a sustainable path. To accomplish this it is necessary to include the cooperation and alliance of the tourism and development industries, governments at all levels (central, provincial and municipal), local communities, protected areas authorities, and the visitors/tourists.

6) Illegal Trade of Plants and Animals. Develop a prevention and consciousness-raising education program to eliminate the illegal trade of exotic plants and animals and include the information in the Dominican Republic Ministry of Tourism website (www.godominicanrepublic.com). Utilize the media, including radio, television, and newspapers to inform the public, tourists, and businesses. Long-range planning and maintenance of the transportation system is lacking. The infrastructure of the NSPA still awaits the internal structure needed to supply access to protected areas for law enforcement and scientific research needs. Thus, there is need of provision of skill training to natural resource professionals and protected area staff personnel in the planning, maintenance, and monitoring of roads and trails in and to national protected areas. Training courses are available through the USDA Forest Service International Programs. Nationwide dissemination of the "*DR's Conservation Blue Print*" as was accomplished by the detailed National Biological GAP Assessment and National Eco regional Plan. Reaching across all economic and social sectors, the "*Conservation Blue Print"* can work as a reliable foundation of a new style of governance in the country that portrays a true partnership between government, market and civil society.

7) Climate Change. The Dominican Republic high vulnerability to climate change and its negative impacts on habitats and biodiversity, agriculture, fresh water, and

[37] Ricardo Haussman and co-authors provide an assessment of the Dominican Republic potential number of tourists per capita in the DR, and note that if the DR could increase the number of tourists per capita to the levels of Jamaica and Puerto Rico, the Dominican Republic would receive 6.1 and 9.1 million tourists per year respectively.

human health calls for a concerted effort where the Dominican Republic Ministry of Environment and the Climate Change Council can play central roles in coordinating the public, private, international donor community and nongovernment organizations to implement the necessary adaptation and mitigation responses. Given the expected increase in storm intensity in the Caribbean due to climate change, an organized response by using already available research and investing in vulnerability assessments and disaster preparedness are and will be needed. USAID/DR Global Climate Change Adaptation funding can be used effectively in these two areas. The Environmental Protection Program, Dominican Sustainable Tourism Alliance, and Rural Economic Diversification programs can all coordinate efforts, where the EPP program due to its comparative advantage in environmental issues with the Nature Conservancy as implementing partner, can support the other two programs in addressing climate change impacts to their respective sectors. The programs themselves may benefit from the inclusion in their teams of a climate change expert that can provide expertise in activity planning and implementation in line with the Global Climate Change initiative.

In a very recent vulnerability country profile of the Dominican Republic by DARA[38] (DARA 2010), they assess the health impact, weather disaster, habitat loss and economic stress that climate change will cause in the Dominican Republic. DARA's and the CATHALAC's climate change studies on the Dominican Republic agree that changes in rainfall patterns may cause changes in water availability for the local population. In the case of DARA's study, they stress the impact of climate change in the salinization of the underground fresh water aquifers due to the increase in sea water levels. This calls for effective ground and underground water management and protection of the country water resources. Decreases in water availability and changes in temperature will also lead to stress in the agriculture sector, which the DARA study notes as one of the sectors, along with tourism, that will be under stress. Climate change will also affect habitat loss and weather related economic stress in the agriculture sector, according to these studies; thus, DARA's report advises to adapt and mitigage by investing in drought resistance crops, improving crop management, and implementing soil conservation programs. In the case of habitat loss and weather disasters, the DARA report recommends implementing integrated coastal management, effective drainage systems, and flood controls. USAID/DR can play an important role in all of these adaptation responses as recommended.

In 2008, the Ministry of Environment published the National Adaptation Action Plan (PANA in Spanish). The PANA provided climatic scenarios, a conceptual framework for an adaptation plan, objectives of the national action plan for adaptation, identified priority areas for adaptation, measures of action and priority sectors. This document represented a strategy for the Ministry of the Environment. In January 2011, the Dominican Republic Climate Change and Clean Development Mechanism Council commissioned McKenzie Co. to design El Plan de Desarrollo Compatible con el Cambio Climatico (Development Plan Compatible with Climate Change). The work seeks to align a country's Climate Change Strategy with the

[38] For a copy of the Vulnerability Report on the Dominican Republic and for more information on DARA please visit http://daraint.org/climate-vulnerability-monitor/climate-vulnerability-monitor-2010/

development strategy, which will help the country to have an integrated strategy. Once this plan is delivered, it will provide a good framework for the designing of the mission strategy. As a matter of fact, these two climate change plans can be very useful resources that will provide an opportunity for the mission to implement programs that could be cross-sectorial in support of an integrated strategy that will be in line with the country's priorities for mitigation and adaptation.

In the latest efforts by the donor community, which has included USAID/DR, to coordinate efforts in the country to address climate change, it has been agreed that the United Nations Development Program office will be the central facilitating entity between the Climate Change Council and the donor community. This is in line with the USG efforts to unify efforts and work more effectively with the donor community and local government entities, and we recommend continuing this coordinated effort among the donor community and international financial institutions in the country. At the same time, climate change is increasingly becoming an important issue for civil society in general in the Dominican Republic, and USAID/DR could also play an important role in supporting this general effort from diverse entities from the Dominican community.

It is recommended that the support continues to the Ministry of the Environment and the Climate Change Council. The Climate Change Council attempt to reconcile a new country's strategy for climate change with the country's development strategy has led to the beginning of an interaction with the Ministries of Environment, Economy and Planning (MYPED), Health, Agriculture and Tourism, and including the National Energy Council. A multiministry effort is a needed and the inclusion of climate change in the Dominican Republic's roadmap to achieve sustainable development while implementing climate change adaptation and mitigation policies and programs. Moreover, given that climate change is viewed by the Dominican Republic current administration as a priority that needs to be woven into the country own development strategy provides a good base for the design of the new USAID/DR strategy to support the country towards an environmentally sustainable development that will result in positive effects on human populations, natural habitats, and consequently on biodiversity.

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Appendix b – Webpages

www.agricultura.gov.do Dominican Republic Secretariat of Agriculture
www.bancentral.gov.do Central Bank of the Dominican Republic
www.indrhi.gov.do National Institute of Hydrology Resources
http://www.intec.edu.do Santo Domingo Technological Institute
www.medioambiente.gov.do Dominican Republic Secretariat of the Environment
http://www.medioambiente.gov.do/inbidom/main/spanish/especies/index.html
www.godominicanrepublic.com Dominican Republic Ministry of Tourism
www.olade renewable energy production
www.one.gov.do Office of National Statistics
www.ottt.gov.do Technical Office of Land Transportation
http://www.jbn-sdq.org/frameset.htm National Botanic Garden
www.zoodom.gov.do National Zoological Park
www.oas.org Organization of American States
http://odh.pnud.org.do United Nations Development Program Office of Human Development
www.noaa.gov National Oceanic and Atmospheric Administration
www.peregrinefund.org The Peregrine Fund World Center for Birds of Prey
www.aecid.es Spain Agency for International Development
www.uasd.edu.do Autonomous University of Santo Domingo
www.undp.org United Nations Development Program
www.unesco.org United Nations Education, Science, and Culture Organization
http://www.pnuma.org/ing/ United Nations Environmental Programs
www.bancomundial.org World Bank
www.nature.org The Nature Conservancy
www.conserveonline.org The Nature Conservancy
www.footprintnetwork.org
www.iz.carnegiemnh.org/inverts/hispanio Carnegie-Mellon Invertebrate & Plant Surveys
http://pdf.usaid.gov/pdf_docs/Pnade195.pdf USAID Tropical Forestry and Biodiversity Analyses
http://www.iucnredlist.org/static/categories_criteria_3_1 IUCN Red List of Threatened Species
http://www.cites.org/eng/resources/species.html Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
http://www.nationalgeographic.com/wildworld/profiles/terrestrial/nt/nt0305.html
http://www.worldwildlife.org/wildworld/profiles/terrestrial/nt/nt0127_full.html
http://www.dominicanaonline.org/Portal/espanol/cpo_flora.asp
http://www.moscosopuello.org/index3.htm
http://www.tncfire.org/training_LACfln_dominican.htm
http://parksinperil.org/howwework/partnership/dominicanrep.html
http://geocities.com/sociedad_ornitologica_hispaniola/
http://www.usaid.gov/locations/latin_america_caribbean/country/dominican_republic/index.html
http://www.worldwildlife.org/wildworld/profiles/terrestrial
http://www.panda.org/about_wwf/where_we_work/ecoregions/greater_antillean_marine.cfm
http://countrystudies.us/dominican-republic
http://insectdatabases.oeb.harvard.edu/caribbean/aboutus.htm

Appendix C – List of Persons Contacted

Dr. Carlos Cuellar, Director, Program USAID/Maternal and Child Excellence Centers.

