Haiti Biodiversity and Tropical Forest Assessment

(Sections 118 and 119 of the Foreign Assistance Act)

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USAID/USDA Forest Service – International Programs

Contents

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ABBREVIATIONS AND ACRONYMS

AECID	Agencia Española de Cooperación Internacional para el Desarrollo
ANAP	Agence Nationale des Aires Protégées
ASEC	Communal Section Assembly
AVSF	Agronomes et Vétérinaires Sans Frontières
BSAP	Brigade de Sécurité des Aires Protégées
CASEC	Communal Section Administrative Council
CATIE	Tropical Agricultural Research and Higher Education Center
CEPF	Critical Ecosystem Partnership Fund
CGHS	Conseil Général des Hauts-de-Seine
CIAT	Comité Interministériel d'Aménagement du Territoire
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CODE	Collectif pour le Développement
CROSE	Coordination Régionale des Organisations Paysannes du Sud-Est
DISE	Direction de l'Inspection et de la Surveillance Environnementale
EU	European Union
FAD	Fish Aggregation Device or Dispositif de Concentration de Poisson (DCP)
FAO	Food and Agriculture Organization (United Nations)
FHB	Fonds Haïtien pour la Biodiversité (Haitian Biodiversity Fund)
FoProBiM	Fondation pour la Protection de la Biodiversité Marine
FREH	Fonds pour la Réhabilitation de l'Environnement Haitien
GEF	Global Environment Facility
GTAP	Groupe Technique d'appui aux Aires Protégées
IDB	Inter-American Development Bank
IIF	International Iguana Foundation
IUCN	International Union for Conservation of Nature
MARNDR	Ministère de l'Agriculture, des Ressources Naturelles, et du Développement Rural
MDE	Ministère de l'Environnement
MPA	Marine Protected Areas
NBSAP	National Biodiversity Strategy and Action Plan
NEMS	National Environmental Management System
NGO	Non-governmental organization
NORAD	Norwegian Agency for Development Cooperation
OGPAR	Organisation des Groupements pour l'Avenir de Rossignol
ORE	Organisation pour la Réhabilitation de l'Environnement
TNC	The Nature Conservancy
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program, now UN-Environment
USAID	United States Agency for International Development
WINNER	Watershed Initiative for National Natural Environmental Resources

EXECUTIVE SUMMARY

This Biodiversity and Tropical Forest Assessment report has been prepared to provide information and analysis as requested by USAID/Haiti, required by the U.S. Congress, and stipulated in the U.S. Foreign Assistance Act (FAA) of 1961. This report updates the 2016 Biodiversity and Tropical Forest Assessment report and seeks to provide a concise and targeted assessment to inform the USAID/Haiti Mission's strategic planning, program development, and implementation. This assessment includes:

- An overview of the status and value of biodiversity and tropical forests in Haiti;
- The institutional, policy and legislative framework for environmental management in Haiti;
- An analysis of threats to biodiversity and tropical forests;
- Current interventions in the environmental sector, bi- and multilateral donors, non - governmental organizations (NGOs), the private sector and other institutions; and
- An examination of how current activities in the USAID/Haiti portfolio contribute to conservation needs and includes recommendations for actions to further those goals.

The Caribbean is an internationally recognized biodiversity hotspot and is one of the world's greatest centers of endemic biodiversity as a result of the region's geography and climate: an archipelago of habitat-rich tropical and semi-tropical islands tenuously connected to surrounding continents. Haiti is one of the richest countries in the Caribbean in terms of botanical diversity. Haiti boasts a rich fauna as well, of which 75% of species are considered endemic. With a Coastline of 1775 km and a coastal shelf of 5000 km^2 and five main offshore islands, Haiti's coastal and marine resources include examples of a remarkably varied ecology rich in biodiversity.

Less than 2% of the original primary forest ecosystems of Haiti remain. While many tree planting projects are being implemented, they are mostly aimed at promoting agroforestry and establishment of some tree cover, rather than forest ecosystems. When second growth and non-native species are included, the land cover is in the range of 9-11%. Accounting for small fragments and sparser patches of agroforestry trees, the total cover could be as high as 29%. While non-native and agroforestry trees provide benefits to biodiversity including soil stabilization and habitat for some birds and terrestrial animals, they do not carry the same significance as primary forest ecosystems. The remaining primary forest ecosystems of Haiti are globally important and harbor endemic species on the brink of extinction. Since the 2016 biodiversity assessment, 76 more species have been listed as endangered or critically endangered.

Officially, the Haitian Government has identified a total of 26 protected areas, six of which were officially designated since the 2016 biodiversity assessment. Unfortunately, the percentage of effective protected areas is still no more than 0.5% of the surface of the country. However, progress on designating and managing protected areas is being made and ten of the protected areas have management plans and three have staff.

The greatest threats to biodiversity and tropical forests in Haiti continue to be:

- Overexploitation of forest resources
- Overexploitation of fishery resources
- Excessive cutting and filling of mangrove areas
- Pollution and poor waste management
- Fragmentation and alteration of ecosystems and habitats
- Effects of climate change

The above threats are driven primarily by:

- Poverty leading to unsustainable land use practices
- Lack of awareness related to biodiversity and environmental laws
- Weak governance, including political instability and fragility of institutions, lack of sufficient financial support for biodiversity management, and absence of a national environmental policy with well-defined action plans
- Lack of secure land tenure
- Outdated laws related to natural resources and weak enforcement of existing laws

The urgency and extent of the threats to biodiversity require actions to address the numerous drivers to the threats simultaneously, throughout the country; this is a complex and somewhat overwhelming situation. The extent to which USAID/Haiti addresses the actions necessary to conserve biodiversity and tropical forests varies by sector, but there are opportunities to incorporate appropriate actions into all programs. Much more can be done for biodiversity and tropical forests and the need is great. Recommendations for future actions and programming are enumerated in Chapter 9. Among those recommendations, are highlighted:

- Strengthen capacity for ANAP, especially in regard to management planning and staffing to support conservation of remaining primary forests and marine biodiversity in protected areas (particularly for Three Bays Park).
- Lengthen project time frames to ensure the capacity built is not lost and adequate monitoring can be done
- Continue to balance emphasis on resilient sustainable livelihoods with watershed and ecosystem restoration.
- Continue to actively coordinate with other agencies, sharing information on all phases of project planning and implementation
- Continue cross border collaboration with the Dominican Republic to enhance the effectiveness and sustainability of programs including transboundary watershed restoration, marine area protection, and sustainable eco-friendly livelihoods
- Include environmental awareness as a component of all projects
- Increase the restoration of mangroves and native forests as a component of projects developed under the next Strategic Framework
- Follow-up with CHRAD and the Ministry of Environment on potential for assistance with germplasm centers
- Provide the knowledge and means for sustainable living, followed up by enforcement of resource protection
- Enable effective resource protection by strengthening use and tenure laws, awareness and enforcement abilities
- Strengthen capacity for fire control and planning in protected areas

1. INTRODUCTION

1.1 Purpose

As part of the documentation for the new five-year Strategic Plan, USAID/Haiti is required by Sections 118 and 119 of the Foreign Assistance Act to complete an analysis of tropical forests and biological diversity in Haiti.

Summary of relevant parts of FAA Sec 118 and 119:
"FAA Sec 118 (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."

"FAA Sec 119 (d) 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."

In order to integrate environment issues into USAID/Haiti's new five-year strategic plan, it is necessary to conduct an analysis of the current status of tropical forests and biodiversity in Haiti, identify actions needed to conserve biodiversity and tropical forests, assess the current and planned activities of other donor programs and stakeholders in meeting these needs, and analyze the planned activities of USAID/Haiti in reference to the actions needed.

1.2 Current USAID Haiti Program

The USAID/Haiti Strategic Framework (FY 2018 - FY 2020) operates with the goal of *Foundation for resilience, stability, and inclusive growth reinforced*. To achieve this, USAID/Haiti focuses its programming around four development objectives (DOs):

- Independence and accountability of Government of Haiti institutions improved
- Economic and food security advanced
- Health outcomes improved
- Education outcomes improved

USAID/Haiti is expanding resilience programming; it is the biggest resilience program outside of Africa. Although the Mission has moved away from concentrating their program in corridors, they have identified 3 Resilience Zones for priority. The priority zones were based on consultations

with the Government of Haiti and other stakeholders. While the Resilience Zones are emphasized, there is also development work being funded country wide.

USAID/Haiti is in the process of updating their 5-year Strategic Framework. New Development Objectives will be drafted in mid-summer and the plan is to have the Strategy completed by the end of 2020. This assessment serves as a planning tool to assist the Mission in better integrating environment issues into their updated Strategic Framework and programs.

1.3 Methodology

This country analysis has mainly been a compilation and review of existing information, coupled with analysis, synthesis, and corroboration and feedback from major players. Travel restrictions brought on by the Covid-19 pandemic in early 2020 prevented on-site visits for this assessment. Instead, fourteen teleconferences were held to interview key institutions and stakeholders, relevant literature was reviewed, and program plans from agencies involved in biodiversity protection were assessed.

This analysis updates the 2006 “Haiti Country Analysis of Tropical Forestry and Biodiversity” by D.B. Swartley and J.R. Toussaint, the 2010 Haiti Biodiversity and Tropical Forest Assessment (Posner, Michel and Toussaint) and the 2016 Haiti Biodiversity and Tropical Forest Assessment (Posner and Toussaint). This 2020 analysis provides updated information reflecting the changed environmental conditions as well as changes in the socio-political circumstances.

The focus of this analysis is threefold:

1. Assess the conservation status of biodiversity and forests in Haiti;
2. Identify actions necessary to better conserve biodiversity and tropical forests; and
3. Describe how, and to what extent actions in USAID/Haiti’s operational plans meet, or could meet, the biodiversity and tropical forest needs thus identified.

This assessment also examines the following:

- Whether the planned activities and investments are not likely to adversely affect tropical forestry and biodiversity.
- Other issues and opportunities related to forestry and biodiversity conservation for USAID assistance that may match the Mission’s overall strategy.

2. COUNTRY CONTEXT

Haiti is situated on the western third of the island of Hispaniola, located between 18˚ and 20º north of latitude and between 71˚30 and 74˚ 30 west of longitude (Figure 1). Haiti's landscape (27,750 km^2), consists of rugged mountains interspersed with coastal plains and river valleys. The country has been divided into 10 *Departments* (Provinces): Artibonite, Centre, Grande-Anse, Nippes, Nord, Nord-Est, Nord-Ouest, Ouest, Sud, Sud-Est. Haiti also has five satellites islands (totaling 954 km^2), namely Ile de la Tortue (off the north coast), Ile de la Gonâve (northwest of Port-au-Prince), Ile-à-Vache (off the southern tip of southwestern Haiti), Les Cayemites (off the north coast of the Southern Peninsula) and the disputed island of Navassa.

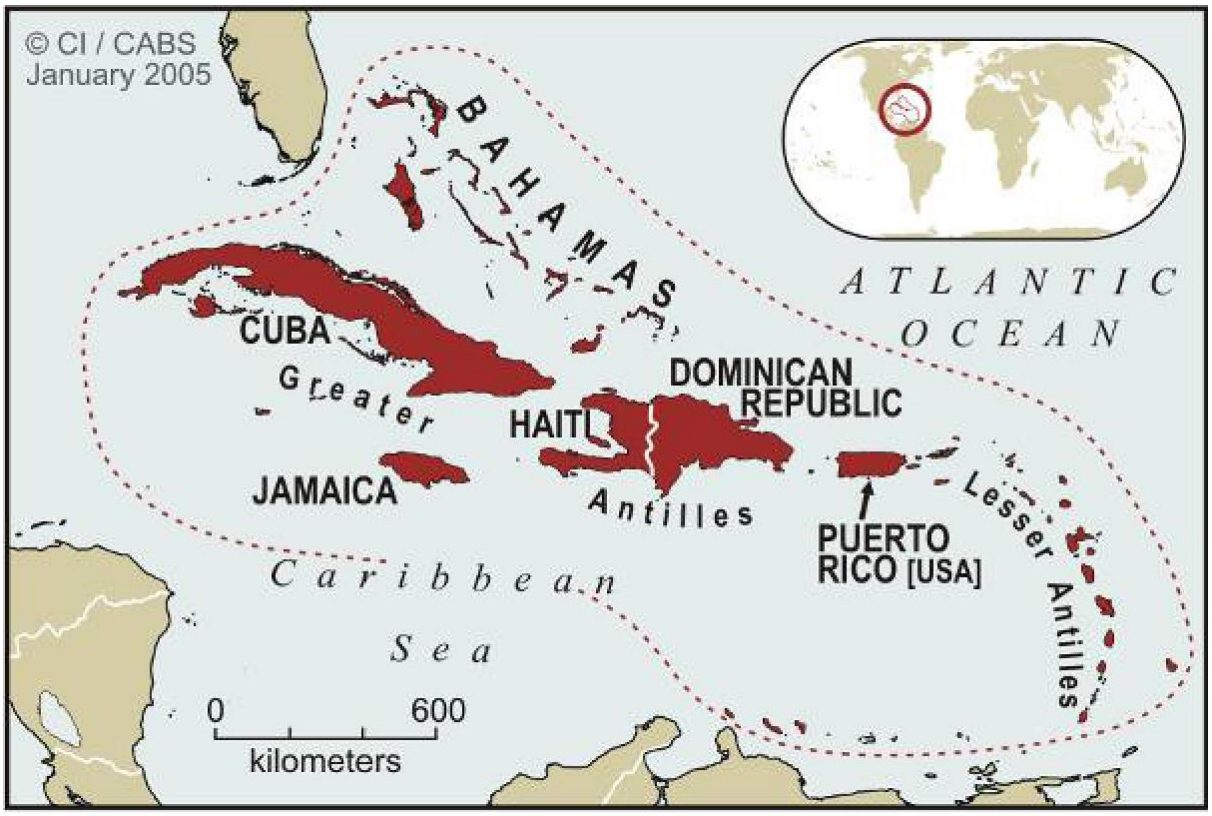


Figure 1. Haiti in the Caribbean Islands. Source: CEPF 2010

3. STATUS OF BIODIVERSITY AND TROPICAL FORESTS IN HAITI

Although affected by severe issues of environmental degradation, the country is endowed with an enviable biodiversity which is an undeniable asset (Erlich et al. 1987). In fact, its insularity and mountainous terrain give rise to a multiplicity of microclimates that some might call “biological or living jewels”. The CEPF in its 2019 Ecosystem Profile: *The Caribbean Islands Biodiversity Hotspot* has identified a total of 30 (up from 17 in 2010) Key Biodiversity Areas for Haiti (Figure 2) with three Wholly Irreplaceable Sites (so named because they contain the only known populations of at least one globally threatened species), namely Dame-Marie (Grande-Anse Department), Cayemites-Barraderes (Nippes Department) and Port-de Paix (Northwest region). Detailed descriptions of the Key Biodiversity Areas can be found at http://audubonhaiti.org/wordpress/wp-content/uploads/2012/09/KEY-BIODIVERSITY-AREAS-OF-HAITI_FINAL.pdf

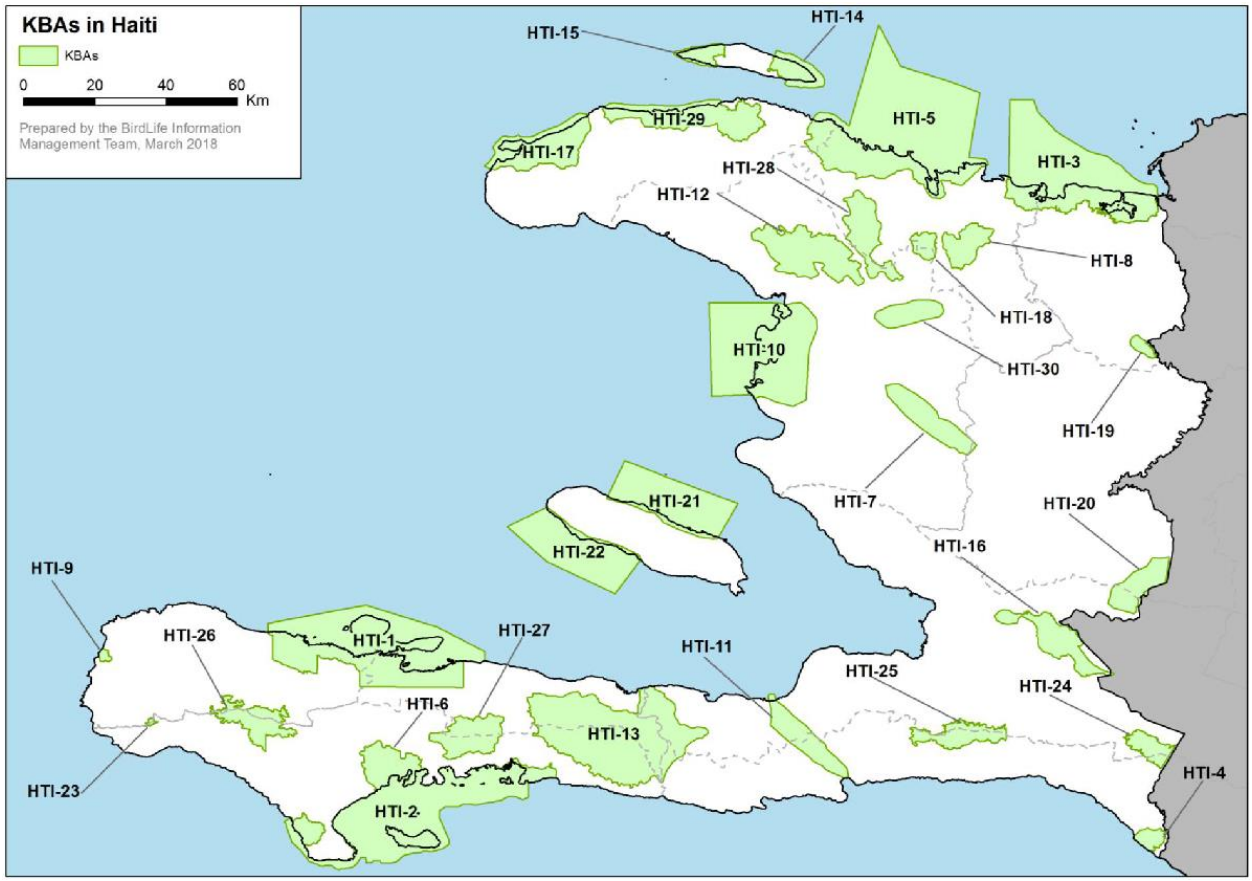


Figure 2. Key Biodiversity Areas in Haiti. Source: CEPF 2019

3.1 Major Ecosystem Types and Status

Haiti has a tropical climate with two main wet seasons: northeast trade winds bring rain from April to June, and northerly winds bring drizzle from about September through November. However, the topography produces significant regional (and altitudinal) differences in temperature and rainfall. The resultant vegetation varies from subtropical very dry forest where cacti and scrub predominate (Northwest and Northeast regions), to tropical montane wet forest at higher altitudes where Hispaniolan pines (*Pinus occidentalis)* and temperate vegetation thrive. Wetlands, lakes, lagoons, estuaries and a varied coastline provide additional diversity.

In 1925, Haiti was significantly more forested, with around 60% of its original forest ecosystems. Deforestation during French colonial times, followed by post-independence exploitation by foreign lumber companies, cutting for charcoal production, and land clearing for subsistence agriculture greatly diminished the forest ecosystems. Geo Haiti (2010) highlighted a 53% reduction in 2000 of the existing forest area in Haiti before 1990. The reduction was only 11% during the same period in the other regions of Central America and the Caribbean. Today, 98% of the original forest is gone (Figure 3). The remaining vegetated areas are also excessively exploited. Table 1 presents an overview of the types of vegetation and their coverage in Haiti.

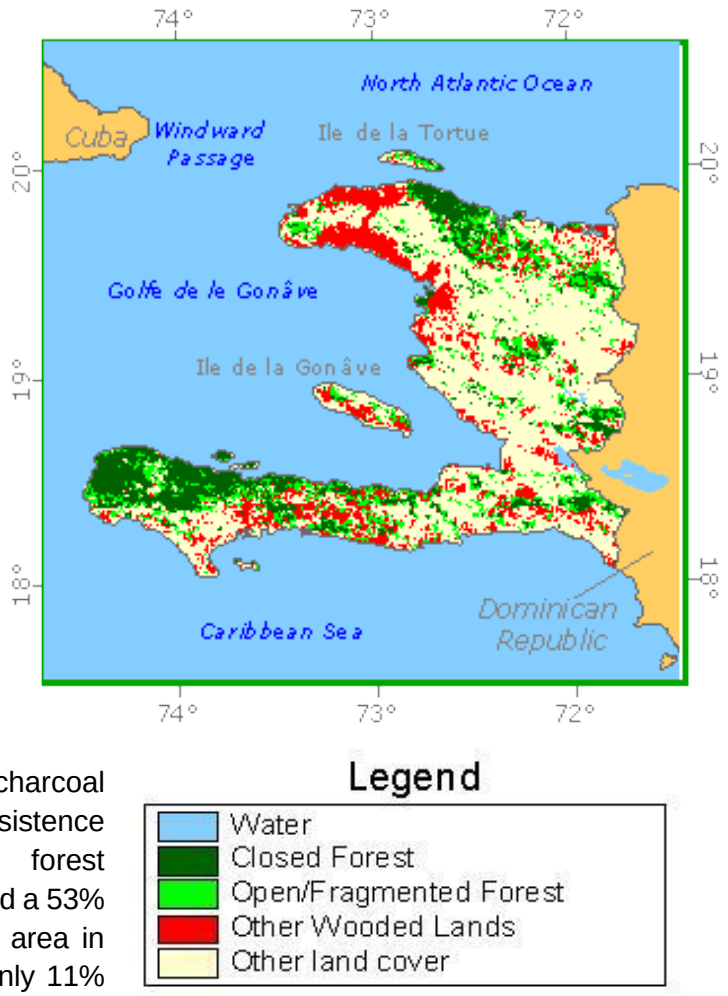


Figure 3. Forest Cover in Haiti (Source http://www.fao.org/forestry/country/en/hti/)

Table 1. Types of Vegetation and their Coverage (%) in Haiti

Types of vegetation	Percentage of Haitian territory
Agroforestry	18.3
Forests	2.6
Intensive cultures	44.1
Wetlands	1.4
Mangroves	0.7
Undergrowth	31.8
Pasture	1.1

Source: Hilaire, 2005 cited by Geo Haiti 2010

3.2 Status and Management of Forest Resources

Narratives of Haiti's forest cover have been subject to conflicting statistics for decades. To this date the exact forest cover remains a subject of debate among experts and policy makers (see Churches et al. 2014, Tarter et al. 2016, Hedges et al. 2018, and Wampler et al. 2019). For example, multiple well-known sources since the 1980s have reported the forest cover of Haiti to be 1.5% or 2%, while more recent analyses have raised questions about the accuracy of these two figures, one even claiming "Haiti is covered with trees" (Tarter 2016). A combination of factors seems to explain the situation, such as differences in methodology used for remote sensing analyses, lack of peer-reviewed data sources, and lack of specificity on forest categories (primary forests, secondary regrown forests, reclassification of primary forest to "other naturally regenerated forests" etc.). Further complicating the subject, there is confusion between deforestation and degradation of forests (transformation into another land use vs reduction of potential supply of benefits from the forests) as well as reforestation for ecosystem restoration vs tree planting for biodiversity.

