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LIBERIA ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT (ETOA)

FINAL REPORT



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Cover Photo: +/- 100ha section of forest cleared for cassava production at the proposed Lake Piso National Park site.

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EXECUTIVE SUMMARY

USAID/Liberia is currently transitioning from emergency relief to development. The Mission's Office of Economic Growth, which encompasses natural resource management and biodiversity activities, is crafting a new strategy to reflect the changing times. Pressures on Liberia's forests, biodiversity, natural resources and ecosystems are increasing. At the same time there are growing opportunities for USAID to collaborate with other donors, non-governmental organizations (NGOs), government agencies that are acquiring new mandates and competencies, and the private sector. These factors led the Mission to decide that an Environmental Threats and Opportunities Assessment (ETOA) was warranted. An ETOA goes beyond, yet incorporates, a 118-119 analysis. An ETOA describes the range of environmental impacts from human activities across the spectrum of sectors: green (forests, agricultural systems), brown (urban, industrial systems) and blue (marine and freshwater systems).

The ETOA report is divided into three sections; a State of the Environment Report, Actions Necessary and Planned to Conserve Tropical Forests and Biodiversity (Tropical Forests and Biodiversity Report - Foreign Assistance Act Sections 118/119), and an Environmental Data Collection, Monitoring and Adaptive Management Plan.

The State of the Environment (SOE) Report identifies threats to terrestrial, coastal/marine and freshwater ecosystems and examines the potential effects of climate change on these ecosystems. It also assesses environmental and natural resource hazards and degradation in urban and rural areas. The SOE includes an analysis of policy and institutional issues impacting the environment, natural resources and ecosystems. Drawing on these assessments, the SOE identifies the underlying causes of environmental degradation and analyses approaches and interventions used by all institutions (e.g., NGOs, government, private sector) to address these causes and the results obtained, with particular emphasis on enabling conditions including the legal and regulatory environment. The SOE concludes with an analysis of opportunities and constraints associated with all environmental elements, recommendations for indicators of environmental damage/health and potential monitoring systems, and a brief analysis of key links between economic growth, health and governance activities and environmental threats and opportunities.

The Actions Necessary and Planned to Conserve Tropical Forests and Biodiversity Report was prepared to provide information and analysis required by the U.S. Congress, and stipulated in the U.S. Foreign Assistance Act (FAA) of 1961. Sections 118 and 119 of the FAA require USAID Missions to examine issues of tropical forests and biodiversity conservation when preparing strategies for development assistance.

The Environmental Data Collection, Monitoring and Adaptive Management Plan Report identifies environmental spatial data gaps, assesses the capacity of Liberian institutions to collect and manage data, analyses monitoring and adaptive management use of data and information by Government of Liberia, USAID and key partners, and provides recommendations for strengthening data collection and management.

PART 1: STATE OF THE ENVIRONMENT REPORT

THREATS TO FOREST ECOSYSTEMS

Liberia is situated in the fragmented band of forest known as the ‘Upper Guinean Forest’. It is one of the two most significant forest blocks in Africa, the other being the ‘Congolese Forest’. The Upper Guinean Forest extends from Guinea at the Northwestern extreme, down through Sierra Leone, Liberia, and the Ivory Coast and reaching Cameroon at its most Easterly extent. Liberia accounts for more than half of West Africa’s remaining Upper Guinean tropical forest, and in December 1999, The West African Conservation Priority-Setting Exercise for the Upper Guinean Ecosystem identified Liberia as the “heart of the hotspot”—critical to successful conservation in the region, and in need of immediate conservation action. Liberia accounts for more than half of West Africa’s remaining Upper Guinean tropical forest. The total Liberian land area is 9.59 million hectares, of which forests cover about 4.39 million hectares (ha) equivalent to 45 percent of the land area, including 2.42 million ha classified as closed dense forest, 1.02 million ha classified as open dense forest, and .95 million ha classified as agriculture degraded forest. Liberia’s forests provide a wide range of benefits to the Liberian people and the international community. Forest areas provide habitat for globally important biodiversity and maintain ecological services (such as oxygen production and soil stabilization), enable harvesting of non-timber forest products that many local people depend upon for daily subsistence, and provide a significant input to the national budget through commercial forestry development.