Indhira de Jesus, Director, The Nature Conservancy

Luis Tollentino, USAID/Rural Economic Diversification Program

Josefina Espaillat, USAID/Rural Economic Diversification Program

Miguel Silva, Biological Consultant, USAID/IPEP

Néstor Sánchez – The Nature Conservancy (TNC) Director of External Affairs and Government Relations Central Caribbean Program

Francisco Nuñez – TNC Conservation Science Director, Central Caribbean Program

Lic. Amarilis Polonia – Ministry of the Environment Vice-Minister of Protected Areas and Biodiversity, Director of Biodiversity and Wildlife

Ing. Bernabé Mañón Rossi – Ministry of the Environment Vice-Ministry of Forestry Resources

Nina Lysenko – Ministry of the Environment Coastal and Marine Resources

Dra. Yolanda León – INTEC Investigative Professor of Remote Sensing Laboratory

Telésforo González Mercadi – Universidad Agroforestal Fernando Arturo de Meriño, Director

Ing. Alberto Rodríguez Liriano, M.Sc. – Peace Corps Associate Director for the Environment

Eddy Ramírez – Belarmino Ramírez e Hijos Coffee Producer and Exporter

Fátima Franco – Coffee Cluster of Jarabacoa

Ing. Harmut Mueller-Heinze – Coffee Cluster of Jarbacoa, Assessor of Organic Coffee Certification

Ramón Ramírez – Ramírez Coffee Center, Jarabacoa

José Cruz – organic coffee and strawberry producer

Porfirio Alvarez – Los Calabazos Eco-lodge Community Leader

Milena Delgado – Constanza Tourism Cluster

Johnny Tactuc – Constanza Tourism Cluster

Ramón Díaz – National Botanic Gardens

Tom Brandeis – USDA Forest Service Research Forester Forest Inventory & Analysis

Appendix D – List of Acronyms

CAD	Consorcio Ambiental Dominicana/Dominican Environmental Consortium
CATHALAC	Water Center for the Humid Tropics of Latin America and the Caribbean
CCCC	Caribbean Centre for Climate Change
CCP	Central Caribbean Program
CEES	Center for Environment, Economy and Society
CID	Center for International Development at Harvard University
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CODOPESCA	Consejo Dominicano de Pesca y Acuicultura
DARA	Development Assistance Research Associates
DR-CAFTA	Dominican Republic-Central American Free Trade Agreement
DSTA	Dominican Sustainable Tourism Alliance
FESS	Foundation for Environmental Security and Sustainability
FMP	Fundación Moscoso Puello
FUNDEMAR	Fundación Dominicana de Estudios Marinos/Dominican Foundation of Marine Studies
GODR	Government of the Dominican Republic
HIS	Humane Society International
ICS	Incident Command System
INTEC	Technological Institute of Santo Domingo
IPEP	Improving Policies for Environmental Protection
IRG	International Resources Group, Ltd.
IUCN	International Union for the Conservation of Nature/World Conservation Union
LHNP	Los Haitises National Park
MDG	Millennium Development Goals
NGO	Non-government Organization
NNIS	Non-Native Invasive Species
NSPA	National System of Protected Areas
PCEF	Punta Cana Ecological Foundation
RENAEPA	National Network of Private Enterprise Support for Environmental Protection
SAVAMACA	Employers for the Tourism and Ecological Development of the communities Sabana de la Mar, El Valle, Magua, and Las Cañitas
SEMARENA	Secretária de Medio Ambiente y Recursos Naturales/Secretariat of the Environment and Natural Resources
SINAP	Sistema Nacional de Áreas Protegidas/National System of Protected Areas
SOH	Sociedad Ornitológica de la Hispaniola/Ornithology Society of Hispaniola
SOPROECO	Sociedad Pro Rescate Ecológico, Inc.
SPAW	Specially Protected Areas and Wildlife treaty protocol
TNC	The Nature Conservancy
UGAMs	Municipal Units for Environmental Management
UNDP	United Nations Development Program

USAID/DR	United States Agency for International Development/Dominican Republic
USDA	United States Department of Agriculture

Appendix E – List of Non-native Invasive Species

Scientific Name	Common Name	Lifeform
Acacia mangium Racosperma	hickory wattle, zamorano	tree
Aceria anonae	acaro de la guanábana	insect
Agriolimax agrestis	grey field slug	mollusk
Albizia lebbeck	woman's tongue	tree
Aleurites fordii (Vernicia fordii)	tungoil tree	tree
Aleurites moluccana	Indian walnut	tree
Aleurites trisperma Reutealis trisperma	Phillipine tung	tree
Aleurocanthus woglumi	citrus black fly	insect
Alysicarpus vaginalis	madreselva, white moneywort	forb
Adenanthera pavonina	red beadtree	tree
Anastrepha oblicua	fruit fly	insect
Andropogon pertusus	pajón haitiano, pitted beardgrass	grass
Anodonta sp.	a clam	mollusk
Anolis cristatellus	a lizard	reptile
Anolis porcatus	Cuban green anole	reptile
Azadirachta indica	neem	tree
Barringtonia asiatica	Bonete de arzobispo, sea putat	tree
Bauhinia monandra	pata de vaca, Napoleon's plume	shrub
Bemisia tabaci	sweet potato whitefly	insect
Bephratelloides paraguayensis	an arthropod	insect
Bertholettia excelsa	Brazil nut	tree
Betta sp.	Beta	fish
Betta splendens	Siamese fighting fish	fish
Bothriocloa pertusa	Indian bluegrass	grass
Boussingaultia leptostachys	yucca hiedra	forb
Bufo marinus	marine toad	amphibian
Calliandra calothyrsus	calliandra, palo de ángel	shrub
Canis familiaris	domestic dog	mammal
Capra hircus	goat	mammal
Cariobruchus sp.	a bean beetle	insect
Cassia javanica	apple blossom cassia	tree
Casuarina equisetifolia	Australian pine	tree
Chrysemys scripta	Yellow-bellied turtle	amphibian
Cleome gynandra	spiderwisp	forb
Cleome viscosa	Asian spiderflower	forb
Columba livia	pigeon	bird
Contarinia maculipennis	Crossandra blossom midge	insect
Copaifera officinalis	copaiba	tree
Couroupita guianensis	cannonball tree	tree
Cyperus esculentus	yellow nutsedge	sedge
Cyprinus carpio	common carp	fish
Diaphorina citri	Asian citrus psyllid	insect
Dorosoma petenense	threadfin shad	fish
Drymaeus multilineatus	tree snail	mollusk
Echinochloa crusgalli	barnyard grass, semilla de María	grass
Eichornia crassipes	water hyacinth	forb
Eleusine indica	goosegrass, pata de gallina	grass
Emilia coccinea	scarlet tasselflower, pincel de amor	forb
Emilia fosbergii	Florida tasselflower	forb
Emilia sonchifolia native in PR & VI	lilac tasselflower	forb
Erinnyis ello	cassava hornworm	insect
Eriophyes sp.	blister mite	insect
Felis catus	common cat	mammal
Flemingia strobilifera	wildhops	shrub
Fragaria vesca	woodland strawberry	forb
Gaillardia pulchella	firewheel	forb
Gambusia affinis	mosquitofish	fish
Gambusia holbrooki	eastern mosquitofish	fish
Gurahmi sp.	a fish	fish
Gynaicothrips ficorum	gall thrips	insect
Herpestes auropunctatus	small Indian mongoose	mammal
Heterobasidium annosum	annosum root rot	fungus
Scientific Name	**Common Name**	**Lifeform**
Hyparrhenia rufa	jaraguagrass	grass
Hypotenemus hampeii	coffee borer	insect
Hypsipyla grandella	mahogany shoot borer	insect
Ictalurus punctatus	channel catfish	fish
Indigofera jamaicensis	Asian indigo	forb
Ips sp.	a pine bark beetle	insect
Ischaemum rugosum	ribbed murainagrass	grass