This debate is a great source of confusion for national policy makers in terms of planning. This is even more complicated since the Haitian government has not yet adopted a standardized forest definition in terms of minimal land area they should consider as a forest, tree density, canopy cover criteria, ecological functions, and stands of trees that should be excluded from the definition (e.g. fruit plantations, agroforestry systems, trees in urban parks and gardens). Bearing all of this in mind, the most common notion among the Haitian government is that Haiti's forest cover is under extreme stress and the country has very little forest remaining.

The 2015 FAO Global Forest Resources Assessment estimates the current forest cover in Haiti to be 3.5%. Virtually all of the original primary forest of Haiti has been removed or altered. Despite numerous reforestation projects (artificial regeneration accounts for one-third of Haiti's current forest cover), Haiti continues to lose approximately 800 ha of forest cover each year (FAO 2015).

The FAO forest cover estimates are based on coarse scale forest typing and do not include patches of trees less than 0.5 ha, nor does it include areas of fruit tree production and agroforestry. Thus, there is a difference between forest cover and tree cover. Fine scale analysis, which included agroforestry, sparse fragments, and linear bands of tree cover, estimates total tree cover in Haiti as high as 29% (Churches et al. 2014). A 2016 USAID Geocenter land cover analysis (USAID 2016) assessed several categories of tree height and canopy cover and suggested a possible range of existing forest cover in Haiti between 9-11%, including agroforestry.

While the higher estimates of tree cover are comprised mostly by areas of sparse tree cover (primarily non-native species such as mesquite *Prosopis juliflora*), rather than native forest ecosystems, even sparse tree cover has value for biodiversity and watershed stability. However, those estimates should not be confused with native forest cover, especially primary forest, which continues to be lost at an alarming rate and is truly the key indicator in terms of biodiversity in Haiti. Primary forest in Haiti declined from 4.4% of total land area in 1988 to 0.32% in 2016

(Hedges et al. 2018). In general, it is estimated that 16% of the national territory is completely devoid of vegetation (Geo Haiti 2010).

In 2013 President Martelly launched a program to double the forest coverage in Haiti by 2016. The program called for planting 50 million trees per year and attracted interest from around the world. From major donor agencies and corporations to private foundations and church groups, a myriad of tree planting projects were started. Most of the trees are planted for agroforestry and very little planting has been done to restore native forest ecosystems. No one really knows at this point how many trees or which species have been planted, the survival rates, or the long-term viability of those plantings.

3.3 Species Diversity and Status

As mentioned previously, Haiti is a rich biodiversity hotspot. The following information has been updated from the USAID 2016 report to describe the species richness and species at risk in Haiti. Unfortunately, the number of Critically Endangered, Endangered, and Vulnerable species continues to rise (Table 2). Some of the increase has been due to more assessments being completed, particularly for reptiles and plants, but it is clear that the situation is not improving.

Table 2. Species diversity and conservation status of major taxa in Haiti.

Taxa	# Species	# Critically Endangered	# Endangered	# Vulnerable
Amphibians	57[1]	31	12 (+1)	7
Birds	258	1	6 (+1)	12 (+4)
Fish	932	2	3 (-3)	21 (+1)
Mammals	38		2 (-1)	3
Reptiles	132[1]	18 (+15)	23 (+17)	13 (+8)
Plants	5242	30 (+21)	34 (+25)	30 (+6)

Data from: IUCN Red List http://www.iucnredlist.org accessed April 21, 2020.
[1]Supplemental Data from: Caribherp, http://www.caribherp.org
Numbers in () show change since 2016

FLORA

Despite severe problems of environmental degradation in Haiti, Hispaniola has the second most diverse flora in the Caribbean, after Cuba. The *Flore d'Haiti* (Barker and Dardeau 1931) suggests that over 5,365 vascular plant species were found in Haiti in the early 20th Century. It has been estimated that among these plants, 37% are endemic.

Between 21- 24 palm species are known to occur in Haiti and up to a quarter of these species might be considered endemics (Henderson et al. 1990). Most of these palm-trees are becoming rare and those which are endemic are particularly threatened by extinction.

FAUNA

Haiti boasts a rich fauna as well, of which 75% are considered endemic.

Mammals: There are 38 native mammal species in Haiti. Two endangered native mammals of special significance occur in Haiti: the Haitian Hutia or zagouti (*Plagiodontia aedium*) and the Giant Island Shrew or the Nez long (*Solenodon paradoxus*). Both are likely extirpated over much of their native range. The highest diversity among the native mammals in Haiti is among bats. There are seventeen bat species of which seven taxa, including species and sub-species, are considered endemic. The remainder of the native mammal diversity is aquatic and includes the West Indian Manatee (*Trichecus manatus*), twelve whale and six dolphin species.

Birds: The Hispaniolan avifauna exhibits exceptional levels of endemism. Haiti supports 258 species of birds and 36 are range restricted species, one of which, the grey-crowned palm tanager (*Phaenicophilus poliocephalus)* is endemic to Haiti. The majority of the range restricted species are confined to, or occur in habitats above, 1,000 m, emphasizing the importance of mixed montane broadleaf-pine forest.

Reptiles and Amphibians: Hispaniola is known to host 254 species of reptiles and amphibians (caribherp 2020). Approximately 75% of this diversity has been recorded in Haiti. Ninety five percent (95%) of the species are endemic to Hispaniola with about a third of the species occurring only in Haiti. Two terrestrial iguanas are recorded: the rhinoceros iguana *Cyclura cornuta* and Ricord's iguana *Cyclura ricardi.* Haiti harbors an exceptional fauna of terrestrial frogs. Unfortunately, 50 of the 57 species of amphibians in Haiti are at risk (Table 2), some at the verge of extinction.

Fish: Most of the 932 fish species in Haiti are marine species (sharks and rays are also included in this number). Of the approximately 42 freshwater species, about 25% are endemic, while about 10% are introduced carp and tilapia (Froese and Pauly 2010). Among the highlights of the Three Bays Baseline Ecological study (Kramer et al. 2016) is the discovery of a new species of fish for science – the Haitian Barred Hamlet, known to exist only in Fort Liberté Bay and the confirmation of the discovery of an endemic freshwater fish *Limia paucuridata* in the Trou du Nord river.

Corals and Sponges: The staghorn coral (*Acropora cervicornis*) and the elkhorn coral (*Acropora palmata*) that were previously common in the Caribbean during the 1970s, making up some 30% to 50% of most reefs, have now almost disappeared due to a disease. Both of these species are now on the US Endangered Species List. Because of their rarity in the Caribbean as a whole, the high numbers and wide distribution of healthy populations of these species in Haiti are regionally significant as a potential source of larvae to help re-populate other areas downstream of the biological corridor on both the north and south coasts of the country. The sponge communities in Haiti are diverse and include very large colonies such that they provide habitat and structure similar to coral reefs.

3.4 Genetic Diversity

The high rate of endemism in Haiti combined with the high proportion of species at risk puts the genetic diversity of Haiti in a precarious position. While the key to maintaining genetic diversity in Haiti is the preservation and restoration of habitat for native fauna and flora, the advanced state

of degradation of those habitats requires additional actions be taken. A variety of agencies and organizations are involved in in situ and ex situ programs designed to protect and maintain genetic diversity in Haiti. Some of the key initiatives are described below.

CHRAD Centre Haitien de Recherche en Amenagement et en Developpement S.A. (Haitian Research Center for Planning and Development, Inc.) is a private think tank that organized to address issues related to deforestation, pollution and climate change (see interview notes, Appendix 1). To address deforestation and habitat loss, they spearheaded an ambitious program to finance, design, establish, guide operations, and transfer to the Haitian government six Forest and Fruit Growing Trees Germplasm Centers (FGC) throughout Haiti. According to CHRAD, a FGC is a technical infrastructure for reproduction and propagation of higher varieties of fruit growing and forest species dedicated to positively influence the demand for wood and edible fruits through the production of and planting of trees. The FGC also refers to a technical infrastructure targeting the conservation of the diversity of forest and fruit growing genetic resources, namely all values (environmental, social, economic, cultural and scientific) represented by a forest or fruit growing species.

The centers are producing 23 species of trees, primarily agroforestry related species such as coffee and cocoa, as well as breadfruit, avocado, mangos, cashews, guava, citrus and moringa. CHRAD promotes genetic diversity by favoring native species and selecting disease resistant genetic stock. CHRAD is also planning to plant rare and endangered species, such as Kajou Peyi (*Swietania mahogani*), Gaïac, the lignum vitae, (*Guaiacum oficinale*) and Mapou (*Ceiba pentandra*), a giant sacred bombacaceae in Haitian vodoo, which is endangered. With the capacity to produce 5 million seedlings per year, the germplasm centers are a key resource for enabling watershed stabilization through the soil-holding function of agroforestry trees, as well as being able to provide native species for future reforestation efforts.

The **National Botanical Garden of Haiti (JBNH)** at Source Zabeth (Ganthier, West Dept.) was started in 2017. This center for public education, conservation of biodiversity and promotion of sustainable development is the result of a partnership between various actors, including three Ministries (Education, Environment, and Agriculture), the Faculty of Agronomy and Veterinary Medicine, the State University of Haiti, the Haitian National Commission for Cooperation with UNESCO, the Ganthier City Council and the Board of Directors of the 2nd Communal Section Balan, of the same commune. Article 256 of the amended Haitian Constitution of 1987 directs the establishment of National Botanic Gardens, although this is the first one. JBNH has goals for environmental awareness, sustainable development, research, conservation of threatened plants ex situ, and provision of plants for restoration projects. In addition, JBNH has a vision of at least 60% of the genetic diversity of plants cultivated in Haiti, including their wild relatives, and that of other plant species with socio-economic value are preserved in the Garden, while respecting and preserving local knowledge.

Les Cayes Botanical Garden promotes and conserves the nation's biodiversity. The 8 ha privately organized Cayes Botanical Garden is one of the few institutions in Haiti that hold the botanical and horticultural expertise required to improve the country's restoration success. In

addition to completing baseline floristic surveys, the botanic garden has established native plant plots within its grounds to gather important ecological information to guide future restoration efforts (https://www.jardinbotaniquecayeshaiti.org/restauration-ecologique). The garden was severely damaged when Hurricane Matthew hit the island on October 4, 2016. Most of the botanical garden facilities and the garden's living collection of Haitian flora were destroyed. Since then, Les Cayes Botanical Garden has been recovering and has regained most of its operational functions.

Fairchild Tropical Botanic Garden in Miami, Florida (http://www.bgci.org): As part of the official agreements signed between the Cayes Botanic Garden, the National Botanic Garden of the Dominican Republic, and the College of Arts and Sciences of Florida International University, there are three joint projects in development: (1) Capacity building for botanists and environmental biologists from Haiti at the National Botanic Garden of the Dominican Republic; (2) Conservation biology of Haitian palms, and (3) Plant endemism in Haiti. These studies build on a 20 year fruitful collaboration established with the National Botanical Garden of the Dominican Republic and on the extensive field/taxonomic experience of Dominican Republic botanists. The Botanical Garden of the Dominican Republic has played a major role in ex situ conservation of Haitian endemics. Fairchild Tropical Botanic Garden has a seed orchard growing the rare Haiti endemic palm *Attalea crassispatha*. Since only a handful of these critically endangered trees remain in Haiti and the native habitat is severely degraded, botanic gardens are the best hope for survival of the species. It is hoped that this ex situ conservation of the species will provide seed for conservation work. Their orchard represents almost as many plants as are left in Haiti.

Conservatoire Botanique de Brest in France was funded by CEPF to identify rare and threatened plant species from the Forêt des Pins protected area in Haiti and develop activities for their long-term survival to be integrated into the forest's management plan. A special in-vitro reproduction program, prior to reintroduction in the wild, was planned for Ekmann's Juniper (*Juniperus gracilior var. ekmanii*), one of Earth's rarest trees with only seven specimens remaining in Haiti and a few trees in the Dominican Republic (Farjon 2013). Following the 2016 departure of the project manager, the rescue actions of Ekmann's Juniper were continued at a minimum. The Conservatory is currently cultivating 648 seedlings. A new three-year partnership with the Vegenov laboratory and the Yves Rocher Foundation should help to raise seedlings of this critically endangered taxon. The Swiss development organization Helvetas has also been asked to participate in the repatriation to Haiti and the future reintroduction of plants produced in Brest and the creation of an endemic plants garden at Forêt des Pins.

Temple University in Philadelphia, Pennsylvania - Temple University's Center for Biodiversity is working to preserve Haiti's biodiversity in a cryobank located at Temple's Science Education and Research Center (SERC). The Center's director, Dr. S. Blair Hedges, and his team collect plant and animal tissue in Haiti and store them in the cryobank in the hopes that if a species in Haiti goes extinct, they can use the DNA in the cryobank to re-create the lost animal and plant life.

Captive Breeding Programs for Amphibians and Reptiles - Philadelphia Zoo has a captive breeding program to conserve endangered frogs from Haiti. Nashville Zoo has a captive breeding

program for Haitian giant galliwasps (*Celestus warreni*), a vulnerable species of reptile from northern Haiti, which has historically been reported as locally common, but is now only found in a small protected area.

3.5 Status and Management of Protected Areas

To meet Aichi Biodiversity Target 11 from the 2011-2020 Strategic Plan of the Convention on Biological Diversity, 17% of a nation's territory is required to be in terrestrial protected areas and 10% in marine protected areas by 2020. The Haitian Government has officially gazetted 26 National Parks and Protected Zones (both natural and historical) encompassing 99,000 ha terrestrial and 229,000 ha marine habitats or slightly less than 4% and 6% of the country, respectively (Table 3). However, the percentage of effectively protected areas is evaluated at no more than 1% of the surface of the country.

In relation to the effectiveness of protected area management, none of the areas listed in Table 3 can currently be considered truly protected from degradation. Hedges et al. (2016) estimated that 60–75% of primary forest in the two original national parks, Macaya and La Visite, has disappeared since they were declared as protected areas 35 years prior. In both cases, the rates of primary forest loss (pre-2000 and post-2000) were greater than the overall rates for all of Haiti, indicating that protection was minimal or nonexistent. Fortunately, progress is being made in the designation, planning, and management of protected areas. Ten protected areas now have management plans and Foret des Pins, Macaya, Oyster Lagoon, and Three Bays National Parks have staff, but are not fully staffed (ANAP interview, Appendix 1).

Haiti has joined other nations in the wider Caribbean that have established Marine Protected Areas (MPA) with varying degrees of protection for the marine environment. In reality, an MPA in Haiti is a Marine Managed Area reflecting the intention to sustainably and wisely use natural resources, with some no-take zones for recovery purposes, rather than strict protection. They are mainly concentrated in the near coastal areas (0-12 nautical miles) stretching from the shoreline to the limit of the Exclusive Economic Zone.

Haiti's first MPA was created in August 2013 and is a complex called the **Natural Protected Area of Managed Resources of Port-Salut/Aquin** (Table 3, Figure 4). The complex includes the National Park in Ile-a-Vache; the protected areas of Grosse Caye/ Aquin wetland, Olivier/Zanglais, Fonds des Cayes, and Plaine Cahouane; and the Port-Salut Protected Natural Landscape. There are vast seagrass beds and well-developed coral reef systems, flamingo and crocodile habitats, as well as a scenic landscape around St. Louis du Sud. This area has an annual potential of 100,000 tons of shrimp, however intensive fishing is threatening the marine ecosystem and most of the coral reefs are becoming covered with silt from eroding hillsides.

Table 3. National Parks and Protected Areas in Haiti

TERRESTRIAL PROTECTED AREAS	AREA (HA)	MARINE PROTECTED AREAS (includes uplands within protected areas)	AREA (HA)
La Visite National Natural Park *	11,426	*Port Salut/Aquin Protected Area Complex* ** (6 areas below):	
Forêt des Pins (Unit I) National Park *	6,786	Ile-à-Vache National Natural Park	11,235
Forêt des Pins (Unit II) National Park *	14,000	Olvier/Zanglais Protected Area	7,553
Macaya National Natural Park **	8,726	Fonds des Cayes Protected Area	2,365
Marie Jeanne Cave **	31	Pointe Abacou Protected Area	1,840
Grande Colline National Park **	1,510	Grosse Caye/Aquin Protected Wetland Area	10,974
Grand Bois National Natural Park **	370	Port-Salut Protected Natural Landscape (Marine and Terrestrial)	9,038
Deux Mamelles National Natural Park **	2,265		
Plaine Cahouane Protected Area **	5,940	Three Bays National Park	75,614
Historical Park Des Matheux	20,655		
Sans-souci Ramier National Historic Park	2500	Jeremie-Abricots Protected Area **	7,575
Saut-d'Eau National Natural Park	648	Baraderes-Cayemites Protected Area **	87,621
Pèlerin National Natural Park	98		
Martissant National Park	13	Primarily Terrestrial, but with a significant marine component:	
Canapé-Vert Urban National Park	33	Lagon des Huitres (Oyster Lagoon) National Park *	9,640
Péligre Strategic Interest Reserve	29,995		

* Part of La Selle Biosphere Reserve

** Part of La Hotte Biosphere Reserve

Haiti's second MPA, the Three Bays National Park (Parc Nationale des Trois Baies, Figure 4), includes the bays of Limonade, Caracol and Fort Liberté as well as the Lagon aux Boeufs. The park contains the most extensive and healthiest coral reefs, mangroves and other marine/coastal habitats in Haiti (e.g. about 20% of Haiti's remaining mangroves can be found in the Park, USAID/TNC 2015). Fish and other types of marine life in this area are important sources of protein for local communities. The marine habitats also provide the local communities with critical coastal protection. Three Bays National Park is part of a larger seascape which encompasses about 200,000 hectares, including the northwest part of the Dominican Republic (e.g. MonteCristi National Park).

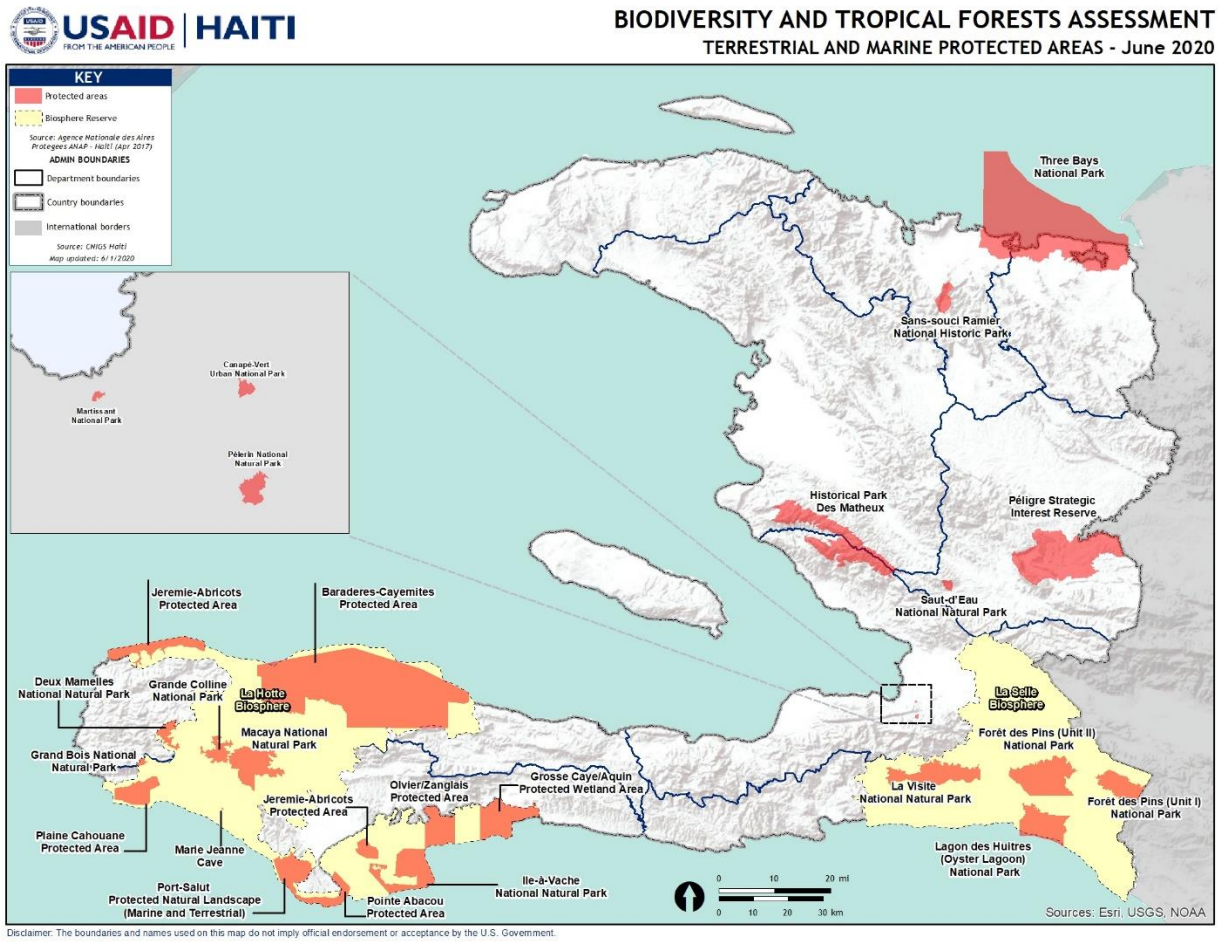


Figure 4. Protected Areas in Haiti

More than 87,000 ha of marine, coastal and upland habitats in the Baraderes-Cayemite area and more than 7,500 ha in the area of Jérémie-Abricots (Figure 4) were designated as Protected Areas of Managed Natural Resources in 2017. The Nature Conservancy is working on a baseline ecological assessment of the Baraderes-Cayemite area where the coastal bays are naturally protected, but there has been significant conversion to agriculture in the uplands.

In addition to the larger national protected areas, there are small, but important local terrestrial protected areas being established, such as the municipal iguana reserve at Anse-à-Pitres and the Wynne Farm ecological reserve at Kenscoff. Freshwater springs are sometimes protected for the valuable potable water they provide. In the eastern Cul de Sac Plain, at least 17 springs, such as Source Zabeth, are being protected, resulting in small parcels (up to 4 ha) of relic tropical forest and habitat for native terrestrial and aquatic species. These small parcels provide a genetic reservoir of native species that could be used to repopulate adjacent areas if ecosystem restoration projects were initiated.

To enhance the effectiveness of protected areas, national authorities perceive in the Biosphere Reserve approach a way to manage biodiversity as an integral component of economic and social

infrastructure. The biosphere reserve approach recognizes the role played by driving forces such as poverty and current population trends in the erosion of biodiversity within the country. The two designated biosphere reserves in Haiti -- the La Selle Biosphere Reserve and the La Hotte Biosphere Reserve -- encompass 70% of the protected area of Haiti, plus buffer zones for sustainable development. Having officially designated biosphere reserves is important because 1) there will be more local involvement than before, particularly for economic development, 2) Biosphere Reserve designation will give international status to help get financial and technical assistance, 3) the increased attention brought with the heightened status may improve governance, and 4) it helps get organizations working together under one umbrella.

The La Selle Biosphere Reserve (Figure 4) is located along the southeast coast of Haiti, bordering the Dominican Republic, and is administered by the Ministry of Environment (CNHCU 2013) in close collaboration with the National Commission of UNESCO. The La Selle biosphere reserve includes La Visite National Park, Forêt des Pins National Park, Lagon des Huitres (Oyster Lagoon) National Park, Lake Azuei and Trou Caïman pond; the latter being considered an Important Bird Area for conservation. The Massif de la Selle mountain range contains Haiti's highest peak 'Pic la Selle' (2684 m) and the second most biodiverse region of the country after the Massif de la Hotte. The area has a great diversity of landscapes and ecosystems, including rainforests, mountain pine forests, deciduous forests and high-altitude dry forests. The coastal landscape is dominated by marine coastal ecosystems such as mangroves, lagoons, estuaries and deltas (unesco.org). Associated with the La Selle Biosphere Reserve research and education is the National Botanical Garden being developed near Ganthier (see Section 3.4 page 15).