Threats to forest ecosystems include:

- **Degradation from Illegal and Quasi-Legal Logging.** Currently, illegal commercial logging no longer poses a threat to Liberia’s forests. However the Government of Liberia’s (GOL) domestic timber supply policy appears to be a contributor to forest degradation though poorly regulated chain sawing practices (known locally as “pitsawing”) via a permit system which leads to over cutting, lost revenues and potential corruption, including the illegal export of planks.
- **Shifting Cultivation.** The threat of deforestation posed by shifting cultivation is difficult to measure. Attention tends to focus on the clearing of forest lands (whether secondary or primary), and this is especially noticeable for upland rice cultivation, where fields tend to be large and cleared by multiple families or commercial interests, often with some capital investment. In this context, there seems to be a trend towards more “mechanized” slash and burn using chainsaws which may impact regeneration in the future as the larger trees which provide a seed source for regeneration are now being cut. Increases in world rice prices may drive also drive upland rice expansion in Liberia. In general, however, Liberia’s low population density combined with the fact that only 6% of Liberia’s land is devoted to agriculture, means that shifting cultivation does not represent a current threat to forests if the lands are subsequently fallowed. Rather, the threat is the overall degradation of forest over time, best measured from successive satellite images.
- **The Bushmeat Trade.** Liberia is unusual in the high importance of bush meat, and in the lack of alternative animal protein. Its economic value is enormous, rivaling pre-war timber revenues, and the industry is effectively unregulated at present. Because of the adverse impacts of hunting on protected species and because the harvest is generally assumed to be unsustainable at current levels, Liberia has a bush meat crisis, and could lose an important source of animal protein, rural and urban livelihoods, and some of its protected species if the industry continues to be poorly-regulated.

- **Mining.** The GOL expects industrial and artisanal mining activities to grow rapidly during the Poverty Reduction Strategy period, from near zero production in 2005/06 to 12 percent of GDP by 2010. Indeed the GOL is counting on such growth as a means of contributing significantly to employment, income generation and infrastructure development. There is a high degree of geographic overlap between mineral deposits and exploration permits and the protected area/forest reserve network. If exploitation occurs within these areas as expected, the potential to significantly affect biodiversity and forest cover should be considered very high. Forest destruction will be locally extensive and permanent. Other potential environmental impacts include: siltation of dams and rivers, ground and surface water pollution, and habitat fragmentation among others. The impact of over 100,000 artisanal miners operating in Liberia, including 6000 operating in Sapo National Park alone, may have individually insignificant effects on biodiversity and tropical forests but cumulatively significant effects.
- **Agro Industrial Crops.** Although the current threat to forests from agro-industrial plantation expansion is currently low, in the past, the conversion of huge areas of Liberia’s forests into monocultures of rubber and oil palm accounted for the vast majority of forest loss. As tree crops are an important component of the Liberian economy, accounting for 22 percent of the GDP in 2005, with rubber alone employing 18,500 workers and accounting for 90 percent of total exports, there may be economic pressure to expand the area under tree crops, particularly given Government’s interest in biofuel (oil palm) production.
- **Alien invasive Species.** Alien invasive species such as *Acacia spp.* and *Chromoleana odorata* are out competing natural forest regeneration in some areas.

THREATS TO COASTAL ECOSYSTEMS

Liberia has a coastline 565 km long and claims an economic zone of 13 nautical miles and a territorial zone of two hundred (200) nautical miles. About 90% of the coastline consists of a narrow sand beach 20-25 meters wide, reaching 60-80 meters in some parts of southeastern Liberia, interspersed with lagoons, estuaries, bays and brackish wetlands. The coastal area consists of swamp-related vegetation, including mangroves forests and reeds that extend up to 25 miles inland.

Nearly 58% of Liberia’s population lives within 40 miles of the coast, which puts extensive pressure on this ecosystem for food, land mineral and other resources. Threats include:

- **Over-Exploitation of Demersal Fish Species.** Although there have been no recent surveys to take stock of existing biomass, the Bureau of National Fisheries (BNF) believes that the demersal species are under threat from rampant pirate fishing that lacks any monitoring, control and surveillance systems. BNF conservatively estimates that there may be upwards of 250 “pirate” boats operating in Liberian waters, the majority of which are using illegal fishing techniques and operating within the three mile limit reserved for artisanal fisheries, and competing for the same demersal species. BNF reports that there may be an additional 8000 unlicensed foreign artisanal boats operating in Liberian waters, some of which are using undersize nets and more recently dynamite. BNF estimates that Liberia loses approximately \$10-12 million through illegal fishing each year.
- **Over-Exploitation of Other Species.** There are no research facilities to study the dynamics of the ecological factor affecting the fisheries environment- the productivity of ecosystem, pollution levels and nutrient load, species diversity of the various fish communities and harvesting pattern of commercial species. With regard to sea turtles, there are reports that they are hunted secretly for food

throughout Liberia. Their eggs are also collected by humans and destroyed by dogs and pigs on the beaches.