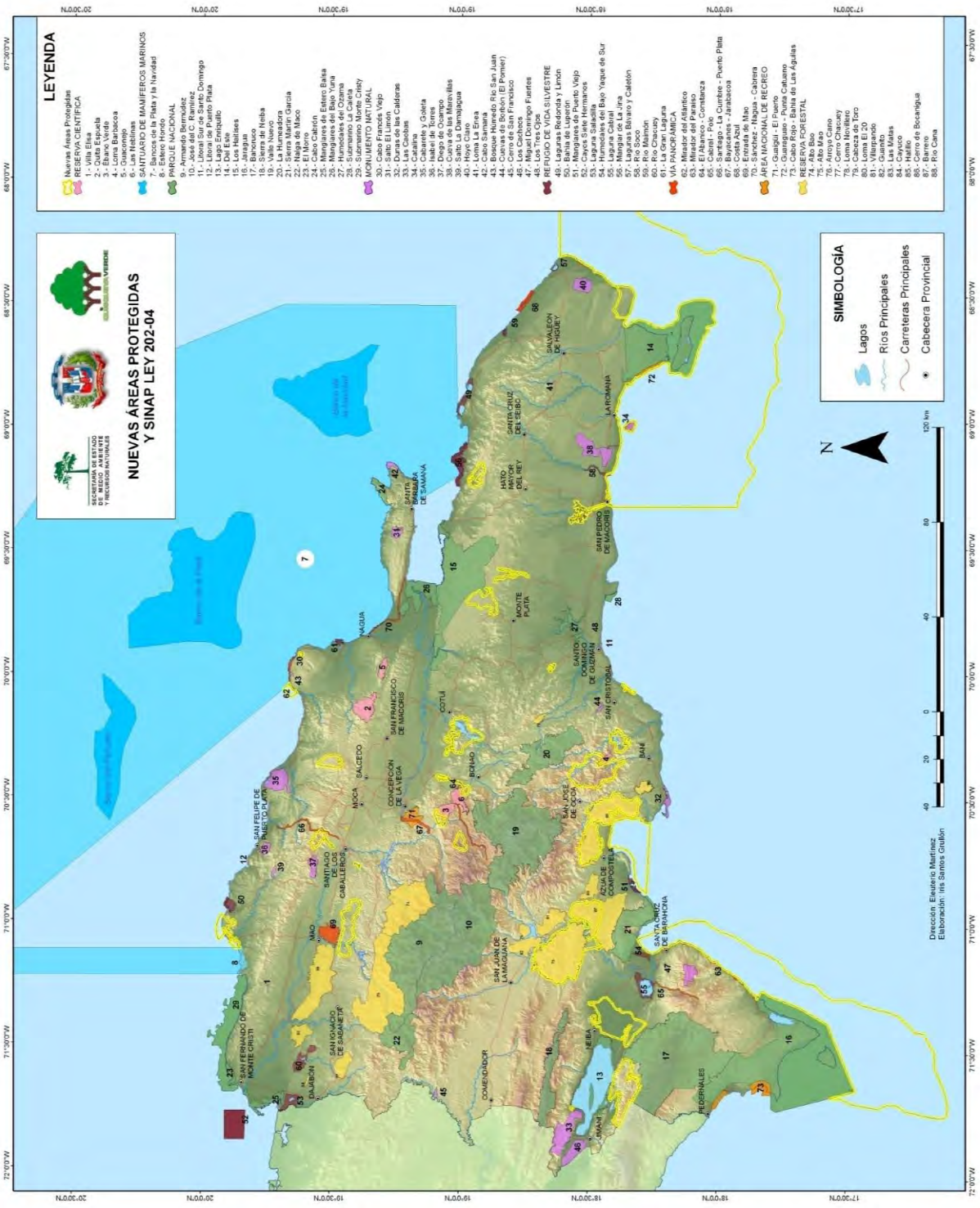
Lebistes reticulatus	guppy	fish
Lehmania marginata	a slug	mollusk
Lehmania valentiana	threeband garden slug	mollusk
Leucaena leucocephala	leucaena	shrub/tree
Lonchura malaca	chestnut manniken	bird
Lonchura punctulata	nutmeg manniken	bird
Lonicera japonica	Japanese honeysuckle	vine
Maconellicoccus hirsutus	hibiscus mealybug	insect
Malva rotundifolia	mallow	forb
Melanagromyza obtusa	pigeonpea pod fly	insect
Melinis minutiflora	molassesgrass	grass
Melopsittacus undulatus	zebra finch	bird
Micropterus salmoides	largemouth bass	fish
Molothrus bonairensis	shiny cowbird	bird
Mus musculus	mouse	mammal
Mycena citricolor	American leafspot of coffee	fungus
Mycosphaerella fijiensis	banana black leaf streak disease	fungus
Nephrolepis multiflora	Asian swordfern	forb
Oncorhynchus mykiss	rainbow trout	fish
Ontophagus gazella	a dung beetle	insect
Oreochromis aurea	blue tilapia	fish
Oreochromis hornorum	Israel red ilapia	fish
Oreochromis mossambica	Mozambique tilapia	fish
Oreochromis niloticus	Nile tilapia	fish
Oreochromis sp.	a tilapia	fish
Oryctolagus cuniculus	rabbit	mammal
Pachira aquatica	Guiana-chestnut	tree
Pachira insignis	wild chestnut	tree
Panicum maximum	guineagrass	grass
Paracoccus marginatus	papaya mealybug	insect
Parkinsonia aculeata	Jerusalem thorn	shrub
Passer domesticus	house sparrow	bird
Peronospora tabacina	blue mold disease of tobacco	fungus
Phyllocnistis citrella	citrus leafminer	insect
Ploceus cucullatus	African village weaver	bird
Poecilia latipinna	sailfin molly	fish
Poecilia reticulata	Trinidad guppy	fish
Poecilia sp.	a guppy	fish
Poliphagotarsonemus latus	cotton mites	insect
Pomacea glauca	Florida apple snail	mollusk
Procambarus clarkii	red swamp crayfish	crustacean
Procyon lotor	raccoon	mammal
Pseudacysta perseae	avocado lace bug	insect
Pyroderces rileyi	pink scavenger caterpillar	insect
Rana catesbeiana	bullfrog	amphibian
Rattus norvegicus	Norway rat	mammal
Rattus ratus	common rat	mammal
Rhizoglyphus robini	bulb mite	insect
Rottboelia cochinchinensis	itch grass	grass
Rottboellia exaltata	itch grass (same as above)	grass
Salmo gardnhierii	rainbow trout	fish
Solidago sempervirens	seaside goldenrod	forb
Sonchus asper	spiny sowthistle	forb
Spathodea campanulata	African tuliptree	tree
Sphenoclea zeylanica	chickenspike	forb
Stachytarpheta urticifolia	nettleleaf velvetberry	forb
Steneotarsonemus spinki	rice tarsonemid mite	insect
Sus scrofa	domestic pig, feral swine	mammal
Sylvilagus sp.	a rabbit	mammal
Scientific Name	**Common Name**	**Lifeform**
Syzygium jambos	Malabar plum	tree
Tabebuia heterophylla native to P.R & V.I.	white-cedar, roble blanco	tree
Tabebuia pentaphylla same as above	white-cedar, roble blanco	tree
Tecoma stans native to P.R., V.I. & Cuba	yellow trumpetbush	shrub
Thrips palmi	melon thrips	insect
Tibraca limbativentris	rice stalk stink bug	insect
Toxoptera citricidus	brown citrus aphid	insect
Trichogaster trichopterus	blue gourami	fish
Umbonia crassicornis	treehopper, thornbug	insect
Varroa jabconsoni	a parasitic mite of honey bees	insect
Vernonia cinerea Cyanthillium cinereum	little ironweed	forb
Xanthium strumarium native to P.R & V.I.	rough cocklebur	forb
Xiphophorus helleri	green swordtail	fish
Xiphophorus maculatus	platyfish	fish

Xiphophorus sp.	a swordtail	fish
Youngia japonica	Oriental false hawkbeard	forb

Source; http://www.medioambiente.gov.do/inbidom/main/spanish/especies/especies_ficha_067.html

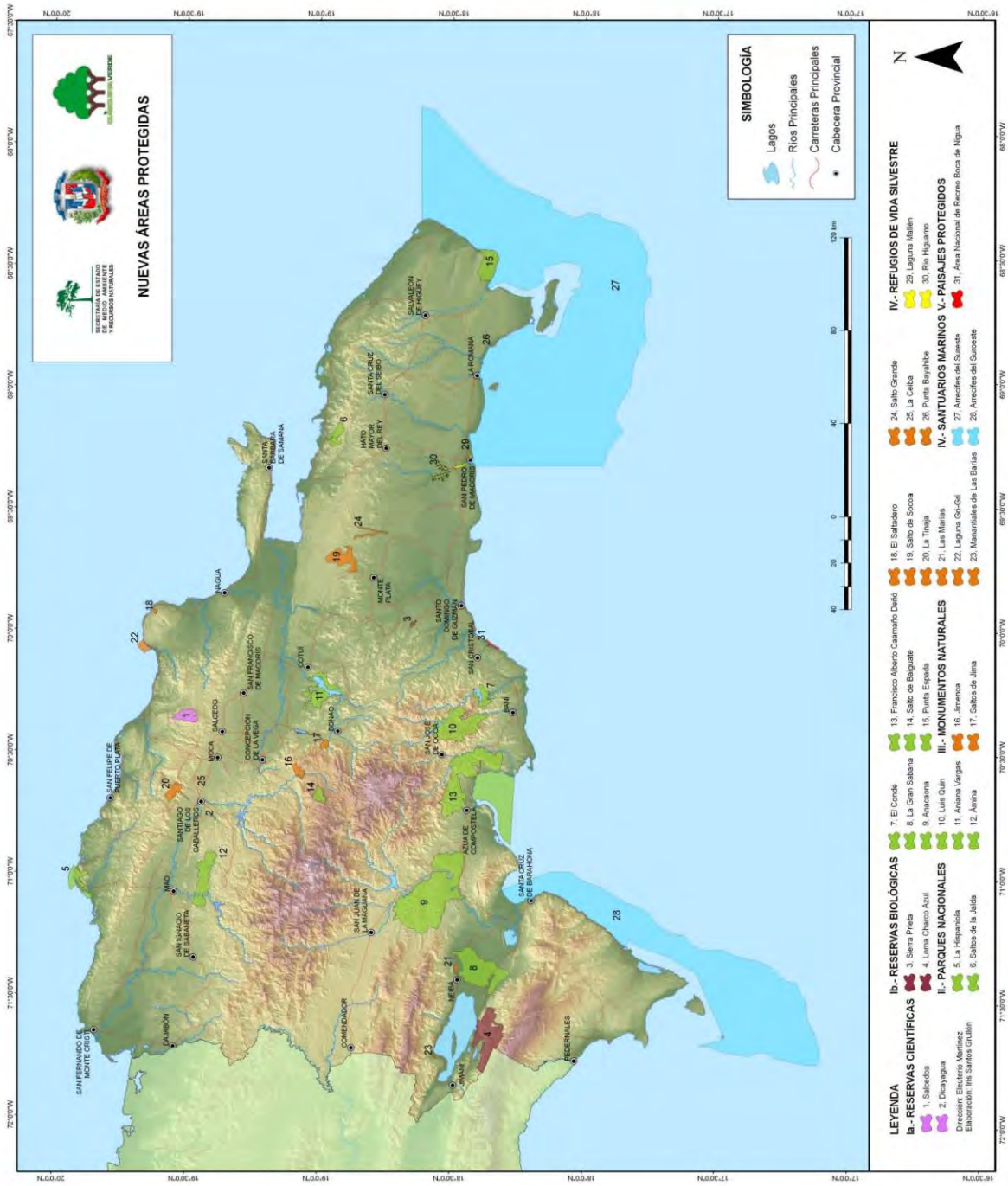
Source: plant information: http://plants.usda.gov
Additional sources: http://scholar.google.com
http://www.worldagroforestrycentre.org/Sites/TreeDBS/Treedatabases.asp