The La Hotte Biosphere Reserve (Figure 4), on the southern peninsula of Haiti, was added to the World Network of Biosphere Reserves in 2016. Massif de la Hotte, especially the area around Macaya National Park, is recognized as the most important area for biodiversity in Haiti, as well as one of the most critically important ecosystems in the Caribbean region. Efforts to protect Massif de la Hotte have been ongoing since the 1980s and several local NGOs (non-governmental organizations) as well as international NGOs and agencies (including, at times, USAID) have been partnering with the Haitian government in this effort. Some of the current initiatives can be found in Table 9.

3.6 Status and Management of Key Natural Resources Outside Protected Areas

Key Biodiversity Areas

Thirty-one Key Biodiversity Areas (KBA) have been identified in Haiti (Timyan and Hilaire 2011) due the vulnerability and uniqueness of the animal and plant populations within these areas (Figure 5). While portions of some KBAs are designated protected areas, most KBAs do not have protected status and/or management (Table 4).

Table 4. Key Biodiversity Areas of Haiti in relation to Protected Areas

KBAs including terrestrial Protected Areas	KBAs within Marine Protected Areas	KBAs outside Protected Areas
1) Massif de la Hotte (Macaya NP, Grand Bois, Deux Mamelles) 2) Massif de la Selle (La Visite, Forêt des Pins Unit I and II)	1) Lagons du Nord-Est, (Three Bays MPA), 2) Cayemites-Baradères, 3) Ile-à-Vache (Port Salut/Aquin MPA)	1) Lac Azuei-Trou Caïman, 2) Citadelle-Grottes Dondon, 3) Ile de la Tortue East, 4) Ile de la Tortue West, 5) Cavaillon, 6) Chaines des Cahos, 7) Dame Marie, 8) Dépression de Jacmel, 9) Dubedou – Morne Balance, 10) Fond des Nègres – L'Etang Miragoâne, 11) La Gonâve – south coast, 12) La Gonâve – north coast, 13) Artibonite Delta, 14) Madicaque, 15) Môle Saint Nicolas, 16) Morne Bailly, 17) Nan L'Etat, 18) Neiba d'Haiti, 19) Pic Tête Bœuf, 20) Picmi, 21) Plaisance, 22) Port-de-Paix, 23) Saint Michel de l'Atalaye-Morne Basile, 24) Côtes du Nord, 25) Rochelois Bank, 26) Arcadins

Of the KBAs outside of protected areas, Dame-Marie (Grande-Anse Department), Plaisance (Northern region), Ile de la Tortue, and Môle Saint Nicolas have been identified as three of the five Wholly Irreplaceable Sites in Haiti. Wholly Irreplaceable Sites contain, according to the CEPF (2010) classification, the only known populations of many globally threatened species.

Important Bird Areas

Ten Important Bird Areas (IBA) covering 232 km^2 (less than 1% of Haiti's land area) have been identified (Birdlife International 2020) and represent the country's international site priorities for bird conservation. Five of the IBAs are within protected areas: Massif de la Hotte, Massif la Selle, Massif du Nord. More than 155 species of water birds are found in Haiti and key water bird sites outside protected areas include Acul Bay near Cap Haitien; Ile de la Tortue in Basse-terre; Etang Labored-lachaux near Camp-Perrin; and Coquillage, Petit Paradis, Artibonite Delta, Etang Bois Neuf, Sources Puantes, and Etang Miragoâne mangroves.

Significant Coastal Habitats, Ecosystems and Wetlands

There are deltas, estuaries, coastal plains, and coastal lagoons found along the Haitian coastline. These wetlands provide diverse, renewable natural resources which support mixed traditional economies based on fisheries, the use of forest products and gathering. Coastal lagoons and mangroves are the nursery grounds for many species, both benthic and pelagic.

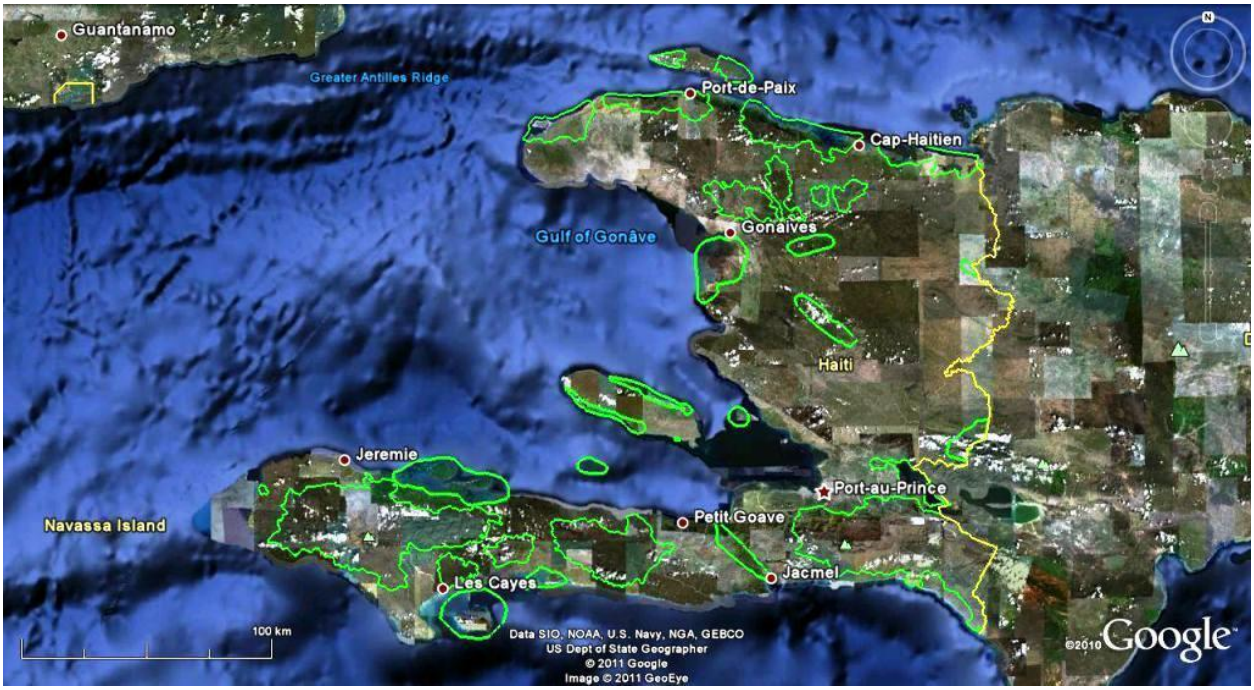


Figure 5. Key Biodiversity Areas of Haiti (source: Timyan and Hilaire 2011)

Coral reefs are scattered along coastal zones in Haiti. They provide food and shelter for resident and migratory species, protect coastal property from tropical storm damage and offer a storehouse for potentially valuable species (pharmaceuticals, commercial species).

In addition to the Marine Protected Areas, described in Section 3.5 of this report, there are numerous areas with important coral reef ecosystems outside the protected areas. The Reef Check Foundation, an international NGO focused on marine conservation, surveyed 95% of the 1500 km coastline of Haiti during 2011-2014 (Hodgson 2014). They evaluated each coastal area's ecology, fisheries and tourism values and their potential as Marine Protected Areas. Some areas they recommended as Marine Protected Areas were designated as such in 2017 (e.g. Baraderes-Cayemites, Jeremie), others remain to be considered and are listed in Table 5.

FoProBim and Reeffix (Wiener 2013) recommend that Gonaïves/Grande Saline (Artibonite Department) including the Artibonite Delta, and Acul Bay (Northern part of the country) should be added to the list above. Both areas have extensive mangroves and coral reefs needing protection.

The major mangrove forests outside protected areas, ranked from largest to smallest, occur at Gonaïves/Grande Saline, Baie de l'Acul, La Gonâve North, La Gonâve South, Arcadins, and Rochelois (Wiener 2014). They play an important role in the reproduction cycle of numerous coastal and pelagic fish species as well provide shelter for their offspring. Thus, they are important from an economic perspective since they are at the center of the fishing industry's productivity.

Table 5. Reef Check priority sites for marine conservation in Haiti (Hodgson 2014)

Name of Proposed MMA	Priority	Rationale based on Reef Check Data
Baie d'Acul	High	Endangered coral species, islands, bays, mangrove sea grass, tourism area
Rochelois Banks	High	Sperm whales
SW Corner Ile Tortuga	Medium	Good coral reef, beaches
Moustique	Medium	Good coral reef, beaches
Mol/Cap San Nicolas	Medium	Coral reef, seagrass, mangroves and beaches
Petite Paradise Lagoon	Medium	Mangrove river, coral reef, seagrass, beaches
Arcadins/Trou Forban	Medium	Coral reef, islands, beaches, seagrass
Sand cayes east of La Gonâve	Medium	Coral reefs, islands, seagrass
Grand Lagoon, N La Gonâve	Medium	Coral reef, mangroves, seagrass, beaches
Deheaune, S La Gonâve	Medium	Patch reefs and drop-off, sea grass, beaches
Jacmel	Medium	Spur and Groove deep reefs, cliffs, beaches
Grand Goave island	Medium	Fringing reefs and beaches, seagrass
Port-à-Piment	Medium	Fringing reefs, seagrass, mangroves
Baies de la Croix/Spagnoles	Medium	Points, beaches, reefs, seagrass

The coastline near Labadie, just west of Cap Haitien, receives a certain degree of protection because of the management of the area associated with the cruise ship tourism industry. The local community leader at Bas Limbé, west of Cap Haitien on Baie de l'Acul, issued a decree that the mangroves are to be protected and restoration projects were initiated.

4. VALUE AND ECONOMIC POTENTIAL

Natural ecosystems provide an incalculable number of tangible and intangible services to humans, including the provision of food and plant products, erosion and flood control, clean air and water, climate regulation, and cultural uses, among others. The value of ecosystem services is tremendous, considering the costs of rebuilding after natural disasters or constructing artificial structures to attempt to replace the services provided by natural ecosystems. For example, the value of the forests of Macaya National Park related to flood control has been estimated at more than $4 million USD per year and the coastal protection ensured by the ecosystems of the Aquin Saint Louis du Sud protected area (mangroves, coral reefs, seagrass beds) at more than $1.5 million USD per year (ANAP 2019).

The direct consequences of deforestation are severe and very costly to the Haitian economy. The destruction of the forest has resulted in accelerated soil erosion. It is estimated that 2,000 ha of arable lands with a depth of 20 cm are washed away every year after the removal of the forest cover. These 2,000 ha would have produced on average $8 million USD of various agricultural products. Although soil erosion is present in almost all regions of the country, some are more severely affected than others. Regions such as Grand'Anse, Southeast, West, Artibonite, North and Northeast, are at risk of very severe erosion (Geo Haiti 2010).

Another consequence of this phenomenon is exemplified by the Péligre dam which provides nearly the totality of the hydroelectric power of the country (up to 30% of the total national electricity production). The dam has already lost 70% of its capacity as a result of siltation filling in the reservoir. CPALC (2005) estimated that the environmental cost of using wood in Haiti would be $1,600 million USD in 2003, which is 18-fold greater than the $88 million USD of savings in imports of petroleum fuel (which would have been used instead of wood).

According to a national land use capability determination for Haiti, only 30% of Haiti's land area is appropriate for agriculture and over half of that requires special conservation practices. Soil erosion caused by inappropriate agricultural practices not only reduces the productive potential of hillside farms, but also has tragic downstream consequences. Removal of tree cover exposes soil to the erosive impact of water and wind. Additionally; the annual input of organic matter to the soil from litter is lost. With less organic matter, the infiltration of rainwater is diminished. Soil loss results in reduced capacity of watersheds to store water. As a result of these two phenomena, the hydrologic cycle is changed, and river levels rise to dangerous levels quickly after heavy or prolonged rainfall (tragically exemplified by devastating floods at Fond Verette, Mapou, and Gonaïves). Conversely, dry season flows are reduced drastically, which negatively impacts irrigation projects and well levels. Thus, watershed deterioration reduces the productive potential of both hillside and valley farms and increases flooding. This degradation of drainages also has a negative impact on biological diversity, as sediment in rivers smothers coral reefs and seagrass beds.

Fuelwood and Charcoal

Forest resources provide the most important sources of energy in Haiti in the form of fuelwood (rural) and charcoal (urban). Charcoal is used by 90% of households in Port-au-Prince and other major cities and the sub-sector employs more than 150,000 persons nation-wide. Nationwide and regional estimates (Tarter et al. 2018 and 2019) suggest that more than one million metric tons of charcoal is consumed annually in Haiti. The contribution of these products to the rural economy is very significant. Charcoal is made in nearly all rural areas of Haiti, and about 20% of the selling price remains in the rural economy (ESMAP 2005).

Wood for Construction

Another contributor to deforestation and land-clearing in Haiti is the demand for wood in the construction sector. Wood is used primarily as struts and facings in construction. Table 6 presents the production and consumption of fuelwood, industrial roundwood, and sawnwood in Haiti from 2000 to 2006. The large increase in consumption of sawnwood from 2009 to 2018 can be primarily attributed to the post-earthquake rebuilding.

Table 6. Production and Consumption (1,000 m^3) of woodfuel, industrial roundwood and sawnwood from 2000 to 2018 in Haiti.

	Woodfuel		Industrial Roundwood		Sawnwood	
Year	*Production*	*Consumption*	*Production*	*Consumption*	*Production*	*Consumption*
2000	1964	1964	239	240	14	33
2006	2008	2008	239	240	14	36
2013	2070	2070	239	246	14	56
2018	2119	2119	239	241	14	106

Source: FAO, State of World's Forests 2007 and 2009, Yearbook of Forest Products 2013, FAOSTAT accessed 21 April 2020.

Agroforestry

Vast areas of Haiti have soil characteristics that theoretically favor permanent forest cover to prevent erosion and promote the infiltration and storage of rainwater. These steep lands have been invaded and brought into cultivation due to the growing need for new lands to crop. This has resulted from population growth and the equal division of land among children leading to smaller and smaller farm plots. Agroforestry offers a potential for stabilizing land in these areas. Roots of trees help to stabilize the soil, and their foliage breaks the erosive impact of rain and wind. Water infiltration and rainwater storage are improved by the incorporation of organic matter from tree leaves and decomposing roots. Trees also contribute to farm economies by producing forage, fruits, medicines, fuelwood, and building materials. In many cases, surplus tree production can be traded off-farm for cash or goods not produced on the farm. Trees also provide shade for livestock and crops such as coffee that are commonly grown under partial shade.

Aquatic Ecosystem Services

Fishing and aquaculture support or supplement the incomes of 50,000 families in Haiti. While the amount of fish caught in inland and coastal waters of Haiti is difficult to determine accurately due to a lack of consistent reporting, it is estimated that the fish catch has increased from less than 10,000 tons/year a decade ago to more than 17,000 tons/year in 2017 (FAOStat accessed 21 April 2020). Despite the increased catch, Haiti still imports around 21,000 tons of seafood annually. In addition to the fish catch, 800-900 tons of lobster, shrimp and crabs are caught and exported each year, as well as around 10,000 sea cucumber and 20,000 eels (See MARNDR interview notes, Appendix 1). It has been estimated that more than 80% of the population receives at least part of their protein requirement through consumption of seafood. Fish also provide 50% of the protein for the country while the contribution of the sector to national wealth is estimated at 2.5% of the GDP.

An assessment of the economic value of ecosystem services provided by mangroves and coral reefs at 10 sites proposed for Marine Protected Areas (Wiener 2013) estimated ecosystem services provided by mangroves and coral reefs at those sites are worth $9.5 billion USD (this total does not include ecosystem services provided by sea grass beds). While this value is significant in itself, when one considers the 1775 km of coastline of Haiti, the value is enormous.

Payments for Ecosystem Services

While it is widely recognized in Haiti that ecosystem services such as clean air, clean water and productive soils are beneficial, the economic realities of rural Haiti often lead to decisions focused on immediate needs rather than long term sustainability or ecological stability. Programs emphasizing alternative sustainable livelihoods help alleviate this issue, but there is usually a significant time lag between inception of the programs and outcomes significant and widespread enough to reduce unsustainable pressures on ecosystems.

Payments for ecological services (PES) recognize that biodiversity, carbon sequestration, clean air, etc. are globally important and beneficiaries worldwide share the costs, as well as the benefits, of protecting and providing those services. While the concept is fairly straightforward, successful implementation is quite complex and must be designed to fit the local situations in which it is applied. A form of PES that has been implemented in Haiti with encouraging results has been PES associated with reforestation. Helvetas (Flückiger and Gaspard 2017), GIZ, and CHRAD (see CHRAD interview, Appendix 1) have separate PES programs aimed at increasing the success of tree planting programs. Local operators are paid to plant, tend and protect trees. Operators can select from a predetermined list of tree species, which are usually focused on agroforestry or fuelwood. The Helvetas program also includes an agreement to follow good agricultural practices.

Payments vary (typically around USD $60/ha per year) and are paid in three installments. The first payment is made after planting, then following a mid-term evaluation, and a final payment at the end of the contract, at which time the trees should be well established. PES payments are results-based and adjusted according to the survival rates of the planted trees. Helvetas is also using PES to protect existing remnants of hardwood forests in the Foret des Pins protected area, with payments based on the successful persistence forests.

5. LEGAL FRAMEWORK AFFECTING CONSERVATION

In Haiti biodiversity and forest issues are the responsibility and/or focus of a great number of government agencies and other actors ranging from academia to municipalities, non-governmental organizations (NGO's) and private firms and community-based organizations. The legal framework is simultaneously held back by outdated legislation and organizational structures yet is also rapidly evolving and adding new regulations beyond the capacity of responsible institutions to implement or enforce. Still, progress is being made and noticeable advances have been made since the 2016 Biodiversity Assessment.

5.1 Laws and Policies

The fundamental legal framework for Biodiversity and Forestry regulations in Haiti is established through the revised Constitution of 1987 with seven articles specifically related to biodiversity and forestry (Table 7); a 2006 Decree on Environmental Management and Regulation (hereinafter referred to as the Environmental Management Decree); a profusion of outdated laws dealing with forests; the 1978 Fishery Law; a set of orders in the field of Protected Areas; and Multilateral

Environmental Agreements. A more extensive discussion of the laws and policies listed in Table 7 is provided in the 2016 118/119 Biodiversity Assessment (Posner and Toussaint 2016).

Table 7. Significant environmental laws and policies related to biodiversity

Environmental Laws	Environmental Policies
Fisheries Act of 1978	Haiti Strategic Development Plan (*Plan Stratégique de Développement d'Haiti, Pays émergent en 2030*).
Constitutional Law - 1987 (art 253-258, below)	National Environmental Action Plan.
253-1 Exceptional measures to be taken to restore ecological equilibrium	National Risk and Disaster Plan (NRDP)
254 Protection/accessibility of natural sites	The Three-Year Plan (2012-2015) of MDE
255 Development of alternative energy (solar, wind) to protect forest resources	National Program to Combat Desertification
256 Obligation to establish botanical and zoological gardens	Interim National Biodiversity Strategy and Action Plan (NBSAP)
256-1 Zones of ecological utility may be declared where necessary	Agricultural Development Policy and the Triennial Program of Agriculture Recovery
257 Conditions for protecting flora and fauna	National Adaptation Program and Strategy in Response to Climate Change
258 Prohibition of waste from foreign sources	Fisheries and Aquaculture Policy
Environmental Management Decree, 2006	Haiti's Nationally Determined Contributions (NDCs) on Climate Change
Presidential Decree prohibiting manufacture, import, sale and of black polyethylene bags and expanded polystyrene 2012	National Policy on Climate Change (NPCC)
Ministerial Decree prohibiting exploitation of Mangroves 2013	

Approximately 80% of the environmental legislation is composed of pieces, laws, and decrees dealing with trees, forests, soils and fisheries. The majority of the laws are not really enforced given the weakness of State Agencies. These laws are primarily composed of different prohibitions and do not promote stakeholder participation. Historically, legal restrictions were enacted to protect forests and certain species of fauna and flora. Special authorizations could be delivered to allow cutting trees in a forest or for fishing during specific seasons.

The Environmental Management Decree (*Décret portant sur la gestion de l'environnement et de régulation de la conduite des citoyens et citoyennes pour un développement durable*) sets out national policies and principles regarding environmental conservation, and involves all levels of Haitian government in fulfilling the nation's duty to protect the environment. The 2006 Decree provides the main legal authority for the creation of protected areas. Additionally, management of the National Protected Area System falls under the authority of the National Agency of Protected Areas (ANAP), within the Ministry of Environment (MDE). Protected areas can be national, regional, or municipal, and must be created through regulations. ANAP administers Haiti's protected areas and must develop a Protected Areas Management Plan, as well as site-specific management plans. (ELI 2018).

The Environmental Management Decree also calls for an institutional and consensus-based framework to be established in terms of environmental management, the National Environmental

Management System (Système National de Gestion de l'Environnement, NEMS). The guiding principle of the NEMS is that environmental management proceeds from collective responsibility and must be shared between the different sectoral ministries, and between the Government and civil society. The NEMS has struggled to become established, particularly because the MDE has not systematically received the support of its partners enabling it to properly fulfil its central role of coordination of the various partners, i.e. the sectoral ministries[1], local intermediaries and civil society. Thus, operations conducted by the MDE have been confined principally to the implementation of externally funded projects, such as the management of protected areas, local development and the production and monitoring of basic environmental information via the National Observatory for the Environment and Vulnerability (ONEV). Environmental assessment and appraisal of the consequences on the environment of sectoral policies, plans and programs, at the heart of the MDE's mandate as set forth in the decree, are generally not addressed by the MDE due to a lack of resources.

Despite the institutional barriers, progress is being made on some important environmental policies. The process to formulate a comprehensive forest policy for Haiti is ongoing, albeit with no clear outlook as to when it may be completed. Haiti Biodiversity 2030 is a revised National Biodiversity Strategy and Action Plan (NBSAP), which is ready for adoption (but still unknown as to when it may be considered). A National Strategy of the National Agency for Protected areas (ANAP) has been drafted and is being finalized for adoption.

5.2 International Agreements

More than ninety Multilateral Environmental Agreements have been signed or ratified by Haiti (https://iea.uoregon.edu/country-members/Haiti). Among the agreements most relevant to the protection of biodiversity are: Convention on Biological Diversity, Convention on the Continental Shelf, Convention on Fishing and Conservation of the Living Resources of the High Seas, United Nations Convention to Combat Desertification, Kyoto Protocol, United Nations Convention on the Law of the Sea, London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Montreal Protocol, Paris Agreement, International Plant Protection Convention, Convention concerning the Protection of the World Cultural and Natural Heritage, UNESCO Convention on the Protection of the Underwater Cultural Heritage, United Nations Framework Convention on Climate Change, Vienna Convention for the Protection of the Ozone Layer.

Conspicuously missing is CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. However, Haiti is still strongly influenced by CITES in that signatory countries will not import restricted species, such as conchs (see MARNDR interview, Appendix 1). The lack of export markets significantly reduces the incentive to harvest the vulnerable species.