- **Beach Sand Mining Beach Erosion.** Unregulated beach sand mining is one of the most serious threats to the coastline and marine environment in the country. Sand mining changes in the balance of littoral sand transport, blocking the natural sand drift. The sand pits cause a slight embayment of the shoreline due to localized recession. The embayment serves as a void, which must be filled before the sand moves along the coast. Sand is trapped by the recessions, reducing its westward flow. Sand “downstream” from the flow is not replaced thus exacerbating shoreline erosion. In some areas, beaches are being lost at an estimated rate of 3 meters/year with concurrent property destruction.
- **Mangrove Loss.** The biggest threat to Liberia’s mangroves is urban expansion and accompanying landfills, particularly in Monrovia. This expansion began during the civil conflict when many displaced people – having very limited land space to carry out business activities – established landfills in Mesurado and Marshall Mangrove wetlands, causing large areas of mangroves to be destroyed (and to be used as dumps or for sewage disposal). The process continues today; Liberia’s burgeoning post conflict economy and increased population have overwhelmed the original planned land area for Monrovia and other beach cities; originally made to accommodate 350,000 persons, Monrovia’s now has a population of over 1 million.

THREATS TO FRESHWATER ECOSYSTEMS

There are six major rivers in Liberia. These flow from mountains in the north and empty into the Atlantic Ocean. Most of the rivers are navigable up to 20 miles from the coast, except for Cavalla, which is navigable up to 50 miles. Together, these basins drain approximately 65% of the country. The Mano and Cavalla are shared basins between Sierra Leone and Côte d’Ivoire respectively, while the Lofa, Saint John and Saint Paul drain part of Guinea. Numerous micro watersheds or sub-watersheds also exist.

- **Potential Threats to Inland Fisheries—Over Fishing.** The value and production of inland fisheries is not known but it is an important seasonal subsistence activity. BNF estimates that there are an estimated 8000 boats on Liberia’s inland river system with only about 200 registered. According to BNF, there is little control over net mesh size and there is wide use of organic and chemical pesticides, and dynamite. BNF has little capacity to monitor inland fisheries.
- **Wetlands.** There are approximately 600,000 ha of freshwater swampland in Liberia with only about 3% (20,000) ha under cultivation. Although there appears to be very few threats to Liberia’s freshwater wetlands, very little is known about the value of freshwater wetlands, from their role in providing medicinal plants and other products, to their role in providing ecosystems services such as water quality enhancement, flood control, and provision of habitat.
- **Water Hyacinth.** Water hyacinth occurs in several waterways but there is no data on its extent and/or its impact on the ecosystem.

IMPACT OF CLIMATE CHANGE

While there is a substantial lack of data concerning climate change and its implications for Liberia’s ecosystems, current models suggest that agriculture crops grown in the tropics, exhibit immediate yield decline with even the slightest warming, and that there will more than likely be a subsequent increase in crop pests and diseases. In terms of forest ecosystems, all climate change models project that even in extreme scenarios, direct deforestation will impact tropical forests before climate-driven dieback.

Although there has been little research on the possible impact of climate change on biodiversity, most specialists agree that as with tropical forests, loss of habitat through anthropogenic factors will impact biodiversity long before any possible impact from climate change. The exception to this would be for migratory animals. Rising sea levels linked to global warming would more than likely pose the biggest threat. A one meter rise could result in the loss of about 95 km² of land in the coastal zone to inundation, the destruction of the majority of mangroves and have a significant effect on fisheries through changes in hydrology and aquatic ecology.

URBAN AND RURAL ENVIRONMENTAL HAZARDS

During the years of conflict, Liberia's infrastructure was nearly completely destroyed and public services ceased to operate, including piped water, drainage, wastewater and solid waste management systems. As a result, residents in urban areas are exposed to contaminated drinking water and untreated wastes. During the rainy season, the lack of adequate drainage also results in ponds of stagnant water in urban areas. These conditions contribute to two of the primary causes of mortality and morbidity in Liberia, malaria and diarrhea.