Appendix F – Protected Areas of the Dominican Republic

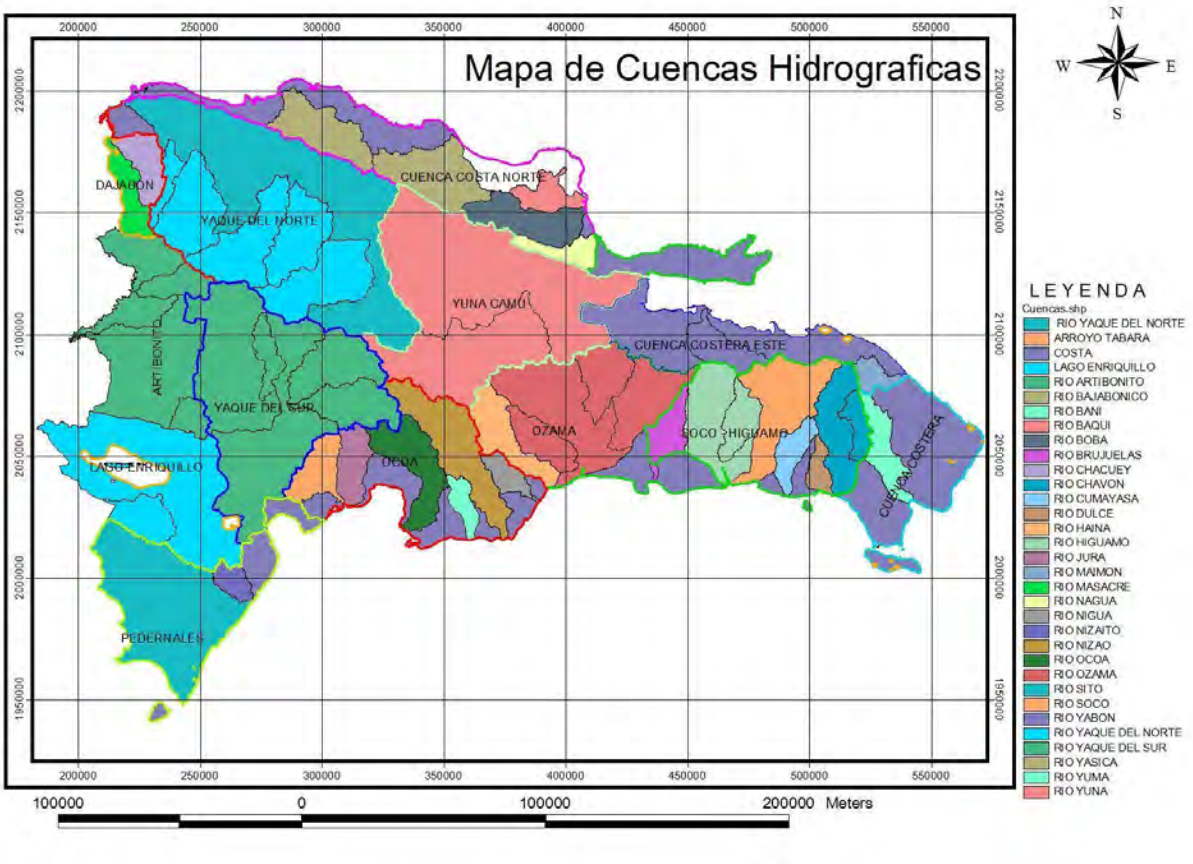


Source: Ministry of the Environment.

Appendix E (continued) – New Protected Areas



Appendix G – Dominican Republic River Basins Map



Source: PRONATURA.

Appendix H – Non-native Species in the Dominican Republic

Species/Taxonomy	a) Origin/entry information	b) Distribution	c) Observations
Common Name: Acacia, zamorano *Scientific Name:* ***Acacia mangium***	From Australia, Papua, Nueva Guinea. Introduced to Rep. Dom. from Costa Rica in 1980 for reforestation programs.	Found throughout the country.	A very aggressive pioneer species and colonizer, with high potential for regeneration, especially in areas affected by fire.
Common Name: Acaro de la guanábana *Scientific Name:* ***Aceria anonae***			
Common Name: Acaro del coco *Scientific Name:* ***Aceria guerreronis***	1979		
Common Name: *Scientific Name:* ***Agriolimax agrestis***			
Common Name: Cha-cha *Scientific Name:* ***Albizia lebbeck***	Asia.	In green zones, parks, and along highways.	Easily adapts to drought conditions.
Common Name: Javilla extranjera *Scientific Name:* ***Aleurites fordii***	China.		
Common Name: Avellano *Scientific Name:* ***Aleurites moluccana***	India		
Common Name: Javillo *Scientific Name:* ***Aleurites trisperma***	Filipinas.		
Common Name: Mosca negra de los cítricos *Scientific Name:* ***Aleurocanthus woglumi***			
Common Name: *Scientific Name:* ***Alysicarpus vaginalis*** (L.) DC. (Fabaceae).	Europe		(Liogier, 1985).
Common Name: Caracol acuático del arroz *Scientific Name:* ***Ampularia conolientata***	Probable from Taiwan.		This species affects rice and other irrigated crops.
Common Name: Caracol acuático del arroz *Scientific Name:* ***Ampularia glauca***			Attacks rice crops.
Common Name: *Scientific Name:* ***Ampularia sp***			Affects rice plantations. Shell is smooth-yellow or orange in color..
Common Name: *Scientific Name:* ***Anadenthera pavonina***	Asia		
Common Name: Mosca del fruto *Scientific Name:* ***Anastrepha oblicua***			Affects guayaba and mango.
Common Name: Caracol *Scientific Name*: ***Anodonta sp.***	1980, imported from Taiwán.		
Common Name: Lagarto verde cubano *Scientific Name:* ***Anolis porcatus***			
Common Name: Abeja *Scientific Name:* ***Apis mellifera***			
Common Name: *Scientific Name:* ***Azadirachta indica*** A. Juss. (Meliaceae).	Southern Asia. Introduced for reforestation.		Competitive (Liogier, 1985).
Common Name: Bonete de arzobispo *Scientific Name:* ***Barringtonia asiatica***	India		
Common Name: Pata de vaca *Scientific Name:* ***Bauhinia monandra***	Asia.		
Common Name: Mosca blanca *Scientific Name:* ***Bemisia tabaci***	1975		Attacks yucca and cotton.

Common Name: *Scientific Name:* ***Bephratelloides paraquayensis*** (Hymenoptera, Eurytomidae)	.	.	Affects guanábanas and other anonaceae species.
Common Name: Nuez del Brasil *Scientific Name:* ***Bertholettia excelsa***	Brazil		
Common Name: Beta *Scientific Name:* ***Betta splendens***	Siam.	Ozama River.	
Common Name: Vaca *Scientific Name:* ***Bos taurus***			
Common Name: *Scientific Name:* ***Botriaclos pertusus***	From Africa	National	
Common Name: Yerba o bojuco de cuaresma *Scientific Name:* ***Boussingaultia leptostachys***			
Common Name: Garza ganadera *Scientific Name:* ***Bubulcus ibis***			
Common Name: Maco pempen, Maco toro *Scientific Name:* ***Bufo marinus***	Introduced in the 1960s	Very common in humid areas and water bodies with temp. >18 °C	Used to control insects.
Common Name: Caliandra *Scientific Name:* ***Calliandra calothyrsus***	Introduced from Central America in the 1980s to use as living fences and agroforestry projects.	All humid and semi-humid zones. Along rivers and streams.	Adaptable to dry areas. Invades open areas rapidly.
Common Name: *Scientific Name:* ***Calloria sp***	Probable from Haití or South America		Attacks rice crops.
Common Name: Perro doméstico *Scientific Name:* ***Canis familiaris***	Domesticated		
Common Name: Chivo, cabra *Scientific Name:* ***Capra hircus***			
Common Name: Barrenador semillas de palma *Scientific Name:* ***Cariobruchus sp.***			
Common Name: Pino australiano *Scientific Name:* ***Casuarina equisetifolia***	Australia.		
Common Name: Jicotea *Scientific Name:* ***Chrysemys sp.***			
Common Name: Masambey *Scientific Name:* ***Cleome gynandra*** L. (Capparaceae).			(Liogier, 1983).
Common Name: Frijol cimarrón *Scientific Name:* ***Cleome viscosa*** L. (Capparaceae).	Asia		(Liogier, 1983).
Common Name: Codorniz *Scientific Name:* ***Colinus virginianus***			
Common Name: Paloma común *Scientific Name:* ***Columba livia***			
Common Name: Mosquita de flores de orquídea *Scientific Name:* ***Contarinia maculipennis***	2001		
Common Name: Amacey *Scientific Name:* ***Copaifera officinalis***	South América.		Damages grain and fruit crops.
Common Name: Muco *Scientific Name:* ***Couroupita guianensis***			
Common Name: *Scientific Name:* ***Cyperus esculentus***			
Common Name: Carpa *Scientific Name:* ***Cyprinus carpio***	1954, Imported from Haiti, FAO 1979-1984. Originally from Israel, Taiwán, USA, Panama		

Common Name: Flambollán *Scientific Name:* ***Delonix regia***	Madagascar.		
Common Name: Yaguasín *Scientific Name:* ***Dendrocygna bicolor***		Muy común en todo el país	
Common Name: Psílido de los cítricos *Scientific Name:* ***Diaphorina citri***	2001		
Common Name: *Scientific Name:* ***Dorosoma petenense***	1995 from Puerto Rico		
Common Name: *Scientific Name:* ***Drymaeus multilineatus***			
Common Name: Quita credito, semilla de María *Scientific Name:* ***Echinochloa crusgalli***		In rice cultivation areas.	
Common Name: Lila de agua *Scientific Name:* ***Eichornia crassipes***		Lagunas, rivers, canals	Invades areas with slow moving water.
Common Name: Pata de gallina *Scientific Name:* ***Eleusine indica***	Africa		
Common Name: Pincel de amor *Scientific Name:* ***Emilia coccinea*** (Sims) G. Don (Asteraceae).	Europe.		(Liogier, 1996).
Common Name: *Scientific Name:* ***Emilia fosbergii*** Nicolson (Asteraceae)	Europe.		(Liogier, 1996).
Common Name: *Scientific Name:* ***Emilia sonchifolia*** (L.) DC. (Asteraceae)	Europe.		(Liogier, 1996).
Common Name: Gusano de la flora *Scientific Name:* ***Erinnyis ello***			
Common Name: Acaro del Hibiscus *Scientific Name:* ***Eriophyes sp.***			
Common Name: Gato doméstico *Scientific Name:* ***Felis catus***	Domesticated		Used as pets and rodent control.
Common Name: Camarones secos *Scientific Name:* ***Fleminqia strobilifera***	India	Humid forests.	Agressive invasive.
Common Name: fresa *Scientific Name:* **Fragaria vesca** L. (Rosaceae).	Europe		Invasive, tolerant (Liogier, 2000).
Common Name: Pez mosquito *Scientific Name:* ***Gambusia affinis***	Mexico and Central America. Introduced for mosquito control.		Has displaced poecílidos species in rivers and streams.
Common Name: Pez mosquito *Nombre científico:* ***Gambusia holbrooki***	USA	Villa Altagracia.	
Common Name: *Scientific Name:* ***Gurahmi sp.***		In bodies of water with temp. >20 °C and flow <2m/sec.	Species commonly used in the aquarium business.
Common Name: Trípido del laurel *Scientific Name:* ***Gynaicothrips ficorum***			
Common Name: Hurón *Scientific Name:* ***Herpestes auropunctatus***			
Common Name: No conocido *Scientific Name:* ***Heterobasidium annosum*** (Fr.) Bref. (Bondarzewiaceae).			(Perdomo & Ryvarden 2002).
Common Name: Caucho *Scientific Name:* ***Hevea brasilensis***	Brazil.		
Common Name: *Scientific Name:* ***Hypasrhamis rufa***	Africa		
Common Name: Broca del café *Scientific Name:* ***Hypotenemus hampeii*** (Coleoptera, scolytidae)	Introduced in 1995 in Cotuí		In coffee plantations.