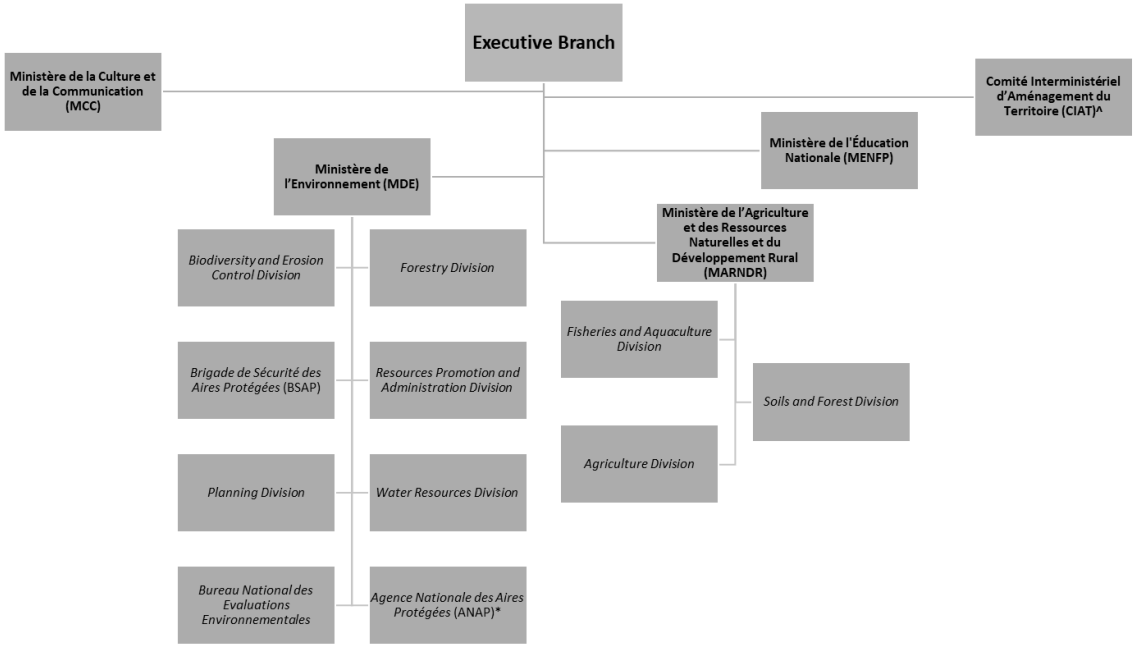
[1]Ministry of the Interior and Territorial Communities, Ministry of Agriculture, Natural Resources and Rural Development, Ministry of Public Works, Transport and Communication, Ministry of Planning and External Cooperation, plus the Ministry of Culture and Communication and the Ministry of Tourism

Haiti is also committed to several regional and international policy frameworks. Among the frameworks most relevant to biodiversity are the Caribbean Challenge Initiative (CCI), the Caribbean Community (CARICOM) Biodiversity Strategy, the 2030 Agenda for Sustainable Development, and the SAMOA Pathway and other international commitments to the sustainable development of Small Islands Developing States (SIDS). These instruments in the regional and international policy arena have been – in addition of the CBD Global Strategic Plan for Biodiversity - inspirational and guided the vision, principles and the orientations of the Haiti Biodiversity 2030.

5.3 Government of Haiti

Various agencies have important roles with respect to the management of biodiversity and tropical forests in Haiti. Those most relevant to conservation of biodiversity and/or having experienced significant changes since the 2016 assessment are shown in Figure 6.

Management efforts are generally uncoordinated and sectoral methods of working result in activities being carried out in isolation, preventing a holistic approach to biodiversity and tropical forest resources management. For example, the Ministry of Agriculture Fisheries Division is responsible for regulating fish harvest but protecting aquatic resources in Marine Protected Areas from excessive exploitation is also the responsibility of the Ministry of Environment. Both agencies claim authority, but neither has adequate capacity to manage the resource or its uses.



* **MDE** *Agence Nationale des Aires Protégées* (ANAP). An autonomous organism, under the umbrella of the MDE

^ **Comité Interministériel d'Aménagement du Territoire (CIAT).** Interministerial Commitee, led by an Executive Secretariat, composed of Ministries of Planning, Agriculture, Environment, Public Works and Interior.

Figure 6. Government of Haiti Agencies

The government of Haiti agencies with their environmental responsibilities are further detailed below:

- **Ministère de l'Environnement:** Prepares, implements and monitors national policy
    - **MDE** *Agence Nationale des Aires Protégées* (ANAP). An autonomous organism, under the umbrella of the MDE. Managing the National System of Protected Areas; coordinating and implementing management plans of Protected Areas; protecting in-situ and ex-situ biological diversity; preserving areas under its jurisdiction and under co-management; involving local communities in protected area management
    - **MDE** *Biodiversity and Erosion Control Division*. Management of land degradation and protected areas, conservation and sustainable use of ecosystems.
    - **MDE** *Forestry Division.* Addressing deforestation, reforestation, updating forestry data inventory, and contributing to national energy policy.
    - **MDE** *Brigade de Sécurité des Aires Protégées* (BSAP). Provides law enforcement for designated and potential protected areas; environmental awareness; fire control; monitoring.
    - **MDE** *Resources Promotion and Administration Division.* Environmental awareness and education.
    - **MDE** *Planning Division.* Environmental planning, negotiation of cooperation projects, monitoring and evaluation of environmental programs.
    - **MDE** *Water Resources Division*. Environmental policy and water resource management.
    - **MDE** *Bureau National des Evaluations Environnementales.* Promotes and implements the National Environmental Impact Assessment System.
- **Comité Interministériel d'Aménagement du Territoire (CIAT):** Policy on regional planning, protection and management of watersheds, sanitation, and urban planning. Delineation of national parks. Pilot Program for Climatic Resilience focal point.
- **Ministère de l'Agriculture et des Ressources Naturelles et du Développement Rural (MARNDR) :** Has several agencies that are responsible for aspects of biodiversity.
    - **MARNDR** *Fisheries and Aquaculture Division.* Enforcement of fishery regulations, policy formulation on fishery, promotion of aquaculture, inland fisheries.
    - **MARNDR** *Soils and Forest Division.* Soils and forest resources management, watershed management and soil conservation.
    - **MARNDR** *Agriculture Division.* The *Agricultural Research and Documentation Centre (CRDA)* includes Phytogenetic and zoogenetic resources.
- **Ministère de la Culture et de la Communication (MCC):** Protection of the natural and historic heritage of Haiti including coastal and marine sites.
- **Ministry of Education** *National Commission on UNESCO.* Creation of biosphere reserves; ex-situ conservation (National Botanical Garden); environmental awareness curricula for youth.

Coordination between the agencies could be enhanced by increased participation in Sectoral Tables and Groups, which have been established to promote coordination between the government, funding entities, implementing partners, and other stakeholders. The CIAT (Table

8), which was specifically created to respond to the needs of more coherent and coordinated actions in land use planning among governmental bodies, seems to be mostly involved with coordinating actions in the Southern Peninsula (Sectoral Table of the South Department and Interdepartmental Land Use Management Authority for the Grand Sud). To date, there is little evidence that Sectoral Table dealing with Environment, where biodiversity and forestry issues can be raised, is a priority for the Committee.

An encouraging improvement since the 2016 assessment has been progress in the development of ANAP, the *Agence Nationale des Aires Protégées* (National Agency for Protected Areas). Although the young agency is understaffed and has no secure funding, they have been steadily building capacity at the national and local (protected area) levels. At this point, Foret des Pins, Macaya, Oyster Lagoon, and Three Bays Parks have staff, but are not fully staffed.

An *ad hoc* technical support group, GTAP (Groupe Technique d'Appui aux Aires Protégées), formalized in 2014, is designed to promote open government, involving all stakeholders giving advice to ANAP on the management of protected areas. ANAP is also supported in their mission by the Security Brigade of Protected Areas (BSAP). BSAP has grown from 10 agents to 100 at Macaya National Park and has 10 more agents at Foret des Pins.

Haitian government is divided between the national government and Territorial Collectivities (Mayors, CASEC and ASEC). These local entities play executive and regulatory functions for populations living in the communes and communal sections where they are closely interacting with community-based organizations. According to the Environmental Management Decree, Territorial Collectivities contribute to the protection of environment, including the preservation of natural and capital assets, by ensuring the protection and rehabilitation of natural resources e.g. forests, green spaces and ecosystems, soils, and fauna. While Territorial Collectivities have enacted local regulations restricting mangrove cutting and protecting iguana habitat, most of them have limited capacity to fulfill their responsibilities for conservation and forests including providing environmental and sustainable development services.

The Fonds Haïtien pour la Biodiversité (Haitian Biodiversity Fund) or FHB was established in 2020 as a foundation to provide a permanent source of long-term funding for biodiversity. The Caribbean Biodiversity Fund will manage the funds and transfer to FHB as needed. FHB has a director, board of directors, by-laws and manual of operations. Haiti Audubon Society was instrumental in organizing and implementing this effort. The Nature Conservancy is providing technical support for a grant making strategy, mobilization, and other key documents. The German government has already transferred 9 million Euros to FHB for biodiversity conservation. TNC is working with the World Bank to transfer $3 million USD for climate adaptation, and the French Development Agency has made a soft commitment for more funding. The World Bank is also providing $400,000 USD for operations (office, vehicle, etc.). This is an encouraging development for sustainable financing for biodiversity and protected areas in Haiti.

5.4 Conservation Initiatives: Gap Analysis

Due to struggles for support from other ministries in the Government of Haiti, operations conducted by the MDE have been confined principally to the implementation of externally funded projects, such as the management of protected areas, local development and the production and monitoring of basic environmental information. ANAP, without a dedicated budget and no authority to sign agreements, is not yet a truly autonomous agency. This has resulted in a gap at the strategic level in which instead of the government of Haiti determining priorities for the types and locations of conservation initiatives, they are dependent on the targets and objectives of the donor agencies. While increased government participation and leadership in Sectoral Tables and Groups would help address this gap, working with donor agencies on conservation initiatives is also increasing government capacity for management, as well as enhancing recognition and relations with local organizations and communities.

Many donors have been and continue to be interested in assisting Haiti in the field of environmental protection and enhancement. Hundreds of non-governmental organizations are active in Haiti, many of which include some aspect of environmental protection or sustainable development in their goals. It would not be possible (nor necessary for this assessment) to compile a list of all active and planned initiatives in Haiti; however, the lack of complete and readily accessible information indicates another gap at the programmatic level. Consistent monitoring, evaluation and sharing of information and lessons learned is crucial for efficient allocation of resources and successful accomplishment of conservation objectives.

Without guidance and sharing of lessons learned, well intended organizations are destined to repeat the mistakes made in past projects. Indeed, some areas have been replanted several times with no follow-up, which does little to promote biodiversity or the credibility of the initiatives.

Among the larger donors and their implementing partners, information sharing and coordination has been improving over the past decade. While there are still some gaps, as well as overlap, in location and purpose, a concerted effort to coordinate among government agencies, donors and implementing organizations has resulted in a sensible distribution of initiatives across the country.

Since the last 118/119 biodiversity assessment, an apparent shift has occurred in which rather than biodiversity being the primary focus of projects funded by large donor agencies, it is more often included as a cross-cutting theme. The large-scale conservation initiatives displayed in Table 8 (see page 4 for expansion of acronyms) shows the majority of initiatives are concentrated in the Southwest and Southeast.

This distribution makes sense given the presence of the country's most important remaining ecosystems and the designation of two biosphere reserves and several marine and terrestrial protected areas. It also shows that USAID involvement in the North and Northeast with the Three Bays National Park and the Reforestation Project are filling an important gap. Unfortunately, with the exception of some mangrove restoration through the Reforestation Project, USAID funding for Three Bays National Park management has ended, which is leaving a significant gap in a highly important area for biodiversity.

Table 8. Conservation Initiatives

Conservation Initiatives	Purpose	Location	Implementing Entity	Funding Entity
Three Bays Marine Protected Area	Biodiversity, mangroves, sustainable fishing, alternative livelihoods	North	MDE/ANAP, FoProBiM,	IDB, TNC, USAID
Reforestation Project	Agroforestry, sustainable livelihoods, watershed stabilization, resilience	North and Northeast	Chemonics	USAID
Sustainable Land Management of the Upper Watersheds of Southwestern Haiti (Project Macaya)	Park management and protection, reforestation, watershed protection, sustainable development.	Southwest Peninsula	MDE/ANAP, Fondation Macaya, Haïti Audubon, ORE, Fondation Nouvelle Grand' Anse, CATIE	GEF, IDB, NORAD, UNEP
Protecting important ecological areas in La Hotte outside Macaya Park	Acquisition of habitat	Southwest Peninsula	Haïti Audubon	Haïti National Trust
Other Macaya projects	Biodiversity conservation and livelihood opportunities to local community members living in the area of Macaya Park	Southwest	Fondation Macaya, Haïti Audubon, ORE, CODE, OGPAR, Fondation Nouvelle Grand' Anse, CATIE	CEPF
South Coast (Grand Sud) Marine Protected Areas	Protect and restore marine biodiversity, sustainable fishing, alternative livelihoods, education	Southwest Peninsula	MDE/ANAP, UNEP, MARNDR, TNC	IDB, EU, GEF
Resilient Productive Landscapes	Capacity building, sustainable agriculture, watershed protection, agroforestry, mangroves	Southwest Nippes	MARNDR, MDE	World Bank, GEF
Adapting biosphere reserves to climate change	Promoting sustainable use to offer local people better foundations for adapting to climate change. Agroforestry and reforestation.	Southeast La Selle Biosphere Reserve/ Dominican Republic	Haiti Ministry of Planning and Cooperation, DR Ministry of Planning, Development and Cooperation	GIZ
High Altitude Biodiversity Valuation Programme	Co-management of Forêt des Pins NP by ANAP and local stakeholders. Sustainable livelihoods.	Southeast (Mare Rouge)	ANAP, Helvetas	Swiss Cooperation, EU
Oyster Lagoon Park	Park establishment, management and use	Southeast	MDE/ANAP, CIAT, CASEC	EU, Helvetas
Environmental protection, restoration, and education in La Selle Biosphere Reserve	Soil conservation, reforestation with native species, PES, eco-friendly livelihoods, education,	Southeast	Fondation Seguin	Helvetas
Marine fisheries and aquaculture	Sustainable artisanal marine fisheries and lake aquaculture	Southeast	AECID/MARNDR	AECID
Arrete Communal municipal reserve	Conservation of Ricord's iguanas. Sustainable livelihoods and education	Southeast Anse-à-Pitres	IIF, Organizasyon Jenes Aktif Ansapit	IIF, CEPF
Reforestation and biodiversity in Haiti's Sud-est region	Reforestation, sustainable agriculture, PES	Southeast Fond-Melon basin	AVSF, CROSE	CEPF, EU, City of Paris, CGHS
Improving the Resilience of Ecosystems and Communities Vulnerable to Climate Change and Anthropogenic Threats through a «Ridge-to-Reef» Approach	Alternative livelihoods, watersheds, sustainable fisheries, protected area management, mangrove restoration, waste management	Northeast, Southwest and Southeast MPAs	UNDP, MDE/ANAP	EU, GEF

The Three Bays Program has been successful, with official designation of the Marine Protected Area, a protected area management plan, a binational action plan for sustainable fisheries (Atis et al. 2018), a Park Director, community awareness, and sustainable livelihood projects. The economic development component is important and there is a need for additional alternative livelihood components, specifically to help with mangrove protection (USAID/Haiti interview, Appendix 1). The newly installed park management is also not yet self-sufficient. Their limited institutional capacity, funding, and staffing have hindered their ability to do marine park management (USAID/DR interview, Appendix 1). The USAID/Dominican Republic Mission is involved in the management of the MonteCristi MPA, which is directly adjacent to Three Bays MPA, and a cooperative relationship has developed. USAID/DR intends to continue transboundary cooperation with the two protected areas. ANAP, IDB and FoProBiM are seeking avenues to continue funding the Three Bays program, but that gap has not yet been filled. Even with the heavier concentration of biodiversity related projects in the south, the deteriorating biodiversity situation of La Visite National Natural Park, the Forêt des Pins National Natural Park Unit I (Fonds Verettes/ West Department), Azuei Lake, and Important Bird Areas such as Trou Caiman and Ti Trou Caiman ponds is worrisome.

Another significant gap in conservation initiatives is in the restoration of forest ecosystems. Some mangrove restoration work is being done, which is highly needed and should be expanded. However, upland reforestation projects are almost exclusively for agroforestry, with some exceptions noted in Table 8. While agroforestry has many benefits for soil conservation as well as some value for biodiversity, the upland forests of Haiti have been so severely degraded and reduced that forest restoration projects are needed in order to preserve a host of endemic species that depend on the native forests.

A reluctance to initiate restoration of native forests is due in part to the low chance of success when people are likely to clear and cultivate the lands after the project has ended. This highlights the need for concurrent assistance with alternative livelihoods, but also a gap in land tenure and security. While the current formal and informal systems of land tenure work for parcels that have been in cultivation for generations, encroachment into protected areas and buffer zones, and clearing of forests, is often a result of tenure issues. Private landowners are also hesitant to invest in reforestation when they are not confident the trees will not be cut or eaten by livestock. Addressing these tenure/security issues is a gap that does not currently appear to be addressed.

6. THREATS TO BIODIVERSITY AND TROPICAL FORESTS

Despite its recognized global and national significance, Haiti's biodiversity and tropical forests have had limited protection. The direct threats to biodiversity and tropical forests and the human activities driving those threats remain similar to those described in the previous three Haiti 118/119 biodiversity assessments. The current status of those threats to biodiversity are discussed in the following sections.

6.1 Direct Threats to Biodiversity

In the Sixth National Report to the Convention on Biodiversity (Blanc Civil et al. 2019), the following principal threats to biodiversity in Haiti were identified: overexploitation of forest and fishery resources, the excessive cutting and filling of mangrove areas, pollution and poor waste management, the effects of climate change, introduction of exotic species; habitat fragmentation due to increasing pressure from the agricultural sector and other human activities (such as urban development and transport corridors). These threats, with the exception of exotic species, were also repeatedly emphasized during the interview process and literature review. While introduction of exotic species is a serious concern, the issue does not have the same magnitude of threat, or relevance to USAID programs, as the other threats listed and will not be described in more detail in this assessment.

Overexploitation of Forest Resources

The loss of native forest in Haiti and subsequent land uses have been and continue to be the greatest threats to biodiversity in the country. Deforestation has been occurring for centuries and the forest habitat has been diminished (both in area and quality of habitat) to the point that many species of plants and animals have gone extinct, others are critically endangered and others are in the precarious position of having such limited habitat that a single event, such as a storm or disease could reduce habitat and numbers to the point that the populations will no longer be viable. Hedges et al. (2018) project that, at the current rate of loss, all primary forest in Haiti would disappear by 2035, along with 66-83% of vertebrate species.

To illustrate the deforestation trends in the uplands, we can look at Massif de la Hotte. Only 6% of Grand Bois National Park area remains in natural forests which are highly fragmented and occur mostly in elevations above 900 m. The deforestation rate for Grand Bois was estimated at 2.7% for the 2000-2012 period (Timyan, 2015). Approximately 32% of the Grande Colline key biodiversity area remains in natural forests, though highly fragmented and occurring mostly above 1500 m. The deforestation rate for Grand Colline was estimated at 2.4% for the same period. A remarkable increase in deforestation occurred between 2008 and 2012. Demographic pressure from the lowlands for wood harvests and garden lands are the main threats to the forests of both areas.

It is estimated that between 30 and 50 million trees and shrubs are cut annually (CEPALC 2005). Most trees cut are for charcoal production, which is often done in areas of regenerating mesquite where the cutting does not result in deforestation. However, given the limited amount of native forests remaining, even a small portion of such a large industry can have a significant effect. The effect is also pronounced in mangroves, as Wiener (2014) noted in a rapid assessment of Haiti's mangroves that "hardly can a single mangrove site be found in which there is not wood harvesting and/or charcoal production".

There is considerable speculation and debate as to whether deforestation is driven more by charcoal production or clearing lands for planting crops. Since the deforestation activities are often unauthorized, reliable nation-wide data on rates and primary causes of deforestation are lacking. The drivers of deforestation also vary by location. Many mangrove forests that have been

deforested are too wet or saline for agriculture, and many of the sites being cleared for small scale cultivation plots are in locations too remote for access to charcoal markets. Of great concern for biodiversity is that many of the remote locations being cleared hold the last vestiges of primary forest, critical habitat for a host of endemic species.

Once an area has been deforested, it is usually cultivated. Even the steep hillsides are farmed, resulting in erosion, which in turn lowers infiltration and water holding capacity, thereby increasing runoff and exacerbating the rate of further erosion. According to USAID estimates, an estimated 15,000 acres (61 km2) of topsoil are washed away each year, with erosion also damaging other productive infrastructure such as dams, irrigation systems, roads, and coastal marine ecosystems (USAID Activity Data Sheet, 1999). While there have been soil stabilization projects over the past two decades designed to stabilize critical watersheds, the limited extent of those projects, combined with additional areas being deforested and converted to unsustainable agriculture, is likely to have resulted in the magnitude of the erosion remaining similar. As the soil is washed down the slopes, the land becomes unproductive and farmers turn to other areas to grow crops, continuing the cycle.

As the sediment enters streams and rivers, fish habitat is degraded or lost. Segments of some rivers have become so filled with sediment that surface water no longer flows for significant portions of the year. These impacts are compounded by diversions of water for irrigation and domestic uses. The changes in river flows have increased the risk and severity of flooding in the lower reaches of rivers. Entire towns (e.g. Grande Saline/Artibonite Department, Les Cayes and Port-Salut (Pointe Sable area)/South Department) have virtually been washed away and riparian habitats lost.

When the rivers flow into the sea, carrying tons of sediment, important marine habitat and fauna are affected or lost. Sediment can cover or reduce the light reaching coral reefs, killing the living formations. Bottom dwelling species lose their habitat as the substrate changes, altering the entire ecosystem.

<u>Overexploitation of fishery resources</u>

Overfishing of marine resources in Haiti is having significant impacts on local economies and biodiversity throughout the coastal areas of Haiti, although the Ministry of Agriculture Fisheries Division believes the problem is more severe in the north (Appendix 1). About 50,000 families harvest fish and other seafood, primarily by artisanal methods (dugouts and rowboats), although the low numbers of larger vessels have a much higher catch per trip.

There is very limited awareness or enforcement of the existing and outdated fishing regulations, so immense pressure is being placed on marine resources. As the fishery stock is depleted, fishers are using nets with smaller mesh size to catch smaller fish, which in turn removes the potential for reproduction and limits the fish stock even more. Reef Check survey results show very low numbers of all indicator fish and extremely small sizes found in all coastal reefs of Haiti (Hodgson 2014). The fish abundance results are the lowest recorded by Reef Check in the Caribbean.

In addition to the consequences to fish abundance and diversity, reducing the abundance of algae-eating fish also affects coral reefs. The algae grow over the reef corals, killing most of the living hard coral and preventing young polyps from anchoring to a suitable substrate. The results of over 400 Reef Check surveys show that the mean living coral cover on Haiti's coral reefs is 15%, compared to 25% for the Caribbean region. The cover of macroalgae on coral reefs is 30% for Haiti compared to 13% for the region. Reef Check (Hodgson 2014) concluded that "at this point, every shallow coral reef in Haiti is severely overfished and the overfishing has destabilized most coral reefs and turned them into algae dominated rocky reefs."