ENVIRONMENTAL POLICIES AND LEGAL FRAMEWORK

Liberia has a number of existing or draft policies and several international commitments which impact environment, natural resources and ecosystems management and conservation. In general terms these policies and legislation—with the exception of land tenure—are more than sufficient to provide the enabling environment for the management of Liberia's environment and natural resources. In specific terms, particularly with regard to implementation, the ETOA Team finds that the policy and legislative framework for managing and conserving natural resources in Liberia is overly comprehensive, complicated and detailed to facilitate implementation. In addition for the need to simplify policies and legislation, other policy issues include:

- **Land Tenure.** As land tenure conflicts are escalating, Government needs to speed up the establishment of the National Land Commission to resolve land tenure issues.
- **Bushmeat Policy and Legislation.** The modalities of wildlife protection in the various categories of reserved and unreserved production forest are not addressed in the 2006 Forestry Act, and fall under the pending wildlife conservation and protection law. Similarly, the protection and exploitation of wildlife by communities and hunters groups is not addressed, and falls under the pending community forestry law.
- **Compensation for Communities Living Around Protected Areas.** The Forest Act provides a system for community compensation in timber concession areas. Communities that live around strictly protected areas, however, receive no compensation for the loss of rights to forest products but are expected to make up the difference through GOL and donor supported alternative livelihood programs. Current alternative livelihood programs fall short in deterring illegal activities and the law does not provide for compensating these communities at least as highly as timber concession communities.
- **Outstanding Commercial Forestry Issues,** such as permitting processes for potentially competing land uses and discrepancies in undertaking commercial forestry operations on private or deeded land need to be addressed.
- **Carbon Financing.** The Government has not adopted a formal policy on the role that Liberia's forests could or should play in accessing potential funding under various carbon financing mechanisms.

- **The 2003 Environment Protection and Management Law (EPML).** While this law contains many significant provisions that could be used to protect the environment, its lack of implementing regulations means that these provisions remain largely inoperative. Particular areas to address include procedures for conducting Environmental Impact Assessments, the establishment of protected areas (including non-forest ecosystems), and implementation of the provisions governing public participation and access to information.

INSTITUTIONAL ISSUES AFFECTING ENVIRONMENTAL STATUS

Liberia has a number of independent agencies, ministries and related organizations as well as domestic and international NGOs whose mandates touch on environmental concerns. The most important of these are Environmental Protection Agency (EPA), the Forestry Development Authority (FDA), the Bureau of National Fisheries, the Liberia Institute of Statistics and Geo-Information Services (LISGIS), and the University of Liberia's College of Agriculture and Forestry. The activities of Liberia's government institutions are constrained by a number of factors, ranging from inadequately trained personnel and lack of basic infrastructure to lack of coordination and cohesion. Particular issues with respect to the capacity of Liberia's government institutions to manage and protect the environment include:

- **Dependence on Foreign Expertise and Resources.** Issues include: i) risk that dependence on foreign expertise and resources, absent substantial investment in local capacity, may breed resentment; ii) limited capacity of some government institutions restricts them from being able to act outside the areas of interest to their international partners; and (iii) new concepts are often outside of agency strategic plans and when taken together they place extraordinary demands on agency technical staff.
- **Infrastructure and Administration.** Liberia's long running civil war decimated much of the country's infrastructure, including government facilities, and severely disrupted many government functions. In the aftermath of the conflict, the country's ministries face severe shortages with respect to office space, equipment, and supplies. The lack of reliable electricity means that for at least part of the working day the staff in government institutions cannot use any electronic equipment.
- **Human Resources.** Lack of qualified staff is a problem in all of the institutions involved in environmental management in Liberia. Of the staff that is in the institutions, many lack training and qualifications necessary for doing their jobs. Moreover, there has been no recent strategic assessment of capacity gaps within the lead environmental agencies to specifically identify what type of capacity building needs to take place and where it should be done.
- **Information and Data Collection.** Liberian government institutions are also facing shortages of scientific information pertaining to environmental management. Availability of tabular and spatial environmental data has been compromised as a result of the civil war. Data that does exist is typically in an analog or paper format which limits external investigator access.
- **Law Enforcement.** Although the EPA Act and the EPM Law authorize the creation of many regulations, rules, standards and guidelines, and provide for penalties for violation, EPA has not officially promulgated any of these regulations, rules, standards and guidelines, so enforcement is not possible. The absence of a law enforcement division within the FDA also appears to hamper enforcement efforts.
- **Overlapping Mandates.** Although there are many examples of overlapping institutional mandates, the situation between EPA and FDA is perhaps the most relevant. The Environment Protection and

Management Law contain some provisions that appear to be in conflict with the Forestry Law, which gives FDA primary authority for management of forests and protected areas.