Common Name: Barrenador de la caoba *Scientific Name:* ***Hypsipyla grandella***			
Common Name: Pez gato *Scientific Name:* ***Ictalurus punctatus***	Introduced intentionally from Miami for food		
Common Name: Añil *Scientific Name:* ***Indigofera jamaicensis*** Spreng. (Fabaceae).	Africa		(Liogier 1985).
Common Name: Barrenador del pino *Scientific Name:* ***Ips sp.***			
Common Name: Yerba de popo *Scientific Name:* ***Ischaemum rugosum*** Salisb. (Poaceae).			Weed in rice crops. (Liogier, 2000).
Common Name: *Scientific Name:* ***Lebistes reticulatus***			
Common Name: *Scientific Name:* ***Lehmania valentiana***			
Common Name: *Scientific Name:* ***Lehmania marginata***			Attacks brocoli, Bromeliads, carrots, orchids.
Common Name: Mongita tricolor *Scientific Name:* ***Lonchura malaca***	This bird affects rice production.		
Common Name: Cigua come arroz, Pecho jabao *Scientific Name:* ***Lonchura punctulata***			
Common Name: Madreselva *Scientific Name:* ***Lonicera japonica*** Thunb. (Caprifoliaceae).	China.		(Liogier, 1995).
Common Name: Cochinilla rosada del Hibiscus *Scientific Name:* ***Maconellicoccus hirsutus***	2002		
Common Name: Malva *Scientific Name:* ***Malva rotundifolia*** L. (Malvaceae).	Europe.		(Liogier, 1996)
Common Name: Minador de vaina del guandul *Scientific Name:* ***Melanagromyza obtusa***	2000		
Common Name: Yaragua *Scientific Name:* ***Melinis minutiflora***	Africa	High and medium elevation forests.	Very aggressive invasive.
Common Name: Periquito del amor *Scientific Name:* ***Melopsittacus undulatus***			
Common Name: lobina-truche *Scientific Name:* ***Micropterus salmoides***	1957, Imported from USA for aquaculture.	In large bodies of water, lakes, and rivers.	
Common Name: Bigañuelo, ratón casero *Scientific Name:* ***Mus musculus***	From Europe		Damages rice, coffee, tomato, melon, peanut, and pineapple crops.
Common Name: Sigatoka negra. *Scientific Name:* ***Mycophaerella fijiensis***	Central America.		Attacks plantationes of *Musa* sp.
Common Name: *Scientific Name:* ***Nephrolepis multiflora***	Asia		Agresive invasive.
Common Name: Guinea *Scientific Name:* ***Numida meleagris***		Not common.	
Common Name: Escarabajo rueda caca *Scientific Name:* ***Ontophagus gazella***			
Common Name: *Scientific Name:* ***Odocoileus virginianus***			
Common Name: Trucha arco iris *Scientific Name:* ***Oncorhynchus mykiss***	USA.		
Common Name: Tilapia aurea *Scientific Name:* ***Oreochromis aurea***			Eats eggs and juveniles of endemic and native shrimp and fish.
Common Name: Tilapia hornorum *Scientific Name:* ***Oreochromis hornorum***			Eats eggs and juveniles of endemic and native shrimp and fish

Common Name: Tilapia mosambica *Scientific Name:* ***Oreochromis mossambica***	Africa.		
Common Name: Tilapia nilotica *Scientific Name:* ***Oreochromis niloticus***		.	Eats eggs and juveniles of endemic and native shrimp and fish
Common Name: Tilapia roja *Scientific Name:* ***Oreochromis sp.***			Eats eggs and juveniles of endemic and native shrimp and fish
Common Name: Carolina *Scientific Name:* ***Pachira acuatica***			
Common Name: *Scientific Name:* ***Pachira insignis***	Tropical America.		
Common Name: Pangola *Scientific Name:* ***Panicum maximun***	Africa		
Common Name: Cochinilla de la lechoza *Scientific Name:* ***Paracoccus marginatus***	1997		
Common Name: Aroma extranjera *Scientific Name:* ***Parkinsonia aculeata***			
Common Name: Gorrión doméstico *Scientific Name:* ***Passer domesticus***	Africa		
Common Name: Moho azul del Tabaco *Scientific Name:* ***Peronospora tabacina***	1981		
Common Name: Minador de los cítricos *Scientific Name:* ***Phyllocnistis citrella*** (Lepidoptera)	1994.	.	.
Common Name: Barrenador –Acacia mangium *Scientific Name:* ***Platipus sp.***			
Common Name: *Scientific Name:* ***Pomacea glauca***			
Common Name: Araña blanca de los invernaderos *Scientific Name:* ***Poliphagotarsonemus latus***			Attacks green beans, citrus, cotton, potato, and other crops.
Common Name: Camarón del diablo *Scientific Name:* ***Procambarus clarkii***	Introduced intentionally from Louisiana USA in 1970		Highly agressive competidor for space and food with native and endemic crustacean species in fresh water. Competes with *Macrobrachium* species.
Common Name: Mapache *Scientific Name:* ***Procyon lotor***			
Common Name: Bayahonda, cambrón *Scientific Name:* ***Prosopis juliflora***			.
Common Name: Chinche del aguacate *Scientific Name:* ***Pseudoacysta perseae*** (Heteroptera, Tingidae)	1994		Parasite of avocado plants.
Common Name: *Scientific Name:* ***Pyroderces rileyi*** (Lepidoptera, cosmopterygidae)		.	In sorghum.
Common Name: Rana toro *Scientific Name:* ***Rana Catesbeiana***	1960		Used to control insect populations.
Common Name: Rata de noruega *Scientific Name:* ***Rattus norvegicus***	Europe		Damages rice, sorghum, corn, and yucca crops.
Common Name: *Scientific Name:* ***Rhizoglyphus robini*** (Acarina, Acaridae)			En garlic and onion.
Common Name: *Scientific Name:* ***Rincle lithium recens***	Africa		
Common Name: *Scientific Name:* ***Rottboelia cochinchinensis***			Associated with corn and sorghum

Common Name: Cebada fría *Scientific Name:* ***Rottboellia exaltata*** L. f. (Poaceae).	Tropical Asia		(Liogier, 2000).
Common Name: *Scientific Name:* ***Salmo gardnhierii***	1982 from Panama.	.	
Common Name: Tilapia mosambica *Scientific Name:* ***Sarotherodon mossambicus***	1954 imported from Haiti, for FAO Project.	All bodies of water, hibridizes with ***S. niloticus***.	
Common Name: Tilapia nilotica *Scientific Name:* ***Sarotherodon niloticus***	1980,1986, 1989, 1990, 1992 imported from Taiwan, Panama, USA, and Israel.	Hibridizes with ***S. mossambicus,*** All bodies of water.	
Common Name: Espiga de oro *Scientific Name:* ***Solidago sempervirens*** L. (Asteraceae).	North America		(Liogier, 1996).
Common Name: Lenmuguilla *Scientific Name:* ***Sonchus asper*** (L.) Hill. (Asteraceae).	Europe.		(Liogier, 1996).
Common Name: Amapola *Scientific Name:* ***Spathodea campanulata***	Africa.		
Common Name: desconocido *Scientific Name:* ***Sphenoclea zeylanica*** Gaertn. (Campanulaceae).	Europe.		(Liogier, 1996).
Common Name: *Scientific Name:* ***Stachytarpheta urticifolia*** (Salisb.) Sims. (Verbenaceae).	Tropical Asia		(Liogier, 1994).
Common Name: Acaro de la vaina del arroz *Scientific Name:* ***Steneotarsonemus spinki*** (Acarina: tarsonemidae)	1998		Affects rice crops.
Common Name: Cerdo, puerco *Scientific Name:* ***Sus scrofa***			
Common Name: Conejo *Scientific Name:* ***Sylvilagus sp***			
Common Name: Pomo *Scientific Name:* ***Syzygium jambos***	Tropical Asia		
Common Name: Roble blanco *Scientific Name:* ***Tabebuia heterophylla***	Tropical America		
Common Name: Roble blanco *Scientific Name:* ***Tabebuia pentaphylla***	Tropical America		
Common Name: Sauco amarillo *Scientific Name:* ***Tecoma stans***	Tropical America		
Common Name: Hiede vivo del arroz *Scientific Name:* ***Tibraca limbativentris*** (Heteroptera, Pentatomidae).	1997. .		Attacks rice crops.
Common Name: Tilapia mosambica *Scientific Name:* ***Tilapia mossambicus***	Lake Mozambique, Africa, 1953		Found in rivers and lagoons. Displaces endemic fish (***Cichlasoma haytensis***)
Common Name: Tilapia *Scientific Name:* ***Tilapia nilotica***	Nile River, Africa, 1953		Found in rivers and lagoons. Displaces endemic fish (***Cichlasoma haytensis***)
Common Name: Tilapia *Scientific Name:* ***Tilapia rendalli***			
Common Name: Trípido de la berenjena *Scientific Name:* ***Thrips palmi*** (Tisanoptera, Thripidae)	1988		In cotton, flower, onions, and other vegetables.
Common Name: Chinche marrón del arroz *Scientific Name:* ***Tibraca limbativentris***	1997		