Other practices resulting in overfishing and habitat degradation include the use of chemical products, such as insecticides and herbicides, to facilitate the catch of fish (Geo Haiti 2010). This not only affects the current fisheries stock, but also removes the young reproduction, severely curtailing the sustainability of the resource. Fishery resources are therefore in a significant state of degradation and are not being replenished. Similarly, manatees, sea turtles, flamingos, sharks, dolphins, and some shellfish, which are protected elsewhere, are openly captured in Haiti (Kiszka 2014, Wiener and Deloire 2014, Wargny 2004, Geo Haiti 2010).

Excessive cutting and filling of mangrove areas

While encouraging progress is being made for the protection of mangroves in Haiti through national and local decrees and establishment of protected areas and restoration projects, the continued loss of this highly ecologically important habitat continues to be a threat to biodiversity. While the relatively small size of mangroves limits its use for lumber, charcoal made from mangrove wood is favored by some commercial uses (e.g. dry cleaners). More detailed information on the mangrove areas most threatened can be found at http://foprobim.org/uploads/3/5/1/1/35111927/haiti_national_mangrove_report_final.pdf).

Pollution and poor waste management

Uncontrolled/unplanned disposal of household and industrial sewage and hazardous waste has been a perpetual problem as there are only three sewage treatment facilities in the country and they are not currently operational. Wastes are being dumped in waterways or ravines, which has major impacts to coastal biodiversity. Birdlife International (2020) noted that Lake Azuei is polluted and because of the adjacent transnational road the lake is being used as a solid waste area.

Fragmentation and alteration of ecosystems and habitats

In addition to the alteration and fragmentation of ecosystems described above, in some areas people exploit coral reefs by removing blocks of coral for use in construction. While not as extensive as other threats to coral reefs, such extraction is locally very destructive. Sand and gravel are also exploited from coastal beaches and riverbeds for individual and commercial construction projects, which destabilizes the beaches and rivers, leading to increased sediment flows and silting of the marine and river ecosystems.

Macaya National Park is in the Massif de la Hotte Key Biodiversity Area. With 99% of Haiti's original forest cover gone, amphibians (of which there are 18 Critically Endangered species within

the Massif de la Hotte Key Biodiversity Area) are now confined to only a few key biodiversity areas, many of which are small islands of cloud forest habitat. Many amphibians can persist in very small patches of habitat and the result is isolated areas with exceptional levels of endemism and threat. Unfortunately, management capacity to protect Massif de la Hotte, like all key biodiversity areas in Haiti, is woefully inadequate.

Climate change

The biodiversity and forests of Hispaniola have been shaped by the climate and geological forces, giving rise to the unique ecosystems of the island. Therefore, natural disasters themselves are not a threat to biodiversity, but are a natural component of the ecosystem. However, the effects of natural disasters are magnified when they occur in ecosystems that are already vulnerable due to factors such as pollution, land clearing, over-harvesting, and climate change (WGIII 2008).

As rainfall patterns change to produce less frequent, but more severe storms, the fragile soil conditions brought on by unsustainable hillside agricultural practices are likely to be exacerbated by heavy runoff and erosion. Eroded lands and mudslides are accompanied by shifts of human pressure from areas of lost productivity to any remaining uncultivated areas, threatening the ecosystems in place. Reduced infiltration resulting from deforestation, soil compaction and loss of moisture holding organic matter is resulting in greater runoff. The increase in periodic heavy rain events and decreased infiltration are projected to result in more frequent and severe flooding events in the lower reaches of the watersheds.

Coastal ecosystems are already being affected by sediment coming from eroded hillsides. Increased erosion resulting from climate change combined with increased water temperatures and sea level may have drastic impacts on the marine resources of Haiti. The recorded rise in sea level and sea surface temperatures are primary causes for increased beach erosion, salinization of freshwater aquifers and estuaries, and increased coral reef bleaching throughout the Caribbean (Smucker et al. 2007).

Coastal estuaries, lagoons, mangroves and other near-shore habitats are likely to be highly impacted by sea level rise, and as a result are expected to lose productivity and suffer species loss (CEPF 2010). Increased hurricane intensity will only add to the problem, as greater storm surges and severe flooding will further erode coastal shorelines and habitats.

The few remaining forest ecosystems of Haiti (e.g. Macaya National Park, La Visite National Park, and Forêt des Pins) are montane ecosystems, which are particularly susceptible to climate change. As temperatures increase, forests are expected to gradually shift upward in altitude. Unfortunately, the remaining forests of Haiti are already in the highest, most inaccessible areas with no potential for an upward shift. Although the ecosystems of Haiti are adapted to hurricanes and other severe weather events, the open canopy and weakened trees (due to cutting for resin wood) leaves the pine forests of the La Selle mountain range particularly susceptible to wind during severe weather events. Climate change resulting in increased severity of hurricanes and other storms may impact large areas of this diminishing forest cover.

6.2 Drivers of Threats

In the Sixth National Report to the Convention on Biodiversity (Blanc Civil et al. 2019), the following drivers of threats to biodiversity in Haiti were identified: lack of education, the poor economic means of the population and population growth; poor governance and institutional problems (characterized in particular by a lack of coordination in actions, lack of strong commitment from the NGO community in favor of conservation, political instability and fragility of institutions, lack of sufficient financial support for biodiversity management), and the absence of a national policy with well-defined action plans that takes into account national priorities in terms of biodiversity management.

During the interview process for this assessment, stakeholders repeatedly made it clear that lack of secure land tenure and outdated laws related to fishing and tree cutting were also driving threats to biodiversity. In addition, threats to biodiversity are exacerbated in the region along the boundary between Haiti and the Dominican Republic. These threats are influenced by the drivers listed above, as well as by economic and resource inequalities between Haitian and the Dominican Republic. While political and institutional governance are better managed in the Dominican Republic, this remains a significant driver on the Haitian side of the border. The cross boundary issue was emphasized during interviews with USAID staff for Haiti, Dominican Republic and Latin America/Caribbean Region (Appendix 1), as well as a report on environmental challenges in the border zone by UNEP, UNDP and the ministries of environment of the two countries (UNEP 2013 at https://www.unenvironment.org/resources/report/haiti-and-dominican-republic-environmental-challenges-border-zones).

Poverty leading to unsustainable land use practices

Socio-economic conditions have greatly influenced, and have been the most important forces driving, the situation of biodiversity and forestry within the country. The country is one of the most densely inhabited regions in the Caribbean, and as of 2019, Haiti's population is estimated to be 11 million. Haiti is the poorest country in the western hemisphere and one of the poorest and least developed countries in the world due to a history of vested interests, political instability and violence, and natural disasters aggravated by environmental problems.

Emigration from Port-au-Prince to rural areas following the earthquake in 2010, and immigration of Haitians expelled from the Dominican Republic, places higher pressure on natural resources and exacerbates unsustainable exploitation of forests and fisheries. As displaced families resettle on lands previously used for crops, grazing or charcoal production, the need for food and fuel products shifts to other areas, again placing pressure on remnant forests, mangroves, and other areas of important biodiversity. As people emigrated from the disaster areas, an increase in the population in Protected Area buffer zones and increased prices for a sack of charcoal were noted. This places greater pressure on the ecosystems, resources and biodiversity of the protected areas which may take the form of an increase in the number of farmed plots within central areas, the use of trees to build new houses and the fragmentation of species habitats (GOH 2010).

Lack of secure land tenure

Increases in rural populations also leads to land tenure and security issues. While several studies have concluded that land tenure in rural Haiti is secure and not an obstacle to landscape-level land management (Tarter et al. 2016), land security was raised as an issue several times during the interviews for this assessment (Appendix 1). This may be due to a difference between the recognition and acceptance of family owned parcels used for agricultural cultivation (whether land tenure is formal or informal) compared to tracts of uncultivated land where land owners/managers are reluctant to make investments in reforestation due to incursions for tree cutting or grazing. Nevertheless, the recommendation to avoid unrealistic efforts to restructure the land tenure system in use in rural Haiti and instead develop mechanisms for understanding, engaging, and working within the existing system (Tarter et al. 2016) merits consideration.

Lack of awareness related to biodiversity and environmental laws

The people of Haiti are generally unaware of biodiversity related legislation. For example, 96% of fishermen interviewed (Wiener and Deloire 2014) do not know that there are laws and regulations concerning the capture and exploitation of sea turtles. Although this shows some progress in raising awareness by institutions such as FoProBiM (previous surveys had shown a 100% lack of this knowledge), environmental education for fishers is still considered to be a serious gap (MARNDR Fisheries Division interview, Appendix 1). In fact, the lack of awareness extends beyond fisheries and education about mangroves, upland forests, and general biodiversity is needed for all stakeholders, law enforcement, and courts.

Most of the new Protected Areas are “parks on paper” with little awareness or changes in use by local populations. Management objectives are not often specified in the establishing decrees and there is an extremely limited awareness of the process. In general, there are no formal requirements in the legislative framework for the involvement of communities and local governments with a rare exception[2]. Therefore, participatory planning methods or public consultation for proposed Protected Areas is limited. Community-based organizations and Territorial Collectives (Mayors, and ASEC) are often not aware of nor had ever been involved in any local planning process related to the establishment of protected areas.

Weak governance

Responsibility for management and protection of Biodiversity and Tropical Forests is divided between several agencies. Government services tend to be organized by sector at both national and local levels, leading to a fragmentation of activities and policies. There is no institutional mechanism drawing all the agencies together to make decisions in a collective manner. This has resulted in activities being carried out that are detrimental to both biodiversity and tropical forests particularly in the marine environment and regulations not being adequately enforced because of overlapping responsibilities.

[2] The Environmental Management Decree provides provisions for the creation of participatory mechanisms for civil society through the CONATE (Conseil National pour l’Environnement, the National Council for Environment) but these provisions are not applied.

Political instability leads to a high turnover in the government agencies, which can negate previous efforts to build working relationships among agencies and with stakeholders. Technical staff at the local level tend to be less affected by political turnover (UNDP and TNC interviews, Appendix 1); however, their salaries may be project dependent, resulting in turnover when projects end.

The lack of a dedicated budget for ANAP, the National Agency for Protected Areas, hampers the ability to retain staff, plan for mid- to long-term programs/projects, and acquire resources to effectively manage protected areas. International funding from bilateral or multilateral sources, budgetary allocations from the public treasury, and State subsidies represent the main sources of ANAP funding. A sustainable finance strategy for ANAP has been drafted (ANAP 2019) to identify the resource needs, priorities, and funding sources available. The authors note that among the 26 protected areas identified in 2019, few have a validated management plan and are therefore in an effective management situation. This situation is explained in particular by the weakness of the available funding, the legal framework that has not been very successful (both at the national level and at the level of each protected area, in particular with the absence of rules of use and sanctions), the absence of management and surveillance teams in many areas, and the lack of qualified human resources to operate adequately in the field.

Even with a dedicated budget, fiscal constraints limit the ability of government agencies to function. The Ministry of Agriculture is a large agency, capable of managing large projects with big budgets (IDB interview, Appendix 1). However, the fisheries division is limited in staff and equipment to the point that it is unable to effectively monitor harvest and enforce regulations (MARNDR and FoProBiM interviews, Appendix 1). In addition to the sector's governance structure, the following constraints have been identified: lack of baseline data and adequate public infrastructure, weak institutional capacity, small size and outdated vessels that prevent the exploitation of resources away from the coast and limit the time and number of fishing days, the lack of organization of fishers, the lack of conservation increasing the risk of losses at all levels of marketing channels, and a lack of regulation contributing to the depletion of the resource.

<u>Outdated laws related to natural resources and weak enforcement of existing laws</u>

The Fisheries Act of 1978 is now outdated on several points (including fishing seasons, fishing gear, international fishing rights and regulations) and technical capacities in the Fishery and Aquaculture Division need to be revamped to implement a more scientific-based approach to the sector's management. Updating this law was already a concern in 1999 (JICA 2011), which illustrates the slow pace of legislative reform in Haiti. Given the importance of coastal and marine resources to the economic development of Haiti, rather than simply updating the 1978 Fishing Law a more holistic and comprehensive General Law on Coastal and Marine Biodiversity should be developed.

The issue of comprehensive enforcement of policy and legislation represents one of the biggest challenges that Haiti must overcome. It is attributable to several factors including failure to adequately formulate policy documents and to enact subsidiary legislation, limited human resources both in terms of number and expertise, absence of rule of law in the country, lack of

training on conducting prosecutions, and lack of commitment by enforcement personnel. Of critical concern is the shortage of qualified personnel at the technical, managerial and even judicial levels since those policies and laws are often not known by professionals involved in the judicial system (judges, attorneys etc.) or even by biodiversity and forestry managers.

Rivers, lakes, and marine ecosystems, already stressed by sediment flows and habitat changes, are further affected by unsustainable human exploitation. According to FoProBiM et al (2002), the law stipulates the conditions under which fishing activities in Haiti must be carried out. Nevertheless, "the lack of means to enforce it" contributes to a large extent to the overexploitation. The CARICOM (Caribbean Regional Fisheries Mechanism) Fisheries Unit (Mateo and Haughton 2003) found that although monitoring, surveillance and enforcement of fisheries regulations are among the specific functions of the Fisheries Service, there is generally no action on those functions due to lack of resources and equipment, limited organizational capacity, lack of personnel, poverty and political instability. Normally, no action is taken when violations of regulations are discovered. That situation has remained largely the same, with slight improvements in staffing and monitoring (MARNDR and FoProBiM interviews, Appendix 1). Exportation of endangered species and their by-products, including coral, sea turtles, lobster, conch, and aquarium fish, is regulated by the Fisheries Division through limiting exportation permits, but avoidance of export laws still occurs. Substantial strengthening of the administrative and enforcement capability of the Haitian Fisheries Service is needed before it can effectively monitor and have any real impact regulating fisheries.

The situation of laws regarding upland habitats is similar. Forestry laws are general, outdated, and poorly known. There is a series of laws and decrees that relate to forestry or woodcutting; however, enforcement of existing laws is essentially non-existent outside of a few portions of the protected areas. Even in the protected areas, enforcement presence is inconsistent and lacking the means to be effective. Education and enforcement have increased over the past five years, but staff and funding constraints limit the effectiveness of those actions.

Despite the efforts of a community-based foundation (Fondation Seguin www.fondationseguin.org) to promote conservation of La Visite's flora and fauna, the addition of a park director with staff and surveillance corps, and the delineation of the park boundaries with concrete markers, humans continue to live throughout the park, freely exploiting its natural resources and fragmenting the forests. Recent reports (TNC interview, Appendix 1) indicate that about 30% of La Visite Park has been converted to agriculture. Control of invasion by still more farmers is crucial, if the last vestiges of native ecosystems in Haiti are to be preserved.

Haitian-Dominican Republic economic and resource inequalities

The disparity in economic opportunities and natural resources between the two countries increases the threats to biodiversity on both sides of the border (UNEP 2013). Haiti is the poorest country in the western hemisphere, whereas the Dominican Republic is classified as a middle-income country. Haitian citizens seeking employment or uncultivated land in the Dominican Republic have settled on both sides of the border, often clearing land for subsistence crops using unsustainable agricultural practices. Active commerce between the two countries provides

employment but has also resulted in illegal trafficking of wildlife (e.g. lambi and eels) and forest products (charcoal). Deforestation, watershed degradation, pollution and resource depletion are affecting the quality of life for residents of both countries and there is a growing recognition that changes are needed.

7. ACTIONS NECESSARY TO CONSERVE BIODIVERSITY AND TROPICAL FORESTS

Throughout the interviews for this assessment, stakeholders emphasized that conservation of biodiversity and tropical forests cannot be achieved in Haiti unless the poverty leading to unsustainable land use practices is addressed. However, the loss of biodiversity and habitats has been so severe that if dramatic steps are not taken now to protect the remnant ecosystems, unique species and habitats may soon be lost forever. The urgency and extent of the threats to biodiversity require actions to address the numerous drivers to the threats simultaneously, throughout the country, a complex and somewhat overwhelming situation.

Table 9 displays actions identified during interviews and a review of project documents and relevant literature, which address the conditions driving the threats to biodiversity, described in Section 6, above. As discussed in Section 5.4, there are numerous conservation initiatives being implemented by government and non-government organizations with funding from public, private, and international sources.

Still, the need for action is great, and requires a balanced approach: address the needs of the local people for alternative sustainable incomes, provide training and equipment to strengthen the capacity to continue with those actions, enhance awareness of the importance of biodiversity and protected areas, and follow up with enforcement of laws protecting the environment. Experience has shown that an initial “strong-fisted” approach does not work, nor does economic development without protection for the remnants of natural ecosystems.

Selection of which actions to address first is not a simple ranking process. It must involve affected stakeholders, including government agencies, local communities, and other development organizations. Coordination with other institutions will allow more efficiency in addressing current gaps in protecting biodiversity as well as avoiding pitfalls such as training overload when too many projects target the same agency or community simultaneously.

To effectively address the threats to biodiversity, cooperation must also extend across the national boundary. Cross boundary initiatives have been progressing over the last decade with participation by both governments and assistance from the United Nations and development agencies of the USA, Germany, Switzerland, and Spain. The existing partnerships and cooperation mechanisms should be continued and improved to effectively address the growing threats to biodiversity across Hispaniola.

Table 9. Actions necessary to conserve biodiversity and tropical forests

Drivers	Links to Direct Threats	Actions Necessary
Poverty leading to unsustainable land use practices	● Overexploitation of resources ● Excessive cutting and filling of mangrove areas and wetlands ● Pollution and poor waste management ● Fragmentation and alteration of ecosystems ● Increased vulnerability to climate change	Focus on economic, social and environmental resilience; develop sustainable alternative livelihoods, promote alternatives to charcoal, enhance watershed stabilization. Facilitate acquisition of Infrastructure (fish storage, germplasm centers) and equipment (fishing gear) followed by training to support alternative livelihoods. Initiate forest restoration as well as agroforestry; increase community involvement in mangrove and upland forest restoration, incorporate PES as an avenue to increase long term project success. Increase capacity of local communities to continue after project funding has ended. Improve health and sanitation.
Lack of awareness related to biodiversity and environmental laws	● Overexploitation of resources ● Excessive cutting and filling of mangrove areas and wetlands ● Fragmentation and alteration of ecosystems	Include environmental awareness as a component of all projects. Promote awareness of the existence and importance of protected areas and environmental laws. Increase education on the importance of environmental laws and ecologically sensitive areas, such as mangroves (for stakeholders, law enforcement, and courts). Increase stakeholder involvement in the development and implementation of environmental policy and law.
Outdated laws related to natural resources and weak enforcement of existing laws	● Overexploitation of forest and fishery resources ● Excessive cutting and filling of mangrove areas and wetlands ● Fragmentation and alteration of ecosystems	Strengthen commitment to transparent governance including enforcement at national and local levels and strengthen capacity for monitoring, compliance and enforcement of natural resource laws and policies, particularly for professionals (e.g. judges, attorneys) involved in the judicial system. Provide technical support for updating laws related to marine resources (fisheries, coral protection). Provide alternatives to practices contrary to environmental law (e.g. fishing, tree cutting) followed up by enforcement.
Lack of secure land tenure	● Overexploitation of forest and fishery resources ● Fragmentation and alteration of ecosystems and habitats	Improve land, marine and natural resource tenure security. Promote innovative best practices (e.g. customary approach, PES, incentives for contractual management arrangements) with the goal of demystifying land tenure as a constraint for the adoption of conservation methods and practices. Increase capacity for research and advocacy on tenure and resource access-related issues and regulations to support government, civil society organizations and citizens. Promote the delineation, management and designation of existing and new protected areas.
Weak governance, including political instability and fragility of institutions, lack of sufficient financial support for biodiversity management, and absence of a national policy with well-defined action plans	● Overexploitation of forest and fishery resources ● Excessive cutting and filling of mangrove areas and wetlands ● Fragmentation and alteration of ecosystems and habitats	Enhance capacity by trainings for results-based environmental management planning, monitoring and the access and use of information. Increase site specific training (e.g. restoration techniques and fire control in native forests and swimming/boating in marine protected areas). Promote participation in group and sectoral tables for coordination with key stakeholders, including government ownership and leadership. Strengthen the capacity of national and local institutions and community-based organizations responsible for the management of natural resources; support organic legislation and independent budget for ANAP, enhance effectiveness by addressing turnover, promote partnership funding and FHB. Improve post-project continuity by lengthening time-frames and continued monitoring.
Haitian-Dominican Republic economic and resource inequalities	● All of the threats listed above are exacerbated in the border region	Emphasize environmental restoration in the border region, following the UNEP (2013) recommendation to improve existing transboundary co-operation mechanisms that deal with environmental issues and transboundary watersheds.

8. EXTENT TO WHICH THE MISSION MEETS THE ACTIONS NEEDED

The mission of USAID/Haiti has a wide scope, and some programs may not be directly linked to protecting species and habitats; however, economic and food security is intrinsically linked to sustainable use of the natural resources of Haiti, and that link should be considered in every program activity. Improving the independence and accountability of specific government institutions can also address relevant actions necessary to conserve biodiversity. With a population of 11 million and an annual growth rate of 2.5%, USAID health and social programs are also linked to the sustainable use of biodiversity resources.

Current Programs

USAID funded programs can affect biodiversity and tropical forests both directly, through projects that conserve or enhance specific ecosystems, or indirectly, such as by providing alternative incomes for people who may otherwise turn to unsustainable exploitation of forest and marine resources. Information from interviews and fact sheets for current USAID programs were reviewed for their potential to affect the following seven categories of actions necessary to conserve biodiversity.

1) Resilience and Sustainable livelihoods: Develop sustainable alternative livelihoods. Promote alternatives to charcoal. Facilitate acquisition of infrastructure (fish storage, germplasm centers) and equipment (fishing gear) followed by training to support alternative livelihoods. Enhance watershed stabilization. Increase capacity of local communities to continue after project funding has ended.
2) Environmental awareness: Include environmental awareness as a component of all projects. Promote awareness of the existence and importance of protected areas and environmental laws. Increase education on the importance of environmental laws and mangroves (for stakeholders, law enforcement, and courts).
3) Ineffective laws/enforcement: Strengthen commitment to transparent governance including enforcement at national and local levels and strengthen capacity for monitoring, compliance and enforcement of natural resource laws and policies. Provide technical support for updating laws related to marine resources (fisheries, coral protection). Provide alternatives to practices contrary to environmental law (e.g. fishing, tree cutting) followed up by enforcement.
4) GOH Natural Resources Agency Capacity Building: Enhance capacity by trainings for environmental management planning, monitoring and the access and use of information. Increase site specific training for marine protected areas. Promote participation in group and sectoral tables for coordination with key stakeholders. Strengthen the capacity of national and local institutions and community-based organizations responsible for the management of natural resources; support organic legislation and independent budget for ANAP, enhance effectiveness by addressing turnover, promote partnership funding and FHB. Improve post-project continuity by lengthening timeframes and continued monitoring.
5) Land tenure/Protected Areas: Improve land, marine and natural resource tenure security; increase capacity for research and advocacy on tenure and resource access-related issues and regulations to support government, civil society organizations and citizens.

Concurrently, support the delineation, management and designation of existing and new protected areas.

6) Reforestation: Initiate forest restoration as well as agroforestry; increase community involvement in mangrove and upland forest restoration, incorporate PES as an avenue to increase long term project success.
7) Improve health and sanitation: particularly management of solid waste and pollution.

The extent to which current USAID/Haiti programs address the 7 categories of actions is displayed in Table 10, followed by a brief descriptive summary of the individual programs.

Table 10. Extent to which USAID programs address threats to biodiversity and tropical forests.

	Resilience/ Livelihoods	Environmental Awareness	Laws/ Enforcement	Capacity Building	Land tenure/ Protected areas	Reforestation/ Agroforestry	Health/ Sanitation
CMBP	X	X	X	X	X	X	X
Reforest	X	X		X		X	
FTFN	X	X				X	
AREA	X						
PAIN	X	X				X	
PARC	X						
SAP	X						
FFP	X					X	
WASH							X

CMBP – Caribbean Marine Biodiversity Program (2014-2019, $10 million USAID, $2.5 million TNC): This recently-ended, regionally funded program was the key biodiversity program for USAID/Haiti. CMBP supported national fisheries policy reforms, strengthening the management of Three Bays Park, mangrove restoration, conducting community outreach programs, and strengthening the capacities of local fisher associations to support sustainable fisheries and undertake alternative livelihood activities. While the successes of the program were very encouraging, there is concern that now that USAID funding has ended, some of the capacities gained may be lost without some follow-up.

USAID Haiti **Reforestation Project** (2017-2022, $39.3 million USD): USAID's Reforestation Project works with communities to develop and implement watershed management plans to increase mangrove and agroforestry tree cover, while raising incomes and bolstering food security. The project takes a holistic, community-based approach to designing and carrying out the watershed management plans for various ecosystems in the region. Such efforts will cultivate trained and empowered local communities and authorities that can continue implementing their watershed management plans (see interview, Appendix 1).

FTFN – Feed the Future-North aka AVANSE (2013-2019, $85.8 million USD): Feed the Future North is a relevant USAID initiative in relation to biodiversity and tropical forests. The recently ended project was a multi-sectoral program, which aimed to increase agricultural incomes for more than 30,000 rural residents through key investments in farm productivity, natural resource management, marketing systems, agribusinesses and agricultural infrastructure. The project worked in the northern plains in three key crops—rice, plantains, and cocoa—and included

complementary investments in other agricultural products. FTFN improved more than 2,700 hectares of degraded lands through installation of agroforestry systems.

AREA - Feed the Future Appui a la Recherche et au Development Agricole (2015-2020, $13.7 million USD): The overall objective of AREA is to build the capacity of public and private Institutions/organizations to provide results-oriented agricultural research and extension programs that are inclusive of all farmers, promote gender equity, and are appropriate for Haiti. In December 2018, researchers with the AREA project launched the innovative program known as PICSA, or Participatory Integrated Climate Services for Agriculture, which combines historical climate data and weather forecasts with farmers' knowledge of what works in their local communities to increase their resilience.

PAIN - Project d'Appui aux Innovations Agricoles (3 years, $350,000 USD): This activity is part of the sustainability measures envisioned by previous programs to ensure continued support to producer Organizations (PO), agribusinesses, and the Rural Center for Sustainable Development at Robin. To improve livelihoods opportunities and protect Kenscoff's particular ecosystem upon which its members depend, the program promotes sustainable agriculture and respect for environmental stewardship. The project works closely with representatives of farmer associations to support a wide range of initiatives, including seedling production and tree planting, composting, vegetable production under greenhouses, demonstration plots to showcase improved agricultural practices and capacity building and market linkages for producer organizations.

PARC - Projet d'Appui au Renforcement du CRDD of Montrouis (3 years, $450,000 USD): This activity is part of the sustainability measures envisioned by previous programs to ensure continued support to producer Organizations (PO), agribusinesses, and the Rural Center for Sustainable Development (French Acronym, CRDD) at Montrouis. A key strategy is to promote dry land and irrigated agricultural production practices that increase productivity while reducing degradation within targeted sub-watersheds.

SAP - Sustainable Agricultural Program (3 years, $500,000 USD): This activity is part of the sustainability measures envisioned by previous programs to ensure continued support to producer Organizations (PO), agribusinesses, and the Rural Center for Sustainable Development (French Acronym, CRDD) at Bas Boen. In addition to increasing agricultural productivity, the program seeks to strengthen the capacity of Sub-Watershed Management Committees (SWMCs) to implement plans to help stabilize targeted sub-watersheds.

FFP - Food for Peace (Permanent program, annual funding varies): Food for Peace has two main components: an Emergency Component in which they respond to earthquakes and other crises by providing food, cash, or other assistance; and a complementary Development Component, which promotes food security. Tree planting for agroforestry is one aspect of the development component, but it is mainly centered on food production and commercialization.

WASH – Water, Sanitation and Hygiene services (2017-2021, $5.4 million USD): USAID WASH activities improve access to clean water and sanitation services, with a focus on preventing waterborne diseases such as cholera. Working closely with the Haitian Water and Sanitation Department, USAID seeks to sustainably improve water and sanitation infrastructure, particularly in cholera hotspots and Hurricane Matthew-affected areas. Helping the government to reopen their fecal sludge management facility at Morne a Cabrits has biodiversity benefits by reducing sewage inputs to the waterways.

Support for biodiversity programs needs to be long-term in order to be effective. This long-term support needs to be in the form of dependable financial support, but also as a long-term commitment to biodiversity protection strategies, strengthening governance (including the appropriate use of influence), capacity building, and involvement of all interested partners.

9. RECOMMENDATIONS

While some of the actions necessary to address threats to biodiversity are already incorporated into current USAID/Haiti programs, as was discussed in Section 8, the next Strategic Framework could enhance the effectiveness of those efforts by more directly incorporating biodiversity issues into the Development Objectives. The extent to which USAID programs can address threats to biodiversity varies by sector. The recommendations in Table 11 show how each sector can take advantage of existing programs or develop new initiatives to increase the extent to which biodiversity threats are addressed.

During the interviews for this assessment, the following specific highlights from the recommendations were emphasized:

- Strengthen capacity for ANAP, especially regarding management planning and staffing to support conservation of remaining primary forests and marine biodiversity in protected areas (particularly for Three Bays Park). This responds to recommendations from MARNDR Fisheries Division, TNC, and FoProBiM (Appendix 1) to continue to emphasize protection of marine ecosystems and mangrove restoration. It also responds to the need expressed by ANAP for assistance with capacity building for effective protected area management as well as concerns expressed by UNEP and UNDP about the loss of newly developed capacity when projects close abruptly without follow-up. As noted in Section 5.4, the newly installed Three Bays Park management is also not yet self-sufficient. While FoProBiM is working with ANAP to help strengthen the management capacity at Three Bays Park, having the continued support of a major development agency, such as USAID, would enhance those efforts and address a spatial gap in conservation efforts as described in Section 5.4, above. Binational training in fisheries and mangrove management, as suggested by TNC, would be one of many options available for capacity building. Binational training would link with the recommendation for cross-border collaboration, described below and could also be linked to development objectives addressing rule of law, institutional independence and accountability, and economic/food security in the new USAID/Haiti Strategic Framework.
- Lengthen project time frames to ensure the capacity built is not lost and adequate monitoring can be done. This responds to concerns expressed by UNEP, UNDP, IDB, TNC and FoProBiM that project time frames of 3-5 years are insufficient to develop capacity that will be able to independently continue once the project ends. Lengthening timeframes to include post-project support and monitoring, as well as assisting the Government of Haiti with addressing the need for national guidance looking at 20-30 years (as suggested by IDB in Appendix 1) could be linked to a development objective related to institutional independence and accountability in the new USAID/Haiti Strategic Framework.
- Continue to balance emphasis on resilient sustainable livelihoods with watershed and ecosystem restoration. This responds to concerns expressed throughout the interviews (particularly with UNEP, UNDP, FoProBiM, World Bank and IDB) that conservation efforts will not succeed unless people are given sustainable alternatives for their livelihoods. At

the same time, if action is not taken now to protect and restore watersheds and ecosystems, globally important components of biodiversity may be irretrievably lost. While we recognize the importance of the USAID/Haiti projects promoting sustainable livelihoods, and there are still some projects with restoration components, it is a concern that since the 2016 Haiti 118/119 biodiversity assessment, the balance has shifted away from ecosystem restoration in USAID projects. We recommend a renewed emphasis on integrating biodiversity into all program areas and projects in the upcoming USAID/Haiti Strategic Framework.

- Continue to actively coordinate with other agencies, sharing information on all phases of project planning and implementation. This responds to recommendations from UNEP, UNDP, TNC, and World Bank to continue to participate in Sectoral Tables/Groups and other forms of coordination to avoid overlap and efficiently allocate development resources. Encouraging stronger participation and leadership by the Government of Haiti would also enhance this effort and could be linked to a development objective related to institutional independence and accountability in the new USAID/Haiti Strategic Framework.
- Continue cross border collaboration with the Dominican Republic to enhance the effectiveness and sustainability of programs including transboundary watershed restoration, marine area protection, and sustainable eco-friendly livelihoods. This responds to ideas raised during interviews with USAID staff for Haiti, Dominican Republic and Latin America/Caribbean Region (Appendix 1), as well as a report on environmental challenges in the border zone by UNEP, UNDP and the ministries of environment of the two countries (UNEP 2013). Since the threats to biodiversity are similar to the rest of the country, but exacerbated in the border region, the recommendations for the rest of the country should also be followed with increased emphasis and collaboration in the border region. As elsewhere, improving livelihoods is essential and should include alternative income generating activities (e.g. ecotourism, beekeeping), sustainable agricultural and fishing best practices, alternatives to charcoal, and support for water, sanitation and health programs. To ensure sustainability, watershed protection and restoration should include reforestation for agroforestry as well as native forest regeneration. The USAID study of watersheds in the Dominican Republic should be replicated in Haiti to identify priority watersheds for restoration. Collaboration encompasses direct project actions as well as general technical exchange, training on best practices, and financial collaboration. Including stakeholders from both sides of the border including national and local governments, non-government organizations, and local community members remains essential to successful collaboration. Rather than emphasizing one country, programs should be developed from an island-wide or regional perspective.
- Include environmental awareness as a component of all projects. This responds to recommendations from IDB, MARNDR Fisheries Division, FoProBiM, and ANAP. Environmental awareness can range from training artisanal fishing participants in the environmental and economic benefits of sustainable practices to including information about the environmental impacts of improper waste disposal in WASH programs. These efforts could be linked to development objectives related to economic/food security, health outcomes and education outcomes in the new USAID/Haiti Strategic Framework.

- Increase the restoration of mangroves and native forests as a component of projects developed under the next Strategic Framework. This responds to recommendations from TNC, MARNDR Fisheries Division, CHRAD, and World Bank. While tree planting for agroforestry is beneficial to biodiversity by providing soil stability and habitat for some birds and other animals, native forest ecosystems are far more important to the variety of endemic and vulnerable species of plants and animals in Haiti. Including restoration of upland forest ecosystems as a component of agroforestry projects and mangrove restoration as a component of sustainable development in coastal areas would result in tangible benefits for biodiversity and the ecosystem services provided to the local communities. These efforts could be linked to development objectives related to economic/food security in the new USAID/Haiti Strategic Framework.
- Follow-up with CHRAD and the Ministry of Environment on potential for assistance with germplasm centers. Concern was expressed during the interview with the CEO of CHRAD that an informal commitment hat been made by USAID to finance two germplasm centers. Following up on this matter would help clear up any misunderstandings, strengthen relations with the Ministry of Environment and CHRAD, and help identify possibilities for moving forward. If USAID is able to finance the germplasm centers, this would help strengthen the capacity for implementing tree planting projects for agroforestry and restoration of native species. This effort could be linked to development objectives related to economic/food security in the new USAID/Haiti Strategic Framework.
- Provide the knowledge and means for sustainable living, followed up by enforcement of resource protection. This responds to concerns expressed by ANAP and MARDR Fisheries Division about insufficient capacity for effective enforcement of environmental protection and fisheries laws. It also responds to the recommendation from FoProBiM to reduce the need for enforcement by first providing education and environmentally sustainable alternatives for livelihoods (followed by enforcement). Incorporating this strategy into capacity building and sustainable development projects could be linked to development objectives addressing rule of law, institutional independence and accountability, and economic/food security in the new USAID/Haiti Strategic Framework.
- Enable effective resource protection by strengthening use and tenure laws, awareness and enforcement abilities. This responds to concerns raised by USAID/Haiti, UNDP (6th National Report on Biodiversity), and World Bank. While the existing formal and informal land tenure system generally works for homesteads and cultivation plots, it does not adequately address issues associated with reforestation and protected areas. Assisting the Government of Haiti with strengthening land use and tenure laws could be linked to development objectives addressing rule of law, as well as institutional independence and accountability in the new USAID/Haiti Strategic Framework.
- Strengthen capacity for fire control and planning in protected areas. This is a specific recommendation from ANAP/BSAP regarding institutional capacity and environmental protection. BSAP staff responded to numerous wildland fires in protected areas in 2020, which directly affected forest ecosystems and reduced the ability to patrol the protected areas and regulate unauthorized uses. Assisting with strengthening capacity for fire control and planning could be linked to a development objective addressing institutional independence and accountability in the new USAID/Haiti Strategic Framework.

Table 11. Recommendations

Sector	**Opportunistic**: Working within the boundaries of programs to improve the extent to which the mission is meeting the actions necessary to reduce threats.	**Proactive:** Adapting programs to improve the extent to which the mission is meeting the actions necessary to reduce threats.	**Direct Threat Reduction:** Designing with an explicit objective of reducing threats or otherwise contributing to biodiversity conservation.
Democracy and Governance	Strengthen commitment to transparent governance (including enforcement) at international, national and local levels. Promote awareness of the existence and importance of protected areas and environmental laws.	Strengthen capacity for monitoring, compliance and enforcement of natural resource laws and policies. Increase capacity for research and advocacy on land tenure issues and regulations including best practices and innovative approaches.	Provide technical support for updating laws related to marine resources (fisheries, coral protection). Provide sustainable alternatives to practices contrary to environmental law (e.g. fishing, tree cutting), followed up by enforcement.
Economic Growth and Agricultural Development	Include environmental awareness as a component of all projects. Promote alternatives to charcoal.	Develop sustainable alternative livelihoods, Facilitate acquisition of Infrastructure (fish storage, germplasm centers) and equipment (fishing gear) followed by training to support alternative livelihoods.	Increase capacity of local communities to continue after project funding ends. Include forest restoration as well as agroforestry for resilience. Enhance watershed stabilization and climate smart agriculture.
Environment	Promote participation and ownership by GOH in group and sectoral tables for coordination with key stakeholders. Support organic legislation and independent budget for ANAP. Enhance effectiveness by addressing turnover. Promote partnership funding and FHB. Improve existing transboundary co-operation mechanisms that deal with environmental issues and transboundary watersheds	Enhance capacity through trainings for results-based environmental management planning, monitoring and the access and use of information. Increase site specific training for marine protected areas. Improve post-project continuity by lengthening timeframes and continued monitoring.	Support the delineation, management (including co-management with local institutions) and designation of existing and new protected areas. Initiate forest restoration projects. Increase community involvement in mangrove and upland forest restoration. Incorporate PES as an avenue to increase long term project success.
Health	Develop governance frameworks and strategies for the prevention and minimization of land-based sources of pollutants.	Promote a life-cycle approach to solid waste across the value chain to ensure the efficient use of natural resources in ways that prevent pollution and strengthen the economy	Improve management of solid waste and pollution by combining incentives with effective and efficient enforcement strategies (e.g. efficient government regulation, public participation, economic instruments, multi-community cooperatives), cultivating a culture of compliance and investing in education for change
Education	Promote the incorporation of environmental education into existing curricula (reading, science)	Support environmental programs provided by botanical gardens and other institutions	Promote a school and educational national pilot program around tree planting and forest ecosystem services.

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Appendix 1. Teleconference Interviews for the Assessment of Biodiversity and Tropical Forests

25 March 2020: USAID/Haiti
31 March 2020: USAID/LAC
4 April 2020: USAID Haiti Reforestation Project - Chemonics International
6 April 2020: USAID Office of Economic Growth and Agricultural Development and USAID Food for Peace
16 April 2020: IDB
16 April 2020: USAID/Dominican Republic SEED Team
29 April 2020: UN Environment
29 April 2020: The Nature Conservancy
30 April 2020: MARNDR Fisheries Division
1 May 2020: FoProBiM Foundation for the Protection of Marine Biodiversity
6 May 2020: UNDP United Nations Development Program
6 May 2020: CHRAD Centre Haitien de Recherche en Amenagement et en Developpement S.A.
7 May 2020: World Bank
8 May 2020: Ministry of the Environment/ANAP (National Agency for Protected Areas)

25 March 2010: USAID - Abdel Abellard (Mission Environmental Officer), Taylor Adams (Programming Officer) and Betzy Colon (REA).

The Strategic Framework may be delayed due to COVID-19. The process starts at the end of March, with an official kickoff in May or June. The plan is to be done by the end of the calendar year. The new Development Objectives will not be drafted until mid-summer. There is a push toward looking at what is and isn't working in the current programs. No clear results are available, but they are working in that direction.

USAID Haiti is expanding resilience programming, it is the biggest resilience program outside of Africa. Although the mission stepped away from concentrating their program in corridors, they have identified 3 Resilience Zones for priority. The priority zones were based on consultations with the Government of Haiti and other stakeholders. While the Resilience Zones are emphasized, there is development work being funded country-wide:

- Health services delivery is country-wide
- Tree planting is being done in protected area buffer zones within or outside of Resilience Zones.
- Macaya and La Visite are not in Resilience Zones, but work is being done there
- Other programs have also expanded country-wide
- USAID is also giving power to local entities to address their own development challenges outside of resilience zones. The small grants program is not limited to Resilience Zones, but priority is given to those that are.

USAID Haiti is coordinating with other major donors to address needs and gaps in environmental programs. IDB and World Bank are two of the major donors working with USAID. Coordination is done at two levels. At the higher level World Bank and IDB meet with USAID and others. There are also Sectoral Groups coordinating and communicating on their respective areas (UNEP, UNDP, Canadian Cooperation are examples of sectoral participants). The Environmental Sectoral group meets and coordinates on areas where they are concentrating their efforts. There are also Sectoral Tables coordinating the implementing partners.

USAID support to community development is funding the power plant in the north and other development projects. They had started a charcoal use study, but stopped in order to adopt the methodology used the World Bank in their study.

The AVANSE program (Feed the Future North) will end later this month.

There was a reforestation training program in the North 2 weeks ago. That presentation will have more information on the program.

A climate risk management assessment is being done and will be shared with the 118/119 team. Each program will be given a Low, Moderate or High risk classification. USAID is also doing a world-wide risk assessment; Haiti is a priority country for interviews.

Some of the biggest challenges with development work in Haiti relate to land tenure and land security. Land and livelihood issues must be addressed for a program to be successful. The reforestation program is doing a good job with tree planting, environmental education, and beekeeping, but there is still a challenge with land security.

In the NE area deforestation is related to 1) trade with the Dominican Republic and 2) illegal harvesting. Clearer land tenure is needed to help with planning future supplies for charcoal and other products. Charcoal needs must be addressed to make reforestation successful. Perhaps remote sensing could be used to monitor tree planting success and illegal harvesting.

The Three Bays Program has been successful. The economic development component is important and there is a need for additional alternative livelihood components – especially to help with mangrove protection. The new Three Bays management plan will help guide involvement with local entities.

Follow up meetings were scheduled with USAID LAC and USAID Haiti EGAD personnel.

31 March 2020: USAID/LAC (Latin America and the Caribbean Bureau) – Benjamin Schapiro (Environment Team Lead, Office of Regional Sustainable Development - RSD), Christy Johnston (Environment and Natural Resources Advisor RSD), Diana Shannon (Bureau Environmental Officer LAC), Abdel Abellard (Mission Environmental Officer)

There is no specific biodiversity for Haiti. To date, funding for biodiversity projects in Haiti has been through regional funds ($4 million USD) managed out of the mission in the Dominican Republic. For the foreseeable future, we can expect similar funding through regional program rather than country specific funding for Haiti.

There is sustainable landscapes funding at significant levels for Haiti earmarked for reforestation, related to mitigating carbon emissions through landscape changes. This area of funding also has biodiversity benefits and may be where future opportunities lie for promoting biodiversity in Haiti. Sustainable landscapes has an $8 million USD earmark for 10 years for reforestation. A range of $4-8 million USD may be a reasonable possibility for future outlook.

Key aspects that will help programs/projects get priority for funding are:

- Opportunities to engage with the private sector
- Self-reliance
- Trans-boundary crime (could include wildlife trafficking, illegal mining, NARCO)

The recommendations to USAID in the 118/119 should be concrete but realistic given funding. Since future funding levels are not well known, most country assessments are not able to give specific funding information.

The DR used education funding, specifically the Workforce for Youth program to promote ecotourism and recycling. Those sorts of ties to biodiversity make use of available funding.

Mangrove harvesting for charcoal is a bi-national issue that is getting priority attention. Wood cut in the DR for charcoal and it is brought to Haiti and smuggled to the US (Puerto Rico and Florida) for grilling.

The sustainable landscapes initiative is addressing mangrove nurseries, seed banks and agroforestry.

CMBP ended in October 2019. There is no CMBP phase 2. Integrated Marine Ecosystem Management is a bi-national biodiversity program for biodiversity protection, fisheries management and mangrove preservation. Counterpart International is managing the IDB funded program through FoProBim in Haiti and Agrofrontera in the Dominican Republic. IDB is still funding FoProBiM for coastal management work through IMEM instead of CMBP.

Working with ANAP on Three Bays Park is a challenge. Their limited institutional capacity, funding, and staffing have limited their ability to do marine park management.

MPAs could still get USAID support either directly or through funding. Promoting artisanal fisheries would be another program that would get support.

It is possible that the next large initiative after CMBP may focus on wildlife trafficking. It would be a good issue to flag in the analysis and recommendations.

Christy will send the DR 118/119 analysis to the team.

4 April 2020: USAID Haiti Reforestation Project - Chemonics International – Michelet Fontaine (Director), Myrlene Chrysostome (Landscape & Watershed Management Specialist), Yves-Andre Wainwright (Lessons Learned)

The Chemonics team gave an overview of the project goals and theory of change.

- Reduce the threat of deforestation, focusing on the role of the wood-fuels and construction market as deforestation drivers in Haiti
- Improve resilience to economic and natural shocks by strengthening agro-forestry and animal husbandry as ways to generate income
- Increase tree cover in targeted areas and boost communities' investments in tree management and soil and water conservation practices
- Improve environmental governance to develop sub-watershed management plans and foster local community ownership of those plans

Getting men, women and youth from local communities involved in all aspects of the program are essential for resilience and long-term success. Resilience wasn't integrated into all aspects of the project at first, but now it is, and needs to be integrated in all aspects from now on, from beginning to end. People need to have ownership in the project for it to succeed. Ownership and resilience to climate change (due to drought, etc.) are highly important.

The project can't do everything everywhere, so from the initial 19 communes involved, they decided to focus on 5 sub watersheds: 3 in the Northeast and 2 in the North. The ministries of Agriculture and Environment identified priority areas in the north. They have been connecting with the communities and local grassroots organizations.in those watersheds for project actions. The project works on more land area in the North, but the number of people involved is similar between the two departments.

The project is active at the DR border, but not across the border. The DR has their own project in the area. There will be some farmer-to-farmer visits across the border in the future, but those have been delayed or possibly cancelled due to the Covid-19 situation.

Farmers have been selecting the tree species they wish to plant, with guidance, based on their needs, the condition of the area, and structure (based on downstream condition of the watershed). Due to past successes, acacia has been the highest demand, especially in the border area. The planting is primarily for woodlots and agroforestry. Agroforestry is done in several systems – e.g. coffee, cacao, sylvo-pastoral, which affects the species selection. Of the 32 species used, 12 are fruit trees. There has not been a demand for native species and there hasn't been planting done strictly for reforestation of native vegetation. Fruit trees have been planted in the Citadelle Historic Park buffer zone, but native species were not requested. The main focus is

on the long-term impact, getting farmers to manage trees after the life of the project, and agroforestry gets ownership.

The team has been engaging stakeholders from local communities and involving the ministries of Agriculture and Environment. They start by mobilizing the local government and staff to discuss the risks and how to address the risks to the landscape and the economy. Target communities identify their priorities for the year in the annual plans. The team also supports local initiatives, such as providing logistical support for an environmental awareness campaign in schools in the Northeast, and funding for a germplasm center. They also coordinate with World Bank, Sectoral Tables, and other organizations. The Three Bays Park manager is aware of all activities they do in the park.

To strengthen local governance, the Chemonics team held a training in the North Department. Lack of governance is always linked to biodiversity. Sometimes it has to do with local authorities not knowing their roles and responsibilities regarding laws related to the environment. The training program was developed specifically for that area. It has application elsewhere, but would have to be adapted.

Climate change is considered in all aspects of the program – species selection, crops, and interventions. For instance, some plantations will have to change from coffee to cacao, and the risk of citrus disease will increase in the lowlands.

Working with schools is important for sustainability, since the students are the next generation and will carry attitudes forward. Last year students planted 6000 trees in a very enriching project.

This project has not encountered any problems with land tenure, so far. The challenge will come in the maintenance of the plantings, as wood cutters and grazing animals move in.

Some future perspectives: Promote the use of local species (value local diversity) in agroforestry species selection (mangos and avocados). The state should get more funding into rural value chains.

6 April 2020: USAID Office of Economic Growth and Agricultural Development (EGAD) and USAID Food for Peace Office – Reginald Toussaint (Project Development Specialist, EGAD), Eddy Lebelon (Senior Development Program Manager, Food for Peace Office)

USAID has been operating under the 2018-2020 Strategic Framework and the Development Objectives of that framework. Development objective #2 Economic and Food Security Enhanced is being addressed by supporting the agricultural sector to foster economic development. This leads to food security and fosters private sector growth (producing jobs and economic growth.

Resilience has been the main focus and EGAD has been supporting that through the reforestation project and other programs. Resilience is likely to continue to be a big focus in the new Strategic Framework. They have completed the Project Appraisal Document for Agricultural projects; as new projects are developed, resilience will be a main focus. While projects in the two Resilience Zones (N/NE and South) get priority, there are still projects outside the Resilience Zones.

The main objective of resilience programming is to reduce the need for humanitarian assistance. The Zones were selected based on the history of crises faced. They are working on two capacities: Adaptive capacity, which is the ability to recover from shocks and crises, and Preventive capacity, which is more proactive. Resilience requires including families/households, communities, farmers, and others.

Macaya and La Hotte are not part of the Resilience program. They didn't want to duplicate other donors' work; they want the work to be complementary. USAID is coordinating closely with IDB and World Bank. La Visite and Foret des Pins are also not included. As part of the reforestation PAD, they are looking at other reforestation activities around the country; however,

that is just an idea, since the resources are all up in the N/NE area. They have been targeting coastal areas and mangrove reforestation in the NE and are working more and more with the Dominican Republic mission.

Due to the many crises hitting Haiti, development actions are often start/stop. USAID wants to be more proactive. Increasing capacity and diversifying incomes will make people more prepared.

Food for Peace has two main components: an Emergency Component in which they respond to earthquakes and other crises by providing food, cash, or other assistance; and a Development Component, which promotes food security. A lack of food security has been leading people to sell their livestock or reduce meals during hard times. The development component is different, but complementary to the emergency component. Tree planting for agroforestry is one aspect, but it is mainly centered on food production and commercialization. Thus, the approach to resilience is layered, with complementary activities, not just one approach.

Biodiversity and tropical forestry are not primary considerations in project objectives. Tree planting, erosion control, flood control are project activities linked to biodiversity. Biodiversity could be considered more directly in the future, but there really hasn't been a push in that direction.

Capacity building with the Haitian government is a long process affected by transferring leaderships and changing priorities. USAID developed a database with WFP and others for the Haitian government to track food assistance, which would be one example of "results based" assistance.

After the WINNER and AVANSE value chain focus, they want to learn from the successes and formulate a new generation of climate sensitive projects, which will lead to resilience. Most activities have been impacted by severe climate conditions, so climate sensitive programming is needed for the future. They also need local ownership. Some projects have no system in place to continue after the project is done. Using local systems and organizations will ensure sustainability at the end of the project. Access to finance is also key to resilience.

Gender and youth issues and opportunities have been key considerations in the resilience program.

Biodiversity and forestry need to be a big part of future programming to achieve resilience, but funding levels are unknown. Forestry isn't likely to be new forests, but support to existing forests (especially mangroves) and primarily agroforestry systems. More and more will be done with local organizations for greater impact with limited resources.

16 April 2020: IDB - Nastasia Keurmeur (Environmental Consultant/Project Manager), Géraud Albaret (Natural Resources Management Specialist)

Environmental protection is not a main priority in the current IDB Country Strategy; however, they are investing heavily in the agricultural sector and promoting watershed management downstream as well as upstream for sustainability. Their environmental work is primarily done through co-financing with NORAD and other groups. IDB projects are mainly in the South, but also have agriculture projects in the North and Northeast. They fund cross cutting projects for forestry management, fisheries, mangrove restoration, coastal areas, and Natural and Historical asset protection. They also have a focus on protected area management (marine and terrestrial).

The Macaya project (https://www.iadb.org/en/countries/haiti/projects-glance) started in 2013 and is now closing. The project included reforestation and support to local communities. The support was largely to farmers to improve the quality of life and decrease pressure inside the park. Although the project is closing, they want to keep supporting the Ministry of the Environment to continue the preservation of the park and zone.

A new phase of the Macaya project, nicknamed Macaya 2, is being formulated as a GEF 7 project. This would be a $2 million USD small project to leverage funds with other donors. There is no commitment yet from NORAD, but UNEP said yes. They want to get other donors involved in the design of the project. Learning from the past project they hope to continue to preserve the park, but have one strategic approach and the projects would be designed around that.

Some lessons learned include:

- There has been a lack of scientific guidance for projects. Reforestation has been based on the desires of locals and not scientific evaluation. The next project should rely more on scientific tools.
- Continue to involve local communities, yet combine scientific tools with local community needs.
- There has been a lack of monitoring of ecosystems in the park. Thus, we don't know which ecological zones are priority or what kind of ecosystem we want to protect or restore. The projects did include some management and monitoring, mainly using GIS data. A draft of the reports may be available for restricted use.

Macaya Park is big so it is hard to put guards everywhere. Therefore, governance has to be addressed in several ways. ANAP is not totally functioning yet, it is on the way to becoming autonomous, but isn't yet. They don't have the legal authority to execute agreements, which will be needed to fully function. They also need strengthened legal status and more staff and funding. There is no dedicated ANAP budget. There is no ANAP office in the Southern Peninsula yet. Their organization needs to be improved at the national level.

GTAP is functioning, but is not moving at this time. In 2019 there was a large meeting and all of the different documents were approved, but there have been no meetings since, probably due to the current pandemic.

IDB has funded some equipment for Three Bays MPA, but no new project is planned.

There is an IDB funded fisheries project with MARNDR designed to improve artisanal fisheries from Jacmel to Jeremie. They are working with 75 fishing cooperatives to strengthen the associations using co-financing for equipment (boats, nets). People were at first reluctant, but now are paying 20-30%. The goal is to link producing sectors with environmental conservation sectors.

There is a GEF project for the restoration and preservation of mangroves in MPAs. The goal is to link economic development with preservation. The fishery access plan is linked to the management of the MPAs. ANAP is doing the ecological monitoring and is part of the steering committee for fisheries. They are hoping to improve communication between ANAP and the ministries.

IDB is focusing on the south because that is where their projects are. There are activities going on at Baraderes-Cayemite and Ile a Vache, but IDB is not directly involved. There is national coordination going on but the real link is in the field.

IDB has a larger focus on development in the agriculture sector. There are large projects for fisheries, fruit flies, and pig vaccination. Watershed management (mainly in the south and 1 project in the north) promotes infrastructures such as small dams and bank stabilization for soil conservation and flood control. The PITAG (Progamme d'Innovation Technologique en Agriculture et en Agroforesterie/ Program for Technological Innovation in the Agricultural and Agro-forestry sector) will provide farmers with technical assistance and a package of things such as rice and equipment.

The agriculture projects are large with big budgets because MARNDR can manage the big budget projects. The institutional capacity of MoE needs to be strengthened so it can also manage big projects. The consultant who evaluated MARNDR also looked at the MoE capacity and the report will be finalized soon. Recommendations from that evaluation will be used in the

design of Macaya 2. One way to build capacity would be getting project managers more directly involved with the national government staff. Too often the projects are funded by outside donors so the project managers feel they are employed by the project and not the ministries.

IDB projects have a climate smart approach, which promotes resilience. PITAG has a research component and climate change is a big part of that. Mangrove restoration includes a climate change component. Watershed stabilization incorporates climate models, but it is not a specific focus. There is also a study on the management of wood lots and how agriculture is connected with forestry projects. Gender is also more and more a component of IDB projects.

The biggest gaps in management of biodiversity and tropical forests in Haiti include:

- Patience: 5 year projects are not long enough for conservation impacts. There is a need for national guidance looking at 20-30 years.
- Monitoring: It is hard to show the effects of reforestation with no follow up monitoring.
- Go from opportunity to science: For example, watershed restoration is mostly based on input from local organizations and NGOs, not on a large area strategy. Choose project areas for specific reasons and rationale over a large area and time. Make a plan and stick to the plan.
- Build in conservation with other productive sectors, not just farmers. Conservation isn't just butterflies and other animals; it conserves ecosystem services to protect people.
- Better connection with social issues. Promote the environment to improve the social situation.

16 April 2020: USAID/Dominican Republic SEED Team (Sustainable Environmental and Economic Development) – Esther Zeledon (Director), Elizabeth Conklin (Deputy Director), Karen Pannocchia (Biodiversity Specialist), Malden Miller. Also Olivia Gilmore from USAID Haiti EGAD.

There are many shared initiatives between USAID missions in the Dominican Republic and Haiti. The main thrust started 18 months ago and builds upon existing biodiversity programs. It started with the Works program as well as WASH and involves natural resources management. There is also a new conflict mitigation and management program.

The DR 118/119 Biodiversity Assessment started with a geospatial analysis along the border. This has not been reproduced in Haiti yet, but was very helpful to the DR effort. The DR evaluation also showed the border is a wildlife trafficking hotspot.

The USAID/DR mission is involved in Three Bays MPA management planning, since their MPA (Monte Cristi) is adjacent, with no real divide. Watershed issues also cross the border in the uplands – supply and quality are affected. They intend to collaborate with the Haitian government, communities and organizations in their transboundary activities. There already is some cross border experience, but past programs used different methodologies and approaches than are being used now.

Transboundary activities involve a mix of local and national linkages. Biodiversity is more at the national level. Links with local governments on the Haitian side are weaker and relationships need to be strengthened.

There is a common plan for fisheries management with a MOU signed between DR and Haiti. Counterpart International will be operating that plan. The plan includes having the same seasons, fishing instruments, fish size catch, surveillance policies, conflict management and coordination on collecting fish catch information.

They are working on a Resilience PAD and biodiversity will be a part. The DR mission doesn't have any specific biodiversity funding.

Biggest Gaps:

- Understanding who are the Haitian counterparts. DR has a specific government contact for border activities. They don't know who all the Haitian counterparts are. They also need more of a sense of where civil society and local organizations are collaborating on watersheds: who are the strong partners and where are the opportunities for more support?
- A joint DR/Haiti workplan is needed for reforestation and other projects, with activity managers in each country.
- Reforestation: there are clear alignments where they can work together but there is more work to do. WASH is similar.

For the 118/119 Assessment, a GIS spatial analysis would take it to another level. Better visuals and maps help people understand the content. There should be a presentation to educate other offices on the assessment to make it more understood and likely to be used, rather than just checking a box.

29 April 2020: UN Environment – Paul Judex Eduouarzin (Chef du Bureau Port-au-Prince, Environmental Governance Officer)

While UN Environment is the new proper name, it will be used interchangeably with UNEP here. The main objective is still to support the government of Haiti in development activities. The approach has changed due to the earthquake of 2010 and other environmental situations, such as 3 hurricanes in recent years. After the Haiti Regeneration Initiative started (2009), the earthquake required a change in activities and UNEP concentrated their actions in the South Department.

UNEP has offices in Port-au-Prince and Port Salut. At the PAP office they work at the national level, while field activities are supervised out of the Port Salut office. For example they are working with the Ministry of Environment to develop new methodological guidelines for coastal reforestation as part of the goal to develop public policy to strengthen capacity at the national level. UNEP programs are focused in the south. They are a small agency and do not have the resources to work in other areas, but they are open if requested by the government.

Past programs have concentrated activities in Protected Areas and while they have seen good results, it has been difficult to see what the change has been at the national level. UNEP is developing a new strategy with a landscape approach. The process is just beginning, but the intent is to involve civil society and other donors. Past activities included projects beyond protecting areas, such as improving governance, working on energy, and supporting local governments on waste management; however, these activities were concentrated in and near protected areas. The new strategy will expand activities to include protected areas plus the surrounding areas in an integrated approach to have a major impact.

The UNEP focus is on ecosystem restoration, which involves dealing with climate change, but climate change is not the entry point. For example, during Hurricane Matthew fishermen put their boats in the mangroves for protection. This shows the need for mangrove restoration to guard against the effects of climate change, but climate change was not the primary driver of the project.

UNEP works with the Ministry of Environment, mostly with ministry staff, ONEV, watershed and coastal management, and then environmental assessment branches. They also work with ANAP, but high turnover is a big problem and lowers their capacity. ANAP has good managers, but lacks the capacity to manage all of the protected areas in the country. They need to improve their capacity while recognizing their existing abilities. The GTAP is still theoretically still there, but in 2019 the political situation made work difficult. When ANAP calls, GTAP will work for them, but they haven't been active in the past year.

Current UN Environment projects involve:

- Macaya 2 – restoring ecosystems, green economy
- Value chains in the South (French cooperation)
- Ecosystem approach in the South (GEF project)
- Cross cutting capacity development per the Rio Convention (GEF)
- A Macaya project funded by the Norway government
- In the preliminary phase of working with the MoE to define a project for environmental information

UNEP is involved with the Green Table, which involves stakeholders concerned with environment, socio-economic, government issues and more. This is different from the Sectoral Table, which is only environment. The Covid-19 situation is keeping them from meeting. UNEP, UNDP, USAID and others meet regularly, every 2-3 months in sub-sector groups (biodiversity, climate change). They are trying to define key approaches to come to the Government of Haiti with one voice. The full Environmental Sector Table is not working normally.

A key gap is the lack of coordination among organizations: need an entity to coordinate and avoid overlap. Donors have tried organizing actions in the past, but have not always been successful. Need an agency to clarify where and what donors should work on. Not at the group level, but at the agency (Minister or delegate) level. Turnover in the government means this is not always possible.

UN Environment is increasing their focus on green economy to improve livelihoods and protect the environment at the same time. They promote environmentally friendly activities and have stopped practices such as funding FADs.

UN Environment has done fisheries management plans for Port Salut and Pointe Abacou and they are developing plans for Ile-a-Vache and other areas. They have had good experiences with fishermen who are interested in improving income by improving the fishery. UN Environment promotes sustainable fisheries through:

- Technical assistance
- Training
- Materials
- Fisherman facilities for storage, etc.

Recommendations for USAID:

- Lack of clarity and lack of governance are the main challenges
- Lack of follow-up when projects close and lack of ability for locals to carry on the projects should be addressed.
- Emphasize capacity building in governance and poverty reduction by developing livelihoods

29 April 2020: The Nature Conservancy – Maxene Atis (Conservation Coordinator, Haiti Program)

TNC is in the process of updating their overall strategy for Haiti and the Caribbean region. Main focus areas will be:

- Strengthen protected area systems, particularly Marine Protected Areas
- Strengthen fisheries management
- Promote sustainable livelihoods

Recent key accomplishments include:

- Fisheries sector action plan
- Underwater mapping
- Biodiversity trust fund (Fonds Haitien pour la Biodiversity)
- Capacity building with local stakeholders, ANAP and the Fisheries Division

- Three Bays Management Plan
- Fish data management system with equipment and software

Going forward, TNC believes alternative livelihood projects in communities will reduce pressure on fisheries and coastal resources. The new strategy will not change much, although environmental awareness programs in the city will end. Coastal/marine management will continue to be the main focus throughout the Caribbean. The second focus will be climate change. TNC will continue to do some work on freshwater systems and watersheds.

TNC is working with UNEP and others on CBC (Caribbean Biological Corridor) and other initiatives. They support binational initiatives with DR, since it is a shared coastline with common concerns. Binational training in fisheries and mangrove management is needed and something that they think USAID could help with.

The management plan for the fisheries sector was developed for the NE area. IDB is working on something similar for the national level. The plan is not really being implemented right now. The fish data management system is a great tool. TNC gave equipment and nationwide training for the data system, but current crises may be slowing implementation. The Fisheries Division is mostly focused on resources exploitation, not protection or management, which is not the same goal as ANAP and other stakeholders.

CMBP (Caribbean Marine Biodiversity Program) was a success, but funding has ended. They are looking for other sources of funding and are working on a couple of proposals with donors. Still hoping for some support from USAID. CMBP and the Three Bays project helped develop some informal partnerships between ANAP, TNC, UNDP, IDB and FoProBiM. IDB helped primarily with infrastructure, such as offices and equipment. ANAP has limited personnel at Three Bays, but may not be able to continue – budgets are limited and the government usually counts on projects for funding.

Local municipalities are aware of Three Bays Park now. Five municipalities signed an inter-communal decree for fish management in the area. As CMBP ended and TNC left, FoProBiM continued some activities. More follow-up would be good to maintain trust with local stakeholders.

TNC is also working on a baseline ecological assessment of the Baraderes-Cayemite area. The coastal bays there are naturally protected, but there has been significant conversion to agriculture in the uplands.

FHB has been established as a foundation and the Caribbean Biodiversity Fund will manage the funds and transfer to FHB as needed. FHB has a director, board of directors, by-laws and manual of operations. TNC is providing technical support for a grant making strategy, mobilization, and other key documents. The German government has already transferred 9 million Euros to FHB for biodiversity conservation. TNC is working with World Bank to transfer $3 million USD for climate adaptation, and the French have made a soft commitment for more funding. World Bank is also providing $400,000 USD for operations (office, vehicle, etc.). TNC is working with FHB to develop partnerships and get operations going.

TNC has funded some reforestation projects on the DR border and Saint Michel de l'Attalaye. Native species of fruit and forest trees were used. The goal was agroforestry, not restoration of forests.

TNC has also been working with UNDP on projects at La Visite Park, Anse-a-Pitres and others. About 30% of La Visite Park has been converted to agriculture.

The biggest gaps in biodiversity conservation are

- Lack of capacity at the local level. There are good individuals, but there is a lack of knowledge about biodiversity issues.
- Continuity. The country runs on projects and by the time a new project starts, everything that has been started is undone.
- The government should play a more central role in directing what is done and where. There are lots of projects all over the place with no good coordination.

- The government is weak and lacks authority, so it can't conduct enforcement.

Recommendations:

- Need to find a way to fill the gap of local capacity. Need dedicated funding to build capacity. It is hard to transfer capacity, so some organizations just do the work rather than using it as an opportunity to strengthen capacity.
- Marine and coastal areas should continue to be a priority
- Freshwater systems should also be a priority. We are looking at a water crisis in the future.

30 April 2020: MARNDR Fisheries Division – Jean Robert Badio (Director of Fisheries and Aquaculture)

Haiti has 1770 km of coastline (including shores of the small islands) and 22,000 ha of inland waters. There are 50,000 fishing families in Haiti harvesting 16,000 tons of seafood annually. This does not include the additional harvest for export of 10,000 sea cucumbers and 20,000 eels. About 800-900 tons of seafood, mainly lobsters, shrimp and crabs are exported. Even with this harvest, Haiti still imports 21,000 tons of seafood (mainly tilapia) to meet the demand in the country.

Although Haiti is not a CITES signatory, exports of conch to other countries will be blocked until Haiti conducts surveys and has a management plan for sustainable harvest. Just before 2004, harvest went from 220 to 280 tons. Harvesting has not been legal since 2004, which is regulated by prohibiting export. Conch, lobster, sea cucumber, octopus and eels are all harvested for export, so export control is the way they can regulated harvest with limited staff. May – July there is no authorized export of lobster or sea cucumbers.

There are 5 large fish landing sites (2 new ones will be inaugurated at the end of the month).

There are 11 agronomists with M.S. degrees working in the Fisheries Division, as well as 26 fish technicians. The Fisheries Division works well with TNC, Spanish Cooperation and IDB. They are going to try to work more closely with FoProBiM in the future.

The National Association for the Protection of Aquatic Resources (ANAPRA) is becoming more active and will pay for surveys of fisheries resources. MARNDR wants to use ANAPRA funding for underwater surveys of conch and other export products (shrimp, lobster). ANAPRA are exporters of seafood and they are helping with conflict between Haiti and DR over lobster fishing. ANAPRA is also going to help with mangrove restoration.

The Fisheries Division is using the TNC/DR system for data collection. They are about 9 months into the data collection, but data collection has been interrupted by the Covid-19 situation. A 5 person team has been hired for underwater surveys, and is waiting on the Covid-19 restrictions.

An update of the fishing laws is being worked on in the IDB artisanal fishing program, but hasn't been completed. Part of the plan is to increase export taxes and license fees to provide revenue for fisheries management. With more than 50,000 fishers, regulating individuals is too difficult, so regulating exports is more efficient.

For sustainable fisheries, the equipment needs to change – get rid of the nets. TNC and FoProBiM are working on that in the north, but it needs to be done nationwide.

Larger boats are needed to get further out and relieve pressure on near shore waters. Most boats are 4-5 meters long, without motors. To get further out, boats need to be longer than 6 meters and have motors. Using fish aggregating devices (FADs) gives bigger fish, which also requires larger boats. There are 96 FADs, mostly in the SE and South. The goal of the FADs is to reduce pressure on the coast and Badio says they are helping a lot so far. He wants to see more, larger boats in the next 5 years. Fishermen also need to sell their catch quickly since there is a lack of refrigeration systems. The co-financing system for freezers and other equipment is

working well, so far. FADs are working well and the fishermen are happy with that. Harvest used to be about 3-5 kilograms/hour, now it is 5-7 kph with the FADs.

Eel are harvested September – April. One kilogram of eels sells for about $2000 USD, so it is much more lucrative than other types of fishing and large numbers of people are after eels. This reduces the pressure on other fish stocks during that season. Sea cucumbers are similar in effect.

Estuaries and rivers need to be protected to promote eel production. Eels are caught in the rivers when they come in from the ocean. Mangrove restoration is also important for the eel fishery. Rivers at Limbe and Limonade are the most important. There are not as many in the NE and NW, while there are some in the South.

Two sea farming (mariculture) projects will be starting, as well as 2 freshwater aquaculture projects. There are 8 big hatcheries for tilapia and other freshwater species. A hatchery is needed to provide fingerlings for the sea farming. Using cobia reduces the need for feeding and chemical inputs.

Gaps in addressing fisheries issues include:

- Overfishing is the biggest problem, especially in the NE and NW. The SE is the best managed fishery
- The lack of infrastructure, especially regarding conserving fish after catch during transport and storage
- The lack of scientific data
- The lack of application of legislation
- The lack of private direct investment
- The lack of education of fishermen
- The environmental condition of the coastline is a problem, sedimentation must be controlled
- Appropriate fishing methods are needed – get rid of nets
- There is a need for increased fish production from mariculture and aquaculture

Recommendations for USAID:

- Increase efforts to establish more MPAs. The Northeast MPA is working very well.
- Restoration of mangroves is very important
- River Protection should be promoted
- Provide education programs for fishermen with environmental awareness

1 May 2020: FoProBiM Foundation for the Protection of Marine Biodiversity – Jean Wiener (Director), Robert Cademus (Deputy Director)

The fisheries situation hasn't changed much over the last 5 years and may have even deteriorated a bit. The eel fishery is an example. American eels are an IUCN Red List endangered species, but they bring such a high price ($6000-8000/kilo) that thousands of people are out each night fishing. This high value has reached people at high level of the government. FoProBiM has backed off on the eel issue, since eel fishing relieves pressure on other fish stocks.

There is little to no regulation of conch, lobster and fin fish. The fisheries division doesn't have the resources to monitor and manage the harvest. People from DR are still buying a lot from Haitian fishers; much of this takes place on the water. There is no seasonal take limit on lobster and conch. Some eel, lobster and conch cross the border to the DR to avoid export limits.

CITES shut down the conch exports. They looked at doing the same for lobster, but it didn't happen. Accession to CITES would be a good idea, but without enforcement not much would change. However, they are hopeful that "if you build it, they will come" and accession to CITES would prompt changes. It would be best if the MoE supervises CITES, not MARNDR, since CITES goes beyond fish to all species.

There is still no clarity as to who is responsible for fisheries. MoE says they are in protected areas and MARNDR says they are responsible for fisheries everywhere. MARNDR still promotes FADs, which FoProBiM is against, believing FADs do more harm than good. FADs concentrate fish for the kill but don't restore fish stocks. Turtles can get tangled in the lines. FADs break free and add to ocean pollution. FADs don't relieve near shore fishing pressure, since so few people have large enough boats to reach FADs. Instead, FADs increase economic inequities by providing opportunities to richer fishers. Ten to fifteen beneficiaries is nothing compared to the total number of fishers. Most of the boats provided by earlier projects in the NE are gone (sold to the DR), no motors are working and no FADs remain.

There are still some MPAs recommended that have yet to be declared. The MoE hasn't been involving MARNDR in discussions of establishing protected areas. While coordination is required by law, it is not done in reality. Much of it is a governance problem – until an organic law is passed for MoE, MARNDR won't recognize their authority.

There is little confidence in the data from the Fisheries Division regarding exports – especially regarding what is sneaking across the border. There are no fisheries agents in Three Bays Park, only a few in the country, and they don't collect good data. Even if people have been trained to input data, it doesn't work if there is no data or no training in collecting data. Haitian fishers are also reluctant to provide information. They don't want more regulations.

The government is weak and sees local NGOs as competitors, rather than partners. They also see NGOs as an unlimited source of funds and want a cut. ANAP suspended the Three Bays co-management accord in March and gave no reason. FoProBiM is still on good terms with the director of ANAP and wants to work on resolving the matter. There is a Caribbean Biodiversity Fund project that FoProBiM is working on that could provide some resources to ANAP, but they need to solve the co-management issue first. ANAP has a park director at Three Bays, but he has no real power and is project funded, which may be ending soon.

Conversations about building a new port in Ft. Liberte are being acted upon. There are already roads being built. FoProBiM isn't against a port but it would need proper monitoring and surveillance. There is not enough water circulation in the bay to flush oil spills or other contaminations, so it would not be a viable commercial port. Planners are looking at more of a tourism marina.

FoProBiM works with and relies on local communities. They are the reason FoProBiM exists and need to be involved in all matters that affect them. Strong arm tactics backfire.

At the end of CMBP a bi-national meeting set up a transboundary working group. Only one Haitian local representative was involved. IMAM (funded by USAID and Counterpart International) is establishing a governance council of charcoal producers, fishers, local and national government (MoE, MARNDR, ANAP) for each side of the border. The councils for each side of the border would get together as a transboundary working group to work on:

- Value chains
- Issues with Haitian fishers crossing into DR
- Management of local resources
- Synchronized data collection: process and management for all resources.

FoProBiM has been involved in rehabilitating 100 ha of mangroves in the north as well as some mangrove restoration in the southwest. FoProBim has formed an environmental surveillance team to be their eyes and ears in different areas. The Agentes du Surveillance Environmental (ASE) only monitor, they have no enforcement capacity. FoProBiM is willing to train ANAP on any capacity building at any level. BISAP is ANAPs surveillance and enforcement team. Local mayors don't like BISAP coming in to enforce without them knowing.

FoProBiM has done some net exchanges for improved sustainable gear. They only had the resources to work with 4-5 fishers. Five mayors signed a decree and starting January 2020 it is illegal to use small mesh nets. They are not able to enforce the decree yet, but once enforcement starts, FoProBiM will provide equipment.

Moving forward, the issues of poverty, governance and environmental degradation are overwhelming. It is difficult to know what to focus on, since all aspects must be addressed at once.

- There is a deep need to increase capacity: data collection, enforcement of rules and regulations, getting people to use sustainable gear, and capacity to monitor exports. Training is very important. There are not enough people to do everything at once, but need to develop capacity.
- Avoid the strong-fisted approach: first educate, provide alternative opportunities, train, then enforce.
- Make sure sustainable stocks are maintained
- After the above are addressed, then go into governance issues.

Recommendations for USAID:

Mangrove ecosystems need more attention

- Find alternatives to the fuel issue
- Increase rehabilitation and reforestation
- Increase education on the importance of mangroves (for stakeholders, law enforcement, and courts)
- Provide support for the ability to protect and enforce

Longer project lengths are needed. Funding seems to be shorter time periods, but post project expectations are getting longer.

The 1978 fisheries and environmental laws need a thorough review/revision/update.

- Need education before enforcement
- Provide options, such as different gear
- Provide training in the use of gear, seasons, etc.
- Need to follow up education with equipment.

Coral reefs need stronger protection laws. There is still some mining of coral for construction.

Capacity building for ANAP and other groups.

- Include site specific training (such as swimming for people working in marine areas)
- Use caution in providing equipment and supplies. It can lead to corruption or being viewed as an unlimited source of funds. There are ways to work around it.

6 May 2020: UNDP United Nations Development Program – Dorine Jean-Paul (Head of Resilience Unit, Program Specialist)

The UNDP Environmental Unit and Risk Reduction & Management Unit have been combined into the Resilience Unit. They are doing multi-risk mapping and promoting local governance in protected areas and areas needing protection. The goal is to reduce the risk of disaster, such as flooding, drought, Tsunami, etc. UNDP works with the Government of Haiti to provide knowledge as well as looking at the livelihoods of local populations to adapt to climate change and disaster. They are working on increasing the knowledge of local populations, increasing government capacity, and increasing knowledge for better planning.

The UNDP Resilience Project is funded by GEF. They are working with ANAP to promote using ecosystem services in ways that increase the ability to adapt to climate change.

UNDP strategies are based on National policies to stay in alignment with national needs. Involvement of local authorities is important to ensure development happens on the ground. UNDP helps make sure local decrees are enforced. For example, the mangrove decree was good but turnover in local governance can lead to problems. Therefore, UNDP tries to reinforce the technical staff, which may be more permanent. ANAP is doing a good job with National strategy, but they are having problems with permanence at the local level.

UNDP tries not to put too many structures in place at once, so communities don't just give up when the project is done. They now try to reinforce what is already in place. For example, in the south UNDP is encouraging community organizations to scale up rather than start new projects.

UNDP is working on Green Climate Fund projects at 2 levels, is working on a food project proposal for implementation in 2021, and is working with ANAP on a GEF funded EBA (Ecosystem Based Adaptation) project: *Improving the Resilience of the Ecosystems and Communities Vulnerable to Climate Change and Anthropogenic Threats through a <<Ridge to Reef>> Approach to Biodiversity Conservation and Watershed Management* (https://open.undp.org/projects). They are also in the final stages of preparation of a biodiversity project with the Ministry of the Environment for productive landscape management focusing on biodiversity. UNDP is also helping Les Cayes Botanic Garden look at good practices to make them better. Another project, which is still in draft form, will seek GEF 7 funding for improving the flow of ecosystem services in the South region.

The national platform for dealing with disasters only comes together when there is a disaster, but should be working more on prevention.

The Nature Conservancy has submitted a draft on two new MPAs (80% completed). Ecological surveys and vulnerability assessments have been done.

UNDP is trying to get the Ministry of Environment to support Three Bays Park staff now rather than waiting for the end of project funding. A lack of specific budget for ANAP makes them dependent on project funding. The local ANAP staff has a lot to do to keep people engaged. They can't keep going because they don't get paid. ANAP staff already have a good local knowledge, but it is more natural knowledge than formal training.

The SNAP program is having a lasting impact through the tools developed for financial management and natural resources management. These tools were developed by ANAP with support from IDB. They also advocated for Three Bays Park and emphasized the importance of biodiversity in the establishment of the park.

The PARC program is having a lasting impact through the capacity strengthening project. They gave training to Ministry of Agriculture staff at local levels. The mangrove decree is a related outcome, since they got some training. There was a program in 2018-2019 to strengthen capacities for environmental management.

Financial and Technical Partners (PTF) need more information sharing, so everyone has the correct information for their programs. This will help avoid duplication of projects in the same area. For example, frequent training sessions by multiple donors in the same area is resulting in a training overload for some local staff. Donors don't seem to want to share information about projects in the planning stage. Knowing what is going on in the next five years is important for donors to know from each other. The Minister of Planning should play a prominent role in this.

UNDP is looking to find synergies and balance on the ground between protection and development. You can't leave one behind – there is a need to improve livelihoods and also enforce environmental protections.

The biggest gap isn't at the national level, it is how enforcement of watershed management is implemented. The 6th National Report on Biodiversity has good recommendations and highlights needs for new protected areas to be managed/protected and involve local communities. It is important to avoid pulling too much from a project where a community can step up and do things.

Dorine had an experience with USAID two years ago that didn't go well. UNDP asked USAID to partner with them on a GEF 6 project. The first discussions went well, but then legal/technical issues blocked progress. The legal staff needs to understand the need for flexibility so work can get done on the ground. Terminology like "co-finance" became a big deal, even with the explanation that it wasn't a funds transfer. Donors need to be able to partner on projects for synergy.

6 May 2020: CHRAD Centre Haitien de Recherche en Amenagement et en Developpement S.A. (Haitian Research Center for Planning and Development, Inc.) – Jean-Lucien Ligondé, CEO

CHRAD is comprised of 32 Haitians with Masters Degrees and PhDs. CHRAD was created to address educated Haitians who can't get a job after leaving government. They created a think tank to get people together.

Their priorities, in order, are:

1. Deforestation, which is the reason for the germplasm centers.
2. Habitat loss and degradation,
3. Overexploitation of forests
4. Air and water pollution
5. Climate change

In 2017 they met with the president and Minister of Environment to discuss the goal of doubling forest cover from 3% to 6%. They will need the infrastructure to produce millions of seedlings. The first germplasm center, located in Levy, was financed by Taiwan for $2.5 million USD and was completed in 5 months. That center is producing 23 species of trees. There are residences for agronomists, cooking facilities, storage buildings and composting facilities. There are 8 nurseries at Levy which together produce 480,000 seedlings. Some are transferred in 2-3 months to transplant stations, so the center has the capacity to produce 4.5 million seedlings per year.

The center at Fond-des-Negres, financed by the Government of Haiti, is 100% complete.

The center at Marfranc, financed by the Government of Haiti, is 100% complete.

The center at Aubert was expected to be financed by FAO, but the money didn't come, so it was financed by the Government of Haiti. It will be completed by the end of May 2020 and already has 250 coffee seedlings ready to go to the mountains.

The center at Grand-Pré was expected to be financed by USAID, but the money didn't come, so it was financed by the Government of Haiti. It is expected to be completed in June 2020.

A center at Ponceley was expected to be financed by USAID, but the money didn't come, so it has been postponed. They are still hoping USAID will come through with funding.

CHRAD has been doing the initial financing of the centers and then getting reimbursement from donors and the government.

The centers will produce one million coffee and one million cocoa, as well as breadfruit, avocado, mangos, cashews, guava, citrus and moringa. CHRAD centers are the only ones in Haiti with the capacity for 4.5 million seedlings in 6 months.

Lemon and coffee trees are dying with disease, so the germplasm centers are using native trees and getting seeds from resistant trees. They are also using indigenous cleaning – spraying without chemicals – to control rust on cacao.

Moringa is a popular species. It grows fast, protects the soil, and is eaten as a vegetable. About three million moringa have been planted for food and watershed restoration. About 5.7 million moringa will be planted in the northwest.

CHRAD is planning to plant 1000 Mapou, a giant ficus, which is endangered in Haiti. Mahogany is also being propagated.

CHRAD has 1.5-1.8 million coffee seedlings at Marfranc ready to go to plantations and the president wants 4-5 million coffee to replace old coffee in plantations.

CHRAD transferred the Marfranc center to the government three months ago, but the Minister of Environment doesn't have proper funding to address maintenance of the centers. CHRAD will enter into a public/private partnership to help manage the centers. They will get daily reports and do monthly visits.

In addition, CHRAD

- Sent management protocols to the Ministry of Environment to help with transition and transfer of the centers
- Is providing trees to people
- Is creating jobs: 270 people had jobs for the last big planting
- Is doing environmental awareness: they spent a month meeting with people for the planting program
- Hired people to watch over planted trees. They would like to expand this payment for ecological services (PES) program. With funding they could pay $60/month USD to protect 3 ha of trees – if the trees die, there would be no payment.

After a major study of 25 watersheds needing reforestation, not even 1% was done. Now with germplasm centers, 5.7 million trees per year can be planted. Haitians will plant and protect coffee and breadfruit trees because they know they will produce in 3 years.

Recommendations for USAID:

- Consider CHRAD centers an asset to the country – they are producing more than USAID thought possible. Consider how to form a Private Public Partnership to help finance germplasm centers for watershed and biodiversity restoration. In 2019 CHRAD didn't get any funding from the government and had to get loans to keep the centers going.
- The largest business in Haiti is charcoal. About $600 million USD in revenue is generated. Around 1.2-1.6 million people live off of charcoal production. CHRAD wants to create some energy forests to supply wood while protecting watersheds. They also want to create a fund to pay people to protect trees (Payments for Ecological Services). Could USAID help with this?
- There is a need for watershed conservation and USAID has the capacity to help with this effort.
- CHRAD would like USAID to finance the two centers that USAID had promised.

7 May 2020: World Bank – Christophe Frederic Robert Grosjean (Development Specialist), Andrew Drumm (Environmental Specialist Consultant), Kevin McCall (Environmental Economist)

World Bank is at the stage of thinking about the next Systematic Country Document (SCD), which is their 5 year framework for development activities. They are refining the SCD now and it is to be done at the end of the year. This is a good time to get together with USAID to engage on environmental projects. Environmental stability and resilience will be included in the new SCD.

Resilience is addressed in many sub-components of projects to protect communities and livelihoods. In disaster response, short term needs can detract from the long-term resilience response. The incorporate resilience into projects through livelihood improvement and add an environmental component.

Resilient Productive Landscapes program includes RESPAC 1, which is closed and RESPAC 2, which will close December 2022. The program is based on lessons learned from the previous 10 years of projects. The objectives are to increase productivity of farmers and the value chain, and (post-Matthew) to improve watersheds.

Haiti has more than 1 million farmers and more than 1 million ha of crops, so farmers are a key element of their programs. The trees they plant are for agroforestry and mangrove restoration, which promotes watershed stability.

The primary objective of World Bank programs is poverty reduction, but environmental sustainability is a result. Biodiversity assessments are done for their projects (freshwater biodiversity needs more attention).

They are looking at doing some reforestation near Cap Haitien in the upper watersheds of Morne Lori, an area of Morne du Haut du Cap (communal section of Cap Haitien commune) which has been identified for designation as a National Park. In other areas, agroforestry and energy trees have a better chance of surviving. Land tenure also hampers reforestation efforts with native species.

Deforestation is due to a lack of food security, so the challenge is in how to promote biodiversity, food security and agroforestry. Agroforestry should protect crops, generate income, improve nutrition, and promote biodiversity.

Macro-landscape conservation is elusive. At the micro level, they incorporate environmental safeguards and components in their projects. Every World Bank project has biodiversity and conservation at its core. Each project also has an amount of tree coverage as a goal.

World Bank supports the Haitian Biodiversity Fund (FHB), which is linked to the Caribbean Biodiversity Fund. The funds are managed by CBF and the interest will be used by FHB for biodiversity. Approximately $150,000 USD will be generated per year from the World Bank contribution ($3 million at 5% interest). The establishment of the FHB was just published in Le Moniteur.

The Resilient Productive Lands project changed focus due to Covid-19. They launched an emergency response to help 20,000 farmers in the next two crop cycles. The food crisis will be the main challenge in the coming times. An emergency component written into each project is triggered by a request from the Government of Haiti. This can delay outcomes from the original goals.

Climate smart agriculture is resilient agriculture. They promote vegetables and other crops at humid mountain tops and irrigation crops in the lower dry forests. They also promote mangrove restoration to protect the coast and reefs. They innovate, test and promote different systems for each area.

To make sure trees aren't cut in protected areas, it is important to promote other livelihood activities in the buffer zones – such as beekeeping and promoting native fruit trees. The program should promote improving livelihoods, agroforestry, watershed protection, and biodiversity.

Coordination among agencies in the agricultural sector is happening at three levels

- Bilateral participation
- Sectoral Groups
- Sectoral Tables: the agriculture table has not met for the last 2-3 years. It is important for the agriculture and environment tables to work together.

CIAT may be leading the charge for biodiversity protection more than the Ministry of Environment. They have been delineating protected areas and getting more done on the ground. Agencies can also work with BNEE (*Bureau National des Evaluations Environnementales*) on environmental safeguards.

Recommendations:

- USAID should continue with the group and table discussions in order to work together with all agencies and donors. The taskforce formed for FHB is an example of good working relations. Unfortunately, there has been a lack of participation from the Government of Haiti, who is supposed to be leading the effort.
- Continue to protect and restore mangroves. There are national policies forthcoming.

8 May 2020 Ministry of the Environment/ANAP (National Agency for Protected Areas) - Bertrand Talot (Environmental Education Specialist), Major Michaud Saint-Fleur (Director of the Security Brigade of Protected Areas (BSAP)), Arlan Lecorps (Technical Advisor and Senior Agronomist), Olivia Gilmore (USAID)

There are 26 protected areas in Haiti, 10 are in normal operation. In 2010 ANAP become an independent autonomous structure under the Ministry of Environment. Their mission is to conserve biodiversity in protected areas. Thus, ANAP is more than a central office, each protected area is ANAP. They seek to have a management plan for each protected area.

A strategic plan for 2019-2025 hasn't been validated yet. They want everyone involved in protected areas to have a role in the strategic plan.

ANAP has two action areas for protected areas:

- Protected area unit management
- Environmental surveillance of the protected areas

Their primary challenge is valorization of the protected areas. They would like to see tourism promoted, so the economic benefits gain public support.

Ideally, at each protected area, ANAP would like to have a park director, a person in charge of environmental protection, a person in charge of environmental education, and a person in charge of security. At this point, Foret des Pins, Macaya, Oyster Lagoon, and Three Bays have staff, but are not fully staffed. ANAP would like to have staff in each unit at Foret des Pins.

The goal for coverage by protected areas is 17% terrestrial and 10% marine protected areas. ANAP is working on adding 12 new protected areas to help meet that goal. Wynn Farm and Source Zabeth are among the areas that they would like to have officially designated. They are using the IUCN criteria to determine which locations should be protected areas. They are working with CNIGS, CIAT and many partners, which makes it a complex process.

The concept of co-management has resulted in some confusion. Since the 26 protected areas belong to the state government, they believe that in theory there can be no co-management. Co-management would mean sharing of responsibilities, so they see no avenue for this in the protected areas. However, organizations have activities in the protected areas, so they have Memoranda of Understanding with FoProBiM at Three Bays and Helvetas (and local community organizations) at Foret des (Mare Rouge). There is also a MOU with a Dominican Republic organization for Foret des Pins Unit I. Once a MOU is signed which clearly outlines roles, ANAP staff believe there should be no problem. A lack of clearly defined roles and an action plan has resulted in communication problems at Three Bays.

All on-site BSAP personnel are trained and respond to fires. Although they lack equipment, such as vehicles, they find a way to get the job done. They had fires in Foret des Pins Unit I, Unit II and Park La Visite this year. The fire season is generally March – June.

BSAP units are organized in small groups of 9, which are split into 2 teams – each with a squad leader. The groups vary their patrols in daytime and night in a specific area. When they respond to fires, they are unable to patrol, and there are not enough agents to cover the entire protected areas.

Macaya used to have 10 BSAP agents, now they have 100 with a 1 year contract (with intent to renew). These agents will be organized into 9 person groups.

Foret des Pins Unit I has 10 people to protect the park and biodiversity, and educate the public. They also have more than 50 who will volunteer.

Park La Visite only has two people. They tried to get local people to help and were able to control the fires with volunteer help.

Capacity Building: ANAP is in the process of recruiting people. They have some volunteers, but have budget issues making it difficult to pay qualified staff. Their normal structure for protected areas is:

- 1 director for the terrestrial portion of protected areas
- 1 director for the marine portion of protected areas
- 1 person in charge of environmental surveillance

They would like to have a new structure with staff responsible for:

- Technical research
- Environmental education
- Plant collection
- Environmental surveillance
- Monitoring and evaluation

The financial structure document has not yet been approved, but they are taking steps to get an executive order for the budget for next year. While they have no budget at this time, they are getting some disbursements to get them through the year. They are also working on getting an organic decree for ANAP, as the Ministry of Environment is also doing.

Recommendations:

- Help establish a unit for effective management of protected areas
- Help ensure there are agents for protection and surveillance
- Continue to plan for fires, especially at Macaya and La Visite
- Promote ecological follow-up and monitoring
- There is a need for and education and information campaign for protected areas
- Enable ANAP to meet international goals for 17% terrestrial and 10% marine coverage in protected areas

Appendix 2. Biodata Sketch of Team Members

Scott Posner, USDA Forest Service (retired), is a Forest Ecologist and certified Wildlife Biologist with more than 25 years of experience in the field, including four years working in North Africa. He has conducted 118/119 Biodiversity and Tropical Forest assessments for the USAID missions working in the African countries of Tunisia and Togo as well as Haiti. In 2009 he was a team member on a USDA Forest Service International Programs/USAID mission to the Democratic Republic of Congo in support of Community Fire Management and Restoration in the Congo Basin.

Joseph Ronald Toussaint, is an International Consultant, providing services in Africa (Tanzania, Rwanda) and the Caribbean. He has more than 20 years of experience, including 15 years of supervision, formulation and implementation with government and non-government organizations in environmental management plans, environmental impact assessment, institutional strengthening, monitoring and evaluation. He frequently serves as a representative of the Haitian Ministry of the Environment and he led the National Environmental Action Plan and the formulation of the Environmental Management Decree, two major legal and policy instruments that offer guidance on all aspects of environmental management in Haiti. Mr. Toussaint co-authored the 2006, 2010 and 2016 Haiti Country Analysis of Tropical Forestry and Biodiversity