- **Coordination across Government Institutions.** Competing land uses being considered by different government agencies for land proposed as protected areas, and the absence of a common land use policy between the Forestry Development Authority, the Ministry of Lands Mines and Energy and the Ministry of Agriculture is posing serious problems in promoting improved environmental management.
- **Coordination between NGOs and Government.** Several agencies noted that although the Ministry of Planning issues certificates of accreditation to qualifying NGOs, these NGOs fail to cooperate with the line agencies after they receive their accreditation, including restricted access to these groups' reports or recommendations.
- **Donor Coordination.** Improved donor coordination in the environment/natural resource sector is becoming increasingly important in Liberia in light of the increased volume of aid, proliferation of projects, and the administrative weaknesses of the GOL noted above. The absence of an environment/natural resource project database hinders collaboration.
- **FDA Internal Collaboration.** Whether a result of the policy or a result of management, the three C's at FDA—commercial, conservation and community - have essentially been compartmentalized, with little collaboration between departments. In the field, however, the lines between the responsibilities of these departments become rather blurred.
- **Financial Support.** Government institutions currently receive their core funding from a range of sources, including the Government of Liberia itself, bilateral and multi lateral donors – mainly “projectized,” and certification fees from local NGOs. Revenue for some forest management activities is also generated through the imposition of stumpage, land rental, and Forest Product fees (Section 14.2(b)), a portion of which is allocated for operational costs of the Protected Forest Areas Network. Although GOL contributions should increase as logging, mining and other concessions are granted, it is unclear whether FDA and EPA core budgets will increase proportionally relative to their mandates, and there are currently no alternative finance mechanisms that would help fill Government budgetary shortfalls in the environment sector.

UNDERLYING CAUSES OF ENVIRONMENTAL DEGRADATION

Drawing on the threats, policy and institutional analyses, nine key underlying causes to environmental degradation were identified including:

- **Lack of Alternative Financing.** The lack of direct financial support is a major cause of most of the institutional limitations identified, and a major underlying cause of threats to the environment. Although GOL contributions are expected to increase as logging and other concessions come on line, the absence of alternative funding sources—particularly for the implementation of field activities—will curtail the ability of Liberian government agencies to implement their mandates with respect to environmental and natural resource protection and management over the longer term.
- **Lack of Capacity.** Practically everyone interviewed by the ETOA Team—expatriate and Liberian alike—cited lack of capacity as the major underlying cause of environmental degradation. Yet there are very few donor activities that incorporate a formal capacity building component; most provide only some combination of on the job training and study visits.

- **Weak Law Enforcement.** One of the key challenges facing environmental protection and management is the lack of enforcement of the existing laws. There are several reasons for this. First, Liberia’s civil conflict, and the resulting shortages in staffing, supplies, and equipment have limited the ability of most GOL agencies to actively implement law enforcement operations. Second, given the post conflict situation and new mandates, there seems to be a certain hesitancy among environmental agencies to enforce laws given current socio-political and economic interests and concerns. In addition to these issues, there are three major contributing factors to the weak law enforcement problem: i) policies and Legislation are far removed from the realities that they are trying to influence; ii) low community awareness of policies and legislation; and iii) the absence of a law enforcement division within the FDA.
- **Lack of a Holistic Approach to Environment/Natural Resource Management.** There is little appreciation of the economic value of non-timber forest products (NTFP) (including bushmeat)—either by the communities or by the FDA. In most instances, FDA focuses on curtailing negative practices with regard to hunting and the bush meat trade rather than on positive economic ventures that could be properly regulated. In general, forest communities view commercial logging as the sole indicator of economic value or activity in the forest sector and feel that to derive economic benefit from the sector they need to be involved in commercial logging.
- **Barriers to Alternative Livelihoods.** Although there are few alternative livelihood programs in Liberia, the ones that do exist have had very limited success; the livelihood options presented to communities by these program cannot compete with incomes gained from illegal logging, the bushmeat trade or diamond and gold mining in the parks and forest reserves. A major part of the reason for this is that the livelihoods offered are not based on any value chain analysis.
- **Insecure Land and Resource Tenure.** Poverty, land, and the environment are inextricably linked. Unequal access to and ownership of land and other resources have contributed significantly to economic and political inequities and environmental degradation throughout Liberia’s history, and have exacerbated tensions and conflict. The existing systems of land acquisition favor the wealthy and the elite. Women in particular have had limited land and resource rights.
- **Absence of a Strategy to Address the Compromises between Environment and Economic Development.** Although Liberia’s Poverty Reduction Strategy (PRS), addresses environmental concerns the “exploitation of Liberia’s abundant natural resources” is the major driver of poverty alleviation. Without a strategy that specifically addresses tradeoffs between the environment and economic development, there is concern that economic development—in the form of mining and agro-industrial concessions will continue to take precedence over the environment as they have done in the past.
- **Absence of Any Land Use Planning.** In Liberia, urban land-use planning and zoning regulations at the national or county level are virtually non-existent, and the PRS only makes passing reference to both urban and rural planning. As a result, landfills for human habitat have destroyed hundreds of hectares of mangroves, while increased beach erosion due to unregulated and unplanned beach mining is destroying both animal and human habitat. At the rural level, there are numerous conflicting land use issues—agro-industrial plantations, mining concessions, absence of information on deeded lands, tribal lands, and any other preexisting land encumbrances, locations of mineral deposits and occurrences, and relevance of boundaries for parks, national forests and concessions. Without any national level land use