Common Name: Afido marrón de cítricos *Scientific Name:* ***Toxoptera citricidus*** (Homoptera, Aphididae)	1992		In citrus crops.
Common Name: Mosca blanca de invernadero *Scientific Name:* ***Trialeurodes vaporariorum***	1978		
Common Name: Gurami *Scientific Name:* ***Trichogaster trichopterus***	Asia.		
Common Name: *Scientific Name:* ***Umbonia crassicornis***			
Common Name: Acaro de las abejas *Scientific Name:* ***Varroa jabconsonii***	1995		
Common Name: Yerba morada. *Scientific Name:* ***Vernonia cinerea*** (L.) Less. (Asteraceae).	Europe.		(Liogier, 1996).
Common Name: Cadillo de sato *Scientific Name:* ***Xanthium strumarium*** L. (Asteraceae).			(Liogier, 1996).
Common Name: Colaespada *Scientific Name:* ***Xiphophorus helleri***	Central America and Mexico. Introduced for aquariums.		Has displaced native poecílidos species in rivers and streams.
Common Name: Platy *Scientific Name:* ***Xiphophorus maculatus***	Central America and Mexico. Introduced for aquariums.		Has displaced native poecílidos species in rivers and streams.
Common Name: *Scientific Name:* ***Xiphophorus sp.***			Commonly used in the aquarium business.
Common Name: *Scientific Name:* ***Youngia japonica*** (L.) DC.	Asia		(Liogier, 1996).

Institutions: **Acuario Nacional; Centro de Investigaciones Arroceras (CEDIA), Juma, Bonao; Centro de Investigaciones de Biología Marina (CIBIMA-UASD); Departamento de Sanidad Vegetal (SEA); Enda Caribe; Fertilizantes Santo Domingo (FERSAN); Fundación Moscoso Puello; Grupo jaragua, Inc.; Instituto Dominicano de Investigaciones Agropecuarias y Forestales (IDIAF); Instituto de Microbiología y Parasitología (UASD) Jardín Botánico Nacional; Junta Agroempresarial Dominicana (JAD); Museo Nacional de Historia Natural Programa Nacional de Manejo Integrado de Plagas (MIP); PRONATURA**

Secretaria de Estado de Medio Ambiente y Recursos Naturales: Subsecretaria de Biodiversidad y Areas Protegidas' Dirección de Vida Silvestre y Biodiversidad; División Flora; Departamento de Pesca y Acuicultura Departamento de Investigación, Subsecretaría de Recursos Forestales; Dirección de Reforestación y Manejo;

Secretaria de Estado de Agricultura, Departamento de Sanidad Vegetal, División Control de Vertebrados Plagas; Dirección General de Ganadería.

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Robert Ortiz	Ornitology student	Tel. (809) 522-3502	

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Source: adapted from http://i3n.iabin.net/documents/final_dominicanrep_species_projects_by_experts.doc

Appendix I – List of Available Bird Conservation Grants

1) The American Ornithologists' Union
Suite 402, 1313 Dolley Madison Blvd
McLean, VA 22101 USA
505-326-1579
AOU@AOU.org

AOU International Grants Program
AOU International Grants are designed to support infrastructure development and capacity building for western hemisphere professional ornithological societies.
As the largest, and one of the oldest, ornithological societies in the western hemisphere, the American Ornithologists' Union (AOU) aspires to increase its role as advocate for the study and conservation of birds throughout the Americas. Therefore, the AOU has established an International Grants Program to support Western Hemisphere Professional Ornithological Societies through funding of activities to develop infrastructure, train ornithologists, and build strategic partnerships within the Western Hemisphere. Activities that will be considered for funding include, but are not restricted to, the following: costs of startup and growth of fledgling ornithological societies; web-based (or other) activities that link ornithological societies from different Western Hemisphere countries to achieve common, concrete objectives; and activities that provide international expertise to ornithological societies to provide training or solve a local problem (e.g., training through technical workshops on research design, field techniques, fund-raising, publishing, science-based conservation activities). This program aims in particular to fund the participation by representatives of non-North American ornithological organizations in meetings or workshops that are held in conjunction with a North American Ornithological Conference (NAOC) and whose specific purpose is to promote hemispheric ornithological initiatives. The purpose of this program is NOT to fund single events, but rather to invest in organizations and infrastructure that demonstrate the greatest promise to increase their impact on the study and conservation of birds.

Guidelines: A total of $5,000 was available in 2011, and proposals will be considered for grants in the amount of $1000-3000, for a period of one year. The due date of proposals was April 15, 2011, and for 2012 applicants the due date will be available at the end of 2011. Proposals should be in the form of a narrative letter (English or Spanish) of no more than four pages, typewritten, double spaced; as well as a brief budget. The whole document should be sent in either Microsoft Word or, ideally in pdf format as an e-mail attachment, and submitted to the AOU Competitive Grants Program (Brent Burt, dbburt@sfasu.edu). The narrative letter should describe as specifically as possible in the available space the nature of the organization, the proposed activities and use of the funds, and the intended impact of the activities. The review committee will consist of members of the AOU International Affairs Committee. Checks will be made out to an organization, not an individual. Important: you should receive an email confirming the receipt of your proposal. If you do not receive this confirmation within one week of sending the proposal, contact Brent Burt at (936) 468-2482.

Review & Oversight: Successful grants carry the obligation of a report due 15 months after the issuance of the check. The report must contain a detailed itemization of how funds were spent (with a return of any unspent portion), including what funds were used for and what

they accomplished. This information will be used to assist the AOU in targeting the most promising programs for future support.

2) Crowder-Messersmith Fund

The Crowder-Messersmith Conservation Fund helps small, mostly local, conservation and/or education projects in underdeveloped countries. Its small grants give a leg up to communities and individuals whose projects have not attracted major support from other sources. Grants have helped more than 75 projects with start-up costs since 1974, when Dr. Donald Messersmith established this memorial to his friend and collaborator Orville Crowder. The Audubon Naturalist Society has administered it since 1999.

If you wish to apply, download the application form and instructions, click here. The email address to use for sending your application is provided in the instructions.

APPLICATION TIME FRAME: We begin accepting applications December 1. Deadline for receipt is February 1. Decisions are generally announced by March 1.

GRANT AMOUNT: Maximum U.S. $2,000

REQUIREMENTS AND RESTRICTIONS: The Project must: (1) be outside the United States or other developed countries, (2) involve the local population through educational workshops, materials, etc., (3) if research, must be for conservation purposes rather than just to obtain scientific data, (4) exclude overhead expenses (funds must go for salaries, publication costs, equipment, room and board, not for such operating expenses as taxes, utilities and insurance)

Preference is given to projects that (1) will benefit the human, plant and animal communities of a particular habitat in an ecologically sustainable manner; (2) have lasting significance to local residents, rather than just passing interest to visiting researchers; (3) protect endangered species and habitats; or (4) have public education value.

Preference is given to applicants who have a record of prior conservation action relevant to their proposed project. Applicants from countries other than the United States are especially encouraged to apply. U.S. researchers planning work in foreign countries must have at least one local collaborator on their research team.

A final report is required upon completion of the project or by November of the year the project is funded.

Research Grants
Students and researchers are ecouraged to apply for any one of three shorebird research grants sponsored and funded by Manomet:

Pablo Canevari Award
Manomet established the Pablo Canevari Award in 2000 to honor long-time Manomet staff member and friend, Pablo Canevari. The Award is a $1,000 grant to a Latin American nominee or organization to support research and/conservation efforts focused on shorebirds. Nominations may be submitted by completing a nomination form [only in

Spanish] no later than October 31st. The award will be announced by early December. Click here to download a nomination form.

3) Ridgway Hawk –

Research Award

The HMANA Board of Directors is pleased to announce the availability of the HMANA Research Award of up to $1000 annually to support field studies relating to raptor migration ecology and behavior, population monitoring, and conservation. Proposals on the following monitoring topics are encouraged for the 2008-09 awards:

- New fall migration monitoring sites in the following regions: Pacific states, Great Plains, Adirondacks, southern states (except Texas), western Mexico, Central and northern South America
- New spring migration monitoring sites outside of the Great Lakes region
- New migration monitoring sites focusing on rough-legged hawks or Swainson.s hawks
- Winter surveys for rough-legged hawks, ferruginous hawks or eastern golden eagles

To apply, submit a proposal no longer than five pages that includes:

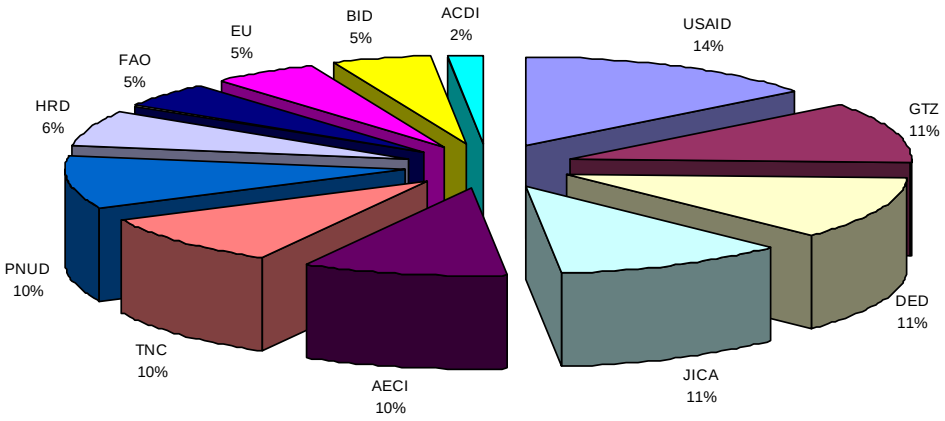
- background of the applicant(s) and organizations involved;
- significance of the proposed research;
- location of the study site(s) and the particular raptor species involved;
- specific research objectives and methods; and
- proposed budget (1 page or less), including other sources of funding or in-kind support.

Deadline for proposals is May 15. Up to two proposals may be funded per year and will be announced by July 31 of the year in which application is made. It is expected that for monitoring projects, hourly data will be entered into hawkcount.org. All awardees should submit a short paper describing the research project and results to the HMANA journal Hawk Migration Studies within six months of conclusion of the study.

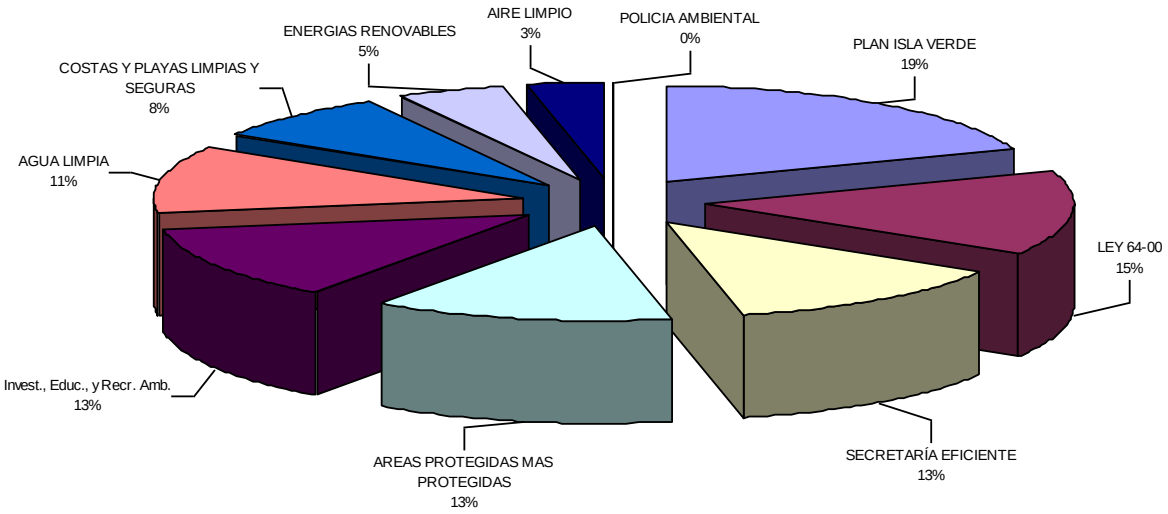
Proposals will be accepted by email at researchaward@hmana.org or may be mailed to:

Ernesto Ruelas Inzunza
HMANA
Cornell Lab of Ornithology
159 Sapsucker Woods Road
Ithaca, NY 14850

Appendix J – International Cooperation: Percentage of Funded Programs



International Cooperation and Program Support SEMARNA 2006



Appendix K – Scope of Work

TERMS OF REFERENCE

Dominican Republic **Country Analysis on Tropical Forest and Biological Diversity For USAID/*Dominican Republic*'s Country Strategy (2012-20*16*)**

I. Background

As part of the documentation for the new five-year Strategic Plan, USAID/***Dominican Republic*** is required by Sections 118 and 119 of the Foreign Assistance Act to update the existing analysis of tropical forests and biological diversity in ***Dominican Republic***. Concept papers for the new strategy have already been completed and approved. Many other documents, studies, and research on ***Dominican Republic***'s tropical forests and biological diversity have also been completed by organizations, most notably The Nature Concervancy. This country analysis will mainly be one of compilation, review, analysis and synthesis of existing information, coupled with corroboration and feedback from major players. A list of existing documents is appended to the TOR.

Summary of relevant parts of FAA Sec 118 and 119:

From Sec 118 Tropical Forests:
(e) COUNTRY ANALYSIS REQUIREMENTS.—Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of—
(1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests, and
(2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

From Sec 119 Endangered Species:
(d)[85] COUNTRY ANALYSIS REQUIREMENTS.—Each country development strategy, statement or other country plan prepared by the Agency for International Development shall include an analysis of—
(1) the actions necessary in that country to conserve biological diversity, and
(2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

II. Scope of Work

The SOW will include an overall review of the current status of tropical forests and biological diversity in ***Dominican Republic***:
Compile information related to, and describe the tropical forests and biological diversity of ***Dominican Republic***, including their current status and trends;
Describe the factors affecting the management of these natural resources, including the principal threats and impediments to conservation and sustainable management of tropical forests and biodiversity in ***Dominican Republic***;
Review the current institutional infrastructure for the management of tropical forests and biodiversity, including a description of major organizations, both public and private, which have a role in this process. Interview key personnel of key institutions.

Review the legislative basis, both national and local, for the protection of biological resources, including tropical forests, in ***Dominican Republic*** (including the ratification of international treaties and agreements such as CITES, and the effectiveness of national implementation),
Identify the full range of cost effective and implementable actions (including priorities) necessary to achieve sustainable management of tropical forests and the conservation of biological diversity in ***Dominican Republic***, and
Identify the extent to which the actions proposed for support by USAID/***Dominican Republic*** meet the needs thus identified, and recommend any further actions not described or outlined in the concept papers. Analyze the effects of USAID/***Dominican Republic***'s entire proposed strategy (FY 2012 – FY 2016) on ***Dominican Republic***'s tropical forests and biodiversity. In particular, the proposed program areas of Economic Growth, Health and Population, and Democracy and Governance should be carefully reviewed.

III. Outline of *Dominican Republic* Country Analysis of Tropical Forests and Biological Diversity:

Title page
Table of contents
List of appendices
List of tables and figures
Executive summary

A. Introduction

B. Legislative and institutional structure affecting biological resources

(1.) Government of ***Dominican Republic***
(2.) Non-governmental organizations
(3.) International organizations

C. Status and management of protected areas and endangered species

D. Status and management of forest resources

E. Conservation outside of protected areas

(1.) Managed natural systems
(2.) Impacts of development projects
(3.) Ex-situ conservation (eg: zoos, seed banks)

F. Major issues in tropical forest and biological diversity conservation

G. Recommendations and proposed actions, including review of actions proposed for support by USAID/***Dominican Republic***

H. Appendices

(1.) Bibliography

(2.) Biodata sketch of team members
(3.) List of persons contacted
(4.) Other appendices as appropriate

IV. Details for specific sections of the above outline

A. Introduction

This section of the assessment will provide an overview of the information available and used in the assessment. It should identify significant gaps in information on the status and management of tropical forest and biological diversity resources in ***Dominican Republic***.

B. Legislative and institutional structure

The assessment should include a review of the current legislative institutional infrastructure for the management of biological diversity and tropical forests. This review should include a description of major organizations, both public and private, which have a role in this process.

(1.) Government of ***Dominican Republic***

The background assessment should include a review of the legislative basis, both national and local, for the protection and management of biological resources, including tropical forests, in ***Dominican Republic***. This should include a review of international treaties and agreements, which have been ratified by ***Dominican Republic*** (CITES, Ramsar, DR-CAFTA, etc.), and the effectiveness of national implementation. A description should be provided of the Government of ***Dominican Republic*** (GODR) institutions responsible for tropical forest and biological diversity issues, and management of all natural resources, within ***Dominican Republic***. It should assess the interest and commitment of the government to the conservation of biological diversity and tropical forests, and summarize whether environmental profiles or national conservation strategies have been produced or are currently underway.

(2) Non-governmental organizations

This section should include a description of major organizations, both public and private and both indigenous and international, which have a role in conserving biological diversity and tropical forests and the levels of funding they contribute toward this issue.

(3) Bilateral, other donors and international organizations

This section should include a description of other donors and international organizations, both indigenous and external, which have a role in conserving biological diversity (including tropical forests) and the levels of funding they receive or contribute toward this issue. Their relationship with the government, membership, and principal programs should be identified.

C. Status and management of protected areas and endangered species

This section should include an inventory of declared and proposed national parks, wildlife refuges, forest reserves, sanctuaries, hunting preserves and other protected areas. The government agency or NGO managing each protected area should be identified, including all partners in cases of co-management. It should include a country map with the location of all existing and proposed protected areas. An assessment should be made of the effectiveness of these areas in protecting plant and animal resources, and of their importance to host-country's economy (e.g., for providing tourist opportunities or for protecting important watersheds). An analysis of the management effectiveness in these areas should be included.

This section should also include an inventory of rare and endangered species found in ***Dominican Republic***. It should identify their critical habitats and evaluate pressures on these habitats. It should review efforts that have been accepted for protection of these species and their habitats and assess their effectiveness.

D. Status and management of forest resources

This section should include a description of the different types of forests in ***Dominican Republic***. An assessment should be made of these forests' economic importance to ***Dominican Republic***, including values for wood, non-timber forest products, tourism, ecosystem services, etc. Existing management structures should be described, including those of the private forest industry and of rural communities. An assessment should also be made of the status of forest certification programs in ***Dominican Republic*** and their impacts (if any) on ***Dominican Republic***'s forests.

E. Conservation outside of protected areas

This section should include a description of conservation activities in host-country which are being undertaken outside designated protected areas. This should include, but not be limited to review of:

(1.) Managed natural ecosystems

This section should include a description of the major ***Dominican Republic*** ecosystems and an analysis of their present conservation status. A country map (to the same scale as the protected area map) of the natural vegetation or habitat types (biogeographic regions) should be included. The text should review the status of managed natural ecosystems including but not limited to:

forest resources
rangeland resources
wetlands
agricultural systems

The text should include a discussion of the economic, ecological and social importance of these ecosystems to ***Dominican Republic***, it should address their role in the regulation of erosion, management of water flow, and the maintenance of productive soils. The assessment should place special emphasis on tropical forests and wetlands of ***Dominican***

Republic and describe their status and current threats. The relationship between land ownership patterns and effective conservation should be addressed.

(2.) Impacts of development projects

The text should include a review, by major ecosystem, of the impacts of internationally and locally funded major development projects on tropical forest and biological diversity resources. The text should review the regulatory framework concerning the implementation of development projects as they affect biological diversity, with emphasis on tropical forests. The text should specify the environmental review and permitting requirements of the GO***DR*** as they concern major projects.

(3.) Ex-situ conservation

This subsection should provide a brief description of ex-situ species conservation efforts being undertaken and/or planned in host-country, it should review the programs of natural history museums, herbariums, botanical gardens, zoos, captive breeding programs, and gene banks, including a summary of any existing conservation actions and data bases. This section should provide a description of the activities being undertaken in ***Dominican Republic*** for the conservation of economically important species and germplasm. It should review the status of gene banks for crop and livestock species, native seed selection, and activities being undertaken to support the sustained production of commercially important wild plant and animal species (e.g. for forestry production, agriculture, hunting, fishing or commercial trade), and in-situ conservation of land races and wild relatives of important crops.

F. Major issues in tropical forest and biological diversity conservation

This section of the assessment should provide a summary of the major issues requiring attention in order to improve the conservation of biological diversity and forest resources. It should include the principal threats and impediments to sustainable management of tropical forests and conservation of biodiversity in ***Dominican Republic***. For example, the study should explore issues such as illegal logging, commercial potential for forest products, regulatory environment, GO***DR*** institutional capacity for regulation and monitoring, fire monitoring and control, etc. The present and future requirements for the development of local institutions and training, both government and non-governmental, should be addressed. Issues concerning the management of protected areas should be reviewed. Special attention should be given to the problems of assuring adequate protection of tropical forests and wetlands (e.g. do existing protected areas encompass most significant biological resources). This section should prioritize issues needing most immediate attention.

G. Recommendations for proposed actions

This section should provide a review of proposed actions to address issues concerning biological diversity and tropical forests which may be implemented, with support from USAID, GO***DR***, international development organizations, and local and international NGOs. Recommendations should be identified with regard to their relative priority and length of implementation period. If available, proposed actions shall include a brief

description of their objective and anticipated benefits. This shall include a concise analysis of cost (foreign and local currency), identification of the appropriate institution(s) for implementation, estimated implementation period, and outline requirements for institutional development and training to assure the sustainability of the proposed program.

This section should also include the identification and assessment of GODR and NGO institutional and education and training programs to preserve and augment biological diversity and tropical forests, especially where endangered species are apparent. The assessment will address program constraints, including the need to consider conditioning certain assistance upon ***Dominican Republic***'s legislative or administrative action in order to officially designate and strengthen GODR commitments for protected areas and tropical forest conservation.

Moreover, this section will identify the extent to which the actions proposed for support by USAID/***Dominican Republic*** meet the needs thus identified, and recommend any further actions not described or outlined in the concept papers (taking into account likely budgetary contraints). Analyze the effects (including potential negative impacts) of USAID/***Dominican Republic***'s entire proposed strategy (FY 2012 – FY 2016) on ***Dominican Republic***'s tropical forests and biodiversity. In particular, the proposed program areas of Economic Growth, Health and Population, and Democracy and Governance should be carefully reviewed.

H. Appendices

The assessment should include, but not limited to the following appendices:

Bibliography
List of relevant government agencies and NGOs
(3.) Biodata sketch of team members
(4.) List of persons and institutions contacted

Other appendices may be added as appropriate to the objective of the biological diversity/tropical forest assessment.

V. Duration and Timing of Consultancy

This consultancy is for 20 working days in ***Dominican Republic*** for one person. <u>The second specialist will be provided locally.</u> It is expected to begin when funds are transferred through the USAID/EGAT-USFS/IP interagency agreement to the US Forest Service which is expected in April of 2008.

VI. Reporting, Deliverables

The consultant will submit an activity schedule for the subject analysis to the USAID/***Dominican Republic*** Mission Environmental Officer (MEO) for his/her approval by COB of the second day of the consultancy period. The consultant will produce a complete draft report for review and comments by the Environment Strategic Objective Team by COB of day 16. Conduct a debriefing for Environment SO Team and other USAID representatives on Day 18. Comments will be incorporated and the consultant will

produce a final draft report by COB of Day 20. The consultants will submit the final draft to the MEO on Day 20 for approval. The MEO will have five working days to approve the document or send any final comments or changes to the team leader, and the team leader will have five working days after that to make final changes to meet MEO approval. The full report should have a length of approximately 75 pages.

Deliverables:

25 hard copies of the document in English.
25 copies of the documents on CDs, to be included in the hard copy.
Document to include a map of bio-geographic regions of ***Dominican Republic***
Document to include a map of protected areas of ***Dominican Republic***

VII. Illustrative Schedule

WEEK	Activity	**Comments**
Week 1	Submit schedule for MEO approval on Day 2. Compile and review information.	
Week 2	Begin to interview key personnel of key institutions. Continue analysis activities.	
Week 3	Continue analysis activities.	
Week 4	Submit initial draft by COB Day 16. Debriefing on Day 18. Incorporate comments	
Week 5 – 6	MEO to approve document or send any final changes to the team leader before document is approved. Submission of deliverables.	

VIII. Qualifications of the Consultants

This assignment requires two senior specialists. <u>One local specialist in conservation of biological diversity will be provided locally to work with the person arriving from the United States. The visiting specialist should be well versed in sustainable tropical forest management with extensive experience in and knowledge of natural resources in Latin America (and *Dominican Republic*).</u> The consultant should be fluent in Spanish, as most documentation is in Spanish. However, the consultant also should have finely developed English language writing skills in order to complete a quality report in the time allowed. The Forest Service employee will produce the complete 118/119 report.

1. Tropical Forest Management Specialist – Team Leader

In-depth knowledge of USAID environmental programs and procedures in Latin America, ability to lead the country analysis team.
Significant experience with sustainable tropical forest management in Latin America (with at least some experience in ***Dominican Republic***), and familiarity with Forest Stewardship Council certification programs in tropical areas of LAC,

A strong professional background (Ph.D. or Masters with five additional years of experience) in forestry management disciplines and at least five years of experience in tropical forest management, research, or training in developing countries of Latin America (preferably including ***Dominican Republic***),
Fluency and ability to communicate effectively in Spanish and English.

2. Biological Diversity Specialist (to be provided locally with USAID bilateral funds)

Knowledge of USAID environmental programs and procedures, preferably in Latin America,
Significant experience with conservation of biological diversity or protected area management in Latin America (preferably including ***Dominican Republic***),
A strong professional background (Ph.D. or Masters with five additional years of experience) in conservation of biological diversity, protected area management, biology or related disciplines and at least five years of related experience in countries of Latin America, preferably in ***Dominican Republic***,
Fluency and ability to communicate effectively in Spanish and English.

Appendix H – List of Preparers

Glen Juergens is currently working as Forest Silviculturist on the Monongahela National Forest in West Virginia, USA. He obtained a Bachelor of Science Degree in Forestsry from Southern Illinois University in 1976. From 1976 – 1979 he served as a Peace Corps volunteer in Honduras, Central America. Various USDA Forest Service positions from 1980 to present include firefighter, forestry technician, forester, timber management assisitant, and silviculturist. He has been a USDA Forest Service certified silviculturist in hardwood forest management since 1988 and is a certified forester with the Society of American Foresters, registered forester in the State of West Virginia, and member of the International Society of Tropical Foresters. Glen has served as interdisciplinary team leader on numerous vegetation management environmental assessments and core team member for the Forest Plan revision team. International assignments include Hurricane Mitch Reconstruction Project team member in Honduras and various tropical hardwood forest management assignments with the USDA Forest Service International Programs and US Agency for International Development in Mexico, Honduras, Angola, and Paraguay. He also attended and completed a Sustainable Tropical Forest Management course in Costa Rica that was sponsored by the World Wildlife Fund.

Odalís Pérez is currently the Mission Environmental Officer (MEO) for USAID/ Dominican Republic. He is also the Agreement Officer's Technical Representative (AOTR) for five USAID/DR Cooperative Agreements: the USAID-TNC Environmental Protection Program implemented by The Nature Conservancy; the Dominican Sustainalbe Tourism Alliaance Program (USAID-DSTA) implemented by FHI 360; the Miches Sustainable Fisheries Project implemented by Columbia University; the Living Musseum in the Sea Project implemented by Indiana University; and the USFS Technical Assistance Support Program to USAID/DR (biodiversity protection, ecotourism development and planning, protected area management,and native/endemic species seed bank development) under the USAID-USFS Forest Resources Management PAPA. He obtained a Bachelor of Science Degree in Civil Engineering from University of Santo Domingo in 1976 and a Master of Science Degree in Hydrology from Univeristy of Arizona in 1989. Odalis has conducted extensive research and consultancies as a ground-water hydrologist including work for University of Arizona, the Dominican Republic's National Water Resources Institute as Director of Hydrogeology and Director of IDB-funded National Ground-Water Development Plan (1981-1983), and numerous water resources development projects.

Katarzyna Grasela is a Conservation Planner for The Nature Conservancy (TNC) Central Caribbean Program. Working from the Dominican Republic office she is responsible for Ecoregional Planning processes in the region, and works with partners to develop Conservation Action Plans for priority sites. She also oversees projects related to conservation of terrestrial ecosystems and fauna. Before joining the TNC she led the Investigation Department for the Dominican Republic's Protected Areas Directorate (1997 – 2000). She also taught biology and environmental science at the Universidad Iberoamericana de Santo Domingo (1997 – 2005). She earned her BS degree in biology from Queens College, New York and completed master studies in Natural Resources Management at the Universidad Nacional Pedro Henríquez Urenia in Santo Domingo. Her postgraduate studies include Planning and Strategies for Conservation (Instituto Tecnológico de Monterrey) and Integrated Watershed Management (State University of Santo Domingo).