plan to guide resolution of these conflicts, sustainable economic development in Liberia could be hampered.

APPROACHES AND INTERVENTIONS

Given that Liberia's civil conflict ended in 2003, the country does not have a long track record of approaches and interventions in environment and natural resource management. As many of these programs are now transitioning from post conflict to development, there are certain interventions that are worth noting, particularly in the context of future programming.

- **Donor-government coalitions—the Liberia Forest Initiative.** LFI has been instrumental in developing Liberia's forestry sector and has had many notable accomplishments, the most important of which was the work leading to the lifting of U.N. Security Council timber sanctions on June 20, 2006. This model could be replicated to address the bushmeat trade.
- **Small Grants Funds for Biodiversity.** Conservation International's Liberia Conservation Action Fund (LCAF) enabled Liberian NGOs to apply for grants, the implementation of which not only helped build their capacity to address the most pressing threats to the country's biodiversity, but laid the groundwork for more development oriented conservation programs in the future.
- **Farmer Field Schools.** Farmer Field Schools (FFS), when operating in the buffer zones of protected areas and focusing on the value chains of high value agricultural commodities have the potential for providing significant alternative incomes to communities living in these buffer zones.
- **Save My Future Foundation's (SAMFU) Marine Sea Turtle Program.** SAMFU claims to have stopped the hunting of sea turtles in two communities near the mouth of the Cess River. Apparently, they made a deal with the communities, so that SAMFU/USFWS would provide fishing nets and outboard motors to the fishermen, in exchange for beach protection. If true, this would be a big breakthrough for beach conservation in Liberia, since sea turtles are in serious trouble throughout their breeding ranges. This would be an important approach to replicate at Lake Piso and other coastal sites.
- **Mediation in Protected Area Boundary Demarcation.** The Land Rights and Community Forestry's Program's (LRCFP) participatory approach of serving as a mediator between FDA and communities in boundary demarcation could prove to be a successful model that could be applied to other protected areas.

ENVIRONMENTAL INDICATORS AND MONITORING

A series of environmental indicators—based on pressure, state (or condition) and response - are proposed for land, biodiversity, water and air. The design and setting up of a national environmental monitoring system for these indicators will demand considerable time, effort, and resource investment given the absence of baselines, laboratories and field facilities. In the short term, the assessment team suggests that EPA consider: i) establishing the data storage and management system into which it can input the data it should start receiving from projects and activities (and eventually data from an ambient monitoring program); ii) Establishing its own laboratory and the certification program for private laboratories; and iii) working with FDA to use GIS and periodically updated satellite imagery to monitor core land use indicators.

KEY LINKS BETWEEN ECONOMIC GROWTH, HEALTH AND GOVERNANCE ACTIVITIES AND THE ENVIRONMENT

This section examines how economic growth, health and governance activities and environmental threats and opportunities can work synergistically to provide for sustainable economic growth and a healthy environment. Programs such as alternative protein, shade grown coffee and cocoa, democracy and governance and non-timber forest products can reduce threats, provide viable alternative incomes, increase household well being as well as provide for the active participation of